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**Report on the Actuarial Valuation of the
Public Employees' Retirement Association
of Colorado**

Prepared as of December 31, 2016





Cavanaugh Macdonald

CONSULTING, LLC

The experience and dedication you deserve

June 8, 2017

The Board of Trustees
Public Employees' Retirement Association of Colorado
1301 Pennsylvania Street
Denver, CO 80203-2386

Dear Trustees:

We are pleased to submit the results of the annual actuarial valuation of the Public Employees' Retirement Association of Colorado (PERA), prepared as of December 31, 2016.

The purpose of this report is to provide a summary of the funded status of PERA as of December 31, 2016, to calculate actuarially determined contribution rates based on the Board's Funding Policy, to evaluate the sufficiency of the current statutory contribution rates, and to provide accounting information under Governmental Accounting Standards Board Statements No. 43 and No. 45 (GASB 43 and 45). While not verifying the data at the source, the actuary performed tests for consistency and reasonability.

The results of the valuation indicate that the current combined employer and member contribution rates are sufficient to fund the normal cost for all members and provide additional contributions to help finance each division's Annual Increase Reserve (AIR) Fund and both the PERA Health Care Trust Fund (PERA HCTF) and the DPS Health Care Trust Fund (DPS HCTF) within reasonable amortization periods. However, based on a snapshot measurement that assumes no change in either the normal cost rate or the Unfunded Actuarial Accrued Liability (UAAL) contribution rate, the current contributions are not sufficient to fund the each division's UAAL within reasonable amortization periods. The resulting amortization periods for each division as of December 31, 2016, with and without recognition of future increases to the Amortization Equalization Disbursement (AED) and the Supplemental Amortization Equalization Disbursement (SAED), are shown in the following table:

	Amortization Period with Current AED & SAED	Amortization Period with Future AED & SAED
State Division	65 years	65 years
School Division	128 years	128 years
Local Government Division	42 years	42 years
Judicial Division	Infinite	Infinite
Denver Public Schools (DPS) Division	Infinite	Infinite
PERA Health Care Trust Fund (PERA HCTF)	37 years	37 years
DPS Health Care Trust Fund (DPS HCTF)	13 years	13 years

3550 Busbee Pkwy, Suite 250, Kennesaw, GA 30144

Phone (678) 388-1700 • Fax (678) 388-1730

www.CavMacConsulting.com

Offices in Englewood, CO • Kennesaw, GA • Bellevue, NE



However, members who began membership after December 31, 2006 are covered by a different benefit structure with a lower normal cost rate, so, as members who began membership prior to January 1, 2007 leave covered employment and are replaced by members in the lower cost benefit structure, the total normal cost rate is expected to decline. As a result, the portion of the total statutory contribution rate available to pay off the UAAL is expected to increase each year in the future until all active members in the valuation are covered by the provisions in the most recent benefit tier. While this is expected to improve the System's financial health in future years, it is impossible to anticipate the long-term funding progress without performing an open group projection of future valuation results. Such projections are performed to assist the Board in evaluating the long-term funding of each division, but the projections are completed after the valuation report is issued.

The employer contribution rate, combined with anticipated future employee growth and service purchase transfers, is sufficient to eventually finance the PERA HCTF's and DPS HCTF's benefits in accordance with GASB 43 and 45.

The December 31, 2016 valuation results for the Judicial Division reflect the funding changes made to the Judicial Division resulting from HB 17-1265, the Judicial (AED and SAED restart) Funding Bill, that was signed into law on May 25, 2017. In 2010, the Judicial Division Amortization Equalization Disbursement (AED) was capped at 2.2% and the Supplemental Amortization Equalization Disbursement (SAED) was capped at 1.5%. With the enactment of HB 17-1265, both the AED and SAED are to increase to 3.4% in 2019 and increase each subsequent year by 0.4% until both the AED and SAED reach 5.0% in 2023.

The December 31, 2016 valuation results for the DPS Division are based upon the current, statutory levels of funding. Colorado statutes call for a "true-up" in 2020, and every five years following, with the expressed purpose of adjusting the total DPS contribution rate to ensure equalization of the ratio of unfunded actuarial accrued liability over payroll between the DPS and School Divisions at the end of the 30-year period beginning January 1, 2010. As such, future levels of funding for the DPS Division may differ from those assumed.

The promised benefits of PERA are included in the actuarially determined contribution rates which are developed using the entry age normal cost method. Four-year smoothed market value of assets is used for actuarial valuation purposes. In accordance with the Funding Policy adopted by the Board of Trustees for pension benefits, the UAAL is being amortized by regular annual contributions as a level percentage of payroll within a closed 30 year period for the legacy UAAL as of December 31, 2014, and gains and losses in subsequent years are amortized within a closed 30 year period, on the assumption that payroll will increase by 3.50% annually and each amortization period will decrease by one each year until reaching 0 years. Please see Schedule D of this report for the amortization payment schedule of the legacy UAAL and all subsequent gains and losses. We believe the assumptions are reasonably related to the actual experience and to expectations of anticipated experience under the Fund and meet the parameters for the disclosures under GASB 43 and 45.

Since the previous valuation, the set of economic assumptions and various demographic assumptions have been revised as a result of review by the Board in November, 2016 based on analysis by the actuary as well as other experts. The economic assumption changes are as follows:

Assumption	Before Change	After Change
Investment Rate of Return	7.50%	7.25%
Price Inflation	2.80%	2.40%
Wage Inflation	3.90%	3.50%



June 8, 2017
Board of Trustees
Page 3

We have prepared the Schedule of Funding Progress and Trend Information shown in the Comprehensive Annual Financial Report, and all supporting schedules, including the Schedule of Active Member Data, the Solvency Test and the Analysis of Financial Experience. All Denver Public School Retirement System (DPSRS) historical information that references a valuation date prior to December 31, 2010 was prepared by DPSRS' actuarial firm.

This is to certify that the independent consulting actuary is a member of the American Academy of Actuaries and has experience in performing valuations for public pension plans, that the valuation was prepared in accordance with principles of practice prescribed by the Actuarial Standards Board, and that the actuarial calculations were performed by qualified actuaries in accordance with accepted actuarial procedures, based on the current provisions of the Plan and on actuarial assumptions that are internally consistent and reasonably based on the actual experience of the Plan.

Future actuarial results may differ significantly from the current results 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; 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. Since the potential impact of such factors is outside the scope of a normal annual actuarial valuation, an analysis of the range of results is not presented herein.

The actuarial computations presented in this report are for purposes of determining the recommended funding amounts for the pension divisions and HCTFs. Use of these computations for purposes other than meeting these requirements may not be appropriate.

The Table of Contents, which immediately follows, outlines the material contained in the report.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read 'Edward Macdonald'.

Edward A. Macdonald, ASA, FCA, MAAA
President

A handwritten signature in blue ink, appearing to read 'Patrice Beckham'.

Patrice A. Beckham, FSA, FCA, EA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink, appearing to read 'Edward J. Koebel'.

Edward J. Koebel, FCA, EA, MAAA
Principal and Consulting Actuary

A handwritten signature in blue ink, appearing to read 'Eric H. Gary'.

Eric H. Gary, FSA, FCA, MAAA
Principal and Chief Health Actuary



Table of Contents

<u>Section</u>	<u>Item</u>	<u>Page No.</u>
I	Summary of Principal Results	1
II	Membership Data	12
III	Assets	14
IV	Comments on the Valuation	16
V	Contributions Payable by Employers	28
VI	Accounting and Historical Funding Information	31
VII	Derivation of Experience Gains and Losses	40
VIII	Additional Information for Health Care Trust Funds	46
<u>Schedule</u>		
A	Valuation Balance Sheet and Solvency Test	47
B	Development of the Actuarial Value of Assets	56
C	Summary of Changes in Net Assets	63
D	UAAL Amortization Schedules	70
E	Outline of Actuarial Assumptions and Methods	77
F	Actuarial Cost Method	102
G	Summary of Main Plan Provisions as Interpreted For Valuation Purposes	103
H	Schedules of Member Data	125
I	Colorado PERA Defined Benefit Pension Plan Funding Policy	132



Section I – Summary of Principal Results

**REPORT ON THE ACTUARIAL VALUATION OF
THE PUBLIC EMPLOYEES' RETIREMENT ASSOCIATION OF COLORADO
PREPARED AS OF DECEMBER 31, 2016**

1. For convenience of reference, the principal results of the valuation and a comparison with the preceding year's results for State Division, School Division, Local Government Division, Judicial Division, Denver Public Schools (DPS) Division, the PERA Health Care Trust Fund and the DPS Health Care Trust Fund are summarized below:

**SUMMARY OF PRINCIPAL RESULTS FOR STATE DIVISION
(\$ IN THOUSANDS)**

VALUATION DATE	12/31/2016	12/31/2015
Number of Active Members		
Non-Troopers	54,889	54,450
Troopers	<u>836</u>	<u>841</u>
Total	55,725	55,291
Annual Reported Payroll		
Non-Troopers	\$ 2,637,890	\$ 2,572,580
Troopers	<u>72,761</u>	<u>69,287</u>
Total	\$ 2,710,651	\$ 2,641,867
Number of Retired Members and Survivors	38,140	36,992
Annual Retirement Benefits	\$ 1,518,223	\$ 1,435,634
Total Assets:		
Actuarial Value	\$ 14,026,332	\$ 13,882,820
Market Value	\$ 13,538,772	\$ 13,391,398
Actuarial Accrued Liability	\$ 25,669,916	\$ 24,085,671
Unfunded Actuarial Accrued Liability (UAAL)	\$ 11,643,584	\$ 10,202,851
Actuarial Value Funded Ratio	54.6%	57.6%
CONTRIBUTIONS FOR YEAR ENDING	12/31/2018	12/31/2017
Employer Contribution Rate:		
Total Normal Cost Rate	10.87%	10.93%
Less Member Contribution Rate	<u>(8.05)%</u>	<u>(8.05)%</u>
Employer Normal Cost Rate	2.82%	2.88%
UAAL Contribution Rate	<u>23.48%</u>	<u>19.83%</u>
Actuarially Determined Contribution	26.30%	22.71%
Reduction for AED and SAED	<u>(10.00)%</u>	<u>(10.00)%</u>
Total Employer Contribution Rate	16.30%	12.71%
Equivalent Single Amortization Period*	27 years	29 years

*The equivalent single amortization period for the State Division reflects an adjustment for the impact of AED and SAED contributions received from employers on the estimated pensionable payroll of employees electing to participate in the defined contribution plan.



Section I – Summary of Principal Results (continued)

**SUMMARY OF PRINCIPAL RESULTS FOR SCHOOL DIVISION
(\$ IN THOUSANDS)**

VALUATION DATE	12/31/2016	12/31/2015
Number of Active Members	121,945	120,239
Annual Reported Payroll	\$ 4,349,320	\$ 4,235,290
Number of Retired Members and Survivors	62,102	60,109
Annual Retirement Benefits	\$ 2,284,090	\$ 2,163,980
Assets:		
Actuarial Value	\$ 23,263,344	\$ 22,871,661
Market Value	\$ 22,465,388	\$ 22,062,124
Actuarial Accrued Liability	\$ 41,352,968	\$ 37,677,153
Unfunded Actuarial Accrued Liability (UAAL)	\$ 18,089,624	\$ 14,805,492
Actuarial Value Funded Ratio	56.3%	60.7%
CONTRIBUTIONS FOR YEAR ENDING	12/31/2018	12/31/2017
Employer Contribution Rate:		
Total Normal Cost Rate	12.22%	12.20%
Less Employee Contribution Rate	<u>(8.00)%</u>	<u>(8.00)%</u>
Employer Normal Cost Rate	4.22%	4.20%
UAAL Contribution Rate	<u>22.58%</u>	<u>18.34%</u>
Actuarially Determined Contribution	26.80%	22.54%
Reduction for AED and SAED	<u>(10.00)%</u>	<u>(9.96)%</u>
Total Employer Contribution Rate	16.80%	12.58%
Equivalent Single Amortization Period	28 years	29 years



Section I – Summary of Principal Results (continued)

**SUMMARY OF PRINCIPAL RESULTS FOR LOCAL GOVERNMENT DIVISION
(\$ IN THOUSANDS)**

VALUATION DATE	12/31/2016	12/31/2015
Number of Active Members	12,736	12,176
Annual Reported Payroll	\$ 608,223	\$ 561,518
Number of Retired Members and Survivors	7,065	6,777
Annual Retirement Benefits	\$ 264,510	\$ 248,588
Assets:		
Actuarial Value	\$ 3,879,197	\$ 3,777,161
Market Value	\$ 3,748,369	\$ 3,639,914
Actuarial Accrued Liability	\$ 5,213,052	\$ 4,780,698
Unfunded Actuarial Accrued Liability (UAAL)	\$ 1,333,855	\$ 1,003,537
Actuarial Value Funded Ratio	74.4%	79.0%
CONTRIBUTIONS FOR YEAR ENDING	12/31/2018	12/31/2017
Employer Contribution Rate:		
Total Normal Cost Rate	10.36%	10.51%
Less Employee Contribution Rate	<u>(8.00)%</u>	<u>(8.00)%</u>
Employer Normal Cost Rate	2.36%	2.51%
UAAL Contribution Rate	<u>11.91%</u>	<u>9.41%</u>
Actuarially Determined Contribution	14.27%	11.92%
Reduction for AED and SAED	<u>(3.70)%</u>	<u>(3.70)%</u>
Total Employer Contribution Rate	10.57%	8.22%
Equivalent Single Amortization Period	28 years	29 years



Section I – Summary of Principal Results (continued)

**SUMMARY OF PRINCIPAL RESULTS FOR JUDICIAL DIVISION
(\$ IN THOUSANDS)**

VALUATION DATE	12/31/2016	12/31/2015
Number of Active Members	335	334
Annual Reported Payroll	\$ 48,700	\$ 46,870
Number of Retired Members and Survivors	361	345
Annual Retirement Benefits	\$ 23,926	\$ 21,586
Assets:		
Actuarial Value	\$ 297,888	\$ 286,891
Market Value	\$ 287,888	\$ 276,563
Actuarial Accrued Liability	\$ 447,117	\$ 401,966
Unfunded Actuarial Accrued Liability (UAAL)	\$ 149,229	\$ 115,075
Actuarial Value Funded Ratio	66.6%	71.4%
CONTRIBUTIONS FOR YEAR ENDING	12/31/2018	12/31/2017
Employer Contribution Rate:		
Total Normal Cost Rate	18.50%	17.55%
Less Employee Contribution Rate	<u>(8.00)%</u>	<u>(8.00)%</u>
Employer Normal Cost Rate	10.50%	9.55%
UAAL Contribution Rate	<u>16.76%</u>	<u>12.99%</u>
Actuarially Determined Contribution	27.26%	22.54%
Reduction for AED and SAED	<u>(8.77)%</u>	<u>(3.70)%</u>
Total Employer Contribution Rate	18.49%	18.84%
Equivalent Single Amortization Period	28 years	29 years



Section I – Summary of Principal Results (continued)

**SUMMARY OF PRINCIPAL RESULTS FOR DENVER PUBLIC SCHOOLS DIVISION
(\$ IN THOUSANDS)**

VALUATION DATE	12/31/2016	12/31/2015
Number of Active Members		
DPS Benefit Structure	3,586	4,037
PERA Benefit Structure	<u>12,364</u>	<u>11,892</u>
Total	15,950	15,929
Annual Reported Payroll		
DPS Benefit Structure	\$ 220,511	\$ 237,724
PERA Benefit Structure	<u>421,666</u>	<u>383,391</u>
Total	\$ 642,177	\$ 621,115
Number of Retired Members and Survivors	6,941	6,812
Annual Retirement Benefits	\$ 269,039	\$ 257,832
Assets:		
Actuarial Value	\$ 3,220,935	\$ 3,207,327
Market Value	\$ 3,108,233	\$ 3,094,339
Actuarial Accrued Liability	\$ 4,246,430	\$ 3,905,240
Unfunded Actuarial Accrued Liability (UAAL)	\$ 1,025,495	\$ 697,913
Actuarial Value Funded Ratio	75.9%	82.1%
CONTRIBUTIONS FOR YEAR ENDING	12/31/2018	12/31/2017
Employer Contribution Rate:		
Total Normal Cost Rate	12.89%	12.40%
Less Employee Contribution Rate	<u>(8.00)%</u>	<u>(8.00)%</u>
Employer Normal Cost Rate	4.89%	4.40%
UAAL Contribution Rate	<u>8.61%</u>	<u>5.88%</u>
Actuarially Determined Contribution	13.50%	10.28%
Reduction for AED and SAED	<u>(10.00)%</u>	<u>(9.96)%</u>
Total Employer Contribution Rate	3.50%	0.32%
Equivalent Single Amortization Period	28 years	29 years



Section I – Summary of Principal Results (continued)

**SUMMARY OF PRINCIPAL RESULTS FOR PERA HEALTH CARE TRUST FUND
(\$ IN THOUSANDS)**

VALUATION DATE	12/31/2016	12/31/2015
Number of Active Members	190,741	188,040
Annual Reported Payroll	\$ 7,716,894	\$ 7,485,545
Number of Retired Members and Survivors	55,789	55,092
Assets:		
Actuarial Value	\$ 270,150	\$ 285,588
Market Value	\$ 260,228	\$ 276,505
Actuarial Accrued Liability	\$1,556,762	\$1,556,269
Unfunded Actuarial Accrued Liability (UAAL)	\$1,286,612	\$1,270,681
Actuarial Value Funded Ratio	17.4%	18.4%
CONTRIBUTIONS FOR YEAR ENDING	12/31/2018	12/31/2017
Employer Contribution Rate:		
Normal Cost Rate	0.24%	0.21%
UAAL Contribution Rate	<u>0.88%</u>	<u>0.87%</u>
Annual Required Contribution (ARC)	1.12%	1.08%
Amortization Period	30 years	30 years



Section I – Summary of Principal Results (continued)

**SUMMARY OF PRINCIPAL RESULTS FOR DPS HEALTH CARE TRUST FUND
(\$ IN THOUSANDS)**

VALUATION DATE	12/31/2016	12/31/2015
Number of Active Members	15,950	15,929
Annual Reported Payroll	\$ 642,177	\$ 621,115
Number of Retired Members and Survivors	3,885	3,930
Assets:		
Actuarial Value	\$ 18,945	\$ 17,557
Market Value	\$ 18,337	\$ 16,936
Actuarial Accrued Liability	\$ 72,845	\$ 74,897
Unfunded Actuarial Accrued Liability (UAAL)	\$ 53,900	\$ 57,340
Actuarial Value Funded Ratio	26.0%	23.4%
CONTRIBUTIONS FOR YEAR ENDING	12/31/2018	12/31/2017
Employer Contribution Rate:		
Normal Cost Rate	0.23%	0.21%
UAAL Contribution Rate	<u>0.44%</u>	<u>0.47%</u>
Annual Required Contribution (ARC)	0.67%	0.68%
Amortization Period	30 years	30 years



Section I – Summary of Principal Results (continued)

2. Comments on the valuation results as of December 31, 2016 are given in Section IV and further discussion of the contribution levels is set out in Section V.
3. The valuation takes into account the effect of amendments to PERA and DPS benefit structures through the valuation date. The Main Provisions of PERA and DPS, as summarized in Schedule G, were taken into account in the current valuation. We have incorporated the funding changes made to the Judicial Division in regards to HB17-1265, the Judicial (AED and SAED restart) Funding Bill, that was signed into law on May 25, 2017. This bill increases the future funding requirements of AED and SAED for the Judicial Division beginning in 2019.
4. Schedule E of this report outlines the full set of actuarial assumptions and methods used in the current valuation. Since the previous valuation, the set of economic assumptions and various demographic assumptions have been revised as a result of a review by the Board in November, 2016, based on analysis by the actuary as well as other experts. The changes are summarized below:
 - Investment Rate of Return changed assumed rate from 7.50% to 7.25%
 - Price Inflation changed assumed rate from 2.80% to 2.40%
 - Wage Inflation changed assumed rate from 3.90% to 3.50%
 - Assumed rates of Withdrawal, Disability, Retirement, and Mortality have been adjusted to more closely reflect experience.

The following table shows the change in the Unfunded Actuarial Accrued Liability (UAAL), the increase in the Actuarially Determined Contribution (ADC) and the increase in the amortization period as a result of the change in the economic and demographic assumptions above:

Group	Change in UAAL (\$ in millions)	Change in ADC	Change in Amortization Period
State Division	\$956.7	2.37%	21 years
School Division	\$2,521.6	3.59%	80 years
Local Government Division	\$218.8	2.10%	14 years
Judicial Division	\$21.3	3.66%	N/A*
DPS Division	\$228.9	3.08%	N/A*

*For the Judicial and DPS Divisions, the amortization period is infinite before and after the assumption changes.



Section I – Summary of Principal Results (continued)

Beyond the revised economic and demographic assumptions previously described, the following additional changes have been made to certain methods and assumptions since the previous valuation of the PERA HCTF and DPS HCTF:

- Method Change
 - For the PERA HCTF and the DPS HCTF, the Entry Age Normal actuarial cost method allocation basis has been changed from a level dollar amount to a level percentage of pay.
- Assumption Changes
 - The assumed rates of PERACare participation have been revised to reflect more closely actual experience.
 - Initial per capita health care costs for those PERACare enrollees under the PERA Benefit Structure who are expected to be age 65 and older and are not eligible for premium-free Medicare Part A benefits have been updated to reflect the change in costs for the 2017 plan year.
 - The assumed rates of PERACare coverage option elections for those PERACare enrollees under the PERA Benefit Structure who, in the future, will be age 65 or older and are assumed not to be eligible for premium-free Medicare Part A benefits have been revised to reflect more closely actual experience.
 - The percentage of Disabled PERACare enrollees who are assumed to not qualify for premium-free Medicare Part A coverage have been revised to reflect more closely actual experience.
 - The assumed rates of inflation for health care costs for Medicare Part A premiums have been revised to reflect the current expectation of future increases.
 - The rate of PERACare coverage election for spouses of eligible inactive members and future retirees of the State, School (other than Denver Public Schools), Local Government, and Judicial Divisions was revised to reflect more closely actual experience.
 - The assumed age differences between future retirees and their participating spouses have been revised to reflect more closely actual experience.

The following table shows the change in the Unfunded Actuarial Accrued Liability (UAAL), the increase in the Annual Required Contribution (ARC) and the increase in the amortization period as a result of the change in methods and assumptions described above:

Group	Change in UAAL (\$ in millions)			Change in ARC			Change in Amortization Period		
	Method	Assumption	Total	Method	Assumption	Total	Method	Assumption	Total
PERA HCTF	\$39.0	\$(31.9)	\$7.1	0.02%	0.03%	0.05%	1	2	3
DPS HCTF	\$2.8	\$(1.2)	\$1.6	0.00%	0.02%	0.02%	0	0	0



Section I – Summary of Principal Results (continued)

- 5. A complete breakdown of the amortization payments of the Unfunded Actuarial Accrued Liability (UAAL) is provided in Schedule D. For the pension divisions, this schedule is based on the Funding Policy adopted by the Board of Trustees. For the HCTFs, this schedule is provided for informational purposes, as with the advent of GASB 74 (first disclosure date of December 31, 2017), changes to the funding policy of the PERA HCTF and DPS HCTF are anticipated.
- 6. On a Market Value of Assets basis, the Plan's investment return for 2016 was 7.27%, resulting in an investment loss when compared to the Plan's assumed investment return for 2016 of 7.50%. However, as the Plan recognizes 25% of each year's investment gains or losses, only a portion of this investment loss will be recognized in the development of the December 31, 2016 Actuarial Value of Assets (AVA), along with the amounts deferred from the prior three years. As the investment gains and losses to be recognized in the December 31, 2016 AVA were, in aggregate, losses, the investment return on an AVA basis was actually 0.55% lower than the assumed investment return for 2016 of 7.50%, or 6.95%. Schedule B shows the development of the Actuarial Value of Assets. The following table shows the increase in the Unfunded Actuarial Accrued Liability (UAAL) as a result of the AVA return being lower than the assumed rate for 2016 of 7.50%:

Group	(Loss) in UAAL (\$ in millions)
State Division	\$(72.7)
School Division	\$(121.6)
Local Government Division	\$(24.3)
Judicial Division	\$(1.8)
DPS Division	<u>\$(15.9)</u>
Total Pension Divisions	\$(236.3)
PERA HCTF	\$(0.2)
DPS HCTF	<u>\$(0.1)</u>
Total HCTFs	\$(0.3)

- 7. The net demographic experience for all divisions was an actuarial loss. The main causes of the actuarial losses were retirement, withdrawal and mortality experience. These losses were offset by gains on salary increases, which were lower than expected for State and School divisions. Please refer to pages 42 and 43 of this report for a complete breakdown of actuarial gains and losses by division.
- 8. Actual contributions during the fiscal year ending December 31, 2016 to fund pension benefits were less than the Actuarially Determined Contribution (ADC), resulting in an increase to the UAAL. Based



Section I – Summary of Principal Results (continued)

upon the valuation results, the total increase in the December 31, 2016 pension UAAL due to contributions, in aggregate, being less than the ADC, was \$249.6 million. The PERA HCTF received payroll contributions below the Annual Required Contribution (ARC), however, members' purchased service transfers made-up the difference. The DPS HCTF contributions continue to exceed the ARC, resulting in a decrease to the expected UAAL.

9. Actual employer contributions to the DPS Division are reduced by an amount equal to the principal payments plus interest necessary each year to finance the Pension Certificates of Participation (PCOPs) issued in 1997 and 2008 and refinanced during 2011, 2012 and 2013. The amount of the credit for the 2018 fiscal year is 14.70% of salary. This credit is expected to decline as a percentage of active member payroll, as currently structured, resulting in an expected amortization period below 30 years. Colorado statutes call for a "true-up" in 2020, and every five years following, with the expressed purpose of adjusting the total DPS Contribution Rate to ensure equalization of the ratio of unfunded actuarial accrued liability over payroll between the DPS and School Divisions at the end of the 30-year period that began January 1, 2010.
10. For benefit recipients of the PERA Benefit Structure with a membership date after December 31, 2006, the liabilities associated with future post-retirement benefit increases are assumed to be limited to the market value of the Annual Increase Reserve (AIR), as these future post-retirement benefit increases are granted only to the extent affordable in accordance with Colorado Statutes. This assumption was adopted as of the December 31, 2007 actuarial funding valuation in recognition of annual post-retirement benefit increase provisions enacted in 2006. As such, the assets and liabilities associated with post-retirement benefit increases financed by the AIR are excluded from the assets and liabilities presented in this report.
11. As shown in the Summary of Principal Results, the funding ratio is the ratio of the actuarial value of assets to the actuarial accrued liability and is different based on market value of assets. The funded ratio is an indication of progress in funding the promised benefits. Since the ratio is less than 100%, there is a need for additional contributions toward payment of the unfunded actuarial accrued liability. In addition, this funded ratio does not have any relationship to measuring sufficiency if the plan had to settle its liabilities.



Section II – Membership Data

1. The membership data used as the basis for the valuation were furnished by PERA. The following table shows the number of active members and their annual reported payroll as of December 31, 2016 on the basis of which the valuation was prepared.

**THE NUMBER AND ANNUAL REPORTED PAYROLL OF
ACTIVE MEMBERS AS OF DECEMBER 31, 2016
(\$ IN THOUSANDS)**

GROUP	NUMBER	ANNUAL REPORTED PAYROLL
State Division	55,725	\$ 2,710,651
School Division	121,945	4,349,320
Local Government Division	12,736	608,223
Judicial Division	335	48,700
Denver Public Schools Division	15,950	642,177
Total	206,691	\$ 8,359,071

2. The following table shows a ten-year history of active member valuation data.

SCHEDULE OF TOTAL ACTIVE MEMBER VALUATION DATA*

VALUATION DATE	NUMBER	ANNUAL REPORTED PAYROLL (\$ IN THOUSANDS)	AVERAGE ANNUAL REPORTED PAYROLL	% CHANGE IN AVERAGE PAYROLL
12/31/2016	206,691	\$ 8,359,071	\$ 40,442	1.75%
12/31/2015	203,969	8,106,660	39,745	3.37%
12/31/2014	202,750	7,795,670	38,450	2.21%
12/31/2013	200,183	7,530,220	37,617	1.54%
12/31/2012	196,435	7,277,585	37,048	(0.86)%
12/31/2011	199,741	7,464,242	37,370	0.12%
12/31/2010	201,095	7,506,193	37,327	0.72%
12/31/2009	190,206	7,048,993	37,060	1.95%
12/31/2008	190,684	6,931,405	36,350	3.43%
12/31/2007	186,842	6,566,368	35,144	4.47%

* The December 31, 2009 numbers and prior do not include the Denver Public Schools Division which was merged into PERA on January 1, 2010.



Section II – Membership Data (continued)

3. The following table shows the number and annual retirement benefits payable to retired members and survivors on the rolls of PERA as of the valuation date.

**THE NUMBER AND ANNUAL RETIREMENT BENEFITS
OF RETIRED MEMBERS AND SURVIVORS OF DECEASED MEMBERS
ON THE ROLLS AS OF DECEMBER 31, 2016
(\$ IN THOUSANDS)**

TYPE OF RETIREMENT	GROUP					TOTAL
	STATE DIVISION	SCHOOL DIVISION	LOCAL GOVERNMENT DIVISION	JUDICIAL DIVISION	DENVER PUBLIC SCHOOLS DIVISION	
Service:						
Number	33,756	57,748	6,197	327	6,456	104,484
Annual Benefits	\$1,412,930	\$2,194,601	\$243,985	\$22,502	\$258,292	\$4,132,310
Avg. Annual Benefits	\$41.857	\$38.003	\$39.371	\$68.813	\$40.008	\$39.550
Avg. Age	71.6	71.1	69.1	74.3	74.3	71.3
Disability:						
Number	3,356	3,081	686	20	348	7,491
Annual Benefits	\$83,864	\$68,979	\$16,883	\$1,005	\$8,141	\$178,872
Avg. Annual Benefits	\$24.989	\$22.389	\$24.611	\$50.250	\$23.394	\$23.878
Avg. Age	69.5	69.3	67.4	72.2	69.0	69.2
Survivors*:						
Number	1,028	1,273	182	14	137	2,634
Annual Benefits	\$21,429	\$20,510	\$3,642	\$ 419	\$2,606	\$48,606
Avg. Annual Benefits	\$20.845	\$16.112	\$20.011	\$29.929	\$19.022	\$18.453
Avg. Age	59.2	59.4	58.6	75.1	68.1	59.8
Total:						
Number	38,140	62,102	7,065	361	6,941	114,609
Annual Benefits	\$1,518,223	\$2,284,090	\$264,510	\$23,926	\$269,039	\$4,359,788
Avg. Annual Benefits	\$39.807	\$36.780	\$37.439	\$66.277	\$38.761	\$38.041
Avg. Age	71.1	70.8	68.7	74.2	73.9	70.9

* Includes deferred survivors

4. Tables in Schedule H show the distribution by age and service of the number and total annual compensation of active members for each division included in the valuation. The tables also show the breakdown of all members for each division by tier.



Section III – Assets

1. Schedule C shows the additions and deductions to PERA’s assets for the year preceding the valuation date and a reconciliation of the fund balances at market value. As of December 31, 2016, the market value of assets for each division is shown below:

**COMPARISON OF MARKET VALUE OF ASSETS AT
DECEMBER 31, 2016 AND DECEMBER 31, 2015
(\$ IN THOUSANDS)**

GROUP	DECEMBER 31, 2016 MARKET VALUE	DECEMBER 31, 2015 MARKET VALUE
State Division	\$ 13,538,772	\$ 13,391,398
School Division	22,465,388	22,062,124
Local Government Division	3,748,369	3,639,914
Judicial Division	287,888	276,563
Denver Public Schools Division	3,108,233	3,094,339
PERA Health Care Trust Fund	260,228	276,505
DPS Health Care Trust Fund	<u>18,337</u>	<u>16,936</u>
Total Market Value of Assets	\$ 43,427,215	\$ 42,757,779

2. The four-year market related actuarial value of assets used for the current valuation was \$44,976,790,742. Schedule B shows the development of the actuarial value of assets as of December 31, 2016. The following table shows the actuarial value of assets for each division.

**COMPARISON OF ACTUARIAL VALUE OF ASSETS AT
DECEMBER 31, 2016 AND DECEMBER 31, 2015
(\$ IN THOUSANDS)**

GROUP	DECEMBER 31, 2016 ACTUARIAL VALUE	DECEMBER 31, 2015 ACTUARIAL VALUE
State Division	\$ 14,026,332	\$ 13,882,820
School Division	23,263,344	22,871,661
Local Government Division	3,879,197	3,777,161
Judicial Division	297,888	286,891
Denver Public Schools	3,220,935	3,207,327
PERA Health Care Trust Fund	270,150	285,588
DPS Health Care Trust Fund	<u>18,945</u>	<u>17,557</u>
Total Actuarial Value of Assets	\$ 44,976,791	\$ 44,329,005



Section III – Assets (continued)

3. The estimated dollar-weighted historical returns for market value of assets and actuarial value of assets for the last ten years, as calculated by the actuaries, are as follows:

YEAR ENDING	MARKET VALUE	ACTUARIAL VALUE
December 31, 2016	7.27%	6.95%
December 31, 2015	1.54%	8.60%
December 31, 2014	5.74%	9.04%
December 31, 2013	15.57%	11.09%
December 31, 2012	12.98%	10.94%
December 31, 2011	1.91%	(0.33)%
December 31, 2010	13.84%	0.94%
December 31, 2009	17.14%	0.85%
December 31, 2008	(25.78)%	2.08%
December 31, 2007	10.09%	11.28%



Section IV – Comments on the Valuation

State Division

1. The total valuation balance sheet on account of benefits shows that the State Division has total prospective benefit liabilities of \$28,029,003,551, of which \$17,297,656,757 is for the prospective benefits payable on account of present retired members and survivors of deceased members, \$635,569,697 is for the prospective benefits payable on account of present inactive members, and \$10,095,777,097 is for the prospective benefits payable on account of present active members. Against these prospective benefit liabilities the State Division has a total present actuarial value of assets of \$14,026,331,996 as of December 31, 2016. The difference of \$14,002,671,555 between the total prospective liabilities and the total present actuarial value of assets represents the present value of contributions to be made in the future on account of benefits. Of this amount, \$1,713,851,835 is the present value of future contributions expected to be made by members (at the rate of 8.0% of salary for non-state troopers and 10.0% of salary for state troopers), and the balance of \$12,288,819,720 represents the present value of future contributions payable by the employers.
2. The employers' contributions to the State Division on account of benefits consist of three amounts set by statute. The basic amount is 9.13% of salary for non-state troopers and 11.83% of salary for state troopers (after reduction for the PERA Health Care Trust Fund Contribution of 1.02% of salary). For members of the PERA Benefit Structure hired on or after January 1, 2007, an allocation of the statutory rates of 1.00% of salary is made each year to pre-fund the Annual Increase Reserve which provides post-retirement increases for these members in retirement. In addition, employers will make Amortization Equalization Disbursement (AED) and Supplemental Amortization Equalization Disbursement (SAED) contributions in the future at the following rates:

Year	AED	SAED
2016	4.60%	4.50%
2017 and later	5.00	5.00



Section IV – Comments on the Valuation (continued)

State Division (continued)

3. The valuation indicates an employer normal cost rate of 2.82% of salary is required to provide the benefits for the State Division. After adjusting for administrative expenses, prospective employer normal costs at this rate have a present value of \$645,235,896. When this amount is subtracted from \$12,288,819,720, which is the present value of the total future contributions to be made by the employers, there remains \$11,643,583,824 as the amount of future actuarial accrued liability contributions.

4. After recognizing the required employer normal cost rates, the remaining basic contribution amounts to 15.89% of salary. Contributions at this level will amortize the unfunded actuarial accrued liability of \$11,643,583,824 over 65 years, assuming the aggregate payroll of the State Division increases by 3.50% each year.

5. Effective July 1, 2005, Colorado PERA began receiving employer contributions on compensation paid to PERA retirees who are working at PERA affiliated employers. The employer rate is the total rate within the division, including both AED and SAED. Effective January 1, 2011, Colorado PERA began receiving employee contributions on compensation paid to PERA retirees who are working at PERA affiliated employers. The working retiree does not accrue an additional benefit and is not eligible for a refund of these contributions.



Section IV – Comments on the Valuation (continued)

School Division

1. The total valuation balance sheet on account of benefits shows that the School Division has total prospective benefit liabilities of \$45,920,917,788, of which \$26,887,437,614 is for the prospective benefits payable on account of present retired members and survivors of deceased members, \$1,034,985,212 is for the prospective benefits payable on account of present inactive members, and \$17,998,494,962 is for the prospective benefits payable on account of present active members. Against these prospective benefit liabilities the School Division has a total present actuarial value of assets of \$23,263,343,921 as of December 31, 2016. The difference of \$22,657,573,867 between the total prospective liabilities and the total present actuarial value of assets represents the present value of contributions to be made in the future on account of benefits. Of this amount, \$2,976,406,833 is the present value of future contributions expected to be made by members (at the rate of 8.0% of salary), and the balance of \$19,681,167,034 represents the present value of future contributions payable by the employers.
2. The employers' contributions to the School Division on account of benefits consist of three amounts set by statute. The basic amount is 9.13% of salary (after reduction for the PERA Health Care Trust Fund Contribution of 1.02% of salary). For members of the PERA Benefit Structure hired on or after January 1, 2007, an allocation of the statutory rates of 1.00% of salary is made each year to pre-fund the Annual Increase Reserve which provides post-retirement increases for these members in retirement. In addition, employers will make Amortization Equalization Disbursement (AED) and Supplemental Amortization Equalization Disbursement (SAED) contributions in the future at the following rates:

Year	AED	SAED
2016	4.50%	4.50%
2017	4.50	5.00
2018 and later	4.50	5.50



Section IV – Comments on the Valuation (continued)

School Division (continued)

3. The valuation indicates an employer normal cost rate of 4.22% of salary is required to provide the benefits for the School Division. After adjusting for administrative expenses, prospective employer normal costs at this rate have a present value of \$1,591,542,504. When this amount is subtracted from \$19,681,167,034, which is the present value of the total future contributions to be made by the employers, there remains \$18,089,624,530 as the amount of future actuarial accrued liability contributions.

4. After recognizing the required employer normal cost rates, the remaining basic contribution amounts to 14.49% of salary. Contributions at this level will amortize the unfunded actuarial accrued liability of \$18,089,624,530 over 128 years, assuming the aggregate payroll of the School Division increases by 3.50% each year.

5. Effective July 1, 2005, Colorado PERA began receiving employer contributions on compensation paid to PERA retirees who are working at PERA affiliated employers. The employer rate is the total rate within the division, including both AED and SAED. Effective January 1, 2011, Colorado PERA began receiving employee contributions on compensation paid to PERA retirees who are working at PERA affiliated employers. The working retiree does not accrue an additional benefit and is not eligible for a refund of these contributions.



Section IV – Comments on the Valuation (continued)

Local Government Division

1. The total valuation balance sheet on account of benefits shows that the Local Government Division has total prospective benefit liabilities of \$5,706,207,133, of which \$3,267,687,245 is for the prospective benefits payable on account of present retired members and survivors of deceased members, \$305,656,720 is for the prospective benefits payable on account of present inactive members, and \$2,132,863,168 is for the prospective benefits payable on account of present active members. Against these prospective benefit liabilities the Local Government Division has a total present actuarial value of assets of \$3,879,197,057 as of December 31, 2016. The difference of \$1,827,010,076 between the total prospective liabilities and the total present actuarial value of assets represents the present value of contributions to be made in the future on account of benefits. Of this amount, \$370,546,406 is the present value of future contributions expected to be made by members (at the rate of 8.0% of salary), and the balance of \$1,456,463,670 represents the present value of future contributions payable by the employers.
2. The employers' contributions to the Local Government Division on account of benefits consist of three amounts set by statute. The basic amount is 8.98% of salary (after reduction for the PERA Health Care Trust Fund Contribution of 1.02% of salary). For members of the PERA Benefit Structure hired on or after January 1, 2007, an allocation of the statutory rates of 1.00% of salary is made each year to pre-fund the Annual Increase Reserve which provides post-retirement increases for these members in retirement. In addition, employers will make Amortization Equalization Disbursement (AED) and Supplemental Amortization Equalization Disbursement (SAED) contributions in the future at the following rates:

Year	AED	SAED
2016 and later	2.20%	1.50%



Section IV – Comments on the Valuation (continued)

Local Government Division (continued)

3. The valuation indicates an employer normal cost rate of 2.36% of salary is required to provide the benefits for the Local Government Division. After adjusting for administrative expenses, prospective employer normal costs at this rate have a present value of \$122,608,773. When this amount is subtracted from \$1,456,463,670, which is the present value of the total future contributions to be made by the employers, there remains \$1,333,854,897 as the amount of future actuarial accrued liability contributions.

4. After recognizing the required employer normal cost rates, the remaining basic contribution amounts to 9.80% of salary. Contributions at this level will amortize the unfunded actuarial accrued liability of \$1,333,854,897 over 42 years, assuming the aggregate payroll of the Local Government Division increases by 3.50% each year.

5. Effective July 1, 2005, Colorado PERA began receiving employer contributions on compensation paid to PERA retirees who are working at PERA affiliated employers. The employer rate is the total rate within the division, including both AED and SAED. Effective January 1, 2011, Colorado PERA began receiving employee contributions on compensation paid to PERA retirees who are working at PERA affiliated employers. The working retiree does not accrue an additional benefit and is not eligible for a refund of these contributions.



Section IV – Comments on the Valuation (continued)

Judicial Division

1. The total valuation balance sheet on account of benefits shows that the Judicial Division has total prospective benefit liabilities of \$518,882,412, of which \$270,996,270 is for the prospective benefits payable on account of present retired members and survivors of deceased members, \$2,419,999 is for the prospective benefits payable on account of present inactive members, and \$245,466,143 is for the prospective benefits payable on account of present active members. Against these prospective benefit liabilities the Judicial Division has a total present actuarial value of assets of \$297,888,464 as of December 31, 2016. The difference of \$220,993,948 between the total prospective liabilities and the total present actuarial value of assets represents the present value of contributions to be made in the future on account of benefits. Of this amount, \$33,758,732 is the present value of future contributions expected to be made by members (at the rate of 8.0% of salary), and the balance of \$187,235,216 represents the present value of future contributions payable by the employers.
2. The employers' contributions to the Judicial Division on account of benefits consist of three amounts set by statute. The basic amount is 12.64% of salary (after reduction for the PERA Health Care Trust Fund Contribution of 1.02% of salary). For members of the PERA Benefit Structure hired on or after January 1, 2007, an allocation of the statutory rates of 1.00% of salary is made each year to pre-fund the Annual Increase Reserve which provides post-retirement increases for these members in retirement. In addition, employers will make Amortization Equalization Disbursement (AED) and Supplemental Amortization Equalization Disbursement (SAED) contributions in the future at the following rates:

Year	AED	SAED
2016 - 2018	2.20%	1.50%
2019*	3.40%	3.40%
2020*	3.80%	3.80%
2021*	4.20%	4.20%
2022*	4.60%	4.60%
2023 and later*	5.00%	5.00%

*Reflects the funding changes made to the Judicial Division in regards to HB17-1265, the Judicial (AED and SAED restart) Funding Bill, that was signed into law on May 25, 2017.



Section IV – Comments on the Valuation (continued)

Judicial Division (continued)

3. The valuation indicates an employer normal cost rate of 10.50% of salary is required to provide the benefits for the Judicial Division. After adjusting for administrative expenses, prospective employer normal costs at this rate have a present value of \$38,006,266. When this amount is subtracted from \$187,235,216, which is the present value of the total future contributions to be made by the employers, there remains \$149,228,950 as the amount of future actuarial accrued liability contributions.

4. After recognizing the required employer normal cost rates, the remaining basic contribution amounts to 5.48% of salary. Contributions at this level will never amortize the unfunded actuarial accrued liability of \$149,228,950, assuming the aggregate payroll of the Judicial Division increases by 3.50% each year. After recognizing the value of future increases in AED and SAED contributions, the amortization period is still infinite.

5. Effective July 1, 2005, Colorado PERA began receiving employer contributions on compensation paid to PERA retirees who are working at PERA affiliated employers. The employer rate is the total rate within the division, including both AED and SAED. Effective January 1, 2011, Colorado PERA began receiving employee contributions on compensation paid to PERA retirees who are working at PERA affiliated employers. The working retiree does not accrue an additional benefit and is not eligible for a refund of these contributions.



Section IV – Comments on the Valuation (continued)

Denver Public Schools Division

1. The total valuation balance sheet on account of benefits shows that the Denver Public Schools Division has total prospective benefit liabilities of \$4,964,244,980, of which \$2,897,265,262 is for the prospective benefits payable on account of present retired members and survivors of deceased members, \$102,501,828 is for the prospective benefits payable on account of present inactive members, and \$1,964,477,890 is for the prospective benefits payable on account of present active members. Against these prospective benefit liabilities the Denver Public Schools Division has a total present actuarial value of assets of \$3,220,935,045 as of December 31, 2016. The difference of \$1,743,309,935 between the total prospective liabilities and the total present actuarial value of assets represents the present value of contributions to be made in the future on account of benefits. Of this amount, \$472,882,597 is the present value of future contributions expected to be made by members (at the rate of 8.0% of salary), and the balance of \$1,270,427,338 represents the present value of future contributions payable by the employers.
2. The employers' contributions to the Denver Public Schools Division on account of benefits consist of three amounts set by statute. The basic amount is 9.13% of salary (after reduction for the DPS Health Care Trust Fund Contribution of 1.02% of salary). For members of the PERA Benefit Structure hired on or after January 1, 2010, an allocation of the statutory rates of 1.00% of salary is made each year to pre-fund the Annual Increase Reserve which provides post-retirement increases for these members in retirement. In addition, employers will make Amortization Equalization Disbursement (AED) and Supplemental Amortization Equalization Disbursement (SAED) contributions in the future at the following rates:

Year	AED	SAED
2016	4.50%	4.50%
2017	4.50	5.00
2018 and later	4.50	5.50



Section IV – Comments on the Valuation (continued)

Denver Public Schools Division (continued)

3. The valuation indicates an employer normal cost rate of 4.89% of salary is required to provide the benefits for the Denver Public Schools Division. After adjusting for administrative expenses, prospective employer normal costs at this rate have a present value of \$244,931,946. When this amount is subtracted from \$1,270,427,338, which is the present value of the total future contributions to be made by the employers, there remains \$1,025,495,392 as the amount of future actuarial accrued liability contributions.
4. Actual employer contributions are reduced by an amount equal to the principal payments plus interest necessary each year to finance the Pension Certificates of Participation (PCOPs) issued in 1997 and 2008 and refinanced during 2011, 2012 and 2013. The amount of the credit for the 2017 fiscal year is \$98,531,203 and for the 2018 fiscal year is \$99,609,045 (estimated to be 15.32% of salary for 2017 and 14.70% of salary for 2018), not considering any refinancing that may happen in the future.
5. After recognizing the required employer normal cost rates and the PCOP credit, the remaining basic contribution amounts to 0.00% of salary. Contributions at this level will never amortize the unfunded actuarial accrued liability of \$1,025,495,392, assuming the aggregate payroll of the Denver Public Schools Division increases by 3.50% each year. As currently structured, the PCOP credit is expected to decline as a percentage of active member payroll. Colorado statutes call for a “true-up” in 2020, and every five years following, with the expressed purpose of adjusting the total DPS Contribution rate to ensure equalization of the ratio of unfunded actuarial accrued liability over payroll between the DPS and School Divisions at the end of the 30-year period beginning January 1, 2010.
6. Effective January 1, 2010, Colorado PERA began receiving employer contributions on compensation paid to DPS Benefit Structure retirees who are working at PERA affiliated employers. The employer rate is the total rate within the division, including both AED and SAED. Effective January 1, 2011, Colorado PERA began receiving employee contributions on compensation paid to PERA retirees who are working at PERA affiliated employers. The working retiree does not accrue an additional benefit and is not eligible for a refund of these contributions.



Section IV – Comments on the Valuation (continued)

PERA Health Care Trust Fund (PERA HCTF)

1. The total valuation balance sheet on account of health care benefits shows the PERA HCTF has total prospective health care benefit liabilities of \$1,683,219,317, of which \$1,116,050,619 is for the prospective benefits payable on account of present PERACare enrollees receiving a health care subsidy pursuant to law, \$36,963,965 is for the prospective benefits payable on account of present eligible inactive members, and \$530,204,733 is for the prospective benefits payable on account of present active members. These amounts are net of any PERACare enrollee premiums required for enrollment in PERACare. Against these prospective health care benefit liabilities, the PERA HCTF has a total present actuarial value of assets of \$270,149,671 as of December 31, 2016. The difference of \$1,413,069,646 between the total prospective liabilities and the total present actuarial value of assets represents the present value of contributions to be made in the future on account of health care benefits. As active members do not contribute to the PERA HCTF, the present value of future contributions payable by employers is \$1,413,069,646.
2. The employers' contributions to the PERA HCTF consist of a statutorily mandated 1.02% of salary. The valuation indicates an employer normal cost rate of 0.24% of salary is required to provide the health care benefits funded by the PERA HCTF.
3. At the rate noted in paragraph 2, prospective employer normal costs have a present value of \$126,457,079. When this amount is subtracted from \$1,413,069,646, which is the present value of the total future contributions to be made by the employers, there remains \$1,286,612,567 as the amount of future actuarial accrued liability contributions.
4. After recognizing the required normal cost rate, the remaining contribution amounts to 0.78% of salary. Contributions at this level will amortize the unfunded actuarial accrued liability of \$1,286,612,567 over 37 years.



Section IV – Comments on the Valuation (continued)

DPS Health Care Trust Fund (DPS HCTF)

1. The total valuation balance sheet on account of health care benefits shows the DPS HCTF has total prospective health care benefit liabilities of \$83,730,271, of which \$50,442,959 is for the prospective benefits payable on account of present PERACare enrollees receiving a health care subsidy pursuant to law, \$914,061 is for the prospective benefits payable on account of present deferred vested members, and \$32,373,251 is for the prospective benefits payable on account of present active members. These amounts are net of any PERACare enrollee premiums required for enrollment in PERACare. Against these prospective health care benefit liabilities, the DPS HCTF has a total present actuarial value of assets of \$18,944,588 as of December 31, 2016. The difference of \$64,785,683 between the total prospective liabilities and the total present actuarial value of assets represents the present value of contributions to be made in the future on account of health care benefits. As active members do not contribute to the DPS HCTF, the present value of future contributions payable by employers is \$64,785,683.
2. The employers' contributions to the DPS HCTF consist of a statutorily mandated 1.02% of salary. The valuation indicates an employer normal cost rate of 0.23% of salary is required to provide the health care benefits funded by the DPS HCTF.
3. At the rate noted in paragraph 2, prospective employer normal costs have a present value of \$10,885,143. When this amount is subtracted from \$64,785,683, which is the present value of the total future contributions to be made by the employers, there remains \$53,900,540 as the amount of future actuarial accrued liability contributions.
4. After recognizing the required normal cost rate, the remaining contribution amounts to 0.79% of salary. Contributions at this level will amortize the unfunded actuarial accrued liability of \$53,900,540 over 13 years.



Section V – Contributions Payable by Employers

1. The statutory employer contribution rates for each division are shown in the following table:

Division	Employer Contribution Rate
State	
Non-Troopers	10.15%
Troopers	12.85
School	10.15
Local Government	10.00
Judicial	13.66
Denver Public Schools	10.15

2. For each division, 1.02% of the statutory rates shown above are allocated to the Health Care Trust Funds.
3. In addition to the statutory rates shown in paragraph 1, AED contributions and SAED contributions are to be made by all employers in amounts shown in the tables from Section IV. Those amounts are continued in each division until the division's actuarial funded ratio exceeds 103%. At that time, the amount of the AED and SAED will each be reduced by 0.5% of payroll.
4. For the DPS Division, the statutory rates, including AED and SAED contributions are being offset annually by an amount equivalent to that which Denver Public Schools pays to finance principal and interest payments on Pension Certificates of Participation (PCOPs) issued in 1997 and 2008 and refinanced during 2011, 2012 and 2013.
5. The tables on the following pages show the development of the normal cost rate, the unfunded actuarial accrued liability (UAAL) payment, amortization period and the actuarially determined contribution rate based on the Funding Policy for each division as well as for the Health Care Trust Funds.



Section V – Contributions Payable by Employers (continued)

**2018 Employer Contribution Rate
Expressed as Percent of Active Member Payroll**

	State Division	School Division	Local Government Division	Judicial Division	Denver Public Schools Division
<u>Contribution For</u>					
Normal Cost					
Service Retirement Benefits	7.45%	8.75%	6.99%	15.66%	8.81%
Disability Benefits	0.38%	0.24%	0.28%	0.78%	0.32%
Survivor Benefits	0.16%	0.13%	0.16%	0.51%	0.13%
Separation Benefits	2.48%	2.70%	2.53%	1.15%	3.23%
Administrative Expense Load	<u>0.40%</u>	<u>0.40%</u>	<u>0.40%</u>	<u>0.40%</u>	<u>0.40%</u>
Total	10.87%	12.22%	10.36%	18.50%	12.89%
Member Current Contributions*	<u>8.05%</u>	<u>8.00%</u>	<u>8.00%</u>	<u>8.00%</u>	<u>8.00%</u>
Employer Normal Cost	2.82%	4.22%	2.36%	10.50%	4.89%
Employer Contribution Rate*	18.71%	18.71%	12.16%	15.98%	3.84%**
Percent Available to Amortize Unfunded Actuarial Accrued Liability (UAAL)	15.89%	14.49%	9.80%	5.48%	0.00%
Number of Years to Amortize UAAL	65 years	128 years	42 years	Infinite***	Infinite^
Actuarially Determined Employer Contribution Rate to pay Normal Cost and amortize UAAL based on Funding Policy (in addition to assumed AED and SAED payments throughout the amortization period)	16.30%	16.80%	10.57%	18.49%	3.50%

* Weighted average for State Division and Employer Contribution Rate is adjusted by contributions to the AIR for all divisions.

** For DPS Division:

Employer Statutory	9.56%	(weighted)
AED and SAED	10.00	
DPS HCTF	(1.02)	
PCOP Credit	<u>(14.70)</u>	
Net	3.84%	

*** On both a current contribution basis and with future increases to AED and SAED.

^ The infinite amortization period of the DPS Division reflects the expected level of the DPS Division's 2018 employer contribution offsets resulting from the cost of certain Pension Certificates of Participation (PCOP). As the PCOP offsets are expected to reduce over time, the realized amortization period is expected to be lower if the DPS Division's statutory employer contribution amounts are maintained at their current level. Additionally, Colorado statutes call for a "true-up" in 2020, and every five years following, with the expressed purpose of adjusting the total DPS Division contribution rate to ensure equalization of the ratio of unfunded actuarial accrued liability over payroll between the DPS Division and the School Division as of December 31, 2039. The initial and most recent true-up resulted in an employer contribution rate for the DPS Division of 10.15%, an amount in excess of that indicated by the statutory equalization ratio.



Section V – Contributions Payable by Employers (continued)

**2018 Employer Contribution Rate
Expressed as Percent of Active Member Payroll**

	PERA Health Care Trust Fund	DPS Health Care Trust Fund
<u>Contribution For</u>		
Normal Cost		
Service Retirement Benefits	0.19%	0.19%
Disability Benefits	0.01%	0.01%
Survivor Benefits	0.00%	0.00%
Separation Benefits	<u>0.04%</u>	<u>0.03%</u>
Total	0.24%	0.23%
Member Current Contributions	<u>0.00%</u>	<u>0.00%</u>
Employer Normal Cost	0.24%	0.23%
Employer Contribution Rate	1.02%	1.02%
Percent Available to Amortize Unfunded Actuarial Accrued Liability (UAAL)	0.78%	0.79%
Number of Years to Amortize UAAL	37 years	13 years
Employer Annual Required Contribution Rate to pay Normal Cost and amortize UAAL over 30 years	1.12%	0.67%



Section VI – Accounting and Historical Funding Information

- The Governmental Accounting Standards Board (GASB) issued Statement No. 67 which replaces Statement No. 25. The information required under GASB 67 was provided in separate reports. However, GASB 43 and 45 set forth certain items of required supplementary information to be disclosed in the financial statements of PERA and the employers. One such item is a distribution of the number of employees by type of membership, as follows:

**NUMBER OF ALL MEMBERS
AS OF DECEMBER 31, 2016**

GROUP	NUMBER					Total
	State Division	School Division	Local Government Division	Judicial Division	Denver Public Schools Division	
Retirees and survivors currently receiving benefits	38,140	62,102	7,065	361	6,941	114,609
Terminated employees entitled to benefits but not yet receiving benefits	6,426	15,727	2,748	8	1,374	26,283
Inactive Members	72,398	113,942	22,896	5	9,545	218,786
Active Members						
Vested						
General employees	30,266	66,650	6,093	275	6,890	110,174
State troopers	653	0	0	0	0	653
Non-vested						
General employees	24,623	55,295	6,643	60	9,060	95,681
State troopers	<u>183</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>183</u>
Total Active Members	55,725	121,945	12,736	335	15,950	206,691
Totals	172,689	313,716	45,445	709	33,810	566,369



Section VI – Accounting and Historical Funding Information (continued)

**NUMBER OF ALL MEMBERS
AS OF December 31, 2016**

GROUP	NUMBER		
	PERA Health Care Trust Fund	DPS Health Care Trust Fund	Total
Retirees and survivors currently receiving benefits	55,789	3,885	59,674
Terminated employees entitled to benefits but not yet receiving benefits	24,909	1,374	26,283
Inactive Members	N/A	N/A	N/A
Active Members	190,741	15,950	206,691
Totals	271,439	21,209	292,648



Section VI – Accounting and Historical Funding Information (continued)

2. Another such item to be disclosed is the schedule of funding progress as shown below.

**SCHEDULE OF FUNDING PROGRESS
(\$ IN THOUSANDS)**

Actuarial Valuation Date	Actuarial Value of Plan Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b - a)	Funded Ratio (a / b)	Reported Payroll (c)	UAAL as a Percentage of Reported Payroll ((b - a) / c)
STATE DIVISION						
12/31/2016	\$ 14,026,332	\$ 25,669,916	\$ 11,643,584	54.6%	\$ 2,710,651	429.5%
12/31/2015	13,882,820	24,085,671	10,202,851	57.6%	2,641,867	386.2%
12/31/2014	13,523,488	23,408,321	9,844,833	57.8%	2,564,670	385.4%
12/31/2013	13,129,460	22,843,725	9,714,265	57.5%	2,474,965	392.5%
12/31/2012	12,538,675	21,191,495	8,652,820	59.2%	2,384,934	362.8%
12/31/2011	12,010,045	20,826,543	8,816,498	57.7%	2,393,791	368.3%
12/31/2010	12,791,946	20,356,176	7,564,230	62.8%	2,392,080	316.2%
12/31/2009	13,382,736	19,977,217	6,594,481	67.0%	2,384,137	276.6%
12/31/2008	13,914,371	20,498,668	6,584,297	67.9%	2,371,639	277.6%
12/31/2007	14,220,681	19,390,296	5,169,615	73.3%	2,236,518	231.1%
SCHOOL DIVISION						
12/31/2016	\$ 23,263,344	\$ 41,352,968	\$ 18,089,624	56.3%	\$ 4,349,320	415.9%
12/31/2015	22,871,661	37,677,153	14,805,492	60.7%	4,235,290	349.6%
12/31/2014	22,143,356	36,386,532	14,243,176	60.9%	4,063,236	350.5%
12/31/2013	21,369,380	35,437,312	14,067,932	60.3%	3,938,650	357.2%
12/31/2012	20,266,574	32,619,033	12,352,459	62.1%	3,819,066	323.4%
12/31/2011	19,266,110	31,986,199	12,720,089	60.2%	3,821,603	332.8%
12/31/2010	20,321,736	31,339,754	11,018,018	64.8%	3,900,662	282.5%
12/31/2009	21,054,910	30,412,815	9,357,905	69.2%	3,922,175	238.6%
12/31/2008	21,733,329	31,000,202	9,266,873	70.1%	3,804,927	243.5%
12/31/2007	22,070,769	29,241,428	7,170,659	75.5%	3,618,258	198.2%
LOCAL GOVERNMENT DIVISION						
12/31/2016	\$ 3,879,197	\$ 5,213,052	\$ 1,333,855	74.4%	\$ 608,223	219.3%
12/31/2015	3,777,161	4,780,698	1,003,537	79.0%	561,518	178.7%
12/31/2014	3,629,400	4,610,967	981,567	78.7%	540,468	181.6%
12/31/2013	3,291,298	4,502,282	1,210,984	73.1%	529,003	228.9%
12/31/2012	3,098,721	4,157,621	1,058,900	74.5%	523,668	202.2%
12/31/2011	2,882,691	4,160,015	1,277,324	69.3%	718,169	177.9%
12/31/2010	2,926,045	4,005,566	1,079,521	73.0%	705,265	153.1%
12/31/2009	2,932,628	3,850,821	918,193	76.2%	705,097	130.2%
12/31/2008	2,933,296	3,838,083	904,787	76.4%	718,902	125.9%
12/31/2007	2,892,847	3,563,199	670,352	81.2%	680,442	98.5%



Section VI – Accounting and Historical Funding Information (continued)

**SCHEDULE OF FUNDING PROGRESS
(\$ IN THOUSANDS)**

Actuarial Valuation Date	Actuarial Value of Plan Assets (a)	Actuarial Accrued Liability (AAL) Entry Age (b)	Unfunded AAL (UAAL) (b - a)	Funded Ratio (a / b)	Reported Payroll (c)	UAAL as a Percentage of Reported Payroll ((b - a) / c)
JUDICIAL DIVISION						
12/31/2016	\$ 297,888	\$ 447,117	\$ 149,229	66.6%	\$ 48,700	306.4%
12/31/2015	286,891	401,966	115,075	71.4%	46,870	245.5%
12/31/2014	270,866	371,253	100,387	73.0%	42,977	233.6%
12/31/2013	256,800	351,598	94,798	73.0%	39,942	237.3%
12/31/2012	238,807	326,897	88,090	73.1%	39,045	225.6%
12/31/2011	221,515	319,437	97,922	69.3%	39,033	250.9%
12/31/2010	227,814	303,839	76,025	75.0%	37,412	203.2%
12/31/2009	228,714	295,696	66,982	77.3%	37,583	178.2%
12/31/2008	230,967	288,058	57,091	80.2%	35,937	158.9%
12/31/2007	231,228	264,210	32,982	87.5%	31,150	105.9%
DENVER PUBLIC SCHOOLS DIVISION						
12/31/2016	\$ 3,220,935	\$ 4,246,430	\$ 1,025,495	75.9%	\$ 642,177	159.7%
12/31/2015	3,207,327	3,905,240	697,913	82.1%	621,115	112.4%
12/31/2014	3,151,456	3,816,093	664,637	82.6%	584,319	113.7%
12/31/2013	3,075,895	3,785,872	709,977	81.2%	547,660	129.6%
12/31/2012	2,936,695	3,495,549	558,854	84.0%	510,872	109.4%
12/31/2011	2,804,706	3,442,527	637,821	81.5%	491,646	129.7%
12/31/2010	2,961,720	3,332,814	371,094	88.9%	470,774	78.8%
PERA HEALTH CARE TRUST FUND						
12/31/2016	\$270,150	\$1,556,762	\$1,286,612	17.4%	\$7,716,894	16.7%
12/31/2015	285,588	1,556,269	1,270,681	18.4%	7,485,545	17.0%
12/31/2014	297,377	1,534,461	1,237,084	19.4%	7,211,351	17.2%
12/31/2013	293,556	1,557,406	1,263,850	18.8%	6,982,560	18.1%
12/31/2012	285,097	1,723,495	1,438,398	16.5%	6,766,713	21.3%
12/31/2011	282,228	1,710,790	1,428,562	16.5%	6,972,596	20.5%
12/31/2010	288,193	1,642,993	1,354,800	17.5%	7,035,419	19.3%
12/31/2009	260,341	1,763,241	1,502,900	14.8%	7,048,992	21.3%
12/31/2008	255,976	1,368,633	1,112,657	18.7%	6,931,405	16.1%
12/31/2007	258,775	1,303,594	1,044,819	19.9%	6,566,368	15.9%
DPS HEALTH CARE TRUST FUND						
12/31/2016	\$18,945	\$72,845	\$53,900	26.0%	\$642,177	8.4%
12/31/2015	17,557	74,897	57,340	23.4%	621,115	9.2%
12/31/2014	16,502	76,026	59,524	21.7%	584,319	10.2%
12/31/2013	15,482	76,636	61,154	20.2%	547,660	11.2%
12/31/2012	14,443	77,669	63,226	18.6%	510,872	12.4%
12/31/2011	14,448	77,475	63,027	18.6%	491,646	12.8%
12/31/2010	14,086	78,513	64,427	17.9%	470,774	13.7%



Section VI – Accounting and Historical Funding Information (continued)

3. The information presented in the financial statements for pension benefits was determined as part of the actuarial valuation at December 31, 2016.

	State Division	School Division	Local Government Division	Judicial Division	Denver Public Schools Division
Valuation date	12/31/2016	12/31/2016	12/31/2016	12/31/2016	12/31/2016
Actuarial cost method	Entry age	Entry age	Entry age	Entry age	Entry age
Amortization method*	Level percent Closed	Level percent Closed	Level percent Closed	Level percent Closed	Level percent Closed
Equivalent single amortization period	27 years [^]	28 years	28 years	28 years	28 years
Asset valuation method	4 year smoothed Market	4 year smoothed Market	4 year smoothed Market	4 year smoothed Market	4 year smoothed Market
Actuarial assumptions:					
Investment rate of return**	7.25%	7.25%	7.25%	7.25%	7.25%
Projected salary increases**	3.50 – 9.17%	3.50 – 9.70%	3.50 – 10.45%	4.00 – 5.00%	3.50 – 9.70%
Post-Retirement Benefit Increases:					
PERA Benefit Structure and membership prior to 1/1/07; or DPS Benefit Structure	2.00% compounded annually	2.00% compounded annually	2.00% compounded annually	2.00% compounded annually	2.00% compounded annually
PERA Benefit Structure and membership after 12/31/06	None***	None***	None***	None***	None***

* Effective with the December 31, 2014 valuation, gains and losses are to be amortized over a closed period. See Schedule I for a full description of the determination of the ADC defined in the Colorado PERA Defined Benefit Pension Plan Funding Policy.

** Includes inflation at 2.40%.

*** Post-Retirement Benefit Increases are provided by a separate fund subject to monies being available.

[^] The equivalent single amortization period for the State Division reflects an adjustment for the impact of AED and SAED contributions received from employers on the estimated pensionable payroll of employees electing to participate in the defined contribution plan.



Section VI – Accounting and Historical Funding Information (continued)

4. The information presented in the required supplementary schedules for health care benefits was determined as part of the actuarial valuation at December 31, 2016.

	PERA Health Care Trust Fund	DPS Health Care Trust Fund
Valuation date	12/31/2016	12/31/2016
Actuarial cost method	Entry age	Entry age
Amortization method	Level percent Open	Level percent Open
Amortization period	30 years	30 years
Asset valuation method	4 year smoothed Market	4 year smoothed Market
Actuarial assumptions:		
Investment rate of return*	7.25%	7.25%
Projected salary increases*	3.50% in aggregate	3.50% in aggregate
Health Care Inflation Factor		
Service-Based Premium Subsidy	0.00%	0.00%
Medicare Part A Premiums	3.00% Initial 4.25% Ultimate	n/a
Carrier Premiums	5.00%	n/a

* Includes inflation at 2.40%.



Section VI – Accounting and Historical Funding Information (continued)

5. **SCHEDULE OF EMPLOYER CONTRIBUTIONS***

Calendar Year	Actuarially Determined Contribution in Dollars (\$ in thousands)	Actuarially Determined Contribution as a Percent of Pay	Percent Of ADC Contributed
State Division			
2016	\$604,746	22.31%	84%
2015	590,457	22.35%	80%
2014	524,475	20.45%	83%
2013	495,241	20.01%	79%
2012	393,991	16.52%**	83%
2011	326,274	13.63%**	85%
2010	452,821	18.93%**	62%
2009	426,999	17.91%	69%
2008	437,567	18.45%	61%
2007	385,352	17.23%	60%
School Division			
2016	\$972,508	22.36%	82%
2015	929,223	21.94%	79%
2014	798,426	19.65%	84%
2013	779,459	19.79%	79%
2012	672,156	17.60%	84%
2011	601,138	15.73%	89%
2010	731,374	18.75%	70%
2009	649,512	16.56%	73%
2008	653,686	17.18%	65%
2007	581,092	16.06%	64%
Local Government Division			
2016	\$ 72,865	11.98%	99%
2015	76,479	13.62%	89%
2014	63,667	11.78%	397%
2013	56,180	10.62%	116%
2012	51,267	9.79%	163%
2011	64,492	8.98%	139%
2010	86,818	12.31%	101%
2009	78,548	11.14%	106%
2008	85,909	11.95%	91%
2007	76,278	11.21%	89%

* All contribution amounts are exclusive of AIR Contributions.

** The State Division 2010, 2011 and 2012 ADCs have been adjusted to reflect the contribution rate swap of 2.5% of payroll for the period July 1, 2010 through June 30, 2012 decreasing the employer contribution rate.



Section VI – Accounting and Historical Funding Information (continued)

SCHEDULE OF EMPLOYER CONTRIBUTIONS*

Calendar Year	Actuarially Determined Contribution in Dollars (\$ in thousands)	Actuarially Determined Contribution as a Percent of Pay	Percent Of ADC Contributed
Judicial Division			
2016	\$ 10,748	22.07%	73%
2015	10,054	21.45%	75%
2014	8,625	20.07%	81%
2013	8,599	21.53%	76%
2012	7,137	18.28%**	82%
2011	6,362	16.30%**	84%
2010	6,970	18.63%**	80%
2009	6,419	17.08%	90%
2008	6,346	17.66%	80%
2007	4,775	15.33%	88%
Denver Public Schools Division			
2016	\$ 67,172	10.46%	20%
2015	68,695	11.06%	8%
2014	56,504	9.67%	28%
2013	63,145	11.53%	37%
2012	49,044	9.60%	27%
2011	58,260	11.85%***	20%
2010	68,780	14.61%****	8%

* All contribution amounts are exclusive of AIR Contributions.

** The Judicial Division 2010, 2011 and 2012 ADCs have been adjusted to reflect the contribution rate swap of 2.5% of payroll for the period July 1, 2010 through June 30, 2012 decreasing the employer contribution rate.

*** Blended Rate for 2011 from 2008 and 2009 Annual Valuations from previous DPSRS actuary

**** Blended Rate for 2010 from 2007 and 2008 Annual Valuations from previous DPSRS actuary



Section VI – Accounting and Historical Funding Information (continued)

SCHEDULE OF EMPLOYER CONTRIBUTIONS

Calendar Year	Annual Required Contribution (ARC) (a)	PERA Payroll Allocations (b)	Retiree Drug Subsidy (RDS) Contribution (c)	Total Contribution (d) = (b)+(c)	Percentage of ARC Contributed (e) = (d)/(a)
PERA Health Care Trust Fund					
2016	\$ 84,114,123	\$ 80,825,145	\$ 0	\$ 80,825,145	96%
2015	86,083,768	78,462,738	0	78,462,738	91%
2014	95,189,820	79,625,680	(1,307)	79,624,373	84%
2013	86,583,744	72,785,209	15,731,044	88,516,253	102%
2012	79,847,213	72,556,763	14,197,649	86,754,412	109%
2011	89,249,242	73,448,775	14,151,366	87,600,141	98%
2010	78,796,693	74,047,581	14,168,745	88,216,326	112%
2009	78,948,710	74,072,676	13,633,368	87,706,044	111%
2008	76,938,596	72,599,167	13,742,749	86,341,916	112%
2007	78,139,779	68,507,982	12,396,777	80,904,759	104%
DPS Health Care Trust Fund					
2016	\$ 4,816,328	\$ 6,722,556	\$ 0	\$ 6,722,556	140%
2015	5,031,032	6,370,903	0	6,370,903	127%
2014	5,083,575	6,003,241	394	6,003,635	118%
2013	4,709,876	5,557,244	562,761	6,120,005	130%
2012	4,700,022	5,243,219	488,054	5,731,273	122%
2011	4,523,143	5,029,151	498,974	5,528,125	122%
2010	4,465,261	4,761,581	536,814	5,298,395	119%

The ARCs shown above reflect a 12-month lag between the valuation date and the beginning of the applicable calendar year.

To comply with GASB 43, beginning with the results of the December 31, 2005 valuation, the unfunded actuarial accrued liability (UAAL) is amortized over a maximum of 30 years in determining the ARC.

For the results of the valuations from December 31, 2005 through December 31, 2012, the following changes were implemented to comply with GASB 43 as clarified by GASB Technical Bulletin 2006-1:

- All liabilities were determined without a reduction for expected future RDS payments.
- The total HCTF contribution was determined to be the statutory employer contribution plus that year's actual RDS payments.

Effective January 1, 2014, PERACare discontinued its participation in the Centers for Medicare & Medicaid Services' (CMS) Retiree Drug Subsidy (RDS) Program. As of January 1, 2014, PERACare enrollees participating in the self-insured Medicare supplement plans and the Medicare HMO plan offered by Rocky Mountain Health Plans receive their prescription drug benefits through a Medicare Prescription Drug Plan (PDP). As the Medicare Part D subsidies implicit in the lower costs for PDPs may be recognized in the liability under GASB Statements No. 43 and No. 45, the liability associated with the premium subsidies funded by estimated RDS receipts has been eliminated and, therefore, is not included in the results of valuations dated on or after December 31, 2013.



Section VII – Derivation of Experience Gains and Losses

Pension Changes in Unfunded Actuarial Accrued Liabilities (UAAL) During Calendar Year 2016 (\$ in Millions)

	State Division	School Division	Local Gov't Division	Judicial Division	Denver Public Schools Division	Total Pension
1) Beginning of Year:						
a) Unfunded Actuarial Accrued Liability	\$10,202.9	\$14,805.5	\$1,003.5	\$ 115.1	\$ 697.9	\$26,824.9
b) Normal Cost	293.3	529.2	60.0	8.4	79.2	970.1
c) Total Required Contributions	823.0	1,320.5	121.5	14.6	118.5	2,398.1
d) Total Actual Contributions*	765.2	1,181.4	124.6	14.7	71.5	2,157.4
2) End of Year:						
a) Expected UAAL from previous valuation (1a) x 1.075 + [1(b) – 1(c)] x 1.0375	\$10,418.6	\$15,094.9	\$1,015.0	\$117.3	\$709.5	\$27,355.3
b) Expected UAAL on actual contributions (1a) x 1.075 + [1(b)] – (1d)] x 1.0375	10,478.5	15,239.3	1,011.7	117.2	758.2	27,604.9
c) Increase in UAAL due to Deficiency (2b) – (2a)	59.9	144.4	(3.3)	(0.1)	48.7	249.6
3) Changes on this Year's Activities						
a) Liability Gain/(Loss)	\$(135.7)	\$(207.1)	\$(79.1)	\$(8.9)	\$(22.5)	\$(453.3)
b) Investment Gain/(Loss)	(72.7)	(121.6)	(24.3)	(1.8)	(15.9)	(236.3)
c) Change in Plan Assumptions	(956.7)	(2,521.6)	(218.8)	(21.3)	(228.9)	(3,947.3)
d) Change in Plan Provisions	0.0	0.0	0.0	0.0	0.0	0.0
e) Change in Methods	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>
f) Total	\$(1,165.1)	\$(2,850.3)	\$(322.2)	\$(32.0)	\$(267.3)	\$(4,636.9)
4) Actual UAAL at End of Year (2a) + (2c) – (3f)	\$11,643.6	\$18,089.6	\$1,333.9	\$ 149.2	\$1,025.5	\$32,241.8

* Includes members' purchased service transfers and other additions.



Section VII – Derivation of Experience Gains and Losses (continued)

**PERA HCTF and DPS HCTF Changes in Unfunded Actuarial Accrued Liabilities (UAAL)
During Calendar Year 2016
(\$ in Millions)**

	PERA HCTF	DPS HCTF
1) Beginning of Year:		
a) Unfunded Actuarial Accrued Liability (UAAL)	\$1,270.7	\$57.3
b) Normal Cost	16.4	1.5
c) Total Required Contributions	84.1	4.8
d) Total Actual Contributions*	87.5	6.9
2) End of Year:		
a) Expected UAAL from previous valuation (1a) x 1.075 + [(1b) - (1c)] x 1.0375	\$1,295.8	\$58.2
b) Expected UAAL on actual contributions (1a) x 1.075 + [(1b) - (1d)] x 1.0375	1,292.2	56.0
c) Change in UAAL due to contributions (2b) - (2a)	(3.6)	(2.2)
3) Changes on this Year's Activities		
a) Liability Gain/(Loss)	\$(1.3)	\$0.6
b) Investment Gain/(Loss)	(0.2)	(0.1)
c) Change in Plan Assumptions	(31.9)	(1.2)
d) Change in Plan Provisions	0.0	0.0
e) Change in Methods	<u>39.0</u>	<u>2.8</u>
f) Total	\$5.6	\$2.1
4) Actual UAAL at End of Year (2a) + (2c) - (3f)	\$1,286.6	\$53.9

* Includes members' purchased service transfers.



Section VII – Derivation of Experience Gains and Losses (continued)

**Pension Gains & (Losses) from Experience
During Calendar Year 2016
(\$ in Millions)**

Type of Activity	State Division	School Division	Local Gov't Division	Judicial Division	Denver Public Schools Division	Total
Age & Service Retirements. If members retire at older ages, there is a gain. If younger ages, a loss.	\$(45.1)	\$(68.3)	\$(9.9)	\$(2.1)	\$(13.6)	\$(139.0)
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	(10.8)	(8.3)	(1.9)	0.1	(1.4)	\$(22.3)
Death-in Service Benefits. If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	(0.9)	(0.5)	(0.1)	0.0	(0.3)	\$(1.8)
Termination of Employment. If more liabilities are released by terminations than assumed, there is a gain. If smaller releases, a loss.	(64.0)	(136.3)	(21.5)	(0.5)	16.4	\$(205.9)
Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	97.9	210.4	(25.1)	(2.1)	(6.1)	\$275.0
New Members. Additional actuarial accrued liability will produce a loss.	(75.5)	(85.8)	(18.8)	(2.4)	(30.5)	\$(213.0)
Investment Income. If there is a greater investment income than assumed, there is a gain. If less income, a loss.	(72.7)	(121.6)	(24.3)	(1.8)	(15.9)	\$(236.3)
Death after Retirement. If retirants live longer than assumed, there is a loss. If not as long, a gain.	(10.5)	(71.8)	1.9	(1.3)	3.6	\$(78.1)
Other. Miscellaneous gains and losses resulting from changes in valuation software, data adjustments, timing of financial transactions, etc.	<u>(26.8)</u>	<u>(46.5)</u>	<u>(3.7)</u>	<u>(0.6)</u>	<u>9.4</u>	<u>\$(68.2)</u>
Net Gain/(Loss) During Year from Experience	\$(208.4)	\$(328.7)	\$(103.4)	\$(10.7)	\$(38.4)	\$(689.6)



Section VII – Derivation of Experience Gains and Losses (continued)

**PERA HCTF and DPS HCTF Gains & (Losses) from Experience
During Calendar Year 2016
(\$ in Millions)**

Type of Activity	PERA HCTF	DPS HCTF
Age & Service Retirements. If members retire at older ages, there is a gain. If younger ages, a loss.	\$(1.5)	\$(0.1)
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	(0.3)	0.0
Death-in Service Benefits. If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	0.0	0.0
Termination of Employment. If more liabilities are released by terminations than assumed, there is a gain. If smaller releases, a loss.	(2.7)	0.1
Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	0.0	0.0
New Members. Additional actuarial accrued liability will produce a loss.	(2.3)	(0.2)
Investment Income. If there is a greater investment income than assumed, there is a gain. If less income, a loss.	(0.2)	(0.1)
Death after Retirement. If retirants live longer than assumed, there is a loss. If not as long, a gain.	(1.0)	0.0
Other. Gains and losses resulting from claims experience, changes in plan participation/benefit utilization, changes in valuation software, data adjustments, timing of financial transactions, etc.	<u>6.5</u>	<u>0.8</u>
Net Gain/(Loss) During Year from Experience	\$(1.5)	\$0.5



Section VII – Derivation of Experience Gains and Losses (continued)

**Pension Gains & (Losses) as a Percentage of Actuarial Accrued Liabilities
During Calendar Year 2016
(\$ in Millions)**

Type of Activity	State Division	School Division	Local Gov't Division	Judicial Division	Denver Public Schools Division	Total Pension
Actuarial Accrued Liability at the Beginning of the Year	\$24,085.7	\$37,677.2	\$4,780.7	\$402.0	\$3,905.2	\$70,850.8
Age & Service Retirements. If members retire at older ages, there is a gain. If younger ages, a loss.	(0.2)%	(0.2)%	(0.2)%	(0.5)%	(0.3)%	(0.2)%
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Death-in Service Benefits. If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Termination from Employment. If more liabilities are released by terminations than assumed, there is a gain. If smaller releases, a loss.	(0.3)%	(0.4)%	(0.4)%	(0.1)%	0.4 %	(0.3)%
Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	0.4 %	0.6 %	(0.5)%	(0.5)%	(0.2)%	0.4 %
New Members. Additional actuarial accrued liability will produce a loss.	(0.3)%	(0.2)%	(0.4)%	(0.6)%	(0.8)%	(0.3)%
Investment Income. If there is a greater investment income than assumed, there is a gain. If less income, a loss.	(0.3)%	(0.3)%	(0.5)%	(0.4)%	(0.4)%	(0.3)%
Death after Retirement. If retirants live longer than assumed, there is a loss. If not as long, a gain.	0.0 %	(0.2)%	0.0 %	(0.3)%	0.1 %	(0.1)%
Other. Miscellaneous gains and losses resulting from changes in valuation software, data adjustments, timing of financial transactions, etc.	<u>(0.1)%</u>	<u>(0.1)%</u>	<u>(0.1)%</u>	<u>(0.1)%</u>	<u>0.2 %</u>	<u>(0.1)%</u>
Gain (or Loss) During Year from Experience	(0.8)%	(0.8)%	(2.1)%	(2.5)%	(1.0)%	(0.9)%



Section VII – Derivation of Experience Gains and Losses (continued)

**PERA HCTF and DPS HCTF Gains & (Losses) as a Percentage of Actuarial Accrued Liabilities
During Calendar Year 2016
(\$ in Millions)**

Type of Activity	PERA HCTF	DPS HCTF
Actuarial Accrued Liability at the Beginning of the Year	\$1,556.3	\$74.9
Age & Service Retirements. If members retire at older ages, there is a gain. If younger ages, a loss.	(0.1)%	(0.1)%
Disability Retirements. If disability claims are less than assumed, there is a gain. If more claims, a loss.	0.0 %	0.0 %
Death-in Service Benefits. If survivor claims are less than assumed, there is a gain. If more claims, there is a loss.	0.0 %	0.0 %
Termination from Employment. If more liabilities are released by terminations than assumed, there is a gain. If smaller releases, a loss.	(0.2)%	0.1 %
Pay Increases. If there are smaller pay increases than assumed, there is a gain. If greater increases, a loss.	0.0 %	0.0 %
New Members. Additional actuarial accrued liability will produce a loss.	(0.1)%	(0.3)%
Investment Income. If there is a greater investment income than assumed, there is a gain. If less income, a loss.	0.0 %	(0.1)%
Death after Retirement. If retirants live longer than assumed, there is a loss. If not as long, a gain.	(0.1)%	0.0 %
Other. Gains and losses resulting from claims experience, changes in plan participation/benefit utilization, changes in valuation software, data adjustments, timing of financial transactions, etc.	<u>0.4 %</u>	<u>1.1 %</u>
Gain (or Loss) During Year from Experience	(0.1)%	0.7 %



Section VIII – Additional Information for Health Care Trust Funds

PERA HCTF Subsidy Analysis

Calendar Year (1)	Administrative Expenses (2)	Claims & HMO Premiums (3)	Total Costs (2)+(3) (4)	PERA Subsidy	
				Amount (5)	Percentage (5)/(4) (6)
2016	\$17,191,422	\$308,638,003	\$325,829,425	\$122,832,804	38%
2015	17,427,167	299,491,591	316,918,758	123,969,209	39%
2014	15,039,802	282,839,340	297,879,142	110,208,226	37%
2013	11,432,638	331,655,337	343,087,975	104,492,638	30%
2012	11,238,351	320,746,116	331,984,467	109,059,949	33%
2011	11,009,812	296,318,871	307,328,683	91,816,866	30%
2010	9,711,601	273,798,971	283,510,572	77,565,425	27%
2009	7,878,395	261,533,889	269,412,284	80,110,149	30%
2008	7,839,386	258,685,119	266,524,505	88,469,990	33%
2007	7,348,821	216,848,936	224,197,757	58,986,436	26%

DPS HCTF Subsidy Analysis

Calendar Year (1)	Administrative Expenses (2)	Claims & HMO Premiums (3)	Total Costs (2)+(3) (4)	DPS Subsidy	
				Amount (5)	Percentage (5)/(4) (6)
2016	\$674,716	\$19,188,078	\$19,862,794	\$6,684,449	34%
2015	664,771	18,913,393	19,578,164	6,831,344	35%
2014	535,270	18,568,484	19,103,754	6,524,980	34%
2013	397,301	23,483,334	23,880,635	6,366,156	27%
2012	383,943	22,993,959	23,377,902	6,652,676	28%
2011	392,263	23,026,025	23,418,288	6,165,753	26%
2010	460,196	22,531,118	22,991,314	6,233,170	27%

Notes:

- Administrative Expenses total includes expenses associated with claims administration.
- Claims and HMO Premiums total reflects actual claims and premiums paid (net of any premium variance).
- The subsidy analysis schedule presented above was revised, beginning with the December 31, 2006 valuation report, for all years shown to include the premiums paid by retirees for HMOs in the claims and HMO premiums and in the total cost columns. The total cost includes all health care costs for retirees, beneficiaries and actives. Also, claims experience gains and losses are now included in the actual PERA and DPS subsidies.



Schedule A – Valuation Balance Sheet and Solvency Test

**VALUATION BALANCE SHEET
SHOWING THE PRESENT AND PROSPECTIVE ASSETS AND LIABILITIES OF
THE PUBLIC EMPLOYEES' RETIREMENT ASSOCIATION OF COLORADO
AS OF DECEMBER 31, 2016**

STATE DIVISION

PRESENT AND PROSPECTIVE ASSETS		
Actuarial Value of Present Assets		\$ 14,026,331,996
Present value of future members' contributions		1,713,851,835
Present value of future employer contributions		
Normal cost	\$ 645,235,896	
Unfunded actuarial accrued liability contributions	<u>11,643,583,824</u>	
Total prospective employer contributions		<u>\$ 12,288,819,720</u>
Total Present and Prospective Assets		<u>\$ 28,029,003,551</u>
ACTUARIAL LIABILITIES		
Present value of benefits payable on account of retired members and survivors of deceased members now drawing retirement benefits		
Retired members	\$ 17,083,997,708	
Survivors	<u>213,659,049</u>	
Total		\$ 17,297,656,757
Present value of prospective benefits payable on account of inactive members		635,569,697
Present value of prospective benefits payable on account of present active members:		
Service retirement benefits	\$ 8,700,093,106	
Disability retirement benefits	215,647,235	
Survivor benefits	105,555,011	
Separation benefits	<u>1,074,481,745</u>	
Total		<u>\$ 10,095,777,097</u>
Total Actuarial Liabilities		<u>\$ 28,029,003,551</u>



Schedule A – Valuation Balance Sheet and Solvency Test (continued)

**VALUATION BALANCE SHEET
SHOWING THE PRESENT AND PROSPECTIVE ASSETS AND LIABILITIES OF
THE PUBLIC EMPLOYEES' RETIREMENT ASSOCIATION OF COLORADO
AS OF DECEMBER 31, 2016**

SCHOOL DIVISION

PRESENT AND PROSPECTIVE ASSETS		
Actuarial Value of Present Assets		\$ 23,263,343,921
Present value of future members' contributions		2,976,406,833
Present value of future employer contributions		
Normal cost	\$ 1,591,542,504	
Unfunded actuarial accrued liability contributions	<u>18,089,624,530</u>	
Total prospective employer contributions		<u>\$ 19,681,167,034</u>
Total Present and Prospective Assets		<u>\$ 45,920,917,788</u>
ACTUARIAL LIABILITIES		
Present value of benefits payable on account of retired members and survivors of deceased members now drawing retirement benefits		
Retired members	\$ 26,685,846,904	
Survivors	<u>201,590,710</u>	
Total		\$ 26,887,437,614
Present value of prospective benefits payable on account of inactive members		1,034,985,212
Present value of prospective benefits payable on account of present active members:		
Service retirement benefits	\$ 15,586,672,641	
Disability retirement benefits	222,394,129	
Survivor benefits	135,057,983	
Separation benefits	<u>2,054,370,209</u>	
Total		<u>\$ 17,998,494,962</u>
Total Actuarial Liabilities		<u>\$ 45,920,917,788</u>



Schedule A – Valuation Balance Sheet and Solvency Test (continued)

**VALUATION BALANCE SHEET
SHOWING THE PRESENT AND PROSPECTIVE ASSETS AND LIABILITIES OF
THE PUBLIC EMPLOYEES’ RETIREMENT ASSOCIATION OF COLORADO
AS OF DECEMBER 31, 2016**

LOCAL GOVERNMENT DIVISION

PRESENT AND PROSPECTIVE ASSETS		
Actuarial Value of Present Assets		\$ 3,879,197,057
Present value of future members’ contributions		370,546,406
Present value of future employer contributions		
Normal cost	\$ 122,608,773	
Unfunded actuarial accrued liability contributions	<u>1,333,854,897</u>	
Total prospective employer contributions		<u>\$ 1,456,463,670</u>
Total Present and Prospective Assets		<u>\$ 5,706,207,133</u>
ACTUARIAL LIABILITIES		
Present value of benefits payable on account of retired members and survivors of deceased members now drawing retirement benefits		
Retired members	\$ 3,228,100,060	
Survivors	<u>39,587,185</u>	
Total		\$ 3,267,687,245
Present value of prospective benefits payable on account of inactive members		305,656,720
Present value of prospective benefits payable on account of present active members:		
Service retirement benefits	\$ 1,822,214,486	
Disability retirement benefits	35,309,147	
Survivor benefits	23,015,260	
Separation benefits	<u>252,324,275</u>	
Total		<u>\$ 2,132,863,168</u>
Total Actuarial Liabilities		<u>\$ 5,706,207,133</u>



Schedule A – Valuation Balance Sheet and Solvency Test (continued)

**VALUATION BALANCE SHEET
SHOWING THE PRESENT AND PROSPECTIVE ASSETS AND LIABILITIES OF
THE PUBLIC EMPLOYEES’ RETIREMENT ASSOCIATION OF COLORADO
AS OF DECEMBER 31, 2016**

JUDICIAL DIVISION

PRESENT AND PROSPECTIVE ASSETS		
Actuarial Value of Present Assets		\$ 297,888,464
Present value of future members’ contributions		33,758,732
Present value of future employer contributions		
Normal cost	\$ 38,006,266	
Unfunded actuarial accrued liability contributions	<u>149,228,950</u>	
Total prospective employer contributions		<u>\$ 187,235,216</u>
Total Present and Prospective Assets		<u>\$ 518,882,412</u>
ACTUARIAL LIABILITIES		
Present value of benefits payable on account of retired members and survivors of deceased members now drawing retirement benefits		
Retired members	\$ 266,955,181	
Survivors	<u>4,041,089</u>	
Total		\$ 270,996,270
Present value of prospective benefits payable on account of inactive members		2,419,999
Present value of prospective benefits payable on account of present active members:		
Service retirement benefits	\$ 229,820,613	
Disability retirement benefits	5,628,315	
Survivor benefits	5,287,857	
Separation benefits	<u>4,729,358</u>	
Total		<u>\$ 245,466,143</u>
Total Actuarial Liabilities		<u>\$ 518,882,412</u>



Schedule A – Valuation Balance Sheet and Solvency Test (continued)

**VALUATION BALANCE SHEET
SHOWING THE PRESENT AND PROSPECTIVE ASSETS AND LIABILITIES OF
THE PUBLIC EMPLOYEES’ RETIREMENT ASSOCIATION OF COLORADO
AS OF DECEMBER 31, 2016**

DENVER PUBLIC SCHOOLS DIVISION

PRESENT AND PROSPECTIVE ASSETS		
Actuarial Value of Present Assets		\$ 3,220,935,045
Present value of future members’ contributions		472,882,597
Present value of future employer contributions		
Normal cost	\$ 244,931,946	
Unfunded actuarial accrued liability contributions	<u>1,025,495,392</u>	
Total prospective employer contributions		<u>\$ 1,270,427,338</u>
Total Present and Prospective Assets		<u>\$ 4,964,244,980</u>
ACTUARIAL LIABILITIES		
Present value of benefits payable on account of retired members and survivors of deceased members now drawing retirement benefits		
Retired members	\$ 2,871,234,799	
Survivors	<u>26,030,463</u>	
Total		\$ 2,897,265,262
Present value of prospective benefits payable on account of inactive members		102,501,828
Present value of prospective benefits payable on account of present active members:		
Service retirement benefits	\$ 1,621,167,715	
Disability retirement benefits	36,145,528	
Survivor benefits	15,659,951	
Separation benefits	<u>291,504,696</u>	
Total		<u>\$ 1,964,477,890</u>
Total Actuarial Liabilities		<u>\$ 4,964,244,980</u>



Schedule A – Valuation Balance Sheet and Solvency Test (continued)

**VALUATION BALANCE SHEET
SHOWING THE PRESENT AND PROSPECTIVE ASSETS AND LIABILITIES OF
THE PUBLIC EMPLOYEES’ RETIREMENT ASSOCIATION OF COLORADO
AS OF DECEMBER 31, 2016**

PERA HEALTH CARE TRUST FUND

PRESENT AND PROSPECTIVE ASSETS		
Actuarial Value of Present Assets		\$ 270,149,671
Present value of future members’ contributions		\$0
Present value of future employer contributions		
Normal cost	\$ 126,457,079	
Unfunded actuarial accrued liability contributions	<u>1,286,612,567</u>	
Total prospective employer contributions		<u>\$ 1,413,069,646</u>
Total Present and Prospective Assets		<u>\$ 1,683,219,317</u>
ACTUARIAL LIABILITIES		
Present value of benefits payable on account of present benefit recipients enrolled in PERA Care and receiving a health care subsidy pursuant to law		
Retired members	\$ 1,110,817,193	
Survivors	<u>5,233,426</u>	
Total		\$ 1,116,050,619
Present value of prospective benefits payable on account of eligible inactive members		36,963,965
Present value of prospective benefits payable on account of present active members:		
Service retirement benefits	\$ 472,562,453	
Disability retirement benefits	16,843,661	
Survivor benefits	1,518,402	
Separation benefits	<u>39,280,217</u>	
Total		<u>\$ 530,204,733</u>
Total Actuarial Liabilities		<u>\$ 1,683,219,317</u>



Schedule A – Valuation Balance Sheet and Solvency Test (continued)

**VALUATION BALANCE SHEET
SHOWING THE PRESENT AND PROSPECTIVE ASSETS AND LIABILITIES OF
THE PUBLIC EMPLOYEES’ RETIREMENT ASSOCIATION OF COLORADO
AS OF DECEMBER 31, 2016**

DPS HEALTH CARE TRUST FUND

PRESENT AND PROSPECTIVE ASSETS		
Actuarial Value of Present Assets		\$ 18,944,588
Present value of future members’ contributions		\$0
Present value of future employer contributions		
Normal cost	\$ 10,885,143	
Unfunded actuarial accrued liability contributions	<u>53,900,540</u>	
Total prospective employer contributions		<u>\$ 64,785,683</u>
Total Present and Prospective Assets		<u>\$ 83,730,271</u>
ACTUARIAL LIABILITIES		
Present value of benefits payable on account of present benefit recipients enrolled in PERA Care and receiving a health care subsidy pursuant to law		
Retired members	\$ 50,442,959	
Survivors	<u>0</u>	
Total		\$ 50,442,959
Present value of prospective benefits payable on account of deferred vested members		914,061
Present value of prospective benefits payable on account of present active members:		
Service retirement benefits	\$ 28,670,310	
Disability retirement benefits	1,181,911	
Survivor benefits	47,314	
Separation benefits	<u>2,473,716</u>	
Total		<u>\$ 32,373,251</u>
Total Actuarial Liabilities		<u>\$ 83,730,271</u>



Schedule A – Valuation Balance Sheet and Solvency Test (continued)

**SOLVENCY TEST
(\$ IN THOUSANDS)**

Aggregate Accrued Liabilities For*					Portion of Accrued Liabilities Covered by Valuation Assets		
Division	(1)	(2)	(3)	Valuation Assets	(1)	(2)	(3)
	Active Member Contributions	Retirees, Survivors and Inactive Members	Active Members (Employer Financed Portion)				
By Division as of December 31, 2016							
State	\$2,678,312	\$17,933,227	\$5,058,377	\$14,026,332	100.0%	63.3%	0.0%
School	4,108,961	27,922,423	9,321,584	23,263,344	100.0%	68.6%	0.0%
Local	545,507	3,573,344	1,094,201	3,879,197	100.0%	93.3%	0.0%
Judicial	58,119	273,416	115,582	297,888	100.0%	87.7%	0.0%
DPS	402,849	2,999,767	843,814	3,220,935	100.0%	93.9%	0.0%
TOTAL	\$7,793,748	\$52,702,177	\$16,433,558	\$44,687,696	100.0%	70.0%	0.0%
Historical Totals							
Valuation Date							
12/31/2016	\$7,793,748	\$52,702,177	\$16,433,558	\$44,687,696	100.0%	70.0%	0.0%
12/31/2015	7,675,951	47,843,813	15,330,964	44,025,860	100.0%	76.0%	0.0%
12/31/2014	7,579,127	46,088,397	14,925,642	42,718,566	100.0%	76.2%	0.0%
12/31/2013	7,513,091	44,469,682	14,938,016	41,122,833	100.0%	75.6%	0.0%
12/31/2012	7,426,820	41,081,983	13,281,792	39,079,472	100.0%	77.0%	0.0%
12/31/2011	7,468,008	39,328,881	13,937,832	37,185,067	100.0%	75.6%	0.0%
12/31/2010	7,377,837	37,530,979	14,429,333	39,229,261	100.0%	84.9%	0.0%
12/31/2009	7,068,660	33,621,499	13,846,390	37,598,988	100.0%	90.8%	0.0%
12/31/2008	6,992,382	34,524,824	14,107,805	38,811,963	100.0%	92.2%	0.0%
12/31/2007	6,834,261	32,017,760	13,607,112	39,415,525	100.0%	100.0%	4.1%

* Results do not include the Health Care Trust Funds.



Schedule A – Valuation Balance Sheet and Solvency Test (continued)

**SOLVENCY TEST
(\$ IN THOUSANDS)**

Valuation Date	Aggregate Accrued Liabilities For				Portion of Accrued Liabilities Covered by Valuation Assets		
	(1) Active Member Contributions	(2) Retirees, Survivors and Inactive Members	(3) Active Members (Employer Financed Portion)	Valuation Assets	(1)	(2)	(3)
PERA Health Care Trust Fund							
12/31/2016	\$0	\$1,153,015	\$403,747	\$270,150	N/A	23.4%	0.0%
12/31/2015	0	1,099,045	457,224	285,588	N/A	26.0%	0.0%
12/31/2014	0	1,085,995	448,466	297,377	N/A	27.4%	0.0%
12/31/2013	0	1,092,438	464,968	293,556	N/A	26.9%	0.0%
12/31/2012	0	1,259,557	463,938	285,097	N/A	22.6%	0.0%
12/31/2011	0	1,251,579	459,211	282,228	N/A	22.5%	0.0%
12/31/2010	0	1,179,809	463,184	288,193	N/A	24.4%	0.0%
12/31/2009	0	1,241,349	521,892	260,341	N/A	21.0%	0.0%
12/31/2008	0	969,288	399,345	255,976	N/A	26.4%	0.0%
12/31/2007	0	926,180	377,414	258,775	N/A	27.9%	0.0%
DPS Health Care Trust Fund							
12/31/2016	\$0	\$51,357	\$21,488	\$18,945	N/A	36.9%	0.0%
12/31/2015	0	49,891	25,006	17,557	N/A	35.2%	0.0%
12/31/2014	0	50,998	25,028	16,502	N/A	32.4%	0.0%
12/31/2013	0	52,106	24,530	15,482	N/A	29.7%	0.0%
12/31/2012	0	54,727	22,942	14,443	N/A	26.4%	0.0%
12/31/2011	0	57,093	20,382	14,448	N/A	25.3%	0.0%
12/31/2010	0	58,432	20,081	14,086	N/A	24.1%	0.0%



Schedule B – Development of the Actuarial Value of Assets

**DEVELOPMENT OF THE DECEMBER 31, 2016
ACTUARIAL VALUE OF ASSETS**

STATE DIVISION

(1)	Actuarial Value Beginning of Year	\$ 13,882,819,694
(2)	Market Value End of Year	\$ 13,538,772,410
(3)	Market Value Beginning of Year	\$ 13,391,398,092
(4)	Cash Flow	
	a. Contributions	\$ 756,449,991
	b. Benefit Payments	(1,549,111,043)
	c. Other Additions	8,708,211
	d. Administrative Expenses	<u>(11,270,928)</u>
	e. Net Cash Flow: [(4)a + (4)b + (4)c + (4)d]	\$ (795,223,769)
(5)	Investment Income	
	a. Market total: (2) – (3) – (4)e	\$ 942,598,087
	b. Assumed Rate	7.50%
	c. Amount of Immediate Recognition [(3) x (5)b] + [(4)e x (5)b x 0.5]	\$ 974,533,966
	d. Amount for Phased-in Recognition: (5)a – (5)c	\$ (31,935,879)
(6)	Phased-In Recognition of Investment Income	
	a. Current Year: 0.25 x (5)d	\$ (7,983,970)
	b. First Prior Year	(201,968,870)
	c. Second Prior Year	(59,669,951)
	d. Third Prior Year	<u>233,824,896</u>
	e. Total Recognized Investment Loss	\$ (35,797,895)
(7)	Actuarial Value End of Year:	
	(1) + (4)e + (5)c + (6)e	\$ 14,026,331,996



Schedule B – Development of the Actuarial Value of Assets (continued)

**DEVELOPMENT OF THE DECEMBER 31, 2016
ACTUARIAL VALUE OF ASSETS**

SCHOOL DIVISION

(1)	Actuarial Value Beginning of Year	\$ 22,871,661,446
(2)	Market Value End of Year	\$ 22,465,387,820
(3)	Market Value Beginning of Year	\$ 22,062,123,913
(4)	Cash Flow	
	a. Contributions	\$ 1,181,312,995
	b. Benefit Payments	(2,318,086,171)
	c. Other Additions	108,774
	d. Administrative Expenses	<u>(21,990,705)</u>
	e. Net Cash Flow: [(4)a + (4)b + (4)c + (4)d]	\$ (1,158,655,107)
(5)	Investment Income	
	a. Market total: (2) – (3) – (4)e	\$ 1,561,919,014
	b. Assumed Rate	7.50%
	c. Amount of Immediate Recognition [(3) x (5)b] + [(4)e x (5)b x 0.5]	\$ 1,611,209,727
	d. Amount for Phased-in Recognition: (5)a – (5)c	\$ (49,290,713)
(6)	Phased-In Recognition of Investment Income	
	a. Current Year: 0.25 x (5)d	\$ (12,322,678)
	b. First Prior Year	(331,967,225)
	c. Second Prior Year	(97,053,617)
	d. Third Prior Year	<u>380,471,375</u>
	e. Total Recognized Investment Loss	\$ (60,872,145)
(7)	Actuarial Value End of Year: (1) + (4)e + (5)c + (6)e	\$ 23,263,343,921



Schedule B – Development of the Actuarial Value of Assets (continued)

**DEVELOPMENT OF THE DECEMBER 31, 2016
ACTUARIAL VALUE OF ASSETS**

LOCAL GOVERNMENT DIVISION

(1)	Actuarial Value Beginning of Year	\$	3,777,160,876
(2)	Market Value End of Year	\$	3,748,369,298
(3)	Market Value Beginning of Year	\$	3,639,914,028
(4)	Cash Flow		
	a. Contributions	\$	124,604,764
	b. Benefit Payments		(273,485,113)
	c. Other Additions		17,400
	d. Administrative Expenses		<u>(2,394,530)</u>
	e. Net Cash Flow: [(4)a + (4)b + (4)c + (4)d]	\$	(151,257,479)
(5)	Investment Income		
	a. Market total: (2) – (3) – (4)e	\$	259,712,749
	b. Assumed Rate		7.50%
	c. Amount of Immediate Recognition [(3) x (5)b] + [(4)e x (5)b x 0.5]	\$	267,321,397
	d. Amount for Phased-in Recognition: (5)a – (5)c	\$	(7,608,648)
(6)	Phased-In Recognition of Investment Income		
	a. Current Year: 0.25 x (5)d	\$	(1,902,162)
	b. First Prior Year		(54,559,593)
	c. Second Prior Year		(16,002,089)
	d. Third Prior Year		<u>58,436,107</u>
	e. Total Recognized Investment Loss	\$	(14,027,737)
(7)	Actuarial Value End of Year: (1) + (4)e + (5)c + (6)e	\$	3,879,197,057



Schedule B – Development of the Actuarial Value of Assets (continued)

**DEVELOPMENT OF THE DECEMBER 31, 2016
ACTUARIAL VALUE OF ASSETS**

JUDICIAL DIVISION

(1)	Actuarial Value Beginning of Year	\$	286,890,898
(2)	Market Value End of Year	\$	287,888,462
(3)	Market Value Beginning of Year	\$	276,563,143
(4)	Cash Flow		
	a. Contributions	\$	11,894,812
	b. Benefit Payments		(23,009,443)
	c. Other Additions		2,799,934
	d. Administrative Expenses		<u>(80,752)</u>
	e. Net Cash Flow: [(4)a + (4)b + (4)c + (4)d]	\$	(8,395,449)
(5)	Investment Income		
	a. Market total: (2) – (3) – (4)e	\$	19,720,768
	b. Assumed Rate		7.50%
	c. Amount of Immediate Recognition [(3) x (5)b] + [(4)e x (5)b x 0.5]	\$	20,427,406
	d. Amount for Phased-in Recognition: (5)a – (5)c	\$	(706,638)
(6)	Phased-In Recognition of Investment Income		
	a. Current Year: 0.25 x (5)d	\$	(176,660)
	b. First Prior Year		(4,132,541)
	c. Second Prior Year		(1,204,938)
	d. Third Prior Year		<u>4,479,748</u>
	e. Total Recognized Investment Loss	\$	(1,034,391)
(7)	Actuarial Value End of Year:		
	(1) + (4)e + (5)c + (6)e	\$	297,888,464



Schedule B – Development of the Actuarial Value of Assets (continued)

**DEVELOPMENT OF THE DECEMBER 31, 2016
ACTUARIAL VALUE OF ASSETS**

DENVER PUBLIC SCHOOLS DIVISION

(1)	Actuarial Value Beginning of Year	\$	3,207,326,956
(2)	Market Value End of Year	\$	3,108,232,941
(3)	Market Value Beginning of Year	\$	3,094,338,946
(4)	Cash Flow		
	a. Contributions	\$	68,237,482
	b. Benefit Payments		(272,199,954)
	c. Other Additions		3,264,082
	d. Administrative Expenses		<u>(2,754,331)</u>
	e. Net Cash Flow: [(4)a + (4)b + (4)c + (4)d]	\$	(203,452,721)
(5)	Investment Income		
	a. Market total: (2) – (3) – (4)e	\$	217,346,716
	b. Assumed Rate		7.50%
	c. Amount of Immediate Recognition [(3) x (5)b] + [(4)e x (5)b x 0.5]	\$	224,445,944
	d. Amount for Phased-in Recognition: (5)a – (5)c	\$	(7,099,228)
(6)	Phased-In Recognition of Investment Income		
	a. Current Year: 0.25 x (5)d	\$	(1,774,807)
	b. First Prior Year		(46,781,861)
	c. Second Prior Year		(13,813,961)
	d. Third Prior Year		<u>54,985,495</u>
	e. Total Recognized Investment Loss	\$	(7,385,134)
(7)	Actuarial Value End of Year:		
	(1) + (4)e + (5)c + (6)e	\$	3,220,935,045



Schedule B – Development of the Actuarial Value of Assets (continued)

**DEVELOPMENT OF THE DECEMBER 31, 2016
ACTUARIAL VALUE OF ASSETS**

PERA HEALTH CARE TRUST FUND

(1)	Actuarial Value Beginning of Year	\$	285,588,114
(2)	Market Value End of Year	\$	260,228,470
(3)	Market Value Beginning of Year	\$	276,504,907
(4)	Cash Flow		
	a. Contributions	\$	225,555,825
	b. Benefit Payments		(243,662,183)
	c. Other Additions		2,465,612
	d. Administrative Expenses		<u>(19,657,034)</u>
	e. Net Cash Flow: [(4)a + (4)b + (4)c + (4)d]	\$	(35,297,780)
(5)	Investment Income		
	a. Market total: (2) – (3) – (4)e	\$	19,021,343
	b. Assumed Rate		7.50%
	c. Amount of Immediate Recognition [(3) x (5)b] + [(4)e x (5)b x 0.5]	\$	19,414,201
	d. Amount for Phased-in Recognition: (5)a – (5)c	\$	(392,858)
(6)	Phased-In Recognition of Investment Income		
	a. Current Year: 0.25 x (5)d	\$	(98,215)
	b. First Prior Year		(4,247,768)
	c. Second Prior Year		(1,131,023)
	d. Third Prior Year		<u>5,922,142</u>
	e. Total Recognized Investment Gain	\$	445,136
(7)	Actuarial Value End of Year: (1) + (4)e + (5)c + (6)e	\$	270,149,671



Schedule B – Development of the Actuarial Value of Assets (continued)

**DEVELOPMENT OF THE DECEMBER 31, 2016
ACTUARIAL VALUE OF ASSETS**

DPS HEALTH CARE TRUST FUND

(1)	Actuarial Value Beginning of Year	\$	17,557,168
(2)	Market Value End of Year	\$	18,337,228
(3)	Market Value Beginning of Year	\$	16,935,520
(4)	Cash Flow		
	a. Contributions	\$	13,589,252
	b. Benefit Payments		(12,748,161)
	c. Other Additions		160,996
	d. Administrative Expenses		<u>(835,712)</u>
	e. Net Cash Flow: [(4)a + (4)b + (4)c + (4)d]	\$	166,375
(5)	Investment Income		
	a. Market total: (2) – (3) – (4)e	\$	1,235,333
	b. Assumed Rate		7.50%
	c. Amount of Immediate Recognition [(3) x (5)b] + [(4)e x (5)b x 0.5]	\$	1,276,403
	d. Amount for Phased-in Recognition: (5)a – (5)c	\$	(41,070)
(6)	Phased-In Recognition of Investment Income		
	a. Current Year: 0.25 x (5)d	\$	(10,268)
	b. First Prior Year		(252,537)
	c. Second Prior Year		(71,484)
	d. Third Prior Year		<u>278,931</u>
	e. Total Recognized Investment Loss	\$	(55,358)
(7)	Actuarial Value End of Year: (1) + (4)e + (5)c + (6)e	\$	18,944,588



Schedule C – Summary of Changes in Net Assets

SUMMARY OF CHANGES IN NET ASSETS FOR THE YEAR ENDING DECEMBER 31, 2016

STATE DIVISION

Additions for the Year

Contributions:		
Members (including purchased service)	\$ 247,483,616	
Employers	<u>508,966,375</u>	
Total		\$ 756,449,991
Other Additions		8,708,211
Net Investment Income		<u>942,598,087</u>
TOTAL		\$ 1,707,756,289

Deductions for the Year

Benefit Payments (including refunds and disability insurance)	\$ 1,546,071,391	
Other deductions	3,039,652	
Administrative Expenses	<u>11,270,928</u>	
TOTAL		\$ <u>1,560,381,971</u>

Excess of Additions Over Deductions \$ 147,374,318

Reconciliation of Asset Balances

Market Value of Assets as of 12/31/2015	\$ 13,391,398,092
Excess of Additions over Deductions	<u>147,374,318</u>
Market Value of Assets as of 12/31/2016*	<u>\$ 13,538,772,410</u>

* The Market Value of Assets shown above is used in the determination of the Actuarial Value of Assets (Schedule B). Final Market Value of Assets is \$13,626,179,667 and includes the amount in the Annual Increase Reserve of \$87,407,257 for post-retirement benefit increases for members of the PERA Benefit Structure hired on or after January 1, 2007.



Schedule C – Summary of Changes in Net Assets (continued)

**SUMMARY OF CHANGES IN NET ASSETS
FOR THE YEAR ENDING DECEMBER 31, 2016**

SCHOOL DIVISION

Additions for the Year

Contributions:		
Members (including purchased service)	\$ 386,440,700	
Employers	<u>794,872,295</u>	
Total		\$ 1,181,312,995
Other Additions		108,774
Net Investment Income		<u>1,561,919,014</u>
TOTAL		\$ 2,743,340,783

Deductions for the Year

Benefit Payments (including refunds and disability insurance)	\$ 2,300,643,034	
Other deductions	17,443,137	
Administrative Expenses	<u>21,990,705</u>	
TOTAL		\$ <u>2,340,076,876</u>

Excess of Additions Over Deductions \$ 403,263,907

Reconciliation of Asset Balances

Market Value of Assets as of 12/31/2015	\$ 22,062,123,913
Excess of Additions over Deductions	<u>403,263,907</u>
Market Value of Assets as of 12/31/2016*	<u>\$ 22,465,387,820</u>

* The Market Value of Assets shown above is used in the determination of the Actuarial Value of Assets (Schedule B). Final Market Value of Assets is \$22,581,046,104 and includes the amount in the Annual Increase Reserve of \$115,658,284 for post-retirement benefit increases for members of the PERA Benefit Structure hired on or after January 1, 2007.



Schedule C – Summary of Changes in Net Assets (continued)

**SUMMARY OF CHANGES IN NET ASSETS
FOR THE YEAR ENDING DECEMBER 31, 2016**

LOCAL GOVERNMENT DIVISION

Additions for the Year

Contributions:		
Members (including purchased service)	\$ 52,442,222	
Employers	<u>72,162,542</u>	
Total		\$ 124,604,764
Other Additions		17,400
Net Investment Income		<u>259,712,749</u>
TOTAL		\$ 384,334,913

Deductions for the Year

Benefit Payments (including refunds and disability insurance)	\$ 272,345,210	
Other deductions	1,139,903	
Administrative Expenses	<u>2,394,530</u>	
TOTAL		\$ <u>275,879,643</u>

Excess of Additions Over Deductions \$ 108,455,270

Reconciliation of Asset Balances

Market Value of Assets as of 12/31/2015	\$ 3,639,914,028
Excess of Additions over Deductions	<u>108,455,270</u>
Market Value of Assets as of 12/31/2016*	<u>\$ 3,748,369,298</u>

* The Market Value of Assets shown above is used in the determination of the Actuarial Value of Assets (Schedule B). Final Market Value of Assets is \$3,773,505,762 and includes the amount in the Annual Increase Reserve of \$25,136,464 for post-retirement benefit increases for members of the PERA Benefit Structure hired on or after January 1, 2007.



Schedule C – Summary of Changes in Net Assets (continued)

**SUMMARY OF CHANGES IN NET ASSETS
FOR THE YEAR ENDING DECEMBER 31, 2016**

JUDICIAL DIVISION

Additions for the Year

Contributions:		
Members (including purchase service)	\$ 4,034,847	
Employers	<u>7,859,965</u>	
Total		\$ 11,894,812
Other Additions		2,799,934
Net Investment Income		<u>19,720,768</u>
TOTAL		\$ 34,415,514

Deductions for the Year

Benefit Payments (including refunds and disability insurance)	\$ 22,887,276	
Other deductions	122,167	
Administrative Expenses	<u>80,752</u>	
TOTAL		\$ <u>23,090,195</u>

Excess of Additions Over Deductions \$ 11,325,319

Reconciliation of Asset Balances

Market Value of Assets as of 12/31/2015	\$ 276,563,143
Excess of Additions over Deductions	<u>11,325,319</u>
Market Value of Assets as of 12/31/2016*	<u>\$ 287,888,462</u>

* The Market Value of Assets shown above is used in the determination of the Actuarial Value of Assets (Schedule B). Final Market Value of Assets is \$288,904,246 and includes the amount in the Annual Increase Reserve of \$1,015,784 for post-retirement benefit increases for members of the PERA Benefit Structure hired on or after January 1, 2007.



Schedule C – Summary of Changes in Net Assets (continued)

**SUMMARY OF CHANGES IN NET ASSETS
FOR THE YEAR ENDING DECEMBER 31, 2016**

DENVER PUBLIC SCHOOLS DIVISION

Additions for the Year

Contributions:		
Members (including purchase service)	\$ 54,851,858	
Employers	<u>13,385,624</u>	
Total		\$ 68,237,482
Other Additions		3,264,082
Net Investment Income		<u>217,346,716</u>
TOTAL		\$ 288,848,280

Deductions for the Year

Benefit Payments (including refunds and disability insurance)	\$ 272,070,933	
Other deductions	129,021	
Administrative Expenses	<u>2,754,331</u>	
TOTAL		\$ <u>274,954,285</u>

Excess of Additions Over Deductions \$ 13,893,995

Reconciliation of Asset Balances

Market Value of Assets as of 12/31/2015	\$ 3,094,338,946
Excess of Additions over Deductions	<u>13,893,995</u>
Market Value of Assets as of 12/31/2016*	<u>\$ 3,108,232,941</u>

* The Market Value of Assets shown above is used in the determination of the Actuarial Value of Assets (Schedule B). Final Market Value of Assets is \$3,125,977,298 and includes the amount in the Annual Increase Reserve of \$17,744,357 for post-retirement benefit increases for those who became members of the PERA Benefit Structure on or after January 1, 2010.



Schedule C – Summary of Changes in Net Assets (continued)

**SUMMARY OF CHANGES IN NET ASSETS
FOR THE YEAR ENDING DECEMBER 31, 2016**

PERA HEALTH CARE TRUST FUND

Additions for the Year

Contributions:		
Members' Purchased Service Transfer	\$	6,709,879
Employers		80,825,145
Retiree Health Care Premiums		<u>138,020,801</u>
Total		\$ 225,555,825
Other Additions		2,465,612
Net Investment Income		<u>19,021,343</u>
TOTAL		\$ 247,042,780

Deductions for the Year

Benefit Payments	\$	243,662,183
Administrative Expenses		<u>19,657,034</u>
TOTAL		\$ <u>263,319,217</u>

Excess of Additions Over Deductions \$ (16,276,437)

Reconciliation of Asset Balances

Market Value of Assets as of 12/31/2015	\$	276,504,907
Excess of Additions over Deductions		<u>(16,276,437)</u>
Market Value of Assets as of 12/31/2016	\$	<u>260,228,470</u>



Schedule C – Summary of Changes in Net Assets (continued)

**SUMMARY OF CHANGES IN NET ASSETS
FOR THE YEAR ENDING DECEMBER 31, 2016**

DPS HEALTH CARE TRUST FUND

Additions for the Year

Contributions:		
Members' Purchased Service Transfer	\$ 128,268	
Employers	6,722,556	
Retiree Health Care Premiums	<u>6,738,428</u>	
Total		\$ 13,589,252
Other Additions		160,996
Net Investment Income		<u>1,235,333</u>
TOTAL		\$ 14,985,581

Deductions for the Year

Benefit Payments	\$ 12,748,161	
Administrative Expenses	<u>835,712</u>	
TOTAL		\$ <u>13,583,873</u>

Excess of Additions Over Deductions \$ 1,401,708

Reconciliation of Asset Balances

Market Value of Assets as of 12/31/2015	\$ 16,935,520
Excess of Additions over Deductions	<u>1,401,708</u>
Market Value of Assets as of 12/31/2016	\$ <u>18,337,228</u>



Schedule D – UAAL Amortization Schedules

**UAAL AMORTIZATION SCHEDULE
STATE DIVISION
(\$ IN THOUSANDS)**

Description	Original Balance	Outstanding Balance as of 12/31/2015	1/1/2016 Amortization Payment	Outstanding Balance as of 12/31/2016	1/1/2017 Amortization Payment	Amortization Period as of 12/31/2016
December 31, 2014 Legacy UAAL	\$9,884,833	\$10,086,082	\$543,423	\$10,279,105	\$590,015	28 Years
December 31, 2015 Contribution Deficiency	116,762	116,762	6,460	118,822	6,820	28 Years
December 31, 2015 UAAL Base*	7	7	0	8	1	29 Years
December 31, 2016 Contribution Deficiency	94,394	N/A	N/A	94,394	5,418	28 Years
December 31, 2016 UAAL Base	1,151,255	N/A	N/A	1,151,255	63,527	30 Years
Total		\$10,202,851	\$549,883	\$11,643,584	\$665,781	
Projected Payroll			\$2,773,139		\$2,835,204	
Total as a Percentage of Projected Payroll			19.83%		23.48%	

* The 1/1/2016 amortization payment rounds to zero.

According to the Funding Policy, each year the Contribution Deficiency/(Surplus) will increase (or decrease) the existing Legacy UAAL as of December 31, 2014 and will be amortized by the remaining period of the initial 30-year period from the date of the valuation.

Prior to January 1, 2017, the UAAL amortization payment for the State Division reflects an adjustment for the impact of AED and SAED contributions received from employers on the estimated pensionable payroll of employees electing to participate in the defined contribution plan.



Schedule D – UAAL Amortization Schedules (continued)

**UAAL AMORTIZATION SCHEDULE
SCHOOL DIVISION
(\$ IN THOUSANDS)**

Description	Original Balance	Outstanding Balance as of 12/31/2015	1/1/2016 Amortization Payment	Outstanding Balance as of 12/31/2016	1/1/2017 Amortization Payment	Amortization Period as of 12/31/2016
December 31, 2014 Legacy UAAL	\$14,243,176	\$14,510,329	\$802,768	\$14,766,276	\$847,577	28 Years
December 31, 2015 Contribution Deficiency	187,761	187,761	10,388	191,073	10,967	28 Years
December 31, 2015 UAAL Base	107,402	107,402	5,826	109,417	6,155	29 Years
December 31, 2016 Contribution Deficiency	172,767	N/A	N/A	172,767	9,917	28 Years
December 31, 2016 UAAL Base	2,850,091	N/A	N/A	2,850,091	157,270	30 Years
Total		\$14,805,492	\$818,982	\$18,089,624	\$1,031,886	
Projected Payroll			\$4,466,391		\$4,569,303	
Total as a Percentage of Projected Payroll			18.34%		22.58%	

According to the Funding Policy, each year the Contribution Deficiency/(Surplus) will increase (or decrease) the existing Legacy UAAL as of December 31, 2014 and will be amortized by the remaining period of the initial 30-year period from the date of the valuation.



Schedule D – UAAL Amortization Schedules (continued)

**UAAL AMORTIZATION SCHEDULE
LOCAL GOVERNMENT DIVISION
(\$ IN THOUSANDS)**

Description	Original Balance	Outstanding Balance as of 12/31/2015	1/1/2016 Amortization Payment	Outstanding Balance as of 12/31/2016	1/1/2017 Amortization Payment	Amortization Period as of 12/31/2016
December 31, 2014 Legacy UAAL	\$981,567	\$999,978	\$55,323	\$1,017,617	\$58,411	28 Years
December 31, 2015 Contribution Deficiency	8,412	8,412	465	8,560	491	28 Years
December 31, 2015 UAAL Base	(4,853)	(4,853)	(263)	(4,944)	(278)	29 Years
December 31, 2016 Contribution Deficiency	924	N/A	N/A	924	53	28 Years
December 31, 2016 UAAL Base	311,698	N/A	N/A	311,698	17,200	30 Years
Total		\$1,003,537	\$55,525	\$1,333,855	\$75,877	
Projected Payroll			\$590,171		\$636,963	
Total as a Percentage of Projected Payroll			9.41%		11.91%	

According to the Funding Policy, each year the Contribution Deficiency/(Surplus) will increase (or decrease) the existing Legacy UAAL as of December 31, 2014 and will be amortized by the remaining period of the initial 30-year period from the date of the valuation.



Schedule D – UAAL Amortization Schedules (continued)

**UAAL AMORTIZATION SCHEDULE
JUDICIAL DIVISION
(\$ IN THOUSANDS)**

Description	Original Balance	Outstanding Balance as of 12/31/2015	1/1/2016 Amortization Payment	Outstanding Balance as of 12/31/2016	1/1/2017 Amortization Payment	Amortization Period as of 12/31/2016
December 31, 2014 Legacy UAAL	\$100,387	\$102,270	\$5,658	\$104,074	\$5,974	28 Years
December 31, 2015 Contribution Deficiency	2,562	2,562	142	2,607	150	28 Years
December 31, 2015 UAAL Base	10,243	10,243	556	10,435	587	29 Years
December 31, 2016 Contribution Deficiency	2,963	N/A	N/A	2,963	170	28 Years
December 31, 2016 UAAL Base	29,150	N/A	N/A	29,150	1,608	30 Years
Total		\$115,075	\$6,356	\$149,229	\$8,489	
Projected Payroll			\$48,939		\$50,661	
Total as a Percentage of Projected Payroll			12.99%		16.76%	

According to the Funding Policy, each year the Contribution Deficiency/(Surplus) will increase (or decrease) the existing Legacy UAAL as of December 31, 2014 and will be amortized by the remaining period of the initial 30-year period from the date of the valuation.



Schedule D – UAAL Amortization Schedules (continued)

**UAAL AMORTIZATION SCHEDULE
DENVER PUBLIC SCHOOLS DIVISION
(\$ IN THOUSANDS)**

Description	Original Balance	Outstanding Balance as of 12/31/2015	1/1/2016 Amortization Payment	Outstanding Balance as of 12/31/2016	1/1/2017 Amortization Payment	Amortization Period as of 12/31/2016
December 31, 2014 Legacy UAAL	\$664,637	\$677,103	\$37,460	\$689,047	\$39,551	28 Years
December 31, 2015 Contribution Deficiency	65,469	65,469	3,622	66,624	3,824	28 Years
December 31, 2015 UAAL Base	(44,659)	(44,659)	(2,423)	(45,497)	(2,559)	29 Years
December 31, 2016 Contribution Deficiency	54,386	N/A	N/A	54,386	3,122	28 Years
December 31, 2016 UAAL Base	260,935	N/A	N/A	260,935	14,398	30 Years
Total		\$697,913	\$38,659	\$1,025,495	\$58,336	
Projected Payroll			\$657,812		\$677,613	
Total as a Percentage of Projected Payroll			5.88%		8.61%	

According to the Funding Policy, each year the Contribution Deficiency/(Surplus) will increase (or decrease) the existing Legacy UAAL as of December 31, 2014 and will amortized by the remaining period of the initial 30-year period from the date of the valuation.



Schedule D – UAAL Amortization Schedules (continued)

**UAAL AMORTIZATION SCHEDULE
PERA Health Care Trust Fund
(\$ IN THOUSANDS)**

Description	Original Balance	Outstanding Balance as of 12/31/2015	1/1/2016 Amortization Payment	Outstanding Balance as of 12/31/2016	1/1/2017 Amortization Payment	Amortization Period as of 12/31/2016
December 31, 2016 UAAL	\$1,286,612	N/A	N/A	\$1,286,612	\$70,996	30 Years
Total		N/A	N/A	\$1,286,612	\$70,996	
Projected Payroll			N/A		\$8,092,131	
Total as a Percentage of Projected Payroll			N/A		0.88%	

For informational purposes. This schedule will adapt, as necessary, to recognize any changes that may be made to the funding policy of the PERA HCTF as a result of the implementation of GASB 74 (first disclosure date of December 31, 2017).



Schedule D – UAAL Amortization Schedules (continued)

**UAAL AMORTIZATION SCHEDULE
DPS Health Care Trust Fund
(\$ IN THOUSANDS)**

Description	Original Balance	Outstanding Balance as of 12/31/2015	1/1/2016 Amortization Payment	Outstanding Balance as of 12/31/2016	1/1/2017 Amortization Payment	Amortization Period as of 12/31/2016
December 31, 2016 UAAL	\$53,900	N/A	N/A	\$53,900	\$2,974	30 Years
Total		N/A	N/A	\$53,900	\$2,974	
Projected Payroll			N/A		\$677,613	
Total as a Percentage of Projected Payroll			N/A		0.44%	

For informational purposes. This schedule will adapt, as necessary, to recognize any changes that may be made to the funding policy of the DPS HCTF as a result of the implementation of GASB 74 (first disclosure date of December 31, 2017).



Schedule E – Outline of Actuarial Assumptions and Methods

INVESTMENT RATE OF RETURN: 7.25% per annum, compounded annually (net of investment expenses only).

PRICE INFLATION ASSUMPTION: 2.40% per year.

WAGE INFLATION ASSUMPTION: 3.50% per year.

PERCENT MARRIED: 100% of active members (80% of Denver Public Schools Division) are assumed to be married, with the wife 2 years younger than the husband.

ACTUARIAL METHOD: Entry age normal cost method. Actuarial gains and losses are reflected in the unfunded actuarial accrued liability. See Schedule F for a detailed explanation.

ASSETS: The method of valuing assets is intended to recognize a “smoothed” market value of assets. Under this method, the difference between actual return on market value from investment experience and the expected return on market value is recognized over a four-year period.

INTEREST CREDIT: 3.00% per annum on member contribution account balances.

POST-RETIREMENT BENEFIT INCREASES: 2.00% per year for members of the DPS Benefit Structure or members of the PERA Benefit Structure with membership prior to 1/1/07; Members of the PERA Benefit Structure with membership after 12/31/06 paid from the AIR. In the determination of the Actuarially Determined Contribution rate, as a percentage of payroll, the AIR balance is excluded from both assets and liabilities.

WITHDRAWAL ASSUMPTION: It was assumed that 35% of the vested members who terminate elect to withdraw their contributions and matching employer contributions while the remaining 65% elect to leave their contributions in the plan in order to be eligible for a benefit at their retirement date. The only exception to this is the Judicial Division, which assumes 100% elect to leave their contributions in the plan in order to be eligible for a benefit at their retirement date. Current active members assumed to terminate service and leave their contributions in the plan in order to be eligible for a benefit at their retirement date are assumed to retire with a reduced benefit, if applicable, at an age based upon benefit structure, division, and/or service as shown in the following table:

Assumed Age of Initial Benefit Receipt	Benefit Structure, Division, and/or Service
50	PERA Benefit Structure Members (excluding Troopers) with 25 or More Years of Service
50	Troopers with 20 or More Years of Service
55	PERA Benefit Structure Members (excluding Troopers) with 20–25 Years of Service
60	PERA Benefit Structure Members with Less than 20 Years of Service
65	DPS Benefit Structure Members



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

INACTIVE MEMBERS: It was assumed that 100% of inactive members who terminated employment with less than five years of service elect to withdraw their contributions. Current inactive members in the PERA Benefit Structure who are assumed to leave their contributions in the plan in order to be eligible for a benefit at their retirement date are assumed to retire at age 62 with an unreduced pension benefit. Current inactive members in the DPS Benefit Structure who are assumed to leave their contributions in the plan in order to be eligible for a benefit at their retirement date are assumed to retire at age 65 with an unreduced pension benefit. For PERACare subsidies, the assumed age of initial benefit receipt is determined using the same approach used for terminating active members.

DEATH AFTER RETIREMENT: These assumptions are used to measure the probabilities of each benefit payment being made after retirement. Mortality improvement is anticipated under these assumptions, as recent mortality experience shows actual deaths 10-14 percent greater than expected under the selected tables.

For the State and Local Government Divisions, the mortality table, for post-retirement healthy mortality, used in evaluating allowances to be paid is the RP-2014 Healthy Annuitant Mortality Table with adjustments for credibility and gender adjustments of a 73 percent factor applied to the rates for ages below 80 and a 108 percent factor applied to the rates for ages 80 and above, projected to 2018 using the MP-2015 projection scale, for males, and a 78 percent factor applied to the rates for ages below 80 and a 109 percent factor applied to the rates for ages 80 and above, projected to 2020 using the MP-2015 projection scale, for females.

For the School, Judicial, and DPS Divisions, the mortality table, for post-retirement healthy mortality, used in evaluating allowances to be paid is the RP-2014 White Collar Healthy Annuitant Mortality Table with adjustments for credibility and gender adjustments of a 93 percent factor applied to the rates for ages below 80 and a 113 percent factor applied to the rates for ages 80 and above, projected to 2018 using the MP-2015 projection scale, for males, and a 68 percent factor applied to the rates for ages below 80 and a 106 percent factor applied to the rates for ages 80 and above, projected to 2020 using the MP-2015 projection scale, for females.

For all disabled retirees, the RP-2014 Disabled Retiree Mortality Table, incorporating a 90 percent factor to both male rates and female rates was used for the period after disability retirement.

For future benefit recipients, the mortality assumption used to determine the factors for money purchase benefits, reduced service benefits for members who were not eligible to retire as of January 1, 2011, and cobeneficiary payment options is based upon the collective experience of all PERA divisions. For male rates, the RP-2014 Healthy Annuitant Mortality Table with adjustments for credibility and a 79 percent factor applied to the rates for ages below 80 and a 111 percent factor applied to the rates for ages 80 and above, projected to 2018 using the MP-2015 projection scale is assumed. For female rates, the RP-2014 White Collar Healthy Annuitant Mortality Table with adjustments for credibility and a 78 percent factor applied to the rates for ages below 80 and a 102 percent factor applied to the rates for ages 80 and above, projected to 2019 using the MP-2015 projection scale is assumed. Unisex factors are then developed using a male/female blend based upon factor type, benefit tier, and/or benefit structure.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

**STATE DIVISION
NON-TROOPERS**

SALARY INCREASES: Representative values of the assumed annual rates of future salary increases are as follows and include wage inflation 3.50% per annum:

Sample Ages	Pay Increase Assumptions for an Individual Member		
	Merit & Seniority	Inflation & Productivity (Economy)	Total Increase (Next Year)
20	5.67%	3.50%	9.17%
25	3.75	3.50	7.25
30	2.80	3.50	6.30
35	2.05	3.50	5.55
40	1.50	3.50	5.00
45	0.85	3.50	4.35
50	0.50	3.50	4.00
55	0.10	3.50	3.60
60	0.00	3.50	3.50
65	0.00	3.50	3.50
70	0.00	3.50	3.50

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed annual rates of termination, death and disability are shown in the following tables:

Sample Ages	Percent of Members Separating Within the Next Year					
	Ultimate Termination		Death ¹		Disability	
	Males	Females	Males	Females	Males	Females
20	30.00%	20.00%	0.0199%	0.0075%	0.01%	0.01%
25	10.00	14.50	0.0237	0.0080	0.01	0.01
30	7.00	10.00	0.0222	0.0101	0.01	0.01
35	6.00	7.50	0.0257	0.0133	0.03	0.03
40	5.00	6.75	0.0308	0.0184	0.05	0.05
45	4.25	5.50	0.0477	0.0305	0.09	0.09
50	4.25	5.25	0.0827	0.0512	0.20	0.20
55	4.25	5.25	0.1369	0.0777	0.27	0.27
60	4.25	5.25	0.2302	0.1133	0.30	0.30
65	4.25	5.25	0.4064	0.1715	0.30	0.30
70	4.25	5.25	0.7195	0.2988	0.30	0.30

¹Rates are shown for active members. Separate tables are used for post-retirement mortality.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

**STATE DIVISION
NON-TROOPERS**

The select termination assumptions for members with less than five years of service are shown in the following table:

Completed Years of Service	Males	Females
0	41.50%	41.50%
1	20.50	21.50
2	14.50	16.00
3	11.50	13.00
4	9.50	11.50

RETIREMENT: Representative values of the assumed annual rates of service retirement are shown in the following table:

Retirement Ages	Percent of Members Who Are Eligible for Reduced Benefits Retiring Next Year		Percent of Members Who Are Eligible for Unreduced Benefits Retiring Next Year	
	Males	Females	Males	Females
50	9.5%	10.0%	60.0%	55.0%
51	9.5	10.0	50.0	40.0
52	9.5	10.0	42.0	36.0
53	9.5	10.0	38.0	34.0
54	9.5	10.0	32.0	26.0
55	9.5	10.0	25.0	25.0
56	9.5	10.0	20.0	24.0
57	9.5	10.0	20.0	20.0
58	9.5	10.0	18.0	18.0
59	9.5	10.0	20.0	18.0
60	9.5	10.0	20.0	21.0
61	9.5	10.0	18.0	18.0
62	9.5	10.0	22.0	19.0
63	9.5	10.0	20.0	19.0
64	9.5	10.0	20.0	19.0
65	0.0	0.0	24.0	22.0
66	0.0	0.0	26.0	26.0
67	0.0	0.0	25.0	24.0
68	0.0	0.0	22.0	25.0
69	0.0	0.0	22.0	24.0
70	0.0	0.0	25.0	25.0
71	0.0	0.0	25.0	25.0
72	0.0	0.0	25.0	25.0
73	0.0	0.0	25.0	25.0
74	0.0	0.0	25.0	25.0
75 & over	0.0	0.0	100.0	100.0



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

**STATE DIVISION
TROOPERS**

SALARY INCREASES: Representative values of the assumed annual rates of future salary increases are as follows and include wage inflation at 3.50% per annum:

Sample Ages	Pay Increase Assumptions for an Individual Member			Total Increase (Next Year)
	Merit & Seniority	Inflation & Productivity (Economy)		
20	5.50%	3.50%		9.00%
25	3.75	3.50		7.25
30	2.80	3.50		6.30
35	2.05	3.50		5.55
40	1.50	3.50		5.00
45	1.20	3.50		4.70
50	0.80	3.50		4.30
55	0.40	3.50		3.90
60	0.00	3.50		3.50
65	0.00	3.50		3.50
70	0.00	3.50		3.50

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed annual rates of termination, death and disability are shown in the following tables:

Sample Ages	Percent of Members Separating Within the Next Year					
	Ultimate Termination ¹		Death ²		Disability	
	Males	Females	Males	Females	Males	Females
20	8.00%	8.00%	0.0199%	0.0075%	0.01%	0.01%
25	6.00	6.00	0.0237	0.0080	0.02	0.02
30	4.00	4.00	0.0222	0.0101	0.04	0.04
35	3.75	3.75	0.0257	0.0133	0.06	0.06
40	3.00	3.00	0.0308	0.0184	0.10	0.10
45	3.00	3.00	0.0477	0.0305	0.25	0.25
50	3.00	3.00	0.0827	0.0512	0.30	0.30
55	3.00	3.00	0.1369	0.0777	0.30	0.30
60	3.00	3.00	0.2302	0.1133	0.30	0.30
65	3.00	3.00	0.4064	0.1715	0.30	0.30
70	3.00	3.00	0.7195	0.2988	0.30	0.30

¹There are no select termination assumptions for the State Troopers.

²Rates are shown for active members. Separate tables are used for post-retirement mortality.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

**STATE DIVISION
TROOPERS**

RETIREMENT: Representative values of the assumed annual rates of service retirement are shown in the following table:

Retirement Ages	Percent of Members Who Are Eligible for Reduced Benefits Retiring Next Year	Percent of Members Who Are Eligible for Unreduced Benefits Retiring Next Year
45		40.0%
46		40.0
47		40.0
48		40.0
49		40.0
50	10.0%	40.0
51	10.0	32.0
52	10.0	32.0
53	10.0	32.0
54	10.0	32.0
55	5.0	32.0
56	5.0	32.0
57	5.0	32.0
58	5.0	32.0
59	5.0	32.0
60	10.0	32.0
61	10.0	32.0
62	10.0	32.0
63	10.0	32.0
64	10.0	32.0
65 & over	0.0	100.0



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

SCHOOL DIVISION

SALARY INCREASES: Representative values of the assumed annual rates of future salary increases are as follows and include wage inflation at 3.50% per annum:

Sample Ages	Pay Increase Assumptions for an Individual Member			Total Increase (Next Year)
	Merit & Seniority	Inflation & Productivity (Economy)		
20	6.20%	3.50%		9.70%
25	4.10	3.50		7.60
30	2.95	3.50		6.45
35	2.50	3.50		6.00
40	1.95	3.50		5.45
45	1.35	3.50		4.85
50	0.80	3.50		4.30
55	0.35	3.50		3.85
60	0.00	3.50		3.50
65	0.00	3.50		3.50
70	0.00	3.50		3.50

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed annual rates of termination, death and disability are shown in the following tables:

Sample Ages	Percent of Members Separating Within the Next Year					
	Ultimate Termination		Death ¹		Disability	
	Males	Females	Males	Females	Males	Females
20	20.00%	14.50%	0.0199%	0.0075%	0.01%	0.01%
25	10.00	12.00	0.0237	0.0080	0.01	0.01
30	6.50	8.00	0.0222	0.0101	0.01	0.01
35	5.25	6.50	0.0257	0.0133	0.02	0.02
40	4.25	5.00	0.0308	0.0184	0.04	0.04
45	4.00	5.00	0.0477	0.0305	0.06	0.06
50	4.00	5.00	0.0827	0.0512	0.09	0.09
55	4.00	5.00	0.1369	0.0777	0.15	0.15
60	4.00	5.00	0.2302	0.1133	0.21	0.21
65	4.00	5.00	0.4064	0.1715	0.21	0.21
70	4.00	5.00	0.7195	0.2988	0.21	0.21

¹Rates are shown for active members. Separate tables are used for post-retirement mortality.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

SCHOOL DIVISION

The select termination assumptions for members with less than five years of service are shown in the following table:

Completed Years of Service	Males	Females
0	37.00%	34.00%
1	21.00	20.00
2	16.00	15.00
3	12.00	12.00
4	11.00	11.00

RETIREMENT: Representative values of the assumed annual rates of service retirement are shown in the following table:

Retirement Ages	Percent of Members Who Are Eligible for Reduced Benefits Retiring Next Year		Percent of Members Who Are Eligible for Unreduced Benefits Retiring Next Year	
	Males	Females	Males	Females
50	8.0%	8.0%	55.0%	60.0%
51	8.0	8.0	48.0	54.0
52	8.0	8.0	46.0	48.0
53	8.0	8.0	42.0	42.0
54	10.0	10.0	40.0	40.0
55	10.0	10.0	28.0	29.0
56	10.0	11.0	25.0	25.0
57	10.0	11.0	25.0	25.0
58	10.0	11.0	22.0	22.0
59	10.0	11.0	22.0	22.0
60	10.0	11.0	25.0	25.0
61	12.0	11.0	25.0	24.0
62	12.0	11.0	24.0	27.0
63	12.0	11.0	24.0	24.0
64	12.0	11.0	24.0	24.0
65	0.0	0.0	27.0	26.0
66	0.0	0.0	28.0	28.0
67	0.0	0.0	25.0	25.0
68	0.0	0.0	24.0	22.0
69	0.0	0.0	24.0	22.0
70	0.0	0.0	22.0	25.0
71	0.0	0.0	22.0	23.0
72	0.0	0.0	22.0	23.0
73	0.0	0.0	22.0	23.0
74	0.0	0.0	22.0	23.0
75 & over	0.0	0.0	100.0	100.0



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

LOCAL GOVERNMENT DIVISION

SALARY INCREASES: Representative values of the assumed annual rates of future salary increases are as follows and include wage inflation at 3.50% per annum:

Sample Ages	Pay Increase Assumptions for an Individual Member			Total Increase (Next Year)
	Merit & Seniority	Inflation & Productivity (Economy)		
20	6.95%	3.50%		10.45%
25	4.30	3.50		7.80
30	2.64	3.50		6.14
35	1.72	3.50		5.22
40	1.23	3.50		4.73
45	0.99	3.50		4.49
50	0.79	3.50		4.29
55	0.60	3.50		4.10
60	0.25	3.50		3.75
65	0.00	3.50		3.50
70	0.00	3.50		3.50

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed annual rates of termination, death and disability are shown in the following tables:

Sample Ages	Percent of Members Separating Within the Next Year					
	Ultimate Termination		Death ¹		Disability	
	Males	Females	Males	Females	Males	Females
20	13.00%	16.00%	0.0199%	0.0075%	0.01%	0.01%
25	12.00	16.00	0.0237	0.0080	0.01	0.01
30	8.00	11.00	0.0222	0.0101	0.01	0.01
35	6.00	9.00	0.0257	0.0133	0.03	0.03
40	5.25	6.50	0.0308	0.0184	0.04	0.04
45	4.50	6.50	0.0477	0.0305	0.11	0.11
50	4.50	6.00	0.0827	0.0512	0.15	0.15
55	4.50	6.00	0.1369	0.0777	0.17	0.17
60	4.50	6.00	0.2302	0.1133	0.25	0.25
65	4.50	6.00	0.4064	0.1715	0.25	0.25
70	4.50	6.00	0.7195	0.2988	0.25	0.25

¹Rates are shown for active members. Separate tables are used for post-retirement mortality.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

LOCAL GOVERNMENT DIVISION

The select termination assumptions for members with less than five years of service are shown in the following table:

Completed Years of Service	Males	Females
0	41.00%	39.00%
1	24.00	23.00
2	17.00	18.00
3	12.00	14.00
4	10.00	11.00

RETIREMENT: Representative values of the assumed annual rates of service retirement are shown in the following table:

Retirement Ages	Percent of Members Who Are Eligible for Reduced Benefits Retiring Next Year		Percent of Members Who Are Eligible for Unreduced Benefits Retiring Next Year	
	Males	Females	Males	Females
50	8.0%	9.0%	60.0%	60.0%
51	8.0	9.0	46.0	52.0
52	8.0	9.0	30.0	40.0
53	8.0	9.0	25.0	40.0
54	8.0	9.0	22.0	40.0
55	8.0	12.0	22.0	28.0
56	8.0	12.0	25.0	30.0
57	8.0	12.0	22.0	21.0
58	8.0	12.0	20.0	21.0
59	10.0	11.5	20.0	21.0
60	11.0	11.5	22.0	21.0
61	11.0	11.5	22.0	20.0
62	11.0	11.5	24.0	27.0
63	11.0	11.5	25.0	22.0
64	11.0	11.5	25.0	22.0
65	0.0	0.0	25.0	25.0
66	0.0	0.0	30.0	25.0
67	0.0	0.0	20.0	30.0
68	0.0	0.0	25.0	20.0
69	0.0	0.0	25.0	20.0
70	0.0	0.0	25.0	24.0
71	0.0	0.0	25.0	24.0
72	0.0	0.0	25.0	24.0
73	0.0	0.0	25.0	24.0
74	0.0	0.0	25.0	24.0
75 & over	0.0	0.0	100.0	100.0



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

JUDICIAL DIVISION

SALARY INCREASES: Representative values of the assumed annual rates of future salary increases are as follows and include wage inflation at 3.50% per annum:

Sample Ages	Pay Increase Assumptions for an Individual Member		
	Merit & Seniority	Inflation & Productivity (Economy)	Total Increase (Next Year)
30	1.50%	3.50%	5.00%
35	1.50	3.50	5.00
40	0.67	3.50	4.17
45	0.50	3.50	4.00
50	0.50	3.50	4.00
55	0.50	3.50	4.00
60	0.50	3.50	4.00
65	0.50	3.50	4.00
70	0.50	3.50	4.00

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed annual rates of termination, death and disability are shown in the following tables:

Sample Ages	Percent of Members Separating Within the Next Year					
	Termination ¹		Death ²		Disability	
	Males	Females	Males	Females	Males	Females
30	1.65%	1.65%	0.0222%	0.0101%	0.01%	0.01%
35	1.65	1.65	0.0257	0.0133	0.02	0.02
40	1.65	1.65	0.0308	0.0184	0.04	0.04
45	1.65	1.65	0.0477	0.0305	0.08	0.08
50	1.65	1.65	0.0827	0.0512	0.10	0.10
55	1.65	1.65	0.1369	0.0777	0.20	0.20
60	1.65	1.65	0.2302	0.1133	0.30	0.30
65	1.65	1.65	0.4064	0.1715	0.30	0.30
70	1.65	1.65	0.7195	0.2988	0.30	0.30

¹There are no select termination assumptions for the Judicial Division.

²Rates are shown for active members. Separate tables are used for post-retirement mortality.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

JUDICIAL DIVISION

RETIREMENT: Representative values of the assumed annual rates of service retirement are shown in the following table:

Retirement Ages	Percent of Members Who Are Eligible for Reduced Benefits Retiring Next Year	Percent of Members Who Are Eligible for Unreduced Benefits Retiring Next Year
50	6.0%	6.0%
51	6.0	6.0
52	6.0	6.0
53	6.0	6.0
54	6.0	6.0
55	6.0	6.0
56	6.0	6.0
57	6.0	6.0
58	6.0	6.0
59	6.0	6.0
60	8.0	8.0
61	8.0	8.0
62	8.0	8.0
63	8.0	8.0
64	8.0	8.0
65	0.0	15.0
66	0.0	15.0
67	0.0	15.0
68	0.0	15.0
69	0.0	15.0
70	0.0	40.0
71	0.0	40.0
72	0.0	40.0
73	0.0	40.0
74	0.0	40.0
75 & over	0.0	100.0



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

ALL DIVISIONS (DPS BENEFIT STRUCTURE)

SALARY INCREASES: Representative values of the assumed annual rates of future salary increases are as follows and include wage inflation at 3.50% per annum:

Sample Ages	Pay Increase Assumptions for an Individual Member		
	Merit & Seniority	Inflation & Productivity (Economy)	Total Increase (Next Year)
20	3.50%	3.50%	7.00%
25	3.50	3.50	7.00
30	3.20	3.50	6.70
35	2.76	3.50	6.26
40	2.12	3.50	5.62
45	1.34	3.50	4.84
50	0.80	3.50	4.30
55	0.42	3.50	3.92
60	0.20	3.50	3.70
65	0.00	3.50	3.50
70	0.00	3.50	3.50

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed annual rates of termination, death and disability are shown in the following tables:

Sample Ages	Percent of Members Separating Within the Next Year					
	Termination ¹		Death ²		Disability	
	Males	Females	Males	Females	Males	Females
20	8.00%	10.00%	0.0199%	0.0075%	0.01%	0.01%
25	8.00	10.00	0.0237	0.0080	0.01	0.01
30	7.00	9.00	0.0222	0.0101	0.01	0.01
35	7.00	8.00	0.0257	0.0133	0.02	0.02
40	5.75	6.50	0.0308	0.0184	0.05	0.05
45	5.00	4.50	0.0477	0.0305	0.09	0.09
50	4.50	4.50	0.0827	0.0512	0.20	0.20
55	4.25	4.50	0.1369	0.0777	0.24	0.24
60	4.25	4.50	0.2302	0.1133	0.38	0.38
65	4.25	4.50	0.4064	0.1715	0.40	0.40
70	4.25	4.50	0.7195	0.2988	0.40	0.40

¹There are no select termination assumptions for DPS.

²Rates are shown for active members. Separate tables are used for post-retirement mortality.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

ALL DIVISIONS (DPS BENEFIT STRUCTURE)

RETIREMENT: Representative values of the assumed annual rates of service retirement are shown in the following table:

Retirement Ages	Percent of Members Who Are Eligible for Reduced Benefits Retiring Next Year		Percent of Members Who Are Eligible for Unreduced Benefits Retiring Next Year	
	Males	Females	Males	Females
50	8.0%	5.0%	40.0%	40.0%
51	8.0	5.0	40.0	40.0
52	8.0	5.0	35.0	30.0
53	8.0	10.0	35.0	30.0
54	11.0	10.0	30.0	30.0
55	11.0	10.0	30.0	30.0
56	11.0	10.0	20.0	25.0
57	11.0	10.0	24.0	25.0
58	11.0	10.0	22.0	20.0
59	15.0	12.0	25.0	24.0
60	15.0	15.0	22.0	30.0
61	17.0	15.0	20.0	28.0
62	17.0	15.0	25.0	30.0
63	17.0	15.0	40.0	30.0
64	17.0	15.0	20.0	30.0
65	0.0	0.0	30.0	35.0
66	0.0	0.0	30.0	35.0
67	0.0	0.0	30.0	32.0
68	0.0	0.0	30.0	30.0
69	0.0	0.0	30.0	30.0
70	0.0	0.0	30.0	30.0
71	0.0	0.0	30.0	30.0
72	0.0	0.0	30.0	30.0
73	0.0	0.0	30.0	30.0
74	0.0	0.0	30.0	30.0
75 & over	0.0	0.0	100.0	100.0



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

SINGLE LIFE RETIREMENT VALUES AND RATES OF POST-RETIREMENT MORTALITY

Healthy Benefit Recipients								
State/Troopers/Local								
Sample Ages	Rates of Post-Retirement Mortality		Present Value of \$1.00 Monthly for Life		Present Value of \$1.00 Monthly Increasing 2.0% Annually		Future Life Expectancy (Years)	
	Males	Females	Males	Females	Males	Females	Males	Females
40	0.031%	0.018%	\$159.33	\$161.37	\$204.66	\$208.57	43.92	46.29
45	0.048	0.031	154.77	157.53	196.08	200.96	39.00	41.34
50	0.297	0.198	148.50	152.23	185.30	191.34	34.11	36.41
55	0.458	0.277	142.13	146.36	174.39	180.92	29.67	31.80
60	0.635	0.393	134.41	138.72	161.84	168.30	25.40	27.26
65	0.831	0.595	124.54	128.88	146.83	153.16	21.22	22.84
70	1.185	0.965	111.83	116.53	128.84	135.42	17.14	18.59
75	1.830	1.627	95.82	101.49	107.74	115.19	13.21	14.58
80	3.824	3.123	76.84	84.09	84.36	93.22	9.59	10.92
85	7.940	6.061	59.12	66.51	63.54	72.11	6.77	7.89

Healthy Benefit Recipients								
School/DPS/Judges								
Sample Ages	Rates of Post-Retirement Mortality		Present Value of \$1.00 Monthly for Life		Present Value of \$1.00 Monthly Increasing 2.0% Annually		Future Life Expectancy (Years)	
	Males	Females	Males	Females	Males	Females	Males	Females
40	0.031%	0.018%	\$159.92	\$162.72	\$205.76	\$211.31	44.51	48.05
45	0.048	0.031	155.60	159.46	197.50	204.49	39.58	43.10
50	0.257	0.130	149.69	154.97	187.12	195.88	34.70	38.18
55	0.397	0.181	143.43	149.57	176.29	185.98	30.19	33.44
60	0.544	0.257	135.67	142.39	163.61	173.77	25.83	28.76
65	0.728	0.422	125.61	132.99	148.31	158.96	21.55	24.18
70	1.117	0.690	112.71	120.96	130.04	141.33	17.38	19.74
75	1.849	1.191	96.88	105.82	109.11	120.67	13.44	15.50
80	3.630	2.537	78.48	87.79	86.27	97.70	9.84	11.59
85	7.332	5.320	60.30	69.46	64.83	75.54	6.91	8.34



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

SINGLE LIFE RETIREMENT VALUES AND RATES OF POST-RETIREMENT MORTALITY

Disabled Retirees								
Sample Ages	Rates of Post-Retirement Mortality		Present Value of \$1.00 Monthly for Life		Present Value of \$1.00 Monthly Increasing 2.0% Annually		Future Life Expectancy (Years)	
	Males	Females	Males	Females	Males	Females	Males	Females
40	0.990%	0.491%	\$134.73	\$145.58	\$166.19	\$182.90	30.30	36.07
45	1.534	0.814	128.67	140.02	156.90	173.76	26.97	32.09
50	1.836	1.072	123.52	134.58	148.78	164.80	24.09	28.49
55	2.103	1.303	117.81	128.53	139.98	155.10	21.32	25.05
60	2.394	1.530	110.85	121.21	129.73	143.89	18.55	21.69
65	2.852	1.877	102.18	111.96	117.60	130.56	15.77	18.35
70	3.631	2.538	91.80	100.74	103.79	115.29	13.05	15.12
75	4.886	3.694	80.02	88.16	88.81	98.98	10.49	12.15
80	6.895	5.493	67.25	75.03	73.27	82.68	8.15	9.54
85	10.197	8.138	54.22	62.08	58.05	67.19	6.12	7.33

Factors for Money Purchase Benefits, Reduced Service Benefits, and Cobeneficiary Payment Options								
Sample Ages	Rates of Post-Retirement Mortality		Present Value of \$1.00 Monthly for Life		Present Value of \$1.00 Monthly Increasing 2.0% Annually		Future Life Expectancy (Years)	
	Males	Females	Males	Females	Males	Females	Males	Females
40	0.031%	0.018%	\$159.61	\$162.21	\$205.19	\$210.29	44.21	47.40
45	0.048	0.031	155.17	158.73	196.77	203.18	39.29	42.45
50	0.275	0.163	149.07	153.94	186.18	194.19	34.40	37.53
55	0.430	0.224	142.77	148.47	175.33	184.24	29.93	32.86
60	0.591	0.302	135.05	141.18	162.74	171.94	25.62	28.24
65	0.778	0.471	125.10	131.62	147.60	157.00	21.39	23.71
70	1.150	0.775	112.29	119.43	129.47	139.26	17.27	19.33
75	1.840	1.331	96.39	104.27	108.47	118.69	13.33	15.16
80	3.717	2.733	77.71	86.37	85.37	95.98	9.72	11.33
85	7.618	5.600	59.76	68.26	64.23	74.13	6.85	8.15



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

METHODS AND ASSUMPTIONS SPECIFIC TO THE PERA DIVISIONS, THE PERA BENEFIT STRUCTURE, AND THE PERA HEALTH CARE TRUST FUND

PERA Divisions Health Care Participation Rates

Current PERACare participants of the State, School (other than Denver Public Schools), Local Government, and the Judicial Divisions, are assumed to maintain their current health care benefit elections in perpetuity. For active members retiring directly from the State, School (other than Denver Public Schools), Local Government, and the Judicial Divisions, the following participation rates are assumed:

Attained Age(s)	Percent Electing Health Care Coverage
15-48	20%
49-50	25%
51-52	35%
53-55	40%
56-57	45%
58-61	50%
62-71	55%
72+	60%

The participation of current PERACare enrollees and members retiring directly from active service is adjusted to reflect the increasing rate of participation with age, as described in the above table.

For eligible inactive members of the State, School (other than Denver Public Schools), Local Government, or the Judicial Divisions, 25% are assumed to elect health care coverage upon commencement of their monthly pension benefit.

For spousal participation, actual census data and current plan elections of current benefit recipients were used. For spouses of eligible inactive members and future retirees of the State, School (other than Denver Public Schools), Local Government, or the Judicial Divisions, 20% are assumed to elect coverage for their spouse. For current and future retirees, 70% are assumed to elect a joint and survivor benefit payment form. The age difference between female retirees and covered male spouses is assumed to be 1 year and the age difference between male retirees and female spouses is assumed to be 3 years.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

PERA Benefit Structure Assumptions Specific to the “No Part A” Subsidy

Under Colorado Revised Statute 24-51-1206(4), the premiums charged to a PERACare enrollee who is age sixty-five or older and who is not eligible for premium-free benefits under Medicare Part A shall be no greater than the premium charged to a PERACare enrollee eligible for premium-free benefits under Medicare Part A with the same plan option, coverage level, and service credit. As a result, an additional, “No Part A” subsidy is paid under the PERA Benefit Structure on behalf of those PERACare enrollees who are age sixty-five or older and are not eligible for premium-free benefits under Medicare Part A.

For those current PERACare enrollees who are age 65 and older, the premium-free Medicare Part A eligibility status is provided by PERA and is assumed to be maintained in perpetuity. For current PERACare enrollees not yet age 65, hired prior to April 1, 1986, and not assumed eligible for premium-free Medicare Part A coverage through their spouse, and for those active employees hired prior to April 1, 1986, the following percentage of PERACare enrollees are assumed to not qualify for premium-free Medicare Part A benefits; thus qualifying for the “No Part A” subsidy from the PERA Benefit Structure:

Hire Age	Percent Qualifying for “No Part A” Subsidy
0-24	17%
25-29	11%
30+	4%

Of those PERACare enrollees assumed not qualify for premium-free Medicare Part A benefits and receive the “No Part A” subsidy from the PERA Benefit Structure, 10% are assumed to cover a spouse.

The qualifying assumptions are based upon the experience of current, Medicare eligible, PERACare enrollees. Date of hire and hire age are estimated based upon service and date of retirement for current benefit recipients, or service and the valuation date for active members. As a result, those who are re-employed or transfer to another PERA employer may have accumulated the required quarters of Medicare-covered employment.

90% of PERACare enrollees receiving health care benefits as a result of disability retirement are assumed to qualify for premium-free Medicare Part A. 100% of eligible inactive members enrolled in PERACare are assumed to obtain the 40 or more quarters of Medicare-covered employment required for premium-free Medicare Part A coverage as a result of their subsequent employment.

Currently, the additional plan costs or premiums associated with those PERACare enrollees not eligible for premium-free Medicare Part A coverage are less, in aggregate, than the costs of PERA paying the Medicare Part A premium on their behalf. However, future increases in the additional costs or premiums associated with PERACare enrollees not eligible for premium-free Medicare Part A coverage may, in aggregate, exceed the Medicare Part A premium. As a result, it is assumed PERA will make the decision to pay the Medicare Part A premium when more cost-effective to do so. In making the decision to pay the Medicare Part A premium, it is assumed PERA’s decision will be based upon the level of additional plan costs, include the premium penalties associated with late enrollment in Medicare Part A, and be made when the additional cost, averaged across all plans, for all PERACare enrollees, exceeds the Medicare Part A premium. The valuation assumes this will occur in the year 2030.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

PERA Benefit Structure Assumptions Specific to the “No Part A” Subsidy (continued)

The premium penalty associated with enrollment in Medicare Part A after initial eligibility is 10% of the Part A premium and is payable for a period that is twice as long as the delay in enrollment. For example, someone enrolling at age 70 would need to pay the premium penalty for 10 years, assuming initial eligibility at age 65.

PERA Benefit Structure Health Care Plan Election Rates

Medicare plan elections for future retirees of the State, School, Local Government, Judicial, and Denver Public Schools Divisions who are not eligible for premium-free Medicare Part A, are assumed as follows:

Medicare Plan	Percent Electing Medicare Plan	
	Other Divisions	DPS Division
Self-Funded Medicare Supplement Plans	60%	40%
Kaiser Permanente Medicare Advantage HMO	25%	35%
Rocky Mountain Health Plans Medicare HMO	10%	5%
UnitedHealthcare Medicare HMO	5%	20%

Medicare plan elections for current, Pre-Medicare retirees of the State, School, Local Government, Judicial, and Denver Public Schools Divisions who are not eligible for premium-free Medicare Part A, are assumed as follows:

Medicare Plan	Percent Electing Medicare Plan	
	Pre-Medicare Anthem Plans	Pre-Medicare Kaiser Plans
Self-Funded Medicare Supplement Plans	88%	2%
Kaiser Permanente Medicare Advantage HMO	1%	92%
Rocky Mountain Health Plans Medicare HMO	6%	2%
UnitedHealthcare Medicare HMO	5%	4%

For those PERACare enrollees of the State, School, Local Government, Judicial, and Denver Public Schools Divisions, who are assumed to be ineligible for premium-free Medicare Part A and participate in the self-funded plans, 80% are assumed to elect MS#1, 17% are assumed to elect MS#2, and 3% are assumed to elect MS#3.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

PERA Benefit Structure Initial Health Care Cost Rates

In determining the additional liability for PERACare enrollees who are age sixty-five or older and who are not eligible for premium-free Medicare Part A, the following monthly costs/premiums were provided by PERA, and are assumed for 2017. All costs are subject to the Health Care Cost Trend Rates.

Medicare Plan	Cost for Members without Medicare Part A	Premium for Members without Medicare Part A
Self-Funded Medicare Supplement Plans	\$725	\$362
Kaiser Permanente Medicare Advantage HMO	\$582	\$231
Rocky Mountain Health Plans Medicare HMO	\$601	\$236
UnitedHealthcare Medicare HMO	\$686	\$181

The 2017 Medicare Part A premium is \$413 per month.

PERA Benefit Structure Annual Expected Cost Age Adjusted to Age 65

In determining the additional liability for PERACare enrollees who are age sixty-five or older and who are not eligible for premium-free Medicare Part A, the following chart details the initial expected value of Medicare Part A benefits, age adjusted to age 65 for the year following the valuation date.

Medicare Plan	Cost for Members without Medicare Part A
Self-Funded Medicare Supplement Plans	\$285
Kaiser Permanente Medicare Advantage HMO	\$290
Rocky Mountain Health Plans Medicare HMO	\$276
UnitedHealthcare Medicare HMO	\$428



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

PERA Benefit Structure Age Related Morbidity

For PERACare enrollees who are age sixty-five or older and who are not eligible for premium-free Medicare Part A, per capita health care costs of the PERACare Medicare plans are adjusted to reflect expected health care cost changes related to age. The increase to the net incurred health care claims is assumed to be:

Participant Age	Annual Increase
65 – 69	3.0%
70 – 74	2.5%
75 – 79	2.0%
80 – 84	1.0%
85 – 89	0.5%
90 and Older	0.0%

The Medicare Part A premium is not age adjusted, as Medicare is assumed to be a pooled health plan in which there are no age-related implicit subsidies between active employees and retirees.

The service-based premium subsidy for health care does not result in annually increasing costs to the PERA Benefit Structure as a PERACare enrollee ages (excluding the subsidy reduction at age 65 or the costs associated with Medicare disability eligibility).

PERA Benefit Structure Health Care Cost Trend Rates

Year	PERACare Medicare Plans	Medicare Part A Premiums
2017	5.00%	3.00%
2018	5.00%	3.25%
2019	5.00%	3.50%
2020	5.00%	3.75%
2021	5.00%	4.00%
2022	5.00%	4.00%
2023+	5.00%	4.25%

The service-based premium subsidy is assumed to remain constant at its current level.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

PERA HCTF Dual Status Members and Retirees

Some members and retirees may be represented under both the PERA Benefit Structure and the DPS Benefit Structure, and are considered as members or retirees in both benefit structures due to their dual status. In calculating the PERA HCTF's liabilities for members with a liability under both the PERA HCTF and the DPS HCTF, recognition is given to the choice of benefit structure, and the allocation of member contributions between the two HCTFs, as set forth in C.R.S. 24-51-1206.5. The choice of benefit structure is based upon what is assumed to be of the highest economic value to the benefit recipient. Current allocation percentages and member contribution account balances were provided by PERA for dual status members and retirees. For active members, member contribution account balances were projected assuming annual interest crediting of 3.00%, future salary increases of 3.50%, and member contributions of 8.00% of projected salary.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

METHODS AND ASSUMPTIONS SPECIFIC TO THE DPS DIVISION, THE DPS BENEFIT STRUCTURE, AND THE DPS HEALTH CARE TRUST FUND

DPS Division Health Care Participation Rates

Current PERACare enrollees of the Denver Public Schools (DPS) Division are assumed to maintain their current health care benefit elections in perpetuity. For active members retiring directly from the DPS Division, the following participation rates are assumed:

Attained Age(s)	Percent Electing Health Care Coverage
15-48	20%
49-50	25%
51-52	35%
53	40%
54-57	50%
58-60	55%
61-71	60%
72+	65%

The participation of current PERACare enrollees and members retiring directly from active service is adjusted to reflect the increasing rate of participation with age, as described in the above table.

For deferred vested members of the DPS Division, 25% are assumed to elect health care coverage upon commencement of their monthly benefit.

For spousal participation, actual census data and current plan elections of current benefit recipients were used. For spouses of deferred vested members and future retirees of the DPS Division, 15% are assumed to elect coverage for their spouse. The age difference between female retirees and covered male spouses is assumed to be 1 year and the age difference between male retirees and female spouses is assumed to be 3 years.

DPS Benefit Structure Assumptions Specific to the “No Part A” Subsidy

For those retirees who are age 65 or older and are not eligible for premium-free benefits under Medicare Part A, an additional, “No Part A” premium subsidy is paid under the DPS Benefit Structure.

For those current retirees who are age 65 and older, the premium-free Medicare Part A eligibility status is provided by PERA and is assumed to be maintained in perpetuity. For current retirees not yet age 65, hired prior to April 1, 1986, and not assumed eligible for premium-free Medicare Part A coverage through their spouse, and for those active employees hired prior to April 1, 1986, the following percentage of retirees are assumed to not qualify for premium-free Medicare Part A benefits; thus qualifying for the “No Part A” subsidy from the DPS Benefit Structure:

Hire Age	Percent Qualifying for “No Part A” Subsidy
0-24	17%
25-29	11%
30+	4%



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

DPS Benefit Structure Assumptions Specific to the “No Part A” Subsidy (continued)

The qualifying assumptions are based upon the experience of current, Medicare eligible, PERACare enrollees. Date of hire and hire age are estimated based upon service and date of retirement for current benefit recipients, or service and the valuation date for active members. As a result, those who are re-employed or transfer to another PERA employer may have accumulated the required quarters of Medicare-covered employment.

90% of members enrolled in PERACare as a result of disability retirement are assumed to qualify for premium-free Medicare Part A.

100% of deferred vested members receiving health care benefits are assumed to obtain the 40 or more quarters of Medicare-covered employment required for premium-free Medicare Part A coverage as a result of their subsequent employment.

DPS Benefit Structure Additional Premium Subsidy

In determining the additional liability for retirees who are age sixty-five or older and who are not eligible for premium-free Medicare Part A, the following, additional monthly costs are assumed:

Years of Service	Subsidy for Members without Medicare Part A
20+	\$115.00
19	109.25
18	103.50
17	97.75
16	92.00
15	86.25
14	80.50
13	74.75
12	69.00
11	63.25
10	57.50
9	51.75
8	46.00
7	40.25
6	34.50
5	28.75
4	23.00
3	17.25
2	11.50
1	5.75

The additional premium subsidy for retirees who are age sixty-five or older and who are not eligible for premium-free Medicare Part A is assumed to remain constant at its current level.



Schedule E – Outline of Actuarial Assumptions and Methods (continued)

DPS Benefit Structure Morbidity

The liabilities for medical and drug post-employment benefits are to be based, in most circumstances, on assumed claims costs that vary by age. This is generally accomplished using rates of morbidity, or, an aging curve, modeling the growth in assumed claims as a PERACare enrollee ages. As the service-based premium subsidies for health care do not result in annually increasing costs to the DPS Benefit Structure as a retiree ages (excluding the subsidy reduction at age 65 or the costs associated with Medicare disability eligibility), no morbidity assumptions are utilized in the determination of DPS Benefit Structure liabilities.

DPS HCTF Dual Status Members and Retirees

Some members and retirees may be represented under both the PERA Benefit Structure and the DPS Benefit Structure, and are considered as members or retirees in both structures due to their dual status. In calculating the DPS HCTF's liabilities for members with a liability under both the PERA HCTF and the DPS HCTF, recognition is given to the choice of benefit structure, and the allocation of member contributions between the two HCTFs, as set forth in C.R.S. 24-51-1206.5. The choice of benefit structure is based upon what is assumed to be of the highest economic value to the benefit recipient. Current allocation percentages and member contribution account balances were provided by PERA for dual status members and retirees. For active members, member contribution account balances were projected assuming annual interest crediting of 3.00%, future salary increases of 3.50%, and member contributions of 8.00% of projected salary.



Schedule F – Actuarial Cost Method

ACTUARIAL COST METHOD

1. The valuation is prepared on the projected benefit basis, which is used to determine the present value of each member's expected benefit payable at retirement, disability or death. The calculations are based on the member's age, years of service, sex, compensation, expected future salary increases, and an assumed future investment rate of return. The calculations consider the probability of a member's death or termination of employment prior to becoming eligible for a benefit and the probability of the member terminating with a service, disability, or survivor's benefit. The present value of the expected benefits payable to active members is added to the present value of the expected future payments to current benefit recipients to obtain the present value of all expected benefits payable to the present group of members and survivors.
2. The employer contributions required to support the benefits of PERA are determined following a level funding approach, and consist of a normal contribution and an actuarial accrued liability contribution.
3. The normal contribution is determined using the "entry age normal" method. Under this method, a calculation is made for pension benefits to determine the uniform and constant percentage rate of employer contribution which, if applied to the compensation of the average new member during the entire period of his anticipated covered service, would be required in addition to the contributions of the member to meet the cost of all benefits payable on his behalf.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes

Effective Date

Pension: Established in 1931, most recently amended during 2015 to “true-up” the employer contribution rate of the DPS Division. The Denver Public Schools Retirement System (DPSRS) was merged into PERA effective January 1, 2010. As of that date, all liabilities and assets of DPSRS were transferred to and became liabilities and assets of the DPS Division of PERA, including the maintenance of a separate benefit structure for existing members. Therefore, if a DPS division member terminates employment (without refund) and later is reemployed with an affiliated employer in the State Division, he or she may be building on a DPS Benefit Structure within that division. The benefit provisions of existing members of PERA on the merger date and all new hires, post-merger, are building a benefit under the PERA Benefit Structure.

PERA Health Care Trust Fund (PERA HCTF): On July 1, 1985, employer contributions to the HCTF commenced. Plan coverage and premium subsidy payments began July 1, 1986.

DPS Health Care Trust Fund (DPS HCTF): On January 1, 2010, as part of the merger, the liabilities and assets of the Denver Public Schools health care trust fund were transferred into a newly created DPS Health Care Trust Fund and employer contributions from employers in the DPS Division commenced.

DEFINITIONS

Affiliated Employers

State agencies and institutions of higher education, political subdivisions of the state, all school districts, courts, cities and municipalities and any other public entities which affiliate with PERA.

Annual Increase Reserve

Applicable for PERA Benefit Structure members hired on or after January 1, 2007 and prior non-DPSRS members who became PERA members as of January 1, 2010, a portion of the employer contribution, currently equal to one percent of the salaries of affected members, is accumulated in the Annual Increase Reserve to be paid out in annual increases each July 1, to the extent affordable. A separate, annual actuarial valuation determines the affordability and the percentage of annual increases to the eligible members within the groups previously defined. The maximum annual increase awarded, if any, by the PERA Board is the least of:

- a) Two percent of current benefits,
- b) The average of the annual CPI-W increase determined each month published for the preceding calendar year, and
- c) An increase that will exhaust ten percent of the year-end market value of the Annual Increase Reserve.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

Covered Members Employees of Affiliated Employers who work in a position subject to membership and for whom contributions are made.

Division One of five separate divisions which include: State, School, Local Government, Judicial and Denver Public Schools (DPS). Only local government entities can voluntarily affiliate with PERA and these entities are assigned to the local government division. The financial activities of each division are accounted for in separate trust funds.

Highest Average Salary For PERA Benefit Structure members, not in the Judicial Division, who are eligible for retirement as of January 1, 2011, one-twelfth of the average of the highest annual salaries upon which contributions were made during three periods of twelve consecutive months of Service Credit; or for a member with less than three years of Service Credit, one-twelfth of the average of the annual salaries upon which contributions were made. Annual salary increases recognized in the determination of HAS are limited to 15% a year for members who began membership prior to January 1, 2007. For members who began membership on or after January 1, 2007, the annual salary increases recognized in the determination of HAS are limited to 8% a year.

For Judicial Division members, one-twelfth of the highest annual salary upon which contributions were made during one period of twelve consecutive months of Service Credit.

For DPS Benefit Structure members, who are eligible for retirement as of January 1, 2011, the greater of the average of the 36 months of highest annual salaries or the career average salary.

For all members, who are not eligible for retirement as of January 1, 2011, one-twelfth of the average of the highest annual salaries upon which contributions were made during three periods of twelve consecutive months of Service Credit; or for a member with less than three years of Service Credit, one-twelfth of the average of the annual salaries upon which contributions were made. Annual salary increases recognized in the determination of HAS are limited to 8% a year.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

Interest Credit Rate	3% per annum, on member contribution account balances.
Service Credit	The total of all earned, purchased, (disability) projected, and military service credit which is used to determine benefit eligibility and amounts.
Vested	DPS Benefit Structure: Members who accrue five or more years of Service Credit are vested for benefits. PERA Benefit Structure: Members who accrue five or more years of Service Credit or attain age sixty-five are vested for benefits.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

CONTRIBUTIONS

Member Contributions

Members contribute 8.0% of salary. State Troopers contribute 10.0% of salary. Member contributions, together with any purchased service credit payments and interest, are credited to individual Member Contribution Accounts.

Effective January 1, 2011, retirees working for a PERA employer and not working as state legislators, as judges participating in the Senior Judge Program, or in a position covered by an Optional Retirement Plan are required to make member contributions at the same rate as an active member, however; the contributions are not credited to the member's account, do not accrue a benefit, and are non-refundable.

Employer Contributions

State Division (except State Troopers): 10.15% of salary on and after 7/1/2003

School Division: 10.15% of salary on and after 7/1/2003

State Troopers: 12.85% of salary on and after 7/1/2003

Local Government Division: 10.00% of salary on and after 1/1/2004

Judicial Division: 13.66% of salary on and after 7/1/2004

DPS Division: 10.15% of salary on and after 1/1/2015. Actual employer contributions are reduced by an amount equal to the principal payments plus interest at 8.5% necessary each year to finance the Pension Certificates of Participation (PCOPs) issued in 1997 and 2008 and refinanced thereafter. The amount of the credit for 2016 was 15.96% of salary. The net DPS Division employer contribution rate for 2016 was 1.61% when including the AED and SAED as described on the following page.

The employer contribution rates of the State, School, Local Government, and Judicial Divisions include the contribution of 1.02% allocated to the PERA Health Care Trust Fund.

The employer contribution rate of the DPS Division includes the contribution of 1.02% allocated to the DPS Health Care Trust Fund.

For PERA Benefit Structure members, hired on or after January 1, 2007, these contribution rates also include the 1.00% of payroll contribution earmarked for the Annual Increase Reserve.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

Due to legislation in 2004 through 2006, employers are required to pay the statutory contribution, including AED and SAED amounts, on the payroll of working retirees.

Employer contributions are credited to the employer reserve of each division.

**Amortization Equalization
Disbursement (AED)**

Beginning January 1, 2006 (January 1, 2010 for DPS Division), each employer shall pay to PERA a disbursement equal to a percent of total payroll in accordance with the following schedule:

Year	State Division	Schools/DPS Division
2006	0.50%	0.50%
2007	1.00%	1.00%
2008	1.40%	1.40%
2009	1.80%	1.80%
2010	2.20%	2.20%
2011	2.60%	2.60%
2012	3.00%	3.00%
2013	3.40%	3.40%
2014	3.80%	3.80%
2015	4.20%	4.20%
2016	4.60%	4.50%
2017 & after	5.00%	4.50%

Year	Judicial Division
2006	0.50%
2007	1.00%
2008	1.40%
2009	1.80%
2010 - 2018	2.20%
2019	3.40%
2020	3.80%
2021	4.20%
2022	4.60%
2023 & after	5.00%

If, at any time, the actuarial funded ratio for a division is 103% or more, then the amount of the disbursement shall be reduced by 0.5% of pay.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

**Supplemental Amortization
Equalization
Disbursement (SAED)**

Beginning January 1, 2008 (January 1, 2010 for DPS Division), each employer shall pay to PERA a supplemental disbursement equal to a percent of total payroll in accordance with the following schedule:

Year	State Division	Schools/DPS Division
2008	0.50%	0.50%
2009	1.00%	1.00%
2010	1.50%	1.50%
2011	2.00%	2.00%
2012	2.50%	2.50%
2013	3.00%	3.00%
2014	3.50%	3.50%
2015	4.00%	4.00%
2016	4.50%	4.50%
2017	5.00%	5.00%
2018 & after	5.00%	5.50%

Year	Judicial Division
2008	0.50%
2009	1.00%
2010 - 2018	1.50%
2019	3.40%
2020	3.80%
2021	4.20%
2022	4.60%
2023 & after	5.00%

If, at any time, the actuarial funded ratio for a division is 103% or more, then the amount of the disbursement shall be reduced by 0.5% of pay.

For the Local Government Division, the AED and SAED contributions are frozen at the 2010 levels. If, at any time, the actuarial funded ratio for a division is 103% or more, then the amount of the disbursement shall be reduced by 0.5% of pay.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

Matching Contributions

A match applied to individual Member Contribution Accounts when a refund is made or when a money purchase benefit is calculated. The match is applied to the account balance less:

1. Any amount paid for the purchase of service credit,
2. Any payments in lieu of member contributions, and
3. Any interest accrued on 1 and 2.

For members who receive a refund and meet the requirements for a service or reduced service retirement at the time the match is applied, or for payments made to survivors or beneficiaries of members who die before retirement, the match is 100% of eligible amounts.

For PERA Benefit Structure members who receive a refund prior to meeting the requirements for a service or reduced service retirement, the match is 50% of eligible amounts. Effective January 1, 2011, members must have five years of earned service credit in order to receive the 50% match on a refund. Contributions received prior to January 1, 2011, are matched regardless if the member has five years of service credit on the refund date.

For DPS Benefit Structure members who receive a refund prior to meeting the requirements for a service or reduced service retirement, no match is provided.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

ELIGIBILITY FOR BENEFITS – PERA BENEFIT STRUCTURE

Refund of Member Contributions

In the event a member leaves service for a reason other than death or retirement, member contribution accounts including interest plus matching employer contributions on eligible amounts with interest are refunded upon request.

Service Retirement

The Age and Service Credit requirements to be eligible for a full Service Retirement are listed below:

- **Members, except State Troopers, hired before 7/1/2005 who have 5 or more years of service credit as of 1/1/2011**

Age	Service Credit
50	30
55	Age and Service = 80 years or more
60	20
65	5
65	Less than 5 but 60 payroll postings

- **Members, except State Troopers, hired on and after 7/1/2005 but before 1/1/2007, and who have 5 or more years of service credit as of 1/1/2011**

Age	Service Credit
Any Age	35
55	Age and Service = 80 years or more
60	20
65	5
65	Less than 5 but 60 payroll postings

- **Members, except State Troopers, hired on and after 1/1/2007 but before 1/1/2011, or who have less than 5 years of service credit as of 1/1/2011**

Age	Service Credit
Any Age	35
55	30
55	Age and Service = 85 years or more
60	25
65	5
65	Less than 5 but 60 payroll postings



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

- **Members, except State Troopers, hired on and after 1/1/2011 but before 1/1/2017 and Members, except State Troopers, hired on and after 1/1/2017 whose last 10 years of service credit are in either the School or DPS Division**

Age	Service Credit
Any Age	35
58	Age and Service = 88 years or more
65	5
65	Less than 5 but 60 payroll postings

- **Members, except State Troopers hired on and after 1/1/2017 whose last 10 years of service credit are not in either the School or DPS Divisions**

Age	Service Credit
Any Age	35
60	Age and Service = 90 years or more
65	5
65	Less than 5 but 60 payroll postings

- **State Troopers, regardless of date of hire**

Age	Service Credit
Any Age	30
50	25
55	20
65	5
65	Less than 5 but 60 payroll postings

Reduced Service Retirement

The Age and Service Credit requirements to be eligible for a Reduced Service Retirement are listed below:

- **Members, except State Troopers, regardless of date of hire**

Age	Service Credit
50	25
55	20
60	5



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

- **State Troopers, regardless of date of hire**

Age	Service Credit
50	20
60	5

Disability Retirement

Active members with five or more years of earned service credit, with at least 6 months of this time earned in the most recent period of membership are eligible to apply for disability retirement. To be eligible, the member must be found to be totally and permanently disabled (mentally or physically) from regular and gainful employment. The service credit requirement is waived for state troopers injured in the line of duty and for judges found disabled by the Colorado Supreme Court.

Survivor Benefits

The qualified survivors of members who die before retirement with at least one year of service credit are eligible for monthly survivor benefits. The service credit requirement is waived if the death was job related.

MONTHLY BENEFIT CALCULATIONS – PERA BENEFIT STRUCTURE

Service Retirement Benefit

State, including state troopers, School, Local Government, DPS Divisions and Members of the Judicial Division who were on the bench on and after July 1, 1973:

The greater of a) or b)

- a) 2.5% of HAS times years of Service Credit up to 40
- b) The money purchase benefit which is actuarially determined based on the value of the member contribution account and matching employer contributions on the effective date of retirement.

Members age 65 with less than 5 years and less than 60 payroll postings are eligible for the money purchase benefit only.

In all cases, the benefit is limited to 100% of HAS.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

Reduced Service Retirement Benefit

For all members, except State Troopers:

The service retirement benefit calculated above reduced 4% for each year after age 60, 3% for each year from age 55 to age 60, 6% for each year prior to 55, and proportionately for fractions of a year, from the effective date of reduced service retirement to the date the member would have been eligible for a service retirement benefit.

For State Troopers:

The service retirement benefit calculated above reduced 4% for each year after age 60, 3% for each year from age 50 to age 60, and proportionately for fractions of a year, from the effective date of reduced service retirement to the date the member would have been eligible for a service retirement benefit.

Effective January 1, 2011, for all members that are not retirement eligible on January 1, 2011, the service retirement benefit calculated above shall be reduced using actuarial equivalent factors, from the effective date of reduced service retirement to the date the member would have been eligible for a service retirement benefit.

Disability Retirement Benefit

If years of Service Credit at disability are greater than 20, the disability retirement benefit is calculated based on actual Service Credit at disability; otherwise, the disability retirement benefit is calculated based on actual Service Credit at disability plus Service Credit projected to age 65, but not to exceed a total of 20 years of Service Credit.

Benefits for disability retirees with an effective disability retirement date on or after July 1, 1988 and before January 1, 1999, who work after retirement will be reduced by 1/3 of the amount, if any, by which the initial annual PERA benefit plus earned income exceeds the annualized HAS.

Disability benefits are payable for as long as the disability retiree is disabled. Benefits cease upon recovery.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

Survivor Benefits

➤ **If the deceased was not Eligible for Reduced or Service Retirement at the time of Death**

Benefits are payable in the following order:

- a) Qualified Children Under Age 23: 40% of HAS for one child, an equal share of 50% of HAS if there are two or more children.
- b) Spouse: If no qualified children in (a) exist: i) less than 10 years of Service Credit, 25% of HAS, benefits begin at age 60; ii) 10 or more years of Service Credit, the greater of 25% of HAS or the benefit which would have been payable as a 100% joint and survivor option if the deceased member had been eligible for service retirement and retired on the date of death, benefits begin immediately.
- c) Qualified Children Age 23 or Over: If no persons in (a) or (b) exist, 40% of HAS for one child, an equal share of 50% of HAS if there are two or more children.
- d) Dependent Parents: If no persons in (a) to (c) exist, 25% of HAS for one dependent parent or 40% of HAS for two dependent parents (minimum of \$100 per month for each dependent parent). Benefits begin immediately and continue until the death of the parent(s).
- e) Named Beneficiary: If no persons in (a) to (d) exist, single payment equal to the member contribution account plus the appropriate matching contribution, plus interest.
- f) Estate of Deceased Member: If no persons in (a) to (e) exist, single payment equal to the member contribution account plus the appropriate matching contribution, plus interest.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

➤ **If the deceased was eligible for Reduced or Service Retirement at the time of Death**

The co-beneficiary is eligible for the amount that would have been payable had the member retired on the date of death and elected the 100% joint and survivor option. The order of payment is:

- a) Co-beneficiary – If the deceased member designated a co-beneficiary prior to death, that individual takes precedence in payment of benefits.
- b) Surviving Spouse
- c) Qualified Children
- d) Dependent Parents
- e) Named beneficiary
- f) Estate

Benefit Options

Retirement and disability benefits are payable for the life of the retired member. Optional reduced benefits may be elected at the time of retirement to provide for continuation of 50% or 100% of a reduced benefit amount to a designated co-beneficiary. If the member retires any time after the date on which service retirement eligibility is first met, the reduction for 50% or 100% continuation option will be actuarially determined as of the date the member first became eligible for service retirement.

**Post-Retirement
Benefit Increases**

For members hired prior to January 1, 2007, each year on July 1, benefits which have been paid for at least twelve months preceding July 1 are increased.

The increase is 2.0% compounded annually for each year of retirement. If the investment return for the prior year is negative, then the increase will be an amount equal to the average of the annual CPI-W increases determined monthly for the prior year with a cap of 2%.

In addition, the increase will be first paid on the July 1 that is at least 12 months after retirement for those members who retire on or after January 1, 2011. Members not eligible to retire as of January 1, 2011 who retire with a reduced service retirement allowance must reach age 60 or the age and service requirements for unreduced service retirement to be eligible for the Post-Retirement Benefit Increases.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

For PERA Benefit Structure service and disability retirees who were hired on or after January 1, 2007, and for PERA Benefit Structure survivor benefit recipients of deceased members who were hired on or after January 1, 2007:

- The increase is the lower of 2.0 percent or the average of the CPI-W for each of the months during the prior calendar year. Increases to all benefit recipients in this group are limited to 10 percent of the total funds available in the Annual Increase Reserve in the division from which they retired or were a member before death.
- Members must receive benefits for a full calendar year to be eligible for the increase.
- The increase for service retirees who retire with a reduced service retirement does not begin until the retiree has been receiving benefits for a full calendar year and has on January 1 of the year the increase is paid, either reached age 60, or years of service plus age equal 85, 88, or 90, whichever is applicable.
- No minimum age or service credit requirement shall apply for disability retirees or survivor benefit recipients.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

ELIGIBILITY FOR BENEFITS – DPS BENEFIT STRUCTURE

Refund of Member Contributions

In the event a member leaves service for a reason other than death or retirement, member contribution accounts including interest plus applicable matching employer contributions with interest are refunded upon request.

Service Retirement

The Age and Service Credit requirements to be eligible for a full Service Retirement are listed below:

- **Members, hired before 1/1/2010 who have 5 or more years of service credit on 1/1/2011**

Age	Service Credit
50	30
55	25 (must include 15 years of earned service)
65	5

- **Members, hired before 1/1/2010 who have less than 5 years of service credit as of 1/1/2011**

Age	Service Credit
Any Age	35
55	30 (must include 20 years of earned service)
55	Age and Service = 85 years or more
60	25
65	5
65	Less than 5 but 60 payroll postings

Reduced Service Retirement

The Age and Service Credit requirements to be eligible for a Reduced Service Retirement are listed below:

- **Members, regardless of date of hire who have 5 or more years of service credit on 1/1/2011**

Age	Service Credit
55	15
Any Age	25



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

- **Members, regardless of date of hire who have less than 5 years of service credit on 1/1/2011**

Age	Service Credit
50	25
55	20
60	5

Disability Retirement Active members with five or more years of earned service credit, with at least 6 months of this time earned in the most recent period of membership are eligible to apply for disability retirement. To be eligible, the member must be found to be totally and permanently disabled (mentally or physically) from regular and gainful employment.

Survivor Benefits The qualified survivors of members who die before retirement with at least five years of service credit and are active at time of death are eligible for monthly survivor benefits.

MONTHLY BENEFIT CALCULATIONS – DPS BENEFIT STRUCTURE

Service Retirement Benefit The greater of a) or b)

- a) 2.5% of HAS times years of Service Credit
- b) \$15 times first 10 years of service credit plus \$20 times service credit over 10 years plus an amount equal to annuitized member balance.*

* May include matching dollars if eligible.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

Reduced Service Retirement Benefit

Age	Service	Reduction Amount
Under 50	30 years	4% for each year prior to age 50
Under 50	25 – 30 years	Greater of: <ul style="list-style-type: none"> • 4% for each year of service below 30 years • 4% for each year below age 50
Age 50 - 55	25 – 30 years	Lesser of: <ul style="list-style-type: none"> • 4% for each year under age 50 • 4% for each year of service below 30 years
Over 55	15 years	Lesser of: <ul style="list-style-type: none"> • 4% for each year under age 65 • 4% for each year of service below 25 years

The reduction factor in the table above equals 6% per year for those hired on or after 7/1/2005 but before 1/1/2010.

Effective 1/1/2011, for all members that are not retirement eligible on 1/1/2011, the service retirement benefit calculated above shall be reduced using actuarial equivalent factors, from the effective date of reduced service retirement to the date the member would have been eligible for a service retirement benefit.

Disability Retirement Benefit

If years of Service Credit at disability are greater than 20, the disability retirement benefit is calculated based on actual Service Credit at disability; otherwise, the disability retirement benefit is calculated based on actual Service Credit at disability plus Service Credit projected to age 65, but not to exceed a total of 20 years of Service Credit.

Disability benefits are payable for as long as the disability retiree is disabled. Benefits cease upon recovery.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

Survivor Benefits

- a) Child: Greater of 10% of HAS for each child up to a limit of 30%; and \$160 (pro-rated) for each child up to a limit of \$480.
- b) Spouse with eligible children: The greater of the difference between the child benefit above and 30% (40% if 15 years of service plus 2% for each year of service beyond 25 years) of HAS, and \$480.
- c) Dependent Parents: The greater of 10% of HAS for each parent; and \$240 per parent.
- d) Spouse (less than 15 years of service): Lesser of 30% of HAS; and \$480, payable at later of age 60 or when last eligible child loses eligibility.
- e) Spouse (15 years of service or more): Greater of 30% of HAS, plus an additional 1% for each year of service over 15 years; and \$480, payable at later of age 50 or when last eligible child loses eligibility.

Benefit Options

- Option A: Single life annuity (SLA) with residual refund of member contributions.
- Option B: Single life annuity with guarantee period determined based on accumulated employee contribution balance at retirement.
- Option C: 100% joint and survivor with 10 years certain. – Not available to members retiring post 1/1/2010
- Option D: Cash refund on annuity portion and SLA on pension portion. – Not available to members retiring post 1/1/2010
- Option E: 50% joint and survivor with 10 years certain. – Not available to members retiring post 1/1/2010
- Option P2: 50% joint and survivor with pop-up and residual refund of member contributions.
- Option P3: 100% joint and survivor with pop-up and residual refund of member contributions.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

**Post-Retirement
Benefit Increases**

Each year on July 1, benefits which have been paid for at least twelve months preceding July 1 are increased.

The increase is 2.0% compounded annually for each year of retirement. If the investment return for the prior year is negative, then the increase will be an amount equal to the average of the annual CPI-W increases determined monthly for the prior year with a cap of 2%.

In addition, the increase will be first paid on the July 1 that is at least 12 months after retirement for those members who retire on or after January 1, 2011. Members not eligible to retire as of January 1, 2011 who retire with a reduced service retirement allowance must reach age 60 or the age and service requirements for unreduced service retirement to be eligible for the Post-Retirement Benefit Increases.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

OTHER PROVISIONS SPECIFIC TO THE HEALTH CARE TRUST FUNDS

Eligibility for Health Care Coverage The PERA Health Care Trust Fund (PERA HCTF) includes assets for the purpose of paying premium subsidies on behalf of PERA Benefit Structure benefit recipients and DPS Benefit Structure retirees who worked for an employer in the State, School, Local Government, and Judicial Divisions within PERA who enroll in PERACare.

The DPS Health Care Trust Fund (DPS HCTF) includes assets for the purpose of paying premium subsidies on behalf of PERA Benefit Structure benefit recipients and DPS Benefit Structure retirees who worked for employers of the DPS Division and who enroll in PERACare.

The following individuals are eligible to enroll in PERACare:

- Anyone receiving a monthly PERA benefit (benefit recipient). If the benefit recipient is enrolled in PERACare, the following dependents may be enrolled: spouses (including civil union partners recognized under Colorado law), domestic partners, unmarried dependent children under age 25, certain mentally or physically incapacitated adult children, and dependent parents.
- Guardians of children receiving PERA survivor benefits, if children are receiving health care benefits.
- PERA retirees temporarily not receiving PERA benefits.
- Surviving spouses of deceased retirees who are not receiving PERA benefits but were enrolled in PERACare at the time when death occurred.
- Divorced spouses of retirees who are not receiving PERA benefits, but were receiving health care benefits when the divorce occurred.

Enrollment Enrollment is voluntary, with eligibility within 30 days of initial pension benefit payment, upon the occurrence of certain life events, and during an annual open enrollment for coverage effective each January 1. If a surviving spouse or divorced spouse discontinues coverage, re-enrollment is not allowed.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

Premium Subsidy

A monthly subsidy is allocated to each benefit recipient under the PERA Benefit Structure and each retiree under the DPS Benefit Structure electing health care coverage. Survivors of retirees under the PERA Benefit Structure are eligible to receive the subsidy. The following monthly amounts are based upon the benefit structure elected, date of retirement, Medicare eligibility, and/or credited service:

DPS Benefit Structure Retirees Who Retired Prior to July 1, 1994:

- \$230 per month for retirees without Medicare Part A.
- \$115 per month for retirees with Medicare Part A.

DPS Benefit Structure Retirees Who Retire On or After July 1, 1994:

- \$5.75 if age 65 or older and eligible for premium-free Medicare Part A.
- \$11.50 if not yet age 65, or if age 65 or older and not eligible for premium-free Medicare Part A.

The monthly amounts above are allocated per year of credited service up to a maximum of 20 years of service.

PERA Benefit Structure Benefit Recipients:

- \$5.75 if age 65 or older or eligible for Medicare Part B.
- \$11.50 if not yet age 65 or not eligible for Medicare Part B.

The monthly amounts above are allocated per year of credited service up to a maximum of 20 years of service.

This subsidy is used to determine member premiums, which are the projected full cost of coverage less the premium subsidy. The full costs for claims, administration, premiums, etc., are allocated and paid by the PERA HCTF and the DPS HCTF.

Historically, this has resulted in net costs to the PERA HCTF and the DPS HCTF being very close to the premium subsidy, with all costs of coverage above this subsidy paid by the member. For those benefit recipients under the PERA Benefit Structure who are age 65 or older, the full cost of coverage is considered to be based on the full cost of coverage assuming eligibility for premium-free Medicare Part A. This is independent of actual eligibility for premium-free Medicare Part A.

Members not receiving a PERA monthly benefit do not qualify for this subsidy and bear the full cost of coverage.

This premium subsidy is only available to those enrolled in PERACare and meeting the requirements defined by the benefit structure under which they retire.



Schedule G – Summary of Main Plan Provisions as Interpreted for Valuation Purposes (continued)

Special Note on Members not qualifying for Medicare Part A:

Under the PERA Benefit Structure, an implicit subsidy is paid for those members not eligible for premium-free Medicare Part A benefits. For members in the fully-insured HMOs, this amount is the difference in premiums charged for those without Medicare Part A and for those enrolled in Medicare Part A. For the self-funded plans, this amount is the assumed difference in claims costs for services covered under Medicare Part A between members without Medicare Part A coverage and those enrolled in Medicare Part A.

The DPS Benefit Structure pays an explicit subsidy for those members eligible to receive the premium subsidy and who are not eligible for premium-free Medicare Part A coverage. For these members an additional subsidy of \$5.75 per month for each year of credited service (up to a maximum of 20 years of service) is allocated.

Special Note on Premium Subsidy Funding for Members in both the PERA HCTF and the DPS HCTF:

For members covered under both the PERA HCTF and the DPS HCTF, the allocation of the subsidy amounts is done via an allocation method set forth in C.R.S. 24-51-1206.5.



Schedule H – Schedules of Member Data

**SCHEDULE OF ACTIVE MEMBER DATA
AS OF DECEMBER 31, 2016**

STATE DIVISION

Attained Age	Completed Years of Service								Total	Reported Payroll
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+			
Under 20	151	0	0	0	0	0	0	151	\$ 768,273	
20 to 24	1,614	3	0	0	0	0	0	1,617	\$ 34,215,519	
25 to 29	4,089	362	8	0	0	0	0	4,459	\$ 150,263,700	
30 to 34	4,099	1,579	298	13	0	0	0	5,989	\$ 252,478,639	
35 to 39	3,201	1,703	1,131	293	4	0	0	6,332	\$ 301,468,997	
40 to 44	2,433	1,479	1,202	983	197	7	0	6,301	\$ 328,879,536	
45 to 49	3,874	1,605	1,251	1,172	797	300	13	9,012	\$ 470,825,005	
50 to 54	1,817	1,257	1,187	1,040	772	643	226	6,942	\$ 388,693,639	
55 to 59	1,559	1,171	1,185	1,098	730	578	349	6,670	\$ 365,239,624	
60	298	228	197	214	145	97	57	1,236	\$ 65,922,830	
61	283	215	208	167	125	96	66	1,160	\$ 61,778,104	
62	218	223	175	157	117	78	56	1,024	\$ 55,856,903	
63	187	168	183	166	91	69	61	925	\$ 49,389,738	
64	197	159	162	142	94	56	55	865	\$ 43,917,755	
65	144	126	137	101	76	70	44	698	\$ 36,808,872	
66	135	109	91	96	58	38	37	564	\$ 27,838,030	
67	101	86	68	54	41	29	24	403	\$ 19,887,954	
68	99	62	64	42	28	16	23	334	\$ 15,565,231	
69	59	46	40	35	22	15	18	235	\$ 10,715,049	
70 & Over	248	145	124	104	55	52	80	808	\$ 30,137,167	
Total	24,806	10,726	7,711	5,877	3,352	2,144	1,109	55,725	\$ 2,710,650,565	

Average Age (Non-Trooper): 45.72 Average Age (Trooper): 41.74
 Average Service (Non-Trooper): 8.79 Average Service (Trooper): 12.44



Schedule H – Schedules of Member Data (continued)

**SCHEDULE OF ACTIVE MEMBER DATA
AS OF DECEMBER 31, 2016**

SCHOOL DIVISION

Attained Age	Completed Years of Service							Total	Reported Payroll
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+		
Under 20	793	0	0	0	0	0	0	793	\$ 4,327,800
20 to 24	4,335	32	0	0	0	0	0	4,367	\$ 73,674,372
25 to 29	10,008	1,044	37	0	0	0	0	11,089	\$ 316,198,135
30 to 34	7,339	4,206	876	30	0	0	0	12,451	\$ 422,290,671
35 to 39	6,595	3,406	3,827	693	13	0	0	14,534	\$ 544,576,909
40 to 44	6,393	3,026	3,083	2,872	388	6	0	15,768	\$ 620,489,593
45 to 49	7,848	3,319	2,994	2,684	2,062	396	13	19,316	\$ 744,474,336
50 to 54	4,195	2,617	2,940	2,383	1,656	1,432	222	15,445	\$ 636,009,704
55 to 59	3,381	2,195	2,677	2,569	1,574	1,060	506	13,962	\$ 536,014,080
60	552	331	434	450	271	170	100	2,308	\$ 87,374,649
61	504	323	343	358	221	116	91	1,956	\$ 69,370,369
62	452	231	314	341	206	130	77	1,751	\$ 63,549,011
63	390	220	266	261	185	110	53	1,485	\$ 52,404,229
64	353	221	225	171	168	100	56	1,294	\$ 43,500,665
65	325	192	202	152	114	75	53	1,113	\$ 36,294,504
66	300	135	126	131	66	50	23	831	\$ 24,296,881
67	281	116	98	86	42	37	20	680	\$ 18,318,123
68	216	110	79	67	43	25	25	565	\$ 14,896,877
69	197	90	80	43	23	19	15	467	\$ 10,630,529
70 & Over	838	392	235	132	62	53	58	1,770	\$ 30,628,346
Total	55,295	22,206	18,836	13,423	7,094	3,779	1,312	121,945	\$ 4,349,319,783

Average Age: 44.53
Average Service: 8.38



Schedule H – Schedules of Member Data (continued)

**SCHEDULE OF ACTIVE MEMBER DATA
AS OF DECEMBER 31, 2016**

LOCAL GOVERNMENT DIVISION

Attained Age	Completed Years of Service							Total	Reported Payroll
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+		
Under 20	465	0	0	0	0	0	0	465	\$ 2,069,669
20 to 24	666	6	0	0	0	0	0	672	\$ 10,592,279
25 to 29	925	93	6	0	0	0	0	1,024	\$ 34,677,549
30 to 34	840	225	89	6	0	0	0	1,160	\$ 51,701,001
35 to 39	768	317	215	66	4	0	0	1,370	\$ 70,061,895
40 to 44	570	302	294	134	56	0	0	1,356	\$ 76,441,628
45 to 49	746	267	353	196	109	53	3	1,727	\$ 95,720,558
50 to 54	483	264	311	187	168	83	55	1,551	\$ 94,197,242
55 to 59	428	230	302	210	157	110	67	1,504	\$ 88,562,596
60	73	47	49	38	26	21	14	268	\$ 15,345,641
61	79	37	40	30	27	12	15	240	\$ 12,311,272
62	63	35	34	33	16	9	8	198	\$ 10,827,904
63	67	31	29	28	17	11	4	187	\$ 9,505,372
64	63	35	36	22	14	17	4	191	\$ 9,324,618
65	56	30	28	17	12	5	9	157	\$ 8,202,908
66	54	17	18	11	8	8	2	118	\$ 4,407,536
67	40	21	26	10	3	2	2	104	\$ 4,157,185
68	35	12	13	6	3	5	1	75	\$ 2,572,886
69	38	10	7	5	3	0	4	67	\$ 1,939,697
70 & Over	184	48	31	20	13	4	2	302	\$ 5,603,173
Total	6,643	2,027	1,881	1,019	636	340	190	12,736	\$ 608,222,609

Average Age: 44.53
Average Service: 7.60



Schedule H – Schedules of Member Data (continued)

**SCHEDULE OF ACTIVE MEMBER DATA
AS OF DECEMBER 31, 2016**

JUDICIAL DIVISION

Attained Age	Completed Years of Service							Total	Reported Payroll
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+		
Under 20	0	0	0	0	0	0	0	0	\$ -
20 to 24	0	0	0	0	0	0	0	0	\$ -
25 to 29	0	0	0	0	0	0	0	0	\$ -
30 to 34	3	0	0	0	0	0	0	3	\$ 152,795
35 to 39	9	3	0	0	0	0	0	12	\$ 1,167,133
40 to 44	11	5	2	2	0	0	0	20	\$ 2,618,569
45 to 49	7	11	11	3	1	1	0	34	\$ 4,803,559
50 to 54	11	22	19	8	8	6	1	75	\$ 11,396,307
55 to 59	11	17	13	12	7	11	3	74	\$ 11,176,793
60	0	0	4	1	3	2	0	10	\$ 1,556,095
61	4	3	0	2	1	1	0	11	\$ 1,635,278
62	0	1	4	0	3	0	1	9	\$ 1,271,185
63	1	5	2	1	0	3	1	13	\$ 1,986,041
64	0	4	5	3	2	3	1	18	\$ 2,608,226
65	0	1	2	0	1	1	2	7	\$ 1,057,339
66	1	2	1	2	1	1	3	11	\$ 1,705,950
67	0	2	2	0	0	4	1	9	\$ 1,412,368
68	0	1	4	1	1	1	2	10	\$ 1,214,672
69	1	0	1	2	3	0	1	8	\$ 1,145,741
70 & Over	1	1	2	2	0	1	4	11	\$ 1,791,480
Total	60	78	72	39	31	35	20	335	\$ 48,699,531

Average Age: 55.93
Average Service: 13.79



Schedule H – Schedules of Member Data (continued)

**SCHEDULE OF ACTIVE MEMBER DATA
AS OF DECEMBER 31, 2016**

DENVER PUBLIC SCHOOLS DIVISION

Attained Age	Completed Years of Service								Total	Reported Payroll
	Under 5	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30+			
Under 20	73	0	0	0	0	0	0	0	73	\$ 904,562
20 to 24	891	9	0	0	0	0	0	0	900	\$ 17,914,172
25 to 29	2,321	211	3	0	0	0	0	0	2,535	\$ 82,617,999
30 to 34	1,741	806	65	2	0	0	0	0	2,614	\$ 107,087,680
35 to 39	1,567	749	248	31	1	0	0	0	2,596	\$ 108,882,844
40 to 44	733	536	284	177	23	2	0	0	1,755	\$ 80,832,718
45 to 49	568	477	223	212	92	13	1	0	1,586	\$ 74,876,600
50 to 54	402	344	178	169	107	83	9	0	1,292	\$ 61,791,683
55 to 59	329	315	142	174	100	78	40	0	1,178	\$ 52,497,560
60	59	81	15	26	17	7	9	0	214	\$ 8,095,881
61	54	57	24	29	14	13	7	0	198	\$ 8,946,428
62	41	61	20	23	18	3	6	0	172	\$ 7,417,255
63	53	41	24	18	16	12	8	0	172	\$ 7,050,888
64	27	39	17	17	13	6	4	0	123	\$ 5,638,281
65	36	26	8	10	10	8	2	0	100	\$ 3,757,621
66	26	32	5	11	7	4	0	0	85	\$ 3,290,778
67	24	25	4	6	5	2	1	0	67	\$ 2,341,755
68	18	22	7	2	3	5	2	0	59	\$ 2,047,085
69	15	18	0	1	0	1	1	0	36	\$ 1,063,284
70 & Over	83	73	10	9	8	4	8	0	195	\$ 5,122,084
Total	9,061	3,922	1,277	917	434	241	98	0	15,950	\$ 642,177,158

Average Age (DPS Benefit Structure): 48.47
Average Service (DPS Benefit Structure): 14.41

Average Age (PERA Benefit Structure): 38.08
Average Service (PERA Benefit Structure): 3.41



Schedule H – Schedules of Member Data (continued)

**SCHEDULE OF MEMBER DATA
BROKEN DOWN BY TIER
AS OF DECEMBER 31, 2016**

ACTIVES	DIVISION					TOTAL
	STATE DIVISION	SCHOOL DIVISION	LOCAL GOVERNMENT DIVISION	JUDICIAL DIVISION	DENVER PUBLIC SCHOOLS DIVISION	
Non Tier 2:						
Number	22,908	52,221	4,579	211	2,967	82,886
Annual Payroll	\$1,378,844,257	\$2,496,382,436	\$295,912,904	\$31,255,521	\$178,742,992	\$4,381,138,110
Tier 2:						
Number	32,817	69,724	8,157	124	12,983	123,805
Annual Payroll	\$1,331,806,308	\$1,852,937,347	\$312,309,705	\$17,444,010	\$463,434,166	\$3,977,931,536
Total:						
Number	55,725	121,945	12,736	335	15,950	206,691
Annual Payroll	\$2,710,650,565	\$4,349,319,783	\$608,222,609	\$48,699,531	\$642,177,158	\$8,359,069,646

RETIREES	DIVISION					TOTAL
	STATE DIVISION	SCHOOL DIVISION	LOCAL GOVERNMENT DIVISION	JUDICIAL DIVISION	DENVER PUBLIC SCHOOLS DIVISION	
Non Tier 2:						
Number	37,604	61,465	6,934	356	6,690	113,049
Annual Benefits	\$1,513,355,568	\$2,280,452,441	\$263,372,805	\$23,817,589	\$266,683,503	\$4,347,681,906
Tier 2:						
Number	536	637	131	5	251	1,560
Annual Benefits	\$4,866,869	\$3,637,282	\$1,137,617	\$108,016	\$2,355,298	\$12,105,082
Total:						
Number	38,140	62,102	7,065	361	6,941	114,609
Annual Benefits	\$1,518,222,437	\$2,284,089,723	\$264,510,422	\$23,925,605	\$269,038,801	\$4,359,786,988



Schedule H – Schedules of Member Data (continued)

**SCHEDULE OF MEMBER DATA
BROKEN DOWN BY TIER
AS OF DECEMBER 31, 2016**

NUMBER OF INACTIVES	DIVISION					TOTAL
	STATE DIVISION	SCHOOL DIVISION	LOCAL GOVERNMENT DIVISION	JUDICIAL DIVISION	DENVER PUBLIC SCHOOLS DIVISION	
Non Tier 2:	36,945	53,845	10,225	1	310	101,326
Tier 2:	35,453	60,097	12,671	4	9,235	117,460
Total:	72,398	113,942	22,896	5	9,545	218,786

NUMBER OF TERMINATED VESTED	DIVISION					TOTAL
	STATE DIVISION	SCHOOL DIVISION	LOCAL GOVERNMENT DIVISION	JUDICIAL DIVISION	DENVER PUBLIC SCHOOLS DIVISION	
Non Tier 2:	5,485	13,341	2,320	6	696	21,848
Tier 2:	941	2,386	428	2	678	4,435
Total:	6,426	15,727	2,748	8	1,374	26,283



Schedule I – Colorado PERA Defined Benefit Pension Plan Funding Policy

COLORADO PERA DEFINED BENEFIT PENSION PLAN

FUNDING POLICY

I. Introduction—

The Colorado Public Employees' Retirement Association (PERA) maintains five pre-funded, hybrid defined benefit pension plans (i.e., State, School, Local Government, Judicial, and Denver Public Schools). Each defined benefit pension plan is funded through PERA-affiliated employer contributions, employee contributions, and the investment earnings resulting from those contributions. The fixed contribution rate at which each division's employers contribute is determined by the Colorado General Assembly and defined within the statutes governing PERA.

The purposes of this funding policy are to state the overall funding goals and annual actuarial metrics and to guide the PERA Board of Trustees (Board) when considering whether to pursue or support proposed contribution and benefit legislation. Finally, the policy will include a brief list of governance responsibilities regarding the commissioning, collection, and review of actuarial information, as described in the Board's *Governance Manual*.

PERA also maintains two pre-funded retiree health care subsidy plans, classified as other postemployment benefit (OPEB) plans. The funding policy regarding the retiree health care subsidy plans will be revised and updated after the completion and release of the anticipated GASB Financial and Accounting Standards applicable to OPEB. Until that time, the current funding policy will remain in force with regard to the health care subsidy plans administered by PERA.

It is the intention of the Board that this funding policy be considered a working document, reviewed periodically and, as necessary, altered in the future through formal action of the Board. The final page of this document contains the review and revision/adoption history pertaining to the funding policy of the PERA defined benefit pension plans.

II. Background—

In response to the unfavorable investment market of 2008, and in addition to the funding policy adopted in November 2007, the Board set the following guiding principles in 2009 in the development of a comprehensive package to maintain long-term sustainability:

- Shared responsibility among members, retirees, and employers;
- Intergenerational equity;
- Preservation of the defined benefit plan;
- Preservation of portability through the maintenance of existing benefit structures for the different divisions; and
- Development of recommendations that would have little-to-no short-term impact on member behavior.



Schedule I – Colorado PERA Defined Benefit Pension Plan Funding Policy (continued)

In 2009 and 2010, these guiding principles benefited the Board and all the stakeholders associated with the pension plan as solutions to the immediate funding situation were explored. The Board constructed a series of plan provision changes, enlisting the philosophy of the guiding principles—under the umbrella of shared responsibility—and communicated their recommendations to the General Assembly. Senate Bill 10-001 was the culmination of all the provisional and contribution changes that were to set PERA’s course toward sustainability. Senate Bill 10-001 also contained the following funding and annual increase requirements, which now are embedded in Colorado Statute and will be implemented regardless of the Board’s pension funding policy:

- Per C.R.S. § 24-51-411(8), and § 24-51-411(9), the AED and the SAED are adjusted based on the year-end actuarial funded ratio within a particular division;
 - If a division trust fund’s actuarial funded ratio;
 - Reaches 103 percent, a decrease in the AED and SAED is mandated, and,
 - Subsequently falls below 90 percent, an increase is mandated.
 - For the Local Government and Judicial Divisions, if the actuarial funded ratio reaches 90 percent and subsequently falls below 90 percent, an increase in the AED and SAED is mandated.
 - Increases in AED and SAED cannot exceed the statutory maximum allowable limitation.
- Per C.R.S. § 24-51-1009.5, if the combined pension divisions’ trust fund actuarial funded ratio;
 - Reaches 103 percent, the upper limit of the annual increase shall be increased by one-quarter of one percent, and,
 - Subsequently falls below 90 percent, the upper limit of the annual increase shall be decreased by one-quarter of one percent.

These statutory elements, in addition to the current schedule of employer contribution rates, assist in the ongoing balance of shared responsibility. It is not the intention of this Board, through the development of this funding policy, to undermine or circumvent the work accomplished by Senate Bill 10-001, but rather to ensure continued fiduciary commitment through sound governance practices and recognition of these statutory funding policies.

III. Funding Goals—

- Preservation of the **defined benefit plan structure** of providing lifetime benefits to the employees of PERA-affiliated employers, reflecting the fact that PERA members are not covered under Social Security.
- Demonstration of **transparency and accountability** through the continued maintenance of a defined benefit pension plan funding policy for the stakeholders of PERA.



Schedule I – Colorado PERA Defined Benefit Pension Plan Funding Policy (continued)

- **Achievement of a combined divisions' trust fund actuarial funded ratio greater than or equal to 110%.** Once the 110% combined funded ratio is achieved, following (1) the complete discontinuance of AED and SAED contributions, and (2) the restoration of the annual increase to pre-2010 levels pursuant to C.R.S. § 24-51-1009.5, the Board will consider and/or support the following actions, as ordered, as long as the funded ratio, either combined or individual by division, does not fall below 100% after consideration of the proposed change:
 - Examination and possible action of de-risking the entire plan, including all divisions
 - Reduction in the base contribution rate(s)
 - Adoption of a benefit enhancement, beyond restoration of the annual increase as described above.

If the 110% funded ratio benchmark is attained through the assistance of certain funding arrangements where assets, outside of statutory contributions, are added to the plan, and results in additional tax-payer obligation, the payment method and duration of this debt should be considered prior to any supportive action taken regarding benefit enhancements.

- Dedication to the balance between:
 - **Contribution rate stability**—keeping contributions relatively stable over time, and
 - **Intergenerational equity**—allocating costs over the employees' period of active service.
- Dedication to the systematic **reduction of the unfunded actuarial accrued liabilities** (UAAL), subject to the required action by the state legislature as described in C.R.S. § 24-51-411(8), § 24-51-411(9), and § 24-51-1009.5, and as briefly summarized above in Section II.
- Recognition that within a multiple-employer cost-sharing defined benefit plan there are **beneficial elements of pooled risk**, both in the accrual of plan liabilities, recognizing actuarial gains and loss by division, rather than by employer; and in the accumulation of plan assets through the engagement of an appropriate level of asset risk management.

IV. Annual Actuarial Metrics—

Below is a list of actuarial metrics to be assessed on an **annual basis as of the actuarial valuation date**. The Board recognizes that a single year's results may not be indicative of long-term trends and projected results.

- **Funded ratios**—Calculate and review by division:
 - The actuarial funded ratio based on the actuarial value of plan assets divided by the defined benefit pension plan's actuarial accrued liability (AAL), and
 - The market value funded ratio based on the market value of plan assets divided by the defined benefit pension plan's AAL.



Schedule I – Colorado PERA Defined Benefit Pension Plan Funding Policy (continued)

- **Funding period**—To be determined for each division with respect to the division’s contribution rates. A funding period is the amortization period required to pay off that division’s UAAL considering the resources available. Funding periods for each division will be determined in the annual actuarial valuation in relationship to both
 - Statutory contribution rates, and
 - Actuarially determined contribution (ADC) rates.
- **Contribution rate comparison**—
 - Calculate and review by division.
- **Actuarial Projections**—
 - Perform and review, by division,
 - Actuarial projections considering appropriate benefit provisions, salary and demographic data, actuarial assumptions, membership growth, and statutory contribution rates in order to determine the sustainability of each division under their benefit provisions and statutory contribution rate structure.
 - Projection modeling that allows for the testing of projection results under various economic and demographic stress conditions.

V. Funding Valuation Elements—

Annually, the Board’s actuary will perform an actuarial valuation for funding purposes, and calculate ADC rates against which to compare contribution rates mandated under State statute. The ADC will be the sum of a payment based on normal cost and a payment on the UAAL. The normal cost and the amount of payment on the UAAL are determined by the following three major components of a funding valuation:

- **Actuarial Cost Method:** This component determines the attribution method upon which the cost/liability of the retirement benefits are allocated to a given period, defining the normal cost or annual accrual rate associated with the projected benefits.
 - The Entry Age Normal Cost Method (EAN), as is used for PERA’s annual actuarial valuation purposes, is to be used for the determination of the normal cost rate and the actuarial accrued liability for purposes of calculating the ADC.
 - Under this method, normal cost is calculated using benefits based on projected service and salary at retirement and is allocated over an individual’s career as a level percent of payroll. Because EAN normal cost rates are level for each participant, the normal cost pattern for the entire plan under EAN is more stable in the face of demographic shifts in the workforce. It is this normal cost stability that makes the EAN method the preferred funding method for the majority of public defined benefit pension plans.



Schedule I – Colorado PERA Defined Benefit Pension Plan Funding Policy (continued)

- **Asset Valuation Method:** This component dictates the method by which the asset value, used in the determination of the UAAL, is determined, which could be a market value or a smoothed actuarial value of trust assets.
 - Because investment markets are volatile and defined benefit pension plans typically have long investment horizons, application of an asset-smoothing technique can be an effective tool to manage contribution volatility and provide a more consistent measure of pension plan funding over time. Asset-smoothing methods reduce the effect of short-term market volatility on contributions, while still tracking the overall movement of the market value of plan assets, by recognizing the effects of investment gains and losses over a period of years.
 - The asset valuation method to be used shall be a four-year *smoothed* market value of assets. The difference between actual market value investment returns and the expected actuarial investment returns is recognized equally over a four-year period.
- **Amortization Method:** This component prescribes, in terms of duration and pattern, the systematic manner in which the difference between the actuarial accrued liability and the actuarial value of assets is reduced.
 - Once established for any component of the UAAL, the amortization period for that component will be closed and will decrease by one year annually.
 - The amortization payment will be determined on a level percentage of pay basis.
 - The length of the amortization periods will be as follows:
 - Existing UAAL on December 31, 2014 – 30 years.
 - Any increase (or decrease) in the UAAL existing as of December 31, 2014 – remaining period of the initial 30-year period from the date of the valuation.
 - Annual future actuarial experience gains and losses – 30 years from the date of the valuation.
 - Future assumption changes – 30 years from the date of the valuation.
 - Future benefit enhancements/reductions – the number of years, as determined by the Board, to represent the anticipated duration of payment of the enhancement or, if a reduction, duration of the benefit to the plan. This determination will be based on the nature of the benefit change and the demographics of the membership group affected by the change, not to exceed 25 years from the date of the valuation.
 - If any future annual actuarial valuation indicates a division has a negative UAAL, the ADC shall be set equal to the Normal Cost until such time as the funded ratio equals or exceeds 120%. At that time, the ADC shall be equal to the Normal Cost less an amount equal to 15 year amortization of the portion of the negative UAAL above the 120% funded ratio.
 - The target amortization period noted above regarding new UAAL will be applied for funding benchmark and RSI reporting purposes. Alternative ADCs, will be determined by division, by applying the layered amortization methodology as described above, using a 25-year closed period, a 20-year closed period, and a 15-year closed period, in lieu of the 30-year period, for amortization of new UAAL. These comparatives are to appear in the Comprehensive Annual Financial Report (CAFR) as a demonstration of the transparency and accountability funding goal delineated in Section III of this document.



Schedule I – Colorado PERA Defined Benefit Pension Plan Funding Policy (continued)

In conjunction with the three major components discussed above, a number of actuarial assumptions are used to develop the annual actuarial metrics, as well as the ADC rates, and are described in detail in the annual actuarial valuation report. The actuarial assumptions are derived and proposed by the Board's actuary and adopted by the PERA Board of Trustees in conformity with the *Actuarial Standards of Practice* issued by the Actuarial Standards Board. The assumptions represent the Board's best estimate of anticipated experience under the benefit provisions of PERA and are intended to be long-term in nature. In the development of actuarial assumptions, the Board considers not only past experience but also trends, external economic forces, and future demographic and economic expectations.

- **Actuarial Assumptions**—Actuarial assumptions are generally grouped into two major categories:
 - **Demographic assumptions**, which include rates of termination, retirement, disability, mortality, etc., and
 - **Economic assumptions**, which include investment return, salary increase, payroll growth, and inflation, etc.

Actuarial assumptions do not impact the total cost of the plan (benefit payments and expenses), but rather the timing of prescribed contributions. To the extent that actuarial experience deviates from the assumptions, and actual contributions deviate from projected, experience gains and losses will occur. These gains (or losses) then serve to reduce (or increase) the projected future contributions necessary to achieve or sustain a certain actuarial standard. It is in this vein that the ADC rates may help indicate if the statutory contribution rates are adequate to meet the future cost requirements of the plan, although the ADC calculated in valuation results has limitations due to changing costs over time. In Colorado PERA's situation, until future scheduled contribution increases are fully realized, the results of the actuarial projections will be the best indication of the adequacy of the statutorily prescribed contribution schedule.

VI. Governance Policy/Processes—

As delineated in the **PERA Governance Manual**, below is a list of specific actuarial and/or funding-related studies, the frequency at which they should be commissioned/requested by the Board, and additional responsibilities relating to the studies:

- **Actuarial Valuation** (perform annually)—The Board is responsible for reviewing PERA's annual actuarial valuation report; and submitting a summary report to the Legislative Audit Committee and the Joint Budget Committee of the General Assembly, together with any recommendations concerning such liabilities that have accrued. In addition, the Board, in consultation with the pension actuary, will provide recommendations to the Colorado General Assembly regarding any necessary adjustments to the statutory employer and member contribution rates.
- **Experience Analysis** (perform periodically, historically performed approximately every four years)—The Board is responsible for ensuring that an experience analysis is performed as prescribed, for reviewing the results of that study, and for approving the actuarial assumptions and methodologies to be used for all actuarial purposes relating to the defined benefit pension plans.
- **Actuarial Audit** (perform every five years, or the appointment of a new actuarial firm will satisfy requirement)—The Board is responsible for ensuring that an actuarial audit is performed as prescribed and for reviewing the results of that audit.



Schedule I – Colorado PERA Defined Benefit Pension Plan Funding Policy (continued)

- **Asset Liability Study** (perform at least every three to five years, or more frequently if necessary)—The Board is responsible for ensuring that a study of the relationship between the defined benefit trust assets and liabilities is performed as prescribed and for reviewing the results of that study.
- Review of the **Defined Benefit Pension Plan Funding Policy** (perform periodically)—The Board is responsible for the periodic review of the defined benefit pension plan funding policy, as is deemed necessary.

VII. Glossary of Funding Policy Terms—

- **Actuarial Accrued Liability (AAL):** The AAL is the value at a particular point in time of all past normal costs. This is the amount of assets the plan would have today if the current plan provisions, actuarial assumptions, and participant data had always been in effect, contributions equal to the normal cost had been made, and all actuarial assumptions had been met. For each of the PERA defined benefit plans, the AAL includes the balance in the affiliated annual increase reserve.
- **Actuarial Cost Method:** The actuarial cost method allocates a portion of the total cost (present value of benefits) to each year of service, both past service and future service.
- **Annual Increase Reserve (AIR):** As of January 1, 2007, an AIR was created for each division trust fund for the purpose of funding annual increases for PERA Benefit Structure members hired on or after January 1, 2007. A portion of the employer contribution, equal to one percent of the salaries of affected members, is accumulated in the AIR to be paid out in annual increases each July 1, to the extent affordable. Although invested with the affiliated division assets, the reserve balances are accounted for separately.
- **Asset Values:** For each of the PERA defined benefit plans, the actuarial and market asset values include the balance in the affiliated AIR.
 - **Actuarial Value of Assets (AVA):** The AVA is the market value of assets less the deferred investment gains or losses not yet recognized by the asset smoothing method.
 - **Market Value of Assets (MVA):** The MVA is the fair value of assets of the plan as reported in the plan's audited financial statements.
- **Entry Age Normal Actuarial Cost Method (EAN):** The EAN actuarial cost method is a funding method that calculates the normal cost as a level percentage of pay or level dollar amount over the working lifetime of the plan's members.
- **Funded Ratio:** The funded ratio is the ratio of the plan assets to the plan's actuarial accrued liabilities.
 - **Actuarial Value Funded Ratio:** is the ratio of the AVA to the AAL.
 - **Market Value Funded Ratio:** is the ratio of the MVA to the AAL.
- **Normal Cost:** The normal cost is the cost allocated under the actuarial cost method to each year of active member service.



Schedule I – Colorado PERA Defined Benefit Pension Plan Funding Policy (continued)

- **Present Value of Benefits (PVB) or total cost:** The PVB is the value at a particular point in time of all projected future benefit payments for current plan members, plus the balance in the affiliated AIR. The future benefit payments and the value of those payments are determined using actuarial assumptions regarding future events. Examples of these assumptions are estimates of retirement and termination patterns, salary increases, investment returns, etc.
- **Surplus:** A surplus refers to the positive difference, if any, between the AVA and the AAL.
- **Unfunded Actuarial Accrued Liability (UAAL):** The UAAL is the portion of the AAL that is not currently covered by the AVA. It is the positive difference between the AAL and the AVA.
- **Valuation Date:** The valuation date is the annual date upon which an actuarial valuation is performed; meaning that the trust assets and liabilities of the plan are valued as of that date. PERA's annual valuation date is December 31st.

Adopted: March 20, 2015

Amended: n/a