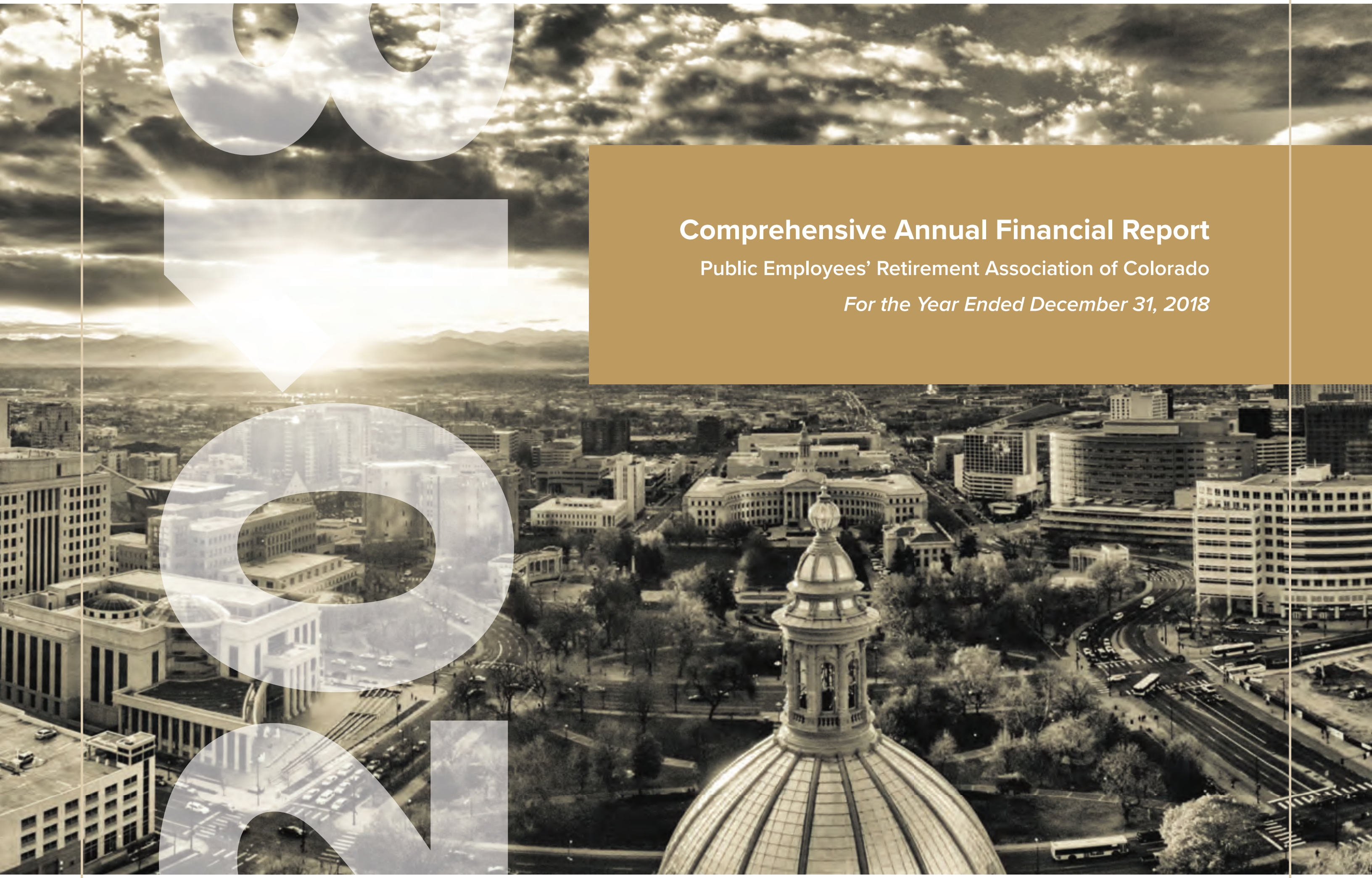
COLORADO PERA



Comprehensive Annual Financial Report

Public Employees' Retirement Association of Colorado

For the Year Ended December 31, 2018

EMBRACING CHANGE

to position PERA for the future

COLORADO PERA®

Comprehensive Annual Financial Report

For the Year Ended December 31, 2018

Public Employees' Retirement Association of Colorado

Prepared by Colorado PERA Staff

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COLORADO PERA

June 21, 2019

Ron Baker
Executive Director

Dear Colorado PERA Members, Benefit Recipients, Employers, and Members of the Board of Trustees:

I am pleased to present Colorado PERA's *Comprehensive Annual Financial Report (CAFR*) for the year ended December 31, 2018. Our year was highlighted by the passage of Senate Bill 200 (SB 18-200), which enacted broad changes to the plan to ensure PERA's continued sustainability. As always, PERA's efforts are designed to strategically position the organization for any upcoming challenges and opportunities, and thus solidify retirement security for Colorado's public employees.

We live, work, and invest in ever-changing times, and understand that change can be unsettling. We believe, however, that only through change can PERA continue to evolve to meet the demands of new circumstances and new challenges. And, evolution is the only way to ensure retirement security for Colorado's public workforce. At the core, the legislative changes that came to fruition last year sought to strike a balance between preserving PERA's retirement benefits and ensuring its long-term viability.

SB 18-200 makes changes in several key ways to the PERA plan:

- Increases contributions from employers and employees.
- Directs the State of Colorado (State) to allocate $225 million each year to PERA to reduce the unfunded liability.
- Modifies retirement benefits, including reducing the annual increase (AI) for all current and future retirees as well as raising the retirement age for new members.
- Establishes an automatic adjustment provision that will make changes to contributions and benefits in an effort to keep PERA on a path to full funding in 30 years.

We understand implementing the changes in SB 18-200 is not easy, but is essential for the health and well-being of the fund and the PERA membership. By increasing funding levels and reducing costs, these legislative changes create more resilience for the plan by shortening the period of time to achieve full funding. In doing so, PERA will be better able to continue to offer its Defined Benefit (DB) Plan, which remains one of the most competitive plans in the country.

Being mindful of our role as fiduciary and steward, PERA takes seriously our responsibility to safeguard the fund today and well into the future. As such, we employ long-term investment strategies that help us manage periodic turbulence. We understand—and expect—that there will be fluctuations in the market. This was the case in 2018, a difficult year for most institutional and individual investors that yielded low investment returns. For the year ended December 31, 2018, the defined benefit funds had a time–weighted rate of return of negative 3.5 percent net–of–fees.

To ensure the fund's ongoing progress toward funding goals, SB 18-200 included provisions to help strengthen PERA's ability to adapt to changes in market conditions and demographics. Most notably, SB 18-200 included an innovative automatic adjustment provision that acts as a "guard rail" to keep the fund on its 30-year path to full funding. This provision makes adjustments in four components: member contributions, employer contributions, the direct distribution from the State, and the AI paid to retirees. If the fund gets ahead of or falls behind the goal, adjustments will be made to these four components to help put PERA back on track.

The amount of each of these adjustments is not fixed and depends on the gap between total expected contributions and total required contributions. There are limits to these adjustments in terms of the amount that can be changed in a single year and over any period of time. In any given year when PERA is behind schedule, contributions can only be adjusted by 0.50 percent and cannot exceed an additional 2 percent to the scheduled contribution increases that will culminate in 2021. Conversely, if PERA is ahead of its funding target, contributions could be reduced but not below 2018 rates. Similarly, the AI can only be adjusted by 0.25 percent in any single year and cannot fall below 0.50 percent if PERA is behind schedule. If PERA is ahead of its funding target, the AI could be restored to 2 percent.

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These are powerful levers that will help ensure PERA's continued progress toward its funding goals. This provision, and the passage of the law in general, has already proven to be timely given the market's volatility in 2018. In July 2020, the automatic adjustment increments will be fully implemented, meaning employee and employer contributions will increase by 0.50 percent and the AI will be reduced by 0.25 percent, with no anticipated change to the direct distribution. These increases are in addition to contribution increases scheduled as part of SB 18-200.

To better understand the effect of the AAP on the scheduled contribution amounts for members, employers, as well as, the scheduled AI amount for retirees, effective July 1, 2020, please see the following tables.

Before the Automatic Adjustment Provision

Division Trust Fund	Member	Employer Contributions Base	Employer Contributions AED	Employer Contributions SAED	AI
State (excl. Troopers)	9.50%	10.40%	5.00%	5.00%	1.50%
State Troopers	11.50%	13.10%	5.00%	5.00%	1.50%
School	9.50%	10.40%	4.50%	5.50%	1.50%
Local Government	8.00%	10.00%	2.20%	1.50%	1.50%
Judicial	9.50%	13.91%	3.80%	3.80%	1.50%
DPS[1]	9.50%	10.40%	4.50%	5.50%	1.50%

[1] Excludes the PCOP rate which reduces the overall employer contribution.

After the Automatic Adjustment Provision

Division Trust Fund	Member	Employer Contributions Base	Employer Contributions AED	Employer Contributions SAED	AI
State (excl. Troopers)	10.00%	10.90%	5.00%	5.00%	1.25%
State Troopers	12.00%	13.60%	5.00%	5.00%	1.25%
School	10.00%	10.90%	4.50%	5.50%	1.25%
Local Government	8.50%	10.50%	2.20%	1.50%	1.25%
Judicial	10.00%	14.41%	3.80%	3.80%	1.25%
DPS[1]	10.00%	10.90%	4.50%	5.50%	1.25%

[1] Excludes the PCOP rate which reduces the overall employer contribution.

To better illustrate the effect of the corrective actions invoked by the automatic adjustment provision, please see the table in the next column which provides a side-by-side comparison, for each division, of the projected amortization periods, in years, (considering 2018 experience) before and after the adjustments.

Division Trust Fund	Before the Automatic Adjustment	After the Automatic Adjustment
State	33	28
School	41	34
Local Government	40	29
Judicial	24	21
DPS	20	17

The activation of the automatic adjustment provision demonstrates that the legislation is working as intended. A stable PERA fund is still one of the best ways for public service employers to recruit and retain an exceptional workforce that improves the quality of life for all Coloradans in countless ways.

Over the past year, PERA has undergone significant changes and it's with a focus on the future that the PERA Board finalized a five-year strategic plan after rigorous inquiry and deliberations. The PERA Board and staff spent much of 2018 examining the internal and external environment, discussing issues that impact our members, and charting a course for the future of PERA. This strategic plan sets priorities and serves as a roadmap for the future of the organization.

As part of that plan, PERA will be focusing on improving the way it delivers service to the membership. To that end, PERA will be conducting an extensive research and engagement effort to better understand what our members need and when they need it, at every stage in their career. Armed with insights from our members, we will continue to endeavor to provide not only high-quality service but also service that is highly relevant.

While there are many changes afoot at PERA, there are some things that remain constant. We remain highly committed to serving our members by providing one of the most competitive defined benefit and defined contribution retirement plans in the country. We remain committed to ensuring the long-term sustainability of the plan. And, we remain committed to ensuring that all stakeholders have access to the information they need when they need it. As the title of this year's *CAFR* indicates, we are indeed *Embracing Change* and doing so with the goals of ensuring resilience of the plan and preserving security.

Report Contents and Structure

Our *CAFR* must comply with the reporting requirements under Title 24, Article 51, Section 204(8) of the Colorado Revised Statutes (C.R.S.).

The compilation of this *CAFR* reflects the combined efforts of PERA staff and is the responsibility of PERA management. It is intended to provide complete and reliable information as a basis for making management decisions, determining compliance with legal provisions, and determining responsible stewardship of assets contributed by members and employers.

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Overview of Colorado PERA

Established in 1931, PERA operates by authority of the Colorado General Assembly and is administered under Title 24, Article 51 of the Colorado Revised Statutes. Initially covering all State employees, PERA has expanded to include all Colorado school districts, the State's judicial system, and many municipalities and other local government entities.

Legislation

During the 2018 legislative session, two bills affecting PERA were introduced, one of which was signed into law. The Board takes positions on legislation affecting PERA based on its fiduciary responsibility to act in the best interest of its membership.

Senate Bill 18-200: Modifications to PERA Public Employees' Retirement Association to Eliminate Unfunded Liability

This bill contains a package of reforms, based largely on a comprehensive set of recommendations from the PERA Board, designed to reduce the overall risk profile of the PERA DB retirement plans and improve their funded status. SB 18-200 makes the following changes:

Current Members

- Increase the member contribution rate by an additional 2 percent of pay (phased-in beginning July 1, 2019) totaling 10 percent for most members by July 1, 2021.
- Require a three-year wait before receiving the first AI.
- Set the AI cap at 1.5 percent.
- Redefine PERA-includable salary to include payouts of unused sick leave.
- Increase to five years the Highest Average Salary (HAS) calculation for nonvested members (for those with fewer than five years of service credit as of January 1, 2020); increase to three-year HAS for Judicial Division members who do not have five years of service credit as of January 1, 2020.

Current Retirees

- Set the AI cap at 1.5 percent.
- Suspend the AI for two years (effective for 2018 and 2019).
- Increase the working retiree contribution rate (for retirees working for PERA employers) by an additional 2 percent of pay (phased-in beginning July 1, 2019) totaling 10 percent for most retirees by July 1, 2021.

Employers

- Increase the employer contribution rate by an additional 0.25 percent except for Local Government Division employers, effective July 1, 2019.
- Require contributions on deductions made to cafeteria or qualified transportation plans for new members hired on or after July 1, 2019.
- Redefine PERA-includable salary to include payouts of unused sick leave for all current and future members.

Future Members (starting membership January 1, 2020, or as indicated)

- Increase eligibility requirements (age and service) for full service retirement benefits to age 64 with 30 years of service; age 55 with 25 years of service for a reduced service retirement. (For State Troopers, full service retirement eligibility will increase to age 55 with 25 years of service and age 55 with 20 years of service for reduced service retirement eligibility.)
- Increase the number of years used in the HAS calculation to five years; increase to three-year HAS for Judicial Division members.
- Set the AI cap at 1.5 percent.
- Require a three-year wait before receiving the first AI.
- Increase the member and working retiree contribution rates incrementally by an additional 2 percent of pay for new hires, totaling 10 percent for most members as of July 1, 2021.
- Redefine PERA-includable salary to include payouts of unused sick leave.
- Require contributions on deductions made to cafeteria or qualified transportation plans (applies to new PERA members hired on or after July 1, 2019).
- Expand Defined Contribution Choice (PERAChoice) to employees hired in the Local Government Division on or after January 1, 2019, and to classified college and university employees hired on or after January 1, 2019.

State Direct Distribution

- Receive an annual direct distribution from the State budget of $225 million to the trust funds of the State, School, Judicial, and Denver Public Schools Divisions, starting July 1, 2018.

Other Provisions

SB 18-200 contains additional provisions to ensure PERA remains a stronger and more stable retirement fund.

- **Automatic Adjustment Provision**—Makes incremental changes to four factors to keep PERA on track to reach its funding goal: member and employer contribution rates, the State direct distribution, and the AI. The amount of the adjustments to each of these factors is not fixed and will depend on the funding needs. If the fund is behind schedule, the member and employer contribution rates can increase by no more than 0.5 percent and the AI can be reduced by no more than 0.25 percent in a single year. If the fund is ahead

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of schedule, member and employer contribution rates can be decreased by up to 0.5 percent, the AI can be raised by up to 0.25 percent in one year, and the State direct distribution can be decreased by up to $20 million. In total and over multiple years, changes from the automatic adjustment provision to member and employer contribution rates will not exceed an additional 2 percent or fall below 2018 levels, the AI will not fall below 0.5 percent or exceed 2 percent, and the State direct distribution will not exceed $225 million.

- **Legislative Oversight**—Expands the existing Police Officers' and Firefighters' Pension Reform Commission to include oversight of PERA and creates pension review subcommittee exclusively focused on PERA. The 14-member subcommittee will include four legislators appointed from the Commission and 10 appointed external experts from relevant industries.
- **Safety Officer Rate and Benefit**—Applies the State Trooper contribution rate and benefits to certain other safety officers, including sheriff deputies and corrections officers hired on or after January 1, 2020.

The Board directed staff to be a resource to the bill sponsors as the bill went through the legislative process. The bill was signed into law by Governor Hickenlooper on June 4, 2018.

House Bill 18-1111: Modification to PERA Board of Trustees

This bill would have eliminated one elected Trustee position from the State Division and three elected Trustee positions from the School Division. These four elected Trustees would have been replaced by Trustees appointed by the Governor and confirmed by the State Senate, bringing the total of appointed Trustees to seven. The appointed Trustees would have been required to have at least 10 years of experience in a set of predefined professional fields. The elected Trustees who would have remained on the Board must be at least 20 years away from retirement eligibility.

The bill would have also authorized a Trustee to review all PERA records, including member salary and benefit information, even if that information would otherwise be deemed confidential by law.

The Board voted to oppose this bill, and the bill was postponed indefinitely by the House Committee on State, Veterans, & Military Affairs.

Economic Condition and Outlook

The U.S. economy grew 2.9 percent during 2018, matching 2015 for the highest levels of gross domestic product (GDP) growth since the recession of 2008. The Tax Cuts and Jobs Act signed into law in late 2017 provided an initial boost to GDP with its impact showing signs of waning as the year went on. Consumer spending remained strong through most of the year, lifted by higher wage growth and low inflation. Consumer confidence moved higher throughout the year, before weakening late in 2018 on concerns of ongoing trade disputes, rising interest rates, declining stock values, and the government shutdown. The unemployment rate trended down for most of 2018, hitting its lowest level in 50 years before increasing slightly in December to end the year at 3.9 percent. The U.S. economy continued to operate at or near full employment, which should fuel ongoing wage growth. Headline inflation, a measure of total inflation in an economy, ended the year at 1.9 percent, led lower by falling energy prices. Core inflation, which does not include the more volatile components such as food and energy, ended the year slightly higher at 2.2 percent. The residential housing market continued to notch year-over-year increases, albeit at slower rates than in previous years, as more balance returned to the market in the second half of 2018. The Federal Reserve (Fed) raised the fed funds rate in each quarter of 2018, marking nine rate increases since the Fed began tightening monetary policy in 2015. The Fed ended 2018 with the benchmark funds rate at 2.25 percent to 2.50 percent, and continued to reduce the size of the $4.5 trillion balance sheet it accumulated in the aftermath of the global recession, ending 2018 with a balance of just over $4.0 trillion.

The global economy grew at an estimated rate of 3.0 percent in 2018, which was lower than the forecasted growth rate of 3.1 percent. The growth was aided by higher, but decelerating, rates of growth in emerging market and developing economies and hindered by slowing growth in advanced economies. Growth in advanced economies is still running above its potential, supported by ongoing accommodative monetary policy. The growth rate in the United States remained strong relative to other advanced economies with Euro area growth beginning to slow even though interest rates remain in negative territory. The U.S. dollar strengthened during the year despite the combination of more restrictive monetary policy and expansionary fiscal policy, as the Fed continued to increase rates while Congress passed tax reform which significantly lowered corporate and generally individual tax rates.

Colorado's diverse economy continued to be among the top performing nationally, ranking sixth in the country for growth in real GDP, with every sector continuing to see gains in both employment and wages. The Colorado labor market recorded seven consecutive years of a declining unemployment rate through 2017 before increasing slightly in 2018. The increase in Colorado's unemployment rate in 2018 was largely due to its growing labor force (ranked second highest growth rate nationally), and increasing labor force participation (ranked third nationally). New construction in Colorado residential housing continued to increase year-over-year, and, for the first time since 2007, the growth in new

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housing outpaced formation of new households. The multi-year run in outsized home price appreciation showed signs of easing in the second half of 2018 as inventory levels increased, causing a slight shift toward a more balanced housing market as supply chased demand.

Investments

Investment portfolio income is a significant source of revenue to PERA. The Board's Investment Committee is responsible for assisting the Board in overseeing PERA's investment program.

In 2018, there was a net investment loss of $1.8 billion compared with total member contributions of $939 million, employer contributions of $1.7 billion and nonemployer contributions of $225 million.

For the year ended December 31, 2018, the defined benefit funds had a time-weighted rate of return of negative 3.5 percent net-of-fees. The annualized, net-of-fees, time-weighted, rates of return over the last three and five years were 6.9 percent and 5.6 percent, respectively, and over the last 10 years it was 8.8 percent. The 30-year annualized, gross-of-fees rate of return was 8.5 percent.

Prudent funding and healthy investment returns are important to the financial soundness of PERA. Changes in the composition of the portfolio are reflected in the Investment Summary on page 147.

An integral part of the overall investment policy is the strategic asset allocation policy. The targeted strategic asset allocation is designed to provide appropriate diversification and balance expected total rates of return with the volatility of expected returns. Specifically, the fund is to be broadly diversified across and within asset classes to limit the volatility of the total fund investment returns and to limit the impact of large losses on individual investments. Both traditional and nontraditional assets are incorporated into the asset allocation mix.

In addition to asset class targets, the Board sets ranges within which asset classes are maintained. The permissible ranges in effect at the end of 2018 were adopted by the Board on March 20, 2015. The interim and long-term targeted asset allocation mix and the specified ranges for each asset class are presented on page 143. All of the asset classes were within their specified ranges at year end.

PERA's investment policy is summarized in the Colorado PERA Report on Investment Activity on page 143.

Corporate Governance

As stewards of capital for over 600,000 members and beneficiaries, corporate governance is one way we protect and grow our portfolio over the long term. PERA's corporate governance philosophy is centered on accountability, transparency, alignment of interests, and sustainability. PERA's approach to advocacy against impediments to strong corporate governance is to actively engage with companies on a wide range of issues that may impact shareholder value. To that end, we hold meetings with corporate management and vote proxies in accordance with PERA's Proxy Voting Policy.

PERA has maintained its commitment to corporate governance reform through participation in the Council of Institutional Investors (CII) as well as several other coalitions of long-term shareholders. I was honored to be re-elected to the CII Board in March 2019, and my representation on the CII Board further supports PERA's commitment to corporate governance. PERA continues to actively advocate for comprehensive improvements to shareholder rights, rigorous federal oversight, and reforms that foster trust in the integrity of the global capital markets. We actively file comment letters to various regulatory agencies and legislative bodies to influence rules and regulations that may impact our investments and our rights as shareholders. In addition, PERA continues to be active in the securities litigation arena, fulfilling the Board's commitment to support corporate governance reforms such as transparency, accountability, and enforcement of shareholders' rights.

Financial Information and Management Responsibility

PERA's financial statements are prepared by management, who is responsible for the integrity and fairness of the data presented, including the many amounts which must, out of necessity, be based on estimates and judgments. This *CAFR* was prepared to conform to the accounting principles generally accepted in the United States of America. Financial information presented through the annual report is consistent with that which is displayed in the basic financial statements.

Ultimate responsibility for the basic financial statements and annual report rests with PERA management; the Board provides an oversight role over financial reporting. The Board is assisted in its responsibilities by the Audit Committee, which consists of five Board members and two independent outside members. The Audit Committee is responsible to oversee the adequacy and effectiveness of PERA's system of internal control and the accounting and financial reporting systems. A more detailed description of the Audit Committee's role can be found in their report on pages 18-19.

Management is responsible for establishing and maintaining adequate internal control over financial reporting. PERA's internal control over financial reporting is designed to provide reasonable, but not absolute assurance, regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. The internal control over financial reporting includes those policies and procedures that:

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- Pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of assets;
- Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures are being made only in accordance with authorizations of management; and
- Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of assets that could have a material effect on the financial statements.

Management has concluded that, as of December 31, 2018, the system of internal controls over financial reporting is effective.

There are inherent limitations in the effectiveness of any system of internal control, including the possibility of human error, the circumvention or overriding of controls, and that the cost of a control should not exceed the benefits to be derived. Accordingly, even an effective internal control system may not prevent or detect misstatements and can provide only reasonable assurance with respect to financial statement preparation. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions or that the degree of compliance with the policies or procedures may deteriorate.

State law requires that the State Auditor conducts or causes to be conducted an annual audit of PERA. Pursuant to this requirement, the State Auditor selected CliftonLarsonAllen LLP in 2015 to perform the independent audit of PERA. Under the direction of the State Auditor, CliftonLarsonAllen LLP audited PERA's 2018 basic financial statements in accordance with auditing standards generally accepted in the United States of America and Government Auditing Standards. This audit is described in the Report of the Independent Auditor on pages 27-29 of the Financial Section. Management has provided the auditors with full and unrestricted access to PERA's records and staff to discuss their audit and related findings to facilitate independent validation of the integrity of the plan's financial reporting and to consider the effectiveness of internal controls.

The Financial Section of the *CAFR* also contains Management's Discussion and Analysis (MD&A) that serves as a narrative introduction, overview, and analysis of the basic financial statements. This Letter of Transmittal is designed to complement the MD&A and should be read in conjunction with it.

Actuarial Results

Actuarial valuations involve assumptions about the probability of events far into the future in order to estimate the financial and actuarial status of the defined benefit trust funds. Two types of actuarial valuations are required to be performed for PERA's five defined benefit pension and two Other Postemployment Benefit (OPEB) trust funds: one for financial accounting and reporting purposes and the other for funding purposes. The results of both actuarial valuations are included in this *CAFR*. The actuarial valuations performed for financial accounting and reporting purposes are prepared in accordance with governmental accounting standards. Pension liabilities, OPEB liabilities, and other related amounts calculated in accordance with these standards emphasize the costs incurred by PERA-affiliated employers for providing benefits to their employees as part of the employment-exchange process. Assets are required to be stated at fair value and the liabilities are determined using a consistent, standardized methodology, which allows for transparency and the comparability of amounts calculated for financial accounting and reporting purposes across U.S. governmental defined benefit pension and OPEB systems.

The actuarial valuations for funding purposes are prepared in accordance with Actuarial Standards of Practice and the Board's pension and OPEB funding policies. Liabilities and other actuarial metrics are calculated for the purpose of determining a systematic approach to pre-funding costs of the five defined benefit pension and two OPEB plans, as well as to assess the adequacy of moneys that are available to pay post-employment benefits earned by the membership. Pre-funding future liabilities defrays the ultimate cost of providing benefits as dollars held in the trust funds generate investment returns. The amount of actuarial accrued liability (AAL) in excess of the actuarial value of assets is referred to as the unfunded actuarial accrued liability (UAAL). The ratio of assets to AAL represents the funded status of each plan.

For the year ended December 31, 2018, the UAAL calculated for purposes of systematically funding the five defined benefit pension trust funds was $31.0 billion compared to the liabilities calculated for accounting and financial reporting purposes of $31.5 billion, a difference of $0.5 billion. Although some of the objectives and calculation methodologies of these valuations are similar, the liabilities calculated for financial reporting purposes and funding purposes can be notably different under certain circumstances. For the year ended, December 31, 2017, the UAAL calculated for purposes of systematically funding the five defined benefit pension trust funds was $28.8 billion compared to the liabilities calculated for accounting and financial reporting purposes of $54.6 billion, a difference of $25.8 billion. The significant decrease in the liabilities calculated for accounting and financial reporting purposes is primarily due to a provision of GASB 67 which requires that a lower discount rate be used in certain circumstances to calculate the value of liabilities in

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today's dollars for purposes of financial accounting and reporting. In accordance with GASB 67, the discount rate determination for 2018 required the use of the long-term expected rate of return of 7.25 percent for the five defined benefit pension trust funds while the discount rate determination for 2017 resulted in a significantly lower rate for three out of the five defined benefit pension trust funds. The increase in the discount rate is directly attributed to the changes in plan provisions required by SB 18-200. When calculating the AAL for purposes of funding, the discount rate used is always equal to the long-term expected rate of return set by the Board.

Information on certain actuarial metrics that assess the moneys required to systematically fund the five defined benefit pension and two OPEB trust funds can be found in the MD&A on pages 43-47 of the Financial Section. A comprehensive discussion of the results of the actuarial valuation performed for financial accounting and reporting purposes can be found in the MD&A on pages 52-59, as well as in Notes 10 and 11 of the Notes to the Financial Statements in the Financial Section. A comprehensive discussion of the results of the actuarial valuations performed for funding purposes, as well as other analysis utilized by PERA can be found below and also in the Actuarial Section.

Funding

On December 31, 2018, the funded ratio for PERA's five defined benefit pension trust funds was 59.8 percent compared to 61.3 percent on December 31, 2017. The unfunded liability as of December 31, 2018, was $31.0 billion, an increase of approximately $2.2 billion from the previous year. The decrease in the funded ratio in 2018 is attributable mainly due to actuarial losses resulting from the demographic experience and the investment performance for 2018 compared to the long-term expected rate of return of 7.25 percent.

The development and ongoing review of a pension funding policy are responsibilities of the Board. PERA's current pension funding policy was initially adopted by the Board in March 2015, and last revised in November 2018, for the five defined benefit pension trust funds. The Board adopted a similarly structured OPEB funding policy in January 2018. Both policies focus on the determination of an actuarially determined contribution reflecting closed and layered 30-year amortization periods. The purpose of each policy is three-fold: (1) to define the overall funding benchmarks of the trust fund, (2) to assess the adequacy of the contribution rates set by the Colorado Legislature by comparing each trust fund's statutorily set contribution rate to an actuarially determined contribution benchmark, and (3) to define the annual actuarial metrics which will assist in assessing the sustainability of the plan. The results of these three items help guide the Board when considering whether to pursue or support proposed contribution and benefit legislation.

A goal of the Board's pension and OPEB funding policies is the achievement of a combined Division Trust Fund and a combined Health Care Trust Fund actuarial funded ratio equal to or greater than 110 percent.

Investment income is the most significant driver of the funded status in a defined benefit plan. To understand the significance of this assumption, a sensitivity analysis is included in the Actuarial Section on page 196 regarding the Division Trust Funds and page 220 regarding the Health Care Trust Funds. Additional information on PERA's funded ratio, unfunded liabilities, and actuarial assumptions may be found in the Actuarial Section starting on page 171 for the Division Trust Funds and on page 207 for the Health Care Trust Funds.

Employer contributions are also a driver of the funded status. In 2018, actual employer contributions received pursuant to statute for the five defined benefit pension trust funds were $450.0 million less than the actuarially determined contributions required. During the past 16 years, this contribution deficiency totaled $5.4 billion. See page 46 of the MD&A for additional details.

Investment Rate of Return Sensitivity Effect on Projected Amortization Periods

In addition to the annual actuarial funding valuation, the Board's actuary performs actuarial projections for each Division Trust Fund. These projections are forward-looking and take into consideration the many tiers of PERA benefit provisions and the statutory contribution rate structures, including when each tier or contribution rate became/becomes effective. The projections also reflect applicable salary, demographic, and economic actuarial assumptions, as well as anticipated member growth. Considering the various benefit tiers currently in effect within PERA, the Board believes the results of the actuarial projections to be the most comprehensive view and best indication of the adequacy of the statutorily prescribed pension contribution schedule.

The main focus of these projections is to provide the amortization period, or rather, the expected funding period, by division, of the estimated number of years until full funding status is achieved. The projected amortization periods reflect all actuarial assumptions and the benefit and contribution provisions currently enacted, even if not yet effective.

On the next page is a table showing the results of the actuarial projections, providing the projected amortization periods under three scenarios: (1) as of the December 31, 2017, actuarial valuation considering the enactment of SB 18-200, (2) as of the December 31, 2018, actuarial valuation, reflecting the less than expected 2018 investment return and other plan experience, and the enactment of HB 19-1217 (see Note 12 of the Notes to the Financial Statements in the Financial Section for additional details), and (3) reflecting the

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December 31, 2018, actuarial valuation results and experience, enactment of HB 19-1217, and the anticipated adjustments to take effect during 2020, resulting from the automatic adjustment provisions enacted through SB 18-200.

Projected Amortization Periods (in years)

Division Trust Fund	2017 Valuation Results	2018 Valuation Results	2018 Valuation Results Considering 2020 Automatic Adjustments[1]
State	27	33	28
School	30	41	34
Local Government	15	40	29
Judicial	15	24	21
DPS	17	20	17

[1] The automatic adjustment provision test and the adjustments, as determined by the Board's actuaries, are detailed in the Actuarial Section.

Since the projections are based on a wide variety of assumptions, it is important to understand the risks related to defined benefit plans, specifically the risks associated with the selection and application of the long-term expected rate of return on investments. Given the long-term funding horizon and anticipated ongoing aspect of such defined benefit plans, particularly those providing benefits in the public sector, it is generally understood that the existence of the plan, itself, is not tied to the financial performance of private enterprise, but rather to the ongoing nature of governmental services. Therefore, it is common practice for plan sponsors/administrators of governmental or public sector pension plans also to apply the expected long-term rate of return as the discount rate used to determine the liabilities of the plan.

In order to derive the long-term rate of return assumption, the PERA Board looks to the expertise of its investment and actuarial consultants to perform a comprehensive asset/liability study on a periodic basis (generally every three to five years). In conjunction with this study, the Board reviews capital market data from numerous sources. PERA is currently undergoing another asset/liability study which is scheduled to be completed in 2019.

The table in the next column illustrates the projected amortization periods, in years, of the School Division Trust Fund under the various return scenarios (used for both assumed investment return and to discount liabilities of the plan) which correspond to the confidence levels (probabilities of investment return) as indicated.

This table reflects the results and experience of the December 31, 2018, actuarial funding valuation and the effect of the automatic adjustment provision, as determined by the Board's actuaries, and detailed in the Actuarial Section. The projected funding periods below reflect 50-year probability outlooks (Monte Carlo simulations), provided by the Board's actuaries, and based on 30-year capital market assumptions, provided by the Board's investment consultants, at the time the Board last reviewed and changed the long-term expected rate of return/discount rate by lowering it to 7.25 percent.

Projected Amortization Periods—School Division Trust Fund

Probability of Achieving at Least the Rate of Return Displayed (or Better), Per Annum	Long-Term Expected Investment Return & Discount Rate				
	4.23%	5.92%	7.25%	8.33%	10.09%
95th Percentile	Infinite				
75th Percentile		73			
47th Percentile			34		
25th Percentile				20	
5th Percentile					9

Signal Light Methodology

Another way of understanding PERA's financial condition was adopted by the Colorado General Assembly's Legislative Audit Committee in 2015. By using the "signal light" methodology, the funded status that is determined on a projected basis is categorized based on an expanded spectrum of signal light colors ranging from dark green to dark red, with dark green, indicating a well-funded position, to dark red, indicating potential insolvency in the near future. PERA updates the signal light indicators each year, following the release of its CAFR. Recognizing the plan experience as of the December 31, 2018, actuarial valuation and the effect of the automatic adjustment provision, the signal light designation is green for the State and Local Government Divisions, light green for the School Division and dark green for the Judicial and DPS Divisions.

PERAPlus 401(k)/457 and Defined Contribution Retirement Plans

PERA offers members opportunities to save for retirement through the PERAPlus 401(k), PERAPlus 457, and Defined Contribution (DC) Retirement Plans. As of December 31, 2018, there were a total of 170 employers who recognized the value of offering more choices in savings by affiliating into the PERAPlus 457 Plan. The Roth option was added to the PERAPlus 401(k) and 457 Plans at the end of 2014. As of December 31, 2018, there were a total of 69 employers who have adopted the Roth option. The Roth option in these plans offers advantages over a Roth IRA, including higher contribution limits and no income-based contribution limitations.

The fiduciary net position of the PERAPlus 401(k) Plan, PERAPlus 457 and DC Retirement Plans decreased for

LETTER OF TRANSMITTAL

the year ended December 31, 2018. The PERAPlus 401 (k), PERAPlus 457, and DC Retirement Plans incurred $165.4 million, $47.5 million, and $15.4 million of investment losses with a fiduciary net position of $3.0 billion, $818.2 million, and $205.8 million, respectively.

Colorado Mile High Fund

In October 2012, PERA introduced the Colorado Mile High Fund, an investment vehicle that made millions of dollars available for qualifying opportunities within Colorado's business community. The creation of the Colorado Mile High Fund earmarked capital for businesses with a nexus to Colorado. The primary focus of this fund was private equity and venture capital opportunities structured as co-investments with financial sponsors. The fund also considered uniquely structured capital formation opportunities from private equity and venture capital firms that targeted Colorado-based opportunities. PERA used an external manager and adhered to the same investment and underwriting criteria for this fund as it used in its overall private equity program.

PERA and its adviser reviewed more than 75 investment opportunities resulting from an active deal sourcing effort that included discussions with scores of representatives from prospective investment opportunities. The Colorado Mile High Fund committed approximately 60 percent of the fund's total capital to six co-investments. Four co-investments were sold, generating gains in the portfolio. As part of its community outreach, PERA has participated in events such as The Mountain Life Science Investor & Partnering Conference, Rocky Mountain Private Fund Advisers Summit, Boulder Business After Hours, Boulder Chamber's Esprit Event, the Silicon Flatirons Fall Private Equity Conference, and the Rocky Mountain Corporate Growth Conference.

The fund closed to new investments on December 31, 2018, but will continue to manage the two existing investments which are in the health care and consumer discretionary sectors. In addition, Colorado investment opportunities will continue to be reviewed by PERA's adviser for fit within the broader context of PERA's Private Equity program.

The current fair value of the Colorado Mile High Fund is just over $3 million and is reflected in the Private Equity section of the Profile of Investments in Colorado schedule, found on page 154.

PERACare Health Benefits Program

The voluntary PERACare program has several plans providing health care, dental, and vision coverage to PERA members and retirees. PERA focuses on designing plans that are competitive, cost-effective, and valuable to members. PERA also participates in a number of value-based programs designed to support improving the patient experience of care, improving the health of populations, and reducing the per capita cost of health care (known as the "Triple Aim").

In April 2015, PERA introduced PERACare Select, a fixed-price hip and knee replacement benefit for Anthem pre-Medicare enrollees. For members who use PERACare Select providers and hospitals for their surgeries, PERACare Select waives the deductible and coinsurance. In 2018, 85 members used the benefit without any cost for their surgeries. PERA saved an average of $16,100 per PERACare Select surgery for $1.37 million in savings.

Total Compensation Philosophy

PERA recognizes that its people are its primary asset and its principal source of competitive advantage. PERA offers competitive compensation, performance recognition, comprehensive, affordable, high-quality medical, dental, and vision care programs as well as disability benefits and life insurance. PERA's Defined Benefit Plan along with two additional retirement savings options are an excellent strategic way for employees to reach their retirement security goals.

PERA strives to maintain a competitive total rewards package by partnering with consultants to stay abreast of current employment trends and analyzing relevant market data. PERA's total rewards program is designed to attract, engage, and retain talented employees while motivating extraordinary performance.

Recognition of Achievements

The Government Finance Officers Association of the United States and Canada (GFOA) awarded a Certificate of Achievement for Excellence in Financial Reporting to PERA for its *CAFR* for the year ended December 31, 2017. This was the 33rd consecutive year that PERA has achieved this prestigious award. In order to be awarded a Certificate of Achievement, a government must publish an easily readable and efficiently organized *CAFR*. This report must satisfy both generally accepted accounting principles and applicable legal requirements.

A Certificate of Achievement is valid for a period of one year only. We believe that our current *CAFR* continues to meet the Certificate of Achievement Program's requirements and we are submitting it to the GFOA to determine its eligibility for another certificate.

The GFOA also awarded PERA an Award for Outstanding Achievement in Popular Annual Financial Reporting for its *Popular Annual Financial Report* for the year ended December 31, 2017. The Award for Outstanding Achievement in Popular Annual Financial Reporting is a prestigious national award recognizing conformance with the highest standards for preparation of state and local government popular reports.

LETTER OF TRANSMITTAL

In order to receive an Award for Outstanding Achievement in Popular Annual Financial Reporting, a government unit must publish a Popular Annual Financial Report, whose contents conform to program standards of creativity, presentation, understandability, and reader appeal.

An award for Outstanding Achievement in Popular Annual Financial Reporting is valid for a period of one year only. PERA has received a Popular Award for the last 16 consecutive years. We believe our current report continues to conform to the Popular Annual Financial Reporting requirements, and we are submitting it to the GFOA.

PPCC Standards Award Program

The Public Pension Coordinating Council (PPCC) presented PERA with its Recognition Award for Administration for meeting professional standards in 2018 for plan administration as set forth in the Public Pension Standards. This is the 16th consecutive year that PERA has received this annual award. In 2018, the PPCC presented PERA with its Recognition Award for Funding by demonstrating the funding adequacy of the pension system. The PPCC is a coalition of three national associations that represent public retirement systems and administrators—the National Association of State Retirement Administrators, National Council on Teacher Retirement, and National Conference on Public Employee Retirement Systems. These three associations represent more than 500 of the largest pension plans in the U.S.

Employer Affiliation

PERA welcomes the North Front Range Water Quality Planning Association, which affiliated in the Local Government Division on March 1, 2018.

Management Changes

In October 2018, Kevin Carpenter was named Chief Administrative Officer. Kevin started his career at PERA in 1988 as a Programmer Analyst. He has served as the Director of the Information Technology Division since 2007. In his new role as Chief Administrative Officer, Carpenter oversees seven divisions of PERA: Accounting, Application Development, Human Resources, Information Technology, Operations Support, Project Management, and Property Management.

Also in October 2018, John Carreon was promoted to Director of Information Technology. John first joined PERA in February 1993 and after a break in service was rehired in January 2007 as an Application Manager in the Information Technology Division. He was named Assistant Director of Information Technology in September 2016. As Director of Information Technology, John is responsible for directing the overall management of networks, telecommunications, database systems, web administration, and information security.

In January 2019, Catherine Maninger joined PERA as Controller, a newly created position at PERA due to former Chief Financial Officer Lawrence Mundy resuming his original position as Accounting Reporting Manager in August 2018. Catherine previously was Chief Financial Officer for Oklahoma City University. As Controller, Catherine's responsibilities include providing day-to-day management of the Accounting Division staff in addition to directing PERA's investment, operational, benefits, and defined contribution accounting areas, including all financial reporting activities.

In March 2019, Sarah Wager joined PERA as Director of Internal Audit replacing David Mather who left PERA in August 2018 after nine years of service. Sarah previously was Director of the Office of Administrative Solutions at the Colorado Department of Human Services. As Director of Internal Audit, Sarah is responsible for developing and implementing a comprehensive internal financial, procedural, and compliance audit program, which includes evaluation of internal controls, policies, and information systems.

In April 2019, Laura Morsch-Babu joined PERA as Director of Communications due to Luc Hatlestad becoming PERA's Editorial Services Manager in January 2019. Laura previously was the Communications Director at the Colorado Department of Human Services. As Director of Communications, Laura is responsible for developing comprehensive communications strategies to advance PERA's vision and goals among stakeholders.

Also in April 2019, Rebecca Harren joined PERA as Director of Human Resources replacing Angela Setter who left PERA in December 2018 after 10 years of service. Rebecca previously was Director of Human Resources at Guaranty Bank and Trust. As Director of Human Resources, Rebecca's responsibilities include developing, recommending, and executing human resources programs, policies, and practices to promote an engaged staff, a healthy workplace culture, and protect the interests of PERA.

In addition to these management changes, in January 2019, Donna Baros, Chief Benefits Officer, left PERA after 30 years of service. PERA thanks Donna for her many years of service and wishes her well in future endeavors. To date, this position remains open.

Board Composition

PERA is governed by a 16-member Board of Trustees; 11 are elected by the membership for staggered four-year terms and serve without compensation except for necessary expenses. In addition, there are three Governor-appointed Trustees confirmed by the Senate who receive limited compensation. The State Treasurer serves as a voting ex officio Trustee, and the DPS Division seat serves as a non-voting ex officio Trustee.

LETTER OF TRANSMITTAL

In April 2018, Trustee Susan G. Murphy was confirmed by the Senate after being reappointed to the Board in October 2017 by Governor Hickenlooper. Trustee Murphy was originally appointed to the Board in 2007.

In June 2018, Carolyn Jonas-Morrison left the Board after not seeking re-election. On behalf of the PERA executive team, we thank Trustee Jonas-Morrison for her dedication and service to the PERA membership.

Beginning July 1, 2018, as a result of the 2018 Board election, Ramon Alvarado was newly elected to the State Division seat previously held by Trustee Jonas Morrison. In addition, Trustee Robert Lamb was re-elected to the Local Government seat and Trustee Guillermo Barriga was elected to the School Division seat to which he was appointed to in 2017 when Trustee Karl Fisch resigned from the Board. All three will serve four-year terms.

Also in July 2018, Trustee Lynn Turner's term ended as a Governor-appointed Trustee. He was first appointed to the Board in July 2011 by Governor Hickenlooper. On behalf of the PERA executive team, we will miss Trustee Turner's perspective and service to the PERA membership.

In August 2018, Thomas Barrett was appointed to fill this vacancy by Governor Hickenlooper. Trustee Barrett is a Personal Financial Planning Specialist at Helm Investment Management. In addition, he is an attorney and certified public accountant practicing in the area of financial planning and investment asset management for more than 30 years. By law, Governor-appointed Trustees must have experience in investment management, finance, banking, economics, accounting, pension administration, or actuarial analysis.

In January 2019, The Honorable Walker Stapleton left the Board when his term as State Treasurer ended. The Honorable Dave Young was elected State Treasurer in November 2018 and he began serving as an ex officio Trustee effective January 2019.

In March 2019, the Board appointed The Honorable Rebecca R. Freyre to the Judicial Division seat and reappointed Timothy M. O'Brien to the retiree seat. Each was the sole candidate duly nominated and eligible to be elected to these seats. Terms for both Trustees begin July 1, 2019, and end June 30, 2023.

The Honorable Will Bain did not seek re-election for the Judicial Division seat, which was up for election in 2019. On behalf of the PERA executive team, we thank him for his contributions and service to the PERA membership.

Also in March 2019, Trustee Robert Lamb announced his upcoming retirement with Boulder County effective May 1, 2019. An ad hoc search committee of the Board was formed in March 2019, and a replacement for this seat is pending.

Acknowledgements

The cooperation of our affiliated employers is significant to the success of PERA and we thank the staff and management of these employers for their continuing support.

Copies of this *CAFR* are provided to all PERA-affiliated employers and other interested parties; a summary (*Popular Annual Financial Report*) will be sent to members and benefit recipients. An electronic version of both publications is available on the PERA website at www.copera.org. For questions concerning any of the information provided in this *CAFR*, please email askpera@copera.org.

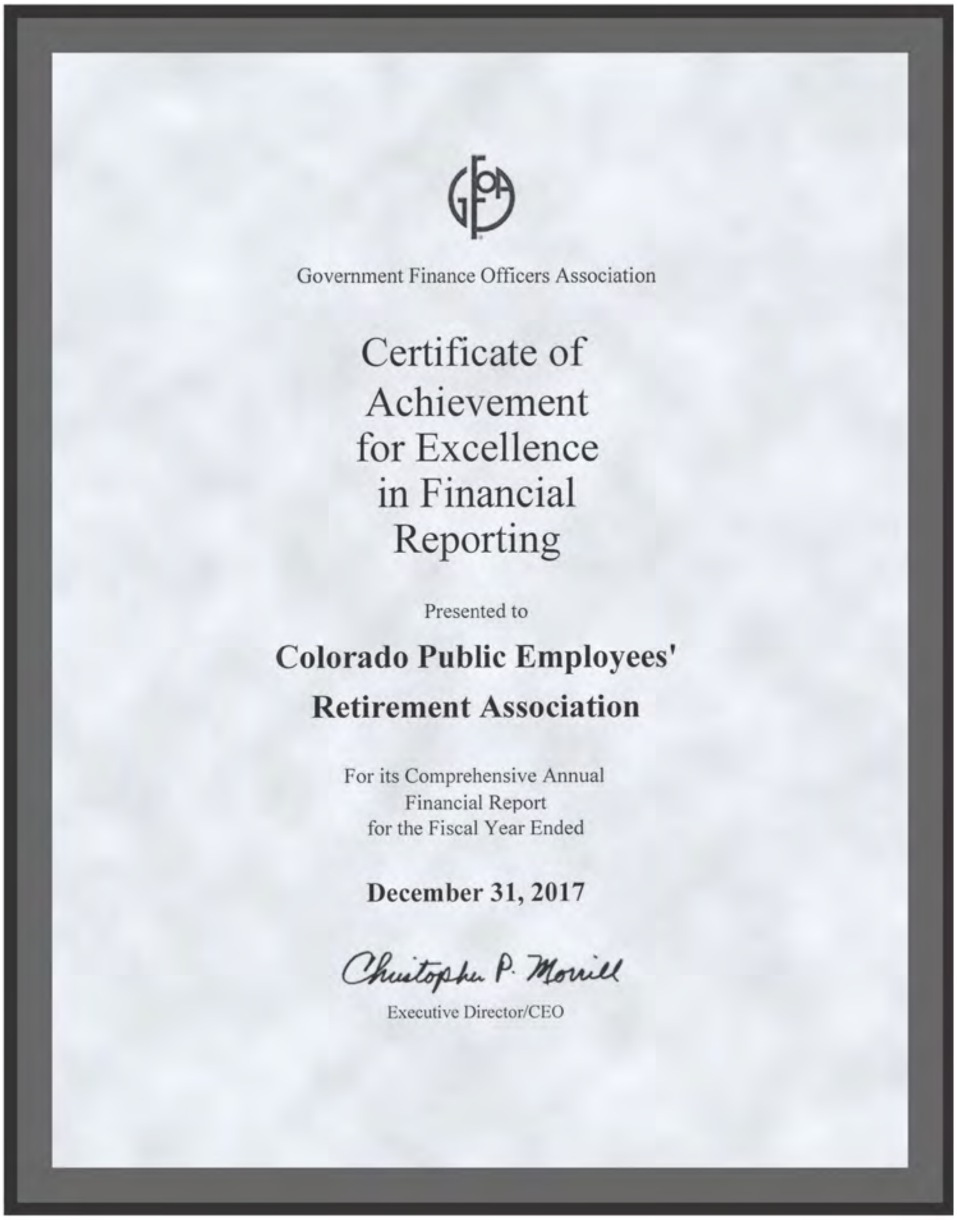
I also thank the PERA staff and Board of Trustees for their commitment and efforts to ensure that PERA meets the needs of all public employees in Colorado.

On a personal note, I am honored that in 2018 the PERA Board selected me to serve as PERA's seventh Executive Director. As I approach my 25th year with the organization, I look forward to leading PERA as we enter a new chapter. I am proud to be a part of PERA's long and illustrious history and to serve all of our stakeholders as we focus on ensuring a strong financial future that benefits all of Colorado.

Respectfully submitted,

Ron Baker
Colorado PERA Executive Director

PROFESSIONAL AWARDS



Government Finance Officers Association

Certificate of
Achievement
for Excellence
in Financial
Reporting

Presented to

Colorado Public Employees'
Retirement Association

For its Comprehensive Annual
Financial Report
for the Fiscal Year Ended

December 31, 2017

Christopher P. Morrill
Executive Director/CEO

PROFESSIONAL AWARDS

Public Pension Coordinating Council

Public Pension Standards Award
For Funding and Administration
2018

Presented to

Colorado Public Employees' Retirement Association

In recognition of meeting professional standards for
plan funding and administration as
set forth in the Public Pension Standards.

Presented by the Public Pension Coordinating Council, a confederation of

National Association of State Retirement Administrators (NASRA)
National Conference on Public Employee Retirement Systems (NCPERS)
National Council on Teacher Retirement (NCTR)

Alan H. Winkle
Program Administrator

BOARD CHAIRMAN'S REPORT

Timothy M. O'Brien
Board Chairman

June 21, 2019

Dear Colorado PERA Members, Benefit Recipients, and Employers:

On behalf of the Board of Trustees (Board), I am pleased to present Colorado PERA's *Comprehensive Annual Financial Report* for the year ended December 31, 2018.

PERA's total fund returns were a negative 3.5 percent for 2018, which was a difficult and volatile year for all investors. But even with these results, PERA continues to maintain its long-term focus toward achieving full funding within 30 years, an objective bolstered by recently enacted legislation.

Prior to the start of the 2018 legislative session, the PERA Board presented a recommendation to the State Legislature that would impact all of PERA's membership. The Board's recommendation largely became Senate Bill 18-200 (SB 18-200) *Modification To PERA Public Employees' Retirement Association To Eliminate Unfunded Liability*, a package of reforms designed to reduce the overall risk profile of the PERA retirement plan and improve its funded status. We understand that implementing these changes is not easy, but we believe shared impact across the membership and with employers was absolutely necessary to strengthen PERA's future stability and resilience.

The PERA system is stronger because of these comprehensive modifications enacted by the Colorado General Assembly and signed into law by Governor John Hickenlooper. This legislation would not have been possible without the dedicated leadership of the bill sponsors, Senators Jack Tate and Kevin Priola, House Majority Leader KC Becker, and Representative Dan Pabon.

As we embark upon changes with the plan as a result of SB 18-200, we also look to the future under the leadership of Ron Baker as the recently appointed Executive Director of PERA. After a rigorous nationwide search, the PERA Board unanimously named Ron to the position in August 2018. Ron's commitment to PERA is unparalleled. His leadership and professional background are ideal in promoting an innovative and adaptive culture at PERA during this time of change.

While legislation was a hallmark of the year, the Board also devoted significant time and effort in 2018 to developing a new five-year strategic plan that builds upon PERA's existing strengths: financial stability, a sound fiduciary governance structure, the highly-skilled PERA staff, effective internal asset management, and the high-quality, low-cost services provided to the PERA membership while positioning the organization for the future. The overarching goals of the strategic plan are to accomplish the following:

- Fortify the investment plan's resilience and adaptability in uncertain market conditions.
- Elevate PERA's recognition as an essential partner in delivering retirement security.
- Strengthen PERA's organizational health and performance.
- Improve the membership's retirement security by offering best-in-class products, services, and education.

In 2018, in keeping with good governance, the Board embarked on a number of initiatives relating to reviewing Board policies and service providers. The Board reviewed its Statement on Divestment to ensure its tenets accurately reflected the Board's position. As part of that process, the Board worked with external investment consultants and independent fiduciary counsel. These consultants stressed the primary importance of PERA's fiduciary duties, as well as the inherent political complexities of divestment that could compromise or endanger those duties. After significant consideration, the Board issued an updated Statement on Divestment in early 2019. This Statement can be found at https://www.copera.org/sites/default/files/documents/divestment.pdf.

Additionally, the Board completed a competitive bid process regarding the Board's actuarial service provider. Following the release of a Request for Proposal in August 2018 and a thorough search process, the Board narrowed the field of possibilities from six initial responding firms to three finalists, ultimately selecting Segal Consulting (Segal) to replace Cavanaugh Macdonald Consulting, LLC, effective November 1, 2018, as the Board's actuarial service provider.

BOARD CHAIRMAN'S REPORT

Finally, as outlined in the Board's Governance Manual, the Board directed PERA staff to initiate a Custodial Review since the last review was completed in 2013. This effort was led by PERA staff with support from Aon Hewitt Investment Consulting, Inc., the Board's investment consultant. A Request for Bid was sent to three custodian banks deemed sufficiently sophisticated to meet PERA's business complexity including incumbent The Northern Trust Company (Northern Trust). After performing on-site visits and a comprehensive analysis of each prospective custodian, PERA staff recommended that the Board retain Northern Trust as Custodian, and the Board approved this recommendation at its November 2018 meeting.

All of these initiatives highlight the Board's ongoing commitment to sound stewardship on behalf of all PERA members. To that end, I would like to recognize the following Trustees for their diligence and thoughtful contributions while serving on the Board: The Honorable Will Bain (Judicial Division), Bob Lamb (Local Government Division), Carolyn Jonas-Morrison (State Division), Lynn Turner (Governor Appointee), and The Honorable Walker Stapleton, outgoing State Treasurer. With these departures, we also welcomed the following new Trustees to the Board: Ramon Alvarado (State Division), The Honorable Rebecca R. Freyre (Judicial Division), Thomas Barrett (Governor Appointee), and The Honorable Dave Young, new State Treasurer. Trustees devote many hours in fulfilling their fiduciary duties while serving the membership, and all Trustees are recognized for their significant contributions of time and service.

The past few years have brought significant changes to PERA; however, these are necessary adjustments to propel the organization forward and maintain its strength and stability. On behalf of the Board, I would like to express my gratitude and appreciation to the entire PERA community for remaining supportive of the work we do to provide reliable retirement security for Colorado's public employees.

Sincerely,

Timothy M. O'Brien
Chairman, Colorado PERA Board of Trustees

REPORT OF THE COLORADO PERA AUDIT COMMITTEE

As described more fully in its Charter, the purpose of the Colorado PERA Audit Committee (Audit Committee) is to assist the Board of Trustees (Board) in fulfilling its fiduciary responsibilities as they relate to accounting policies and financial reporting, the system of internal control, PERA's *Standards of Professional and Ethical Conduct*, the internal audit process, and the practices of the Director of Internal Audit. Management is responsible for the preparation, presentation, and integrity of PERA's financial statements; accounting and financial reporting principles; internal control; and procedures designed to reasonably ensure compliance with accounting standards, applicable laws, and regulations. PERA has a full-time Internal Audit Division that reports functionally to the Audit Committee. The Internal Audit Division is responsible for independently and objectively reviewing and evaluating the effectiveness and efficiency of PERA's system of internal control.

In 2015, the State Auditor selected CliftonLarsonAllen LLP to perform the independent audit of PERA's annual financial statements, commencing with the year ended December 31, 2015. CliftonLarsonAllen LLP is responsible for performing an independent audit of PERA's financial statements in accordance with generally accepted auditing standards and the standards applicable to financial audits contained in Government Auditing Standards issued by the Comptroller General of the United States. In accordance with law, the State Auditor has ultimate authority and responsibility for selecting, evaluating, and, when appropriate, replacing PERA's Independent Auditor.

The Audit Committee serves a Board-level oversight role in which it provides advice, counsel, and direction to management and to the Internal Audit function on the basis of the information it receives, discussions with management and Internal Audit, and the experience of the Audit Committee's members in business, financial, and accounting matters. In this role, the Audit Committee also reviews the audit plan of the Independent Auditor, the results of the audit, and the status of management's actions to implement recommendations from the audit.

The Audit Committee believes that a candid, substantive, and focused dialogue with the internal auditors and the Independent Auditor is fundamental to the Audit Committee's oversight responsibilities. To support this belief, the Audit Committee periodically meets separately with both the Director of Internal Audit and the Independent Auditor, without management present. In the course of its discussions in these meetings, the Audit Committee asked a number of questions intended to bring to light any areas of potential concern related to PERA's financial reporting and internal control. These questions include, but are not limited to:

- Are there any significant accounting judgments, estimates, or adjustments made by management in preparing the financial statements that would have been made differently had the Independent Auditor prepared and been responsible for the financial statements?
- Based on the Independent Auditors' experience, and their knowledge of PERA, do PERA's financial statements fairly present to users, with clarity and completeness, PERA's financial position and performance for the reporting period in accordance with generally accepted accounting principles?
- Based on the Independent Auditors' experience, and their knowledge of PERA, has PERA implemented internal control and internal audit procedures that are appropriate for PERA?
- Are the Independent Auditor and internal auditors getting the support they need from management to execute their duties?

Questions raised by the Audit Committee regarding these matters were answered to the Audit Committee's satisfaction.

The Audit Committee had an agenda for 2018 that included the following items:

- Recommending the *Comprehensive Annual Financial Report (CAFR)* to the Board for its approval;
- Reviewing and approving the plan and budget of the Internal Audit Division;
- Reviewing the adequacy of resources made available to the Internal Audit Division;

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REPORT OF THE COLORADO PERA AUDIT COMMITTEE

- Reviewing the scope, objectives, and timing of the annual independent audit of PERA's financial statements;
- Providing input into the Executive Director's annual performance evaluation of the Director of Internal Audit;
- Reviewing PERA's compliance with its *Standards of Professional and Ethical Conduct*;
- Meeting with the Independent Auditor separately, without management present;
- Meeting separately with the Executive Director, Director of Internal Audit, Chief Financial Officer, and General Counsel; and
- Meeting with the Director of Internal Audit and with management to discuss the effectiveness of PERA's internal control.

The Audit Committee has reviewed and discussed the audited financial statements for the year ended December 31, 2018, with management and the Independent Auditor. Management represented to the Audit Committee that PERA's audited financial statements were prepared in accordance with accounting principles generally accepted in the United States of America that apply to governmental accounting for fiduciary funds. The Independent Auditor represented that their presentations to the Audit Committee included the matters required by auditing standards on auditor communication to be discussed with the Independent Auditor. This review included a discussion with management of the quality (not merely the acceptability) of PERA's accounting principles, the reasonableness of significant estimates and judgments, and the clarity of disclosure in PERA's financial statements, including the disclosures related to critical accounting estimates.

In reliance on these reviews and discussions, and the reports of the Independent Auditor, the Audit Committee has recommended to the Board, and the Board has approved PERA's *CAFR* for the year ended December 31, 2018.

Audit Committee as of June 21, 2019

David Hall, Chairman

Honorable Will Bain

Thomas J. Barrett

Tom Hall

Tammie Lowrie

Susan G. Murphy

Timothy M. O'Brien

BOARD OF TRUSTEES

By State law, authority over the public employees' retirement association is vested in the Board of Trustees (Board). The Board is composed of the following 16 Trustees:

- Nine members elected by members from their respective Divisions to serve on the Board for four-year terms; four from the School Division, three from the State Division, one from the Local Government Division, and one from the Judicial Division.
- Two retirees elected by retirees to serve on the Board for four-year terms.
- Three Trustees appointed by the Governor and confirmed by the State Senate to serve on the Board for four-year terms.
- The State Treasurer.
- One ex officio (non-voting) member or retiree elected by members and retirees of the Denver Public Schools (DPS) Division to serve on the Board for a four-year term.

If a Board member resigns, a new Trustee is appointed from the respective Division until the next election of Trustees.

Timothy M. O'Brien
Chairman

Elected by Retirees
Retired Colorado State Auditor
Office of the State Auditor
Current term expires June 30, 2023

Thomas J. Barrett

Appointed by the Governor
Current term expires July 10, 2022

Marcus Pennell
Vice Chairman

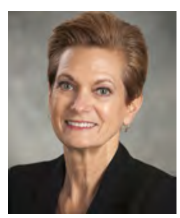
Elected by School Members
Physics Teacher
Jefferson County School District
Current term expires June 30, 2021

Guillermo Barriga

Elected by School Members
Youth Advocate
Aurora Public Schools
Current term expires June 30, 2022

Ramon Alvarado

Elected by State Members
Adjunct Faculty
Metropolitan State University of Denver
Current term expires June 30, 2022



Honorable Rebecca R. Freyre

Appointed to Judicial Division seat
Judge
Colorado Court of Appeals
Current term expires June 30, 2023

Honorable Will Bain

Elected by Judicial Members
Judge
4th Judicial District
Current term expires June 30, 2019

Julie Friedemann

Appointed to Retiree seat
Retired Mathematics Teacher
Jefferson County School District
Current term expires June 30, 2021

BOARD OF TRUSTEES

Amy Grant

Non-voting, Ex officio member
Elected by DPS Division members and retirees
Former Chair of the Denver Public Schools Retirement System Board
Secretary
DPS JROTC Program
Current term expires June 30, 2020

David Hall

Elected by State Members
Sergeant and Legislative Liaison
Colorado State Patrol
Current term expires June 30, 2020

Roger P. Johnson

Appointed by the Governor
Current term expires July 10, 2020

Carolyn Jonas-Morrison

Elected by State Members
College Level Math Faculty
Pikes Peak Community College
Term expired June 30, 2018

Suzanne E. Kubec

Appointed to State Division seat
Liability Claims Manager
State Office of Risk Management
Current term expires June 30, 2021

Robert Lamb

Elected by Local Government Members
Finance Division Director
Boulder County
Retired May 2019

Tina Mueh

Elected by School Members
Middle School Science Teacher
Boulder Valley School District
Current term expires June 30, 2021

Susan G. Murphy

Appointed by the Governor
Current term expires July 10, 2021

William N. Parker

Elected by School Members
International Baccalaureate Coordinator and Literacy Teacher
Brighton School District 27J
Current term expires June 30, 2020

Ryan Parsell

Deputy State Treasurer
Delegated Substitute for the State Treasurer
Term ended January 2019

Eric Rothaus

Deputy State Treasurer
Delegated Substitute for the State Treasurer
Continuous term effective January 2019

Honorable Walker Stapleton

Ex officio member
State Treasurer
Term ended January 2019

Lynn E. Turner

Appointed by the Governor
Term expired July 10, 2018

Honorable Dave Young

Ex officio member
State Treasurer
Continuous term effective January 2019

ADMINISTRATIVE ORGANIZATIONAL CHART AND EXECUTIVE MANAGEMENT

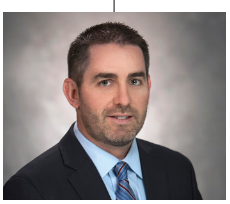
As of June 1, 2019

BOARD OF TRUSTEES

COLORADO PERA AUDIT COMMITTEE

- Internal Audit — *Sarah Wager–Director*

RON BAKER
Executive Director



ADAM FRANKLIN
General Counsel

- Corporate Governance and Legal Services — *Luz Rodriguez–Director*
- Planning, Policy, and Budget — *Karl Paulson–Director*

KEVIN CARPENTER
Chief Administrative Officer

- Accounting — *Catherine Maninger–Controller*
- Application Development — *Rich Krough–Director*
- Human Resources — *Rebecca Harren–Director*
- Information Technology — *John Carreon–Director*
- Operations Support — *Aubre Castillo–Director*
- Project Management
- Property Management — *Jack Dillman–Director*

OPEN
Chief Benefits Officer

- Benefit Services — *Matt Carroll–Director*
- Customer Service — *Lisa Bishop–Director*
- Insurance — *Jessica Linart–Director*

TARA MAY
Chief Communications Officer

- Communications — *Laura Morsch-Babu–Director*
- Creative Services — *Madalyn Knudsen–Director*
- Field Education Services — *Kirsten Lopkoff–Director*
- Government Relations
- Public Information Officer

AMY C. MCGARRITY
Chief Investment Officer

- Investment Administration
- Equities — *Jim Liptak–Director*
- Fixed Income — *Mark Walter–Director*
- Investment Operations — *Tom Liddy–Director*
- Opportunity Fund — *Gary Ratliff–Director*
- Private Equity — *Tim Moore–Director*
- Real Estate — *C.H. Meili–Director*

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Investments—Real Estate Performance
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Voluntary Investment Program, Defined Contribution Retirement, and Deferred Compensation Plan Service Provider
Voya Institutional Plan Services, LLC
30 Braintree Hill Office Park
Braintree, MA 02184

A list of PERA's Investment Brokers/Advisers, the Schedule of Commissions, and other information related to investment expenses can be found in the Investment Section on pages 145-147.

COLORADO PERA®

FINANCIAL SECTION

REPORT OF THE INDEPENDENT AUDITOR

CliftonLarsonAllen LLP
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INDEPENDENT AUDITORS' REPORT

Board of Trustees
Public Employees' Retirement Association of Colorado
Denver, Colorado

Report on the Financial Statements

We have audited the accompanying financial statements of Public Employees' Retirement Association of Colorado (Colorado PERA), as of and for the year ended December 31, 2018, and the related notes to the financial statements, which collectively comprise Colorado PERA's basic financial statements, as listed in the table of contents. We have also audited the financial statements of each individual fund of Colorado PERA as of and for the year ended December 31, 2018 as displayed in Colorado PERA's basic financial statements.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express opinions on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors' judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

A member of Nexia International

REPORT OF THE INDEPENDENT AUDITOR

Board of Trustees
Public Employees' Retirement Association of Colorado

Opinion

In our opinion, the financial statements referred to above present fairly, in all material respects, the fiduciary net position of Colorado PERA as of December 31, 2018, and the respective changes in its fiduciary net position for the year then ended in accordance with accounting principles generally accepted in the United States of America. In addition, in our opinion, the financial statements referred to previously present fairly, in all material respects, the respective fiduciary net position of each individual fund of Colorado PERA as of December 31, 2018, and the respective changes in fiduciary net position thereof for the year then ended in conformity with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

Accounting principles generally accepted in the United States of America require that the management's discussion and analysis, the division trust funds' schedules of changes in net pension liability, net pension liability, employer and nonemployer contributions, and investment returns and related notes, and the health care trust funds' schedules of changes in net OPEB liability, net OPEB liability, contributions from employers and other contributing entities, and investment returns and related notes, as listed in the table of contents, be presented to supplement the basic financial statements. Such information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. We have applied certain limited procedures to the required supplementary information in accordance with auditing standards generally accepted in the United States of America, which consisted of inquiries of management about the methods of preparing the information and comparing the information for consistency with management's responses to our inquiries, the basic financial statements, and other knowledge we obtained during our audit of the basic financial statements. We do not express an opinion or provide any assurance on the information because the limited procedures do not provide us with sufficient evidence to express an opinion or provide any assurance.

Supplementary and Other Information

Our audit was conducted for the purpose of forming an opinion on Colorado PERA's basic financial statements. The schedules of administrative expenses, other additions, other deductions, investment expenses and payments to consultants (supplementary information) and the introductory, investment, actuarial and statistical sections, as listed in the table of contents, are presented for purposes of additional analysis and are not a required part of the basic financial statements.

The supplementary information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the basic financial statements. Such information has been subjected to the auditing procedures applied in the audit of the basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare the basic financial statements or to the basic financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the supplementary information is fairly stated, in all material respects, in relation to the basic financial statements as a whole.

The introductory, investment, actuarial and statistical sections, as listed in the table of contents, have not been subjected to the auditing procedures applied in the audit of the basic financial statements, and accordingly, we do not express an opinion or provide any assurance on them.

REPORT OF THE INDEPENDENT AUDITOR

Board of Trustees
Public Employees' Retirement Association of Colorado

We also previously audited, in accordance with auditing standards generally accepted in the United States of America, the financial statements of Colorado PERA as of and for the year ended December 31, 2017 (not presented herein), and have issued our report thereon dated June 22, 2018, which contained an unmodified opinion on the respective financial statements of fiduciary net position and changes for the year then ended. The schedules of administrative expenses, other additions, other deductions, investment expenses and payments to consultants (supplementary information) for the year ended December 31, 2017 is presented for purposes of additional analysis and is not a required part of the basic financial statements. Such information is the responsibility of management and was derived from and relates directly to the underlying accounting and other records used to prepare the 2017 financial statements. The supplementary information has been subjected to the auditing procedures applied in the audit of the 2017 basic financial statements and certain additional procedures, including comparing and reconciling such information directly to the underlying accounting and other records used to prepare those financial statements or to those financial statements themselves, and other additional procedures in accordance with auditing standards generally accepted in the United States of America. In our opinion, the accompanying supplementary information is fairly stated in all material respects in relation to the financial statements as a whole for the year ended December 31, 2017.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated June 21, 2019 on our consideration of Colorado PERA's internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is solely to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on the effectiveness of PERA's internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering Colorado PERA's internal control over financial reporting and compliance.

CliftonLarsonAllen LLP

CliftonLarsonAllen LLP

Denver, Colorado
June 21, 2019

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

This Management's Discussion and Analysis (MD&A) section provides a narrative overview and analysis of the financial activities of the Public Employees' Retirement Association of Colorado (PERA) for the year ended December 31, 2018. Please consider the information presented here in conjunction with additional information in the Letter of Transmittal starting on page 3 of this *Comprehensive Annual Financial Report (CAFR)* and with the basic financial statements of PERA on pages 66-69.

In addition to historical information, this MD&A includes forward-looking statements, which involve certain risks and uncertainties. PERA's actual results, performance, and achievements may differ materially from the results, performance, and achievements expressed or implied in such forward-looking statements, due to a wide range of factors, including changes in interest rates, changes in the capital markets, general economic conditions, and legislative changes, as well as other factors.

See Note 1 of the Notes to the Financial Statements for additional information on the following plans administered by PERA:

Plan Name
Defined Benefit Pension Plans (Division Trust Funds)
State Division Trust Fund
School Division Trust Fund
Local Government Division Trust Fund
Judicial Division Trust Fund
Denver Public Schools (DPS) Division Trust Fund
Defined Benefit Other Postemployment Benefit Plans (Health Care Trust Funds)
Health Care Trust Fund (HCTF)
Denver Public Schools Health Care Trust Fund (DPS HCTF)
Defined Contribution Plans
Voluntary Investment Program
Defined Contribution Retirement Plan
Deferred Compensation Plan
Deferred Compensation Plan
Private Purpose Trust Fund
Life Insurance Reserve

This MD&A is organized into the following two sections: (1) Defined Benefit Funds and (2) Defined Contribution Pension and Deferred Compensation Trust Funds. The Defined Benefit Funds section includes the discussion and analysis of the Division Trust Funds, Health Care Trust Funds, and Life Insurance Reserve. The Defined Contribution Pension and Deferred Compensation Trust Funds section includes discussion and analysis of the Voluntary Investment Program, the Defined Contribution Retirement Plan, and the Deferred Compensation Plan.

PERA's funded status declined from 75.1 percent at the end of 2007 to 59.8 percent at the end of 2018. During this time, the 2008 global financial crisis further necessitated major pension reform and the enactment of Senate Bill (SB) 10-001 in 2010 significantly affected benefit and eligibility provisions, the payment structure of annual increases, and employer funding mechanisms to address PERA's funded status.

Between 2010 and 2015, PERA's funded status was negatively affected primarily by the recognition of adverse economic experience and the adoption of more conservative actuarial assumptions. The adverse economic experience recognized during this time was primarily due to the four-year smoothing of the large investment loss from 2008 in years 2010 and 2011. More conservative economic and demographic actuarial assumptions were also adopted during this time to better reflect anticipated future behaviors, longevity, and economic conditions.

PERA's funded status declined from 62.1 percent at the end of 2015 to 58.1 percent at the end of 2016 primarily due to the adoption of new mortality tables reflecting the expectation of increased longevity of the membership and a more conservative assumed investment rate of return of 7.25 percent.

Further contributing to PERA's funded status is the historic underpayment by employers of the actuarially determined contribution (ADC).

The Colorado General Assembly passed significant pension reform through SB 18-200: *Concerning Modifications To the Public Employees' Retirement Association Hybrid Defined Benefit Plan Necessary To Eliminate with a High Probability the Unfunded Liability of the Plan Within the Next Thirty Years*. The bill was signed into law by Governor Hickenlooper on June 4, 2018. SB 18-200 makes changes to the plans administered by PERA with the goal of eliminating the unfunded actuarial accrued liability (UAAL) of the Division Trust Funds and thereby reach a 100 percent funded ratio for each division within the next 30 years. The changes to plan provisions promulgated by SB 18-200, are included in the actuarial valuation for funding purposes in the Actuarial Section, commensurate with their effective dates. More information about the results of the 2018 actuarial valuation for funding purposes can be found in this MD&A on pages 46-47 and in the Actuarial Section on pages 171-206.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Basic Retirement Equation

Investment Income + Contributions = Benefits Paid + Expenses
(I + C = B + E)

At the most basic level, in the long run, a retirement plan must balance the money coming in through investment earnings and contributions against the money going out through benefit and expense payments.

I + C = B + E

Where: **I** is investment income

C is contribution inflows

B is benefits paid

E is expenses

During any year in the life of a plan, one side of the equation will be greater than the other with the goal that they will balance in the long run. The Statements of Changes in Fiduciary Net Position on pages 68-69 detail the contributions, investment income, benefit payments, and expenses for all of the fiduciary funds PERA administers.

Over the past 30 years (January 1, 1989, to December 31, 2018), the funds grew by $37,194,000. The components of the change in fiduciary net position (FNP) are shown below for this 30-year period. During this time, the number of members and benefit recipients grew over 340 percent from 136,412 to 604,180.

CHANGE IN FIDUCIARY NET POSITION (30-YEAR PERIOD)

I	–	Investment income	$61,701,000
C	–	Contributions and other additions	41,701,000
C	–	Plan transfers	2,764,000
		Subtotal	106,166,000
B	–	Benefits and other deductions	68,053,000
E	–	Expenses - administrative	919,000
		Subtotal	68,972,000
		Change in fiduciary net position	**$37,194,000**

For the year ended December 31, 2018, the FNP of the defined benefit funds decreased by $3,767,305 or 7.7 percent. The decrease was principally due to a decline in investment income. On a time-weighted basis, the total fund returned negative 3.5 percent outperforming the policy benchmark's annual return of negative 3.6 percent. More information about the total fund returns and policy benchmark can be found in this MD&A on pages 34-36. Benefits and expenses exceeded contributions by $2,152,036. The breakdown of the net change in FNP is shown below for the year ended December 31, 2018.

2018 CHANGE IN FIDUCIARY NET POSITION

I	–	Investment income (loss)	($1,615,269)
C	–	Contributions and other additions	2,777,700
		Subtotal	1,162,431
B	–	Benefits and other deductions	4,867,290
E	–	Expenses - administrative	62,446
		Subtotal	4,929,736
		Change in fiduciary net position	**($3,767,305)**

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Financial Reporting Highlights

The FNP for all defined benefit funds administered by PERA decreased $3,767,305 during calendar year 2018.

FIDUCIARY NET POSITION

Trust Fund	2018 Change Fiduciary Net Position	2018 Ending Fiduciary Net Position
State Division	($1,257,281)	$13,966,421
School Division	(1,885,180)	23,477,550
Local Government Division	(311,697)	3,971,389
Judicial Division	(23,016)	306,846
DPS Division	(293,598)	3,184,442
HCTF	2,970	279,192
DPS HCTF	1,721	24,029
Life Insurance Reserve	(1,224)	17,842
Total	**($3,767,305)**	**$45,227,711**

CHANGE IN FIDUCIARY NET POSITION

Trust Fund	(C) Contributions and Other Additions	+ (I) Net Investment Income/(Loss)	– (B) – (E) Benefits, Expenses, and Other Deductions	= Change in Fiduciary Net Position
State Division	$931,081	($497,562)	$1,690,800	($1,257,281)
School Division	1,472,708	(838,899)	2,518,989	(1,885,180)
Local Government Division	140,261	(142,476)	309,482	(311,697)
Judicial Division	14,609	(11,006)	26,619	(23,016)
DPS Division	116,483	(114,070)	296,011	(293,598)
HCTF	94,932	(9,678)	82,284	2,970
DPS HCTF	7,622	(894)	5,007	1,721
Life Insurance Reserve	4	(684)	544	(1,224)
2018 change in fiduciary net position	**$2,777,700**	**($1,615,269)**	**$4,929,736**	**($3,767,305)**
2017 change in fiduciary net position	**$2,433,016**	**$7,694,263**	**$4,823,132**	**$5,304,147**
2016 change in fiduciary net position	**$2,436,794**	**$3,038,026**	**$4,752,625**	**$722,195**
2015 change in fiduciary net position	**$2,289,511**	**$669,349**	**$4,563,650**	**($1,604,790)**
2014 change in fiduciary net position	**$2,313,846**	**$2,474,349**	**$4,337,188**	**$451,007**
2014-2018 change in fiduciary net position	**$12,250,867**	**$12,260,718**	**$23,406,331**	**$1,105,254**

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Investment Highlights

Analysis of Investment Income
Basic Funding Equation I + C = B + E

INVESTMENT INCOME/(LOSS)

Trust Fund	Net Appreciation/ (Depreciation) in Fair Value	Interest and Dividends	Real Estate, Private Equity, and Oppty Fund Net Operating Inc	Investment Expenses	Net Securities Lending Income	Net Investment Income/(Loss)
State Division	($798,777)	$266,433	$84,012	($52,071)	$2,841	($497,562)
School Division	(1,343,233)	446,097	140,663	(87,184)	4,758	(838,899)
Local Government Division	(227,779)	75,454	23,792	(14,747)	804	(142,476)
Judicial Division	(17,556)	5,794	1,827	(1,132)	61	(11,006)
DPS Division	(182,998)	60,969	19,225	(11,916)	650	(114,070)
HCTF	(15,410)	5,070	1,598	(991)	55	(9,678)
DPS HCTF	(1,360)	412	130	(81)	5	(894)
Life Insurance Reserve	(1,097)	365	115	(71)	4	(684)
2018 Total	**($2,588,210)**	**$860,594**	**$271,362**	**($168,193)**	**$9,178**	**($1,615,269)**
2017 Total	**$6,749,932**	**$836,085**	**$272,097**	**($172,801)**	**$8,950**	**$7,694,263**
2016 Total	**$2,124,689**	**$808,744**	**$256,216**	**($161,800)**	**$10,177**	**$3,038,026**
2015 Total	**($216,959)**	**$807,322**	**$233,535**	**($165,392)**	**$10,843**	**$669,349**
2014 Total	**$1,563,843**	**$854,332**	**$205,078**	**($159,923)**	**$11,019**	**$2,474,349**

The largest inflow into a retirement plan over the long term comes from investment income. For PERA's defined benefit plans, this represents 58 percent of the inflows over the past 30 years and 58 percent of the inflows over the past 10 years.

Investment Performance

Money-Weighted Rate of Return

A money-weighted rate of return considers the effect of timing of transactions that increase the amount of defined benefit plan investments (such as contributions) and those that decrease the amount of defined benefit plan investments (such as benefit payments). Additionally, the money-weighted rate of return provides information that is comparable with the long-term assumed rate of return on the pooled investment assets.

For the year ended December 31, 2018, the net-of-fees, money-weighted rate of return on the pooled investment assets was negative 3.3 percent, which was lower than the actuarial assumed rate of 7.25 percent.

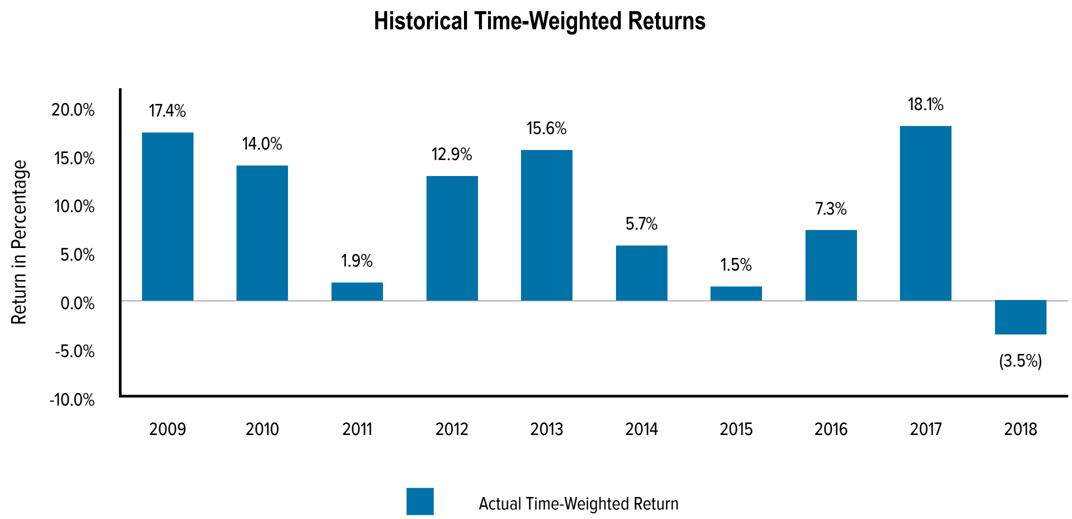
Time-Weighted Rates of Return

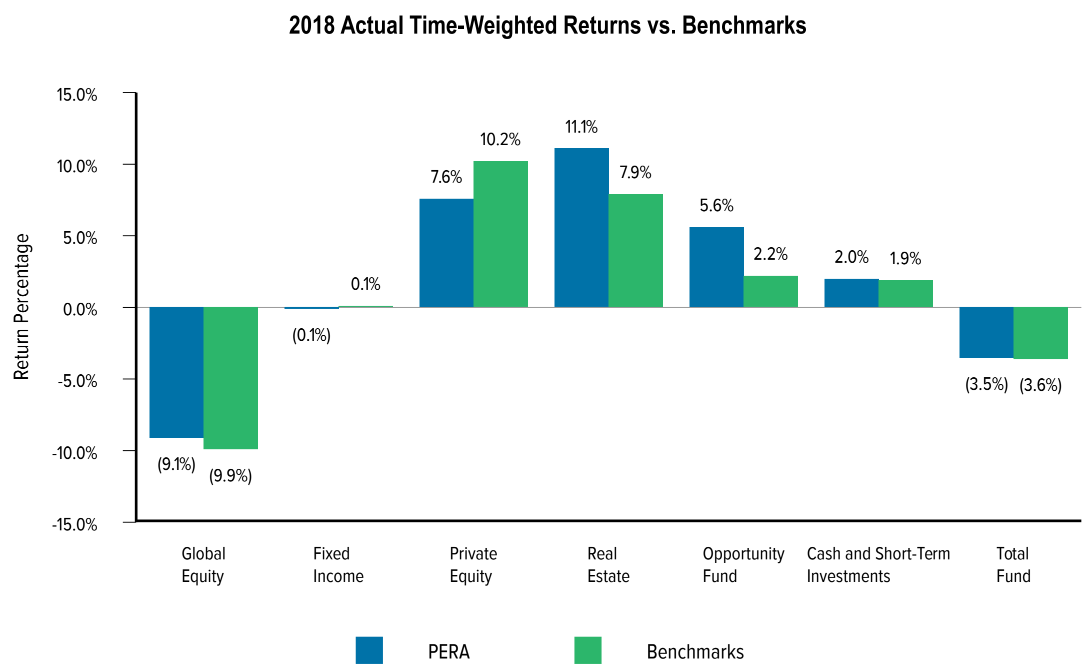
The time-weighted rate of return considers investment performance of a hypothetical dollar invested from the beginning of an investment period to the period’s end. The effect of timing on varying amounts invested due to, for example, the receipt of contributions or the payments of benefits is not considered. This methodology allows PERA to compare its investment performance with relevant benchmark returns, as well as its performance with other pension plans, as shown on the next page.

For the year ended December 31, 2018, the net-of-fees, time-weighted rate of return on the pooled investment assets was negative 3.5 percent compared to 18.1 percent for the year ended December 31, 2017. The net-of-fees, annualized rate of return for the pooled investment assets was 5.6 percent for the past five years and 8.8 percent for the past 10 years. The 30-year annualized, gross-of-fees, rate of return for the pooled investment assets was 8.5 percent. It is important to note that market returns and volatility will vary from year to year for the total fund and across various asset classes.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)





Note: Aon Hewitt Investment Consulting, Inc., the Board's investment consultant, provides the investment returns based on data made available by PERA's custodian, The Northern Trust Company. Listed above are the one-year, net-of-fees, time-weighted rates of return for each asset class and their respective benchmarks. For benchmark descriptions, see the Schedule of Investment Results on page 149 in the Investment section.

As of April 1, 2004, PERA adopted a policy benchmark, which is a passive representation of the asset allocation policy. As of December 31, 2018, the policy benchmark is a combination of 53.5 percent of the Global Equity Custom Benchmark; 23.5 percent of the Fixed Income Custom Benchmark; 8.5 percent of the Private Equity Custom Benchmark; 8.5 percent of the Real Estate Custom Benchmark; 5.0 percent of the Opportunity Fund Benchmark; and 1.0 percent of the ICE BofAML U.S. 3-Month Treasury Bill Index. For more information, see the Schedule of Investment Results on page 149 and the Fund Performance Evaluation on pages 151-153 in the Investment Section.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

The total fund outperformed the policy benchmark's return by 10 basis points for the year ended December 31, 2018. Global Equity, Real Estate, and the Opportunity Fund were the primary contributors to the outperformance, while Private Equity was a detractor to performance versus the policy benchmark.

For the year ended December 31, 2018, PERA's total fund returned negative 3.5 percent net-of-fees, compared to the BNY Mellon Performance and Risk Analytics' and Investment Metrics' Median Public Fund Universe return of negative 3.0 percent. As of December 31, 2018, the BNY Mellon Performance and Risk Analytics' and Investment Metrics' Median Public Fund Universe measure was comprised of 97 public pension funds with assets of approximately $2.3 trillion (actual dollars). PERA's total fund returned 6.9 percent, 5.6 percent, and 8.8 percent on a three-, five-, and ten-year annualized basis, respectively, compared with the BNY Mellon Performance and Risk Analytics' and Investment Metrics' Median Public Fund Universe returns of 6.6 percent, 5.3 percent, and 8.9 percent, respectively.

The Board is responsible for setting the strategic asset allocation of the plan, which is believed to be the most important factor influencing long-term investment performance and portfolio volatility. Staff is responsible for execution of the strategic asset allocation, and uses a combination of active and passive investment management within the public asset classes (Global Equities and Fixed Income). Staff believes that over PERA's long-term investment horizon, a combination of active and passive management remains an appropriate structure.

The Board is responsible for the investment of PERA's funds with the following statutory limitations: the aggregate amount of moneys invested in corporate stocks and fixed income securities convertible into stock cannot exceed 65 percent of the then book value of the fund; no investment in common and/or preferred stock of any single corporation can exceed 5 percent of the then book value of the fund; the fund cannot acquire more than 12 percent of the outstanding stock or bonds of any single corporation; and the origination of mortgages or deeds of trust on real residential property is prohibited. As a fiduciary of the funds, the Board is responsible to carry out its investment functions solely in the interest of the PERA members and benefit recipients and for the exclusive purpose of providing benefits.

In 2014, the Board commissioned an asset/liability study prepared by Aon Hewitt Investment Consulting, Inc. (Aon). The objective of the study was to determine the optimal strategic asset allocation policy that would ultimately allow PERA to meet its benefit obligations, while also ensuring that PERA incurs appropriate levels of risk. On March 20, 2015, the Board voted to change the strategic asset allocation policy of the fund effective July 1, 2015. This strategic asset allocation contains a long-term target allocation and specific ranges within which each asset class may operate. Because the long-term target allocation will be achieved over time, an initial interim target allocation was approved as of July 1, 2015, revised as of July 1, 2016, and reviewed again and retained without changes most recently on June 22, 2018. PERA is currently undergoing another asset/liability study which is scheduled to be completed in 2019.

Asset Allocation

ASSET ALLOCATION VS. TARGETS AND RANGES[1]

	Actual Asset Allocation As of 12/31/2017[2]	Actual Asset Allocation As of 12/31/2018[2]	Interim Asset Allocation Target During 2018	Long-Term Asset Allocation Target	Target Range During 2018
Global Equity	57.7%	**53.4%**	**53.5%**	**53.0%**	**47.0% – 59.0%**
Fixed Income	21.9%	**24.0%**	**23.5%**	**23.0%**	**18.0% – 28.0%**
Private Equity	8.0%	**8.8%**	**8.5%**	**8.5%**	**5.0% – 12.0%**
Real Estate	8.6%	**9.6%**	**8.5%**	**8.5%**	**5.0% – 12.0%**
Opportunity Fund	3.4%	**3.6%**	**5.0%**	**6.0%**	**0.0% – 9.0%**
Cash and Short-Term Investments	0.4%	**0.6%**	**1.0%**	**1.0%**	**0.0% – 3.0%**

1 See Note 5 of the Notes to the Financial Statements for detailed disclosures about each asset class.

2 Asset allocation decisions are made based on the total holdings of the portfolios within each asset class. Therefore, the investment receivables, payables, accruals, securities lending collateral, securities lending obligations, and cash and short-term investments are allocated back to the investment portfolios that hold them for purposes of this table.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Anti-BDS Divestment

During the 2016 legislative session, Governor Hickenlooper signed into law House Bill (HB) 16-1284: *Divest From Companies With Prohibitions Against Israel,* which imposes divestment from companies engaging in actions that are politically motivated and are intended to penalize, inflict economic harm on, or otherwise limit commercial relations with the State of Israel including, but not limited to, the boycott of, divestment from, or imposition of sanctions on the State of Israel. As a result of this legislation, PERA is required to create a list of restricted companies, review it on a biannual basis, and prohibit investments in these companies going forward. The law requires PERA to engage companies on the list to warn them of potential divestment. PERA is required to sell, redeem, divest, or withdraw all direct holdings within 12 months after the company's most recent appearance on the list of restricted companies.

At least annually, PERA is required to report on its website information regarding investments sold, redeemed, divested, or withdrawn in compliance with this law.

More information regarding Anti-BDS Divestment can be obtained from the PERA website at www.copera.org.

Iran-Related Investment Policy

On January 18, 2008, the Board adopted the Iran-related investment policy. This policy outlined a phased strategy to address PERA's direct public investments in foreign companies doing business in the Islamic Republic of Iran. The strategy addressed and included a number of actions, up to and including possible divestment. PERA recognized the federal government has sole responsibility for the conduct of American foreign policy. PERA was acting out of a fiduciary concern for the welfare of its members' assets, which required a broad horizon and sensitivity to the potential risks posed by investment in Iran.

As part of this policy, PERA created a list of public companies doing business in Iran that met certain criteria. PERA engaged with those companies to better understand their involvement in Iran and enacted a moratorium on direct public investments. PERA staff evaluated the companies' responses and determined if they had taken sufficient steps to minimize risk to PERA. If adequate mitigation of risk was not possible, the Board directed staff to divest current public investments in the companies.

The Board rescinded the Iran-related investment policy on January 18, 2019, in conjunction with the approval of the amended Statement on Divestment. More information on that Statement can be obtained from the PERA website at www.copera.org.

Commitments

As of December 31, 2018, PERA had commitments for future investments in Private Equity of $2,411,541, in Real Estate of $804,812, and in the Opportunity Fund of $852,812.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Contributions

Analysis of Contributions
Basic Funding Equation: I + C = B + E

Statutory Contributions

TOTAL CONTRIBUTIONS FOR DIVISION AND HEALTH CARE TRUST FUNDS

Trust Fund	Employer Contributions[1]	Nonemployer Contributions[2]	Member Contributions	Purchased Service	Retiree Health and Life Premiums	Employer Disaffiliation Payment	Other	Total Contributions and Other
State Division	$583,164	$78,489	$236,313	$25,227	$—	$—	$7,888	$931,081
School Division	923,910	126,505	386,811	27,525	—	—	7,957	1,472,708
Local Government Division	81,358	—	52,421	5,642	—	—	840	140,261
Judicial Division	8,299	1,385	4,064	636	—	—	225	14,609
DPS Division	35,994	18,621	58,172	2,926	—	—	770	116,483
HCTF	86,559	—	—	—	—	—	8,373	94,932
DPS HCTF	7,417	—	—	—	—	—	205	7,622
2018 Total	**$1,726,701**	**$225,000**	**$737,781**	**$61,956**	**$—**	**$—**	**$26,258**	**$2,777,696**
2017 Total	**$1,625,673**	**$—**	**$706,499**	**$67,454**	**$—**	**$1,159**	**$32,231**	**$2,433,016**
2016 Total	**$1,522,319**	**$—**	**$687,202**	**$58,152**	**$144,759**	**$—**	**$24,362**	**$2,436,794**
2015 Total	**$1,409,632**	**$—**	**$665,662**	**$61,383**	**$134,148**	**$—**	**$18,686**	**$2,289,511**
2014 Total	**$1,306,596**	**$—**	**$640,531**	**$53,040**	**$109,901**	**$190,000**	**$13,778**	**$2,313,846**

[1] Employer contributions include the employer statutory rate, AED, and SAED, less an offset of 14.18 percent in 2018 for the DPS Division as required by C.R.S. § 24-51-412 *et seq.*

[2] Contributions from a nonemployer contributing entity are required by C.R.S. § 24-51-414 *et seq.*

Contribution rates are set in statute and are thus determined by the Colorado General Assembly. See pages 263-270 in the Statistical Section for the Schedule of Contribution Rate History. Contributions from members to the Division Trust Funds increased from $706,499 in 2017 to $737,781 in 2018. Over the past 30 years, member contributions represent 18 percent of the inflows into the Division Trust Funds.

Contributions from employers to the Division Trust Funds, HCTF, and DPS HCTF increased from $1,625,673 in 2017 to $1,726,701 in 2018. Employer contributions increased due to increases in payroll and increases in the Supplemental Amortization Equalization Disbursement (SAED) for the School and DPS Division Trust Funds.

Pursuant to C.R.S. § 24-51-414, an annual direct distribution from a single nonemployer contributing entity, the State of Colorado (State), was received in 2018 in the amount of $225,000.

Over the past 30 years, contributions from employer and nonemployer contributing entities represent 22 percent of the inflows into the Division Trust Funds, HCTF, and DPS HCTF.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

MEMBER CONTRIBUTION RATES FOR 2018

Trust Fund	January 1–December 31
State Division (except State Troopers[1])	**8.00%**
State Division (State Troopers[1])	**10.00%**
School Division	**8.00%**
Local Government Division	**8.00%**
Judicial Division	**8.00%**
DPS Division	**8.00%**
HCTF	**0.00%**
DPS HCTF	**0.00%**

1 The definition of State Troopers can be found in Note 1 of the Notes to the Financial Statements.

EMPLOYER CONTRIBUTION RATES FOR 2018

		Actual Contribution Rates								
Trust Fund	Actuarially Determined Contribution[1]	Employer	Health Care	AED	SAED	DPS PCOP Offset	Net Employer Contribution	AIR	Nonemployer Contribution[2]	Total Contribution Rate Available for Funding
State Division (except State Troopers[3])	26.30%	10.15%	(1.02%)	5.00%	5.00%	—	19.13%	(0.49%)	2.71%	21.35%
State Division (State Troopers[3])	26.30%	12.85%	(1.02%)	5.00%	5.00%	—	21.83%	(0.49%)	2.71%	24.05%
School Division	26.80%	10.15%	(1.02%)	4.50%	5.50%	—	19.13%	(0.42%)	2.64%	21.35%
Local Government Division	14.27%	10.00%	(1.02%)	2.20%	1.50%	—	12.68%	(0.52%)	—	12.16%
Judicial Division	27.26%	13.66%	(1.02%)	2.20%	1.50%	—	16.34%	(0.36%)	2.74%	18.72%
DPS Division	13.50%	10.15%	(1.02%)	4.50%	5.50%	(14.18%)	4.95%	(0.59%)	2.58%	6.94%
HCTF	1.12%	—	1.02%	—	—	—	1.02%	—	—	1.02%
DPS HCTF	0.67%	—	1.02%	—	—	—	1.02%	—	—	1.02%

1 Actuarially determined contribution (ADC) rates for 2018 are based on the 2016 actuarial valuation.

2 Contributions from a nonemployer contributing entity are required by C.R.S. § 24-51-414 *et seq.* in the amount of $225 million (actual dollars). These contributions have been expressed as a percentage of 2018 covered payroll for purposes of this schedule.

3 The definition of State Troopers can be found in Note 1 of the Notes to the Financial Statements.

Colorado Revised Statutes (C.R.S.) § 24-51-412 *et seq.* provides for an offset to the DPS Division employer contribution rate. The offset, expressed as a percentage of payroll, is equal to the annual assumed payment obligations for pension certificates of participation (PCOPs) issued in 1997 and 2008, including subsequent refinancing by the Denver Public Schools at a fixed effective annual interest rate of 8.50 percent. At a minimum, the DPS Division employer contribution rate must be sufficient to fund the DPS HCTF (1.02 percent) and the Annual Increase Reserve (AIR) (1.00 percent) applicable to the DPS Division. The annual increase (AI) is a post-retirement, cost-of-living adjustment meeting certain criteria as described in Note 1 of the Notes to the Financial Statements. The staff of Denver Public Schools calculated the PCOP offset rate of 14.18 percent for 2018 and 13.48 percent for 2019.

C.R.S. § 24-51-401(1.7) (e) recognizes the effort to equalize the funded status of the DPS Division and the School Division of PERA over a 30-year period beginning January 1, 2010. The basis of the funded status for this purpose is represented by the ratio of UAAL to payroll for each division. Beginning January 1, 2015, and every fifth year thereafter, the bill requires a true-up calculation and actuarial projection to confirm the equalization of the funded status of these two divisions. In the event a true-up calculation does not project equalization between these divisions over the 30-year period, the Board shall recommend an adjustment of the DPS Division employer contribution rate to the Colorado General Assembly. The

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

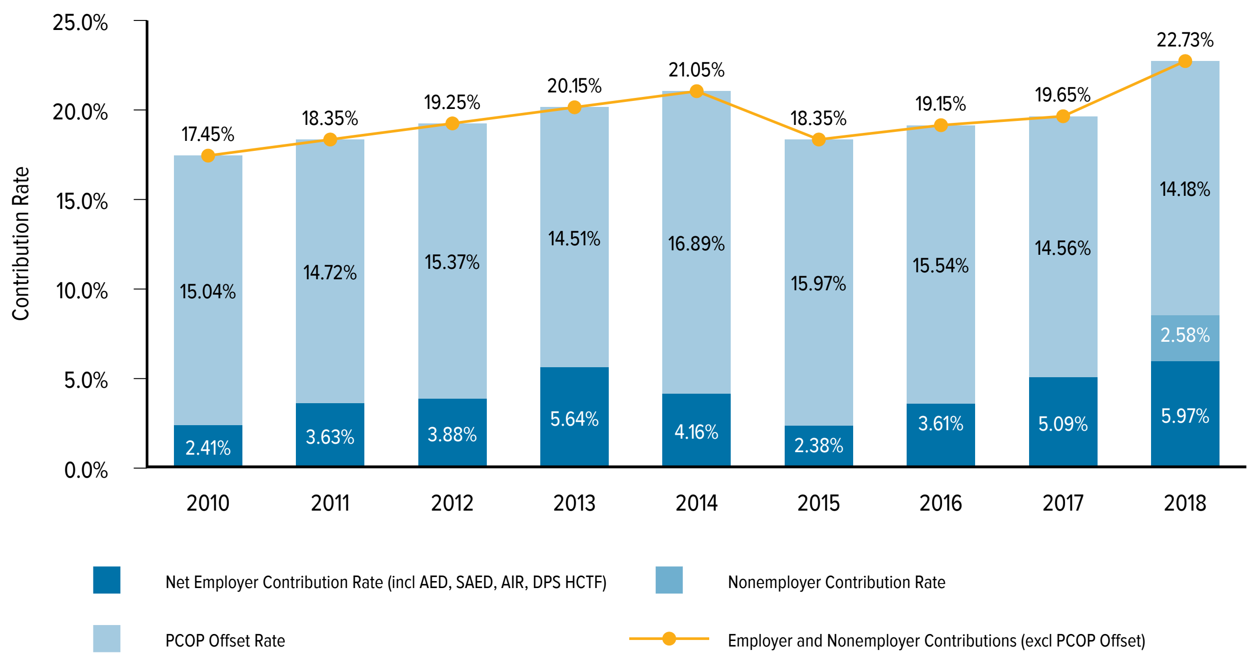
(Dollars in Thousands)

PCOP offset in the DPS Division will be a significant contributor to lowering the funded ratio, until such time that the employer contribution rate is adjusted. An adjustment to the DPS Division employer contribution rate may result in a significant increase or decrease in the total contributions paid by the DPS Division employers.

As described above, C.R.S. § 24-51-401(1.7) created a mechanism to reduce the funded ratio of the DPS Division at its inclusion into PERA in 2010 to the funded ratio of the School Division by 2040. The funded ratio is the actuarial value of assets divided by actuarial accrued liability (AAL). This mechanism involves offsetting the employer contributions into the DPS Division Trust Fund by the amount of the PCOP payments. It is expected that the equalization will occur in approximately 21 years. The DPS Division had a funded ratio of 88.3 percent at its inclusion into PERA. As of December 31, 2018, the funded ratio of the DPS Division was 76.8 percent. This funded ratio is expected to decrease as a result of the equalization effort.

Employer and nonemployer contribution rates, PCOP offset rates, and net contribution rates for the DPS Division are shown in the chart below.

DPS Division's Net Employer Contribution, PCOP Contribution Offset, and Nonemployer Contribution Rates



Prospective Contribution Information

The Amortization Equalization Disbursement (AED) and the SAED are set to increase in future years for the Judicial Division due to the passage of HB 17-1265 in 2017, as presented on the next page. With the passage of SB 10-001 in 2010, the AED and the SAED can be adjusted based on the year-end funded status within a particular Division Trust Fund. If a particular Division Trust Fund reaches a funded status of 103 percent, a decrease in the AED and SAED is mandated and if it subsequently falls below a funded status of 90 percent, an increase is mandated. For the Local Government and Judicial Divisions, if the funded ratio reaches 90 percent and subsequently falls below 90 percent, an increase in the AED and SAED is mandated. Increases cannot exceed the maximum allowable limitations shown in the table on the next page.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

FUTURE AED AND SAED RATES

Trust Fund	2019 Rates AED	2019 Rates SAED	Future Annual Increases in Rates Prescribed by Colorado Revised Statutes AED	Future Annual Increases in Rates Prescribed by Colorado Revised Statutes SAED	Maximum Allowable Limitations AED	Maximum Allowable Limitations SAED
State Division	5.00%	5.00%	N/A	N/A	5.00%	5.00%
School Division	4.50%	5.50%	N/A	N/A	4.50%	5.50%
Local Government Division	2.20%	1.50%	N/A	N/A	5.00%	5.00%
Judicial Division	3.40%	3.40%	Yes[1]	Yes[2]	5.00%	5.00%
DPS Division[3]	4.50%	5.50%	N/A	N/A	4.50%	5.50%

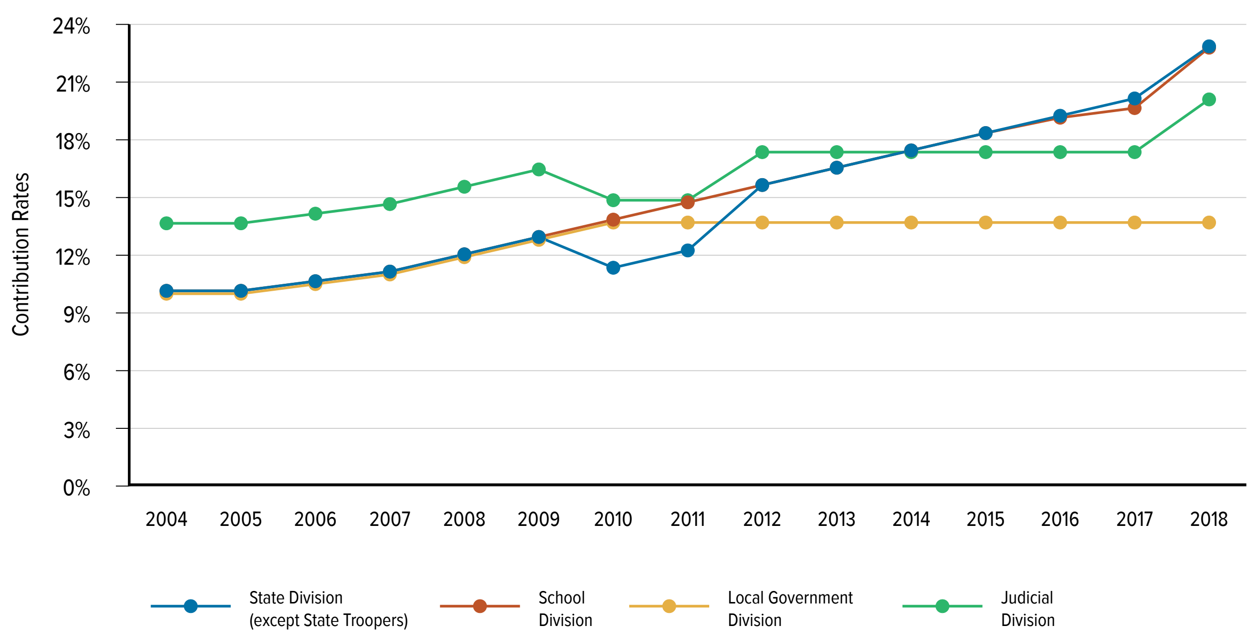
[1] For the calendar year beginning in 2019, C.R.S. § 24-51-411(4.5) increased the AED payment to 3.40 percent of PERA-includable salary and requires the AED payment to increase by 0.40 percent at the start of each of the following four calendar years through 2023 at which time the AED payment will be 5.00 percent of PERA-includable salary.

[2] For the calendar year beginning in 2019, C.R.S. § 24-51-411(7.5) increased the SAED payment to 3.40 percent of PERA-includable salary and requires the SAED payment to increase by 0.40 percent at the start of each of the following four calendar years through 2023 at which time the SAED payment will be 5.00 percent of PERA-includable salary.

[3] DPS Division employers are permitted to reduce the AED and SAED by the PCOP offset, as specified in C.R.S. § 24-51-412 *et seq.*

The chart below illustrates the employer contribution rates, including AED and SAED for the five Division Trust Funds based on the contribution rates prescribed by Colorado statute as of December 31, 2018.

Employer and Nonemployer Contribution Rates Plus AED and SAED (Includes AIR and HCTF Contributions)



MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Future Contribution Changes

Subject to C.R.S. § 24-51-413, the member contribution rates incrementally increase a total of 2.00 percent as follows:

- 0.75 percent on July 1, 2019.
- 0.75 percent on July 1, 2020.
- 0.50 percent on July 1, 2021.

On May 20, 2019, House Bill (HB) 19-1217 was signed into law which repealed the member contribution increases scheduled for the Local Government Division pursuant to SB 18-200. See Note 12 of the Notes to the Financial Statements for more information.

Effective July 1, 2019, subject to C.R.S. § 24-51-413, the employer contribution rates increase 0.25 percent for all divisions except the Local Government Division.

Effective January 1, 2021, and every year thereafter, C.R.S. § 24-51-415 adjusts employer contribution rates for the State and Local Government Divisions to include a defined contribution supplement. See Note 4 of the Notes to the Financial Statements for more information.

Automatic Adjustment Provision

Adjustments may be made to the AI cap, member and employer contribution rates, and, under certain circumstances, the direct distribution from the State.

The automatic adjustment provision (AAP) test to determine if adjustments are necessary as of July 1, 2020, is illustrated in the Actuarial Section. A summary of AAP provisions is provided in Note 4 of the Notes to the Financial Statements and the Actuarial Section.

Contribution Analysis

Funding Policies

PERA implemented GASB Statement No. 67 and GASB Statement No. 74 in 2014 and 2017, respectively. These Statements established a decided shift in financial disclosure requirements from a funding-based approach to an accounting-based approach. To accommodate the financial disclosure requirements promulgated by these Statements, separate actuarial valuations are performed for funding and accounting purposes. The disclosure and use of the annual required contribution (ARC) as a funding benchmark is no longer a required reporting element. This philosophical shift necessitated the development and use of a plan-specific ADC benchmark against which to gauge the adequacy of PERA's statutory contribution rates. In response to these changes, the Board adopted a revised pension funding policy on March 20, 2015, last amended in November 2018, with regard to the Division Trust Funds, and a revised Other Postemployment Benefit (OPEB) funding policy on January 19, 2018, with regard to the Health Care Trust Funds. The purpose of each funding policy is three-fold: (1) to define the overall funding benchmarks of the trust funds, (2) to assess the adequacy of the contribution rates set by the Colorado Legislature by comparing each fund's statutorily set contribution rate to an ADC benchmark, and (3) to define the annual actuarial metrics which will assist the Board in assessing the sustainability of the plans. The results of these three items are intended to help guide the Board when considering whether to pursue or support proposed contribution and benefit legislation.

In November of 2018, the Board amended the pension funding policy to require a re-initialization of the 30-year period over which to amortize the existing UAAL as of December 31, 2017, with the intention of aligning the 30 year period with the funding goals of SB 18-200. Based on the 30-year closed amortization period, effective December 31, 2017, the ADC calculated in the December 31, 2018, actuarial valuation for funding purposes will be the benchmark to gauge the adequacy of 2020 statutory contributions. Based on the OPEB funding policy, which also considers a layered, 30-year closed amortization period, effective December 31, 2017, the ADC calculated in the December 31, 2018, actuarial valuation for funding purposes will be the benchmark to gauge the adequacy of the 2020 statutory contributions. More information about the pension and OPEB funding policies can be found in the Actuarial Section on pages 171 and 207.

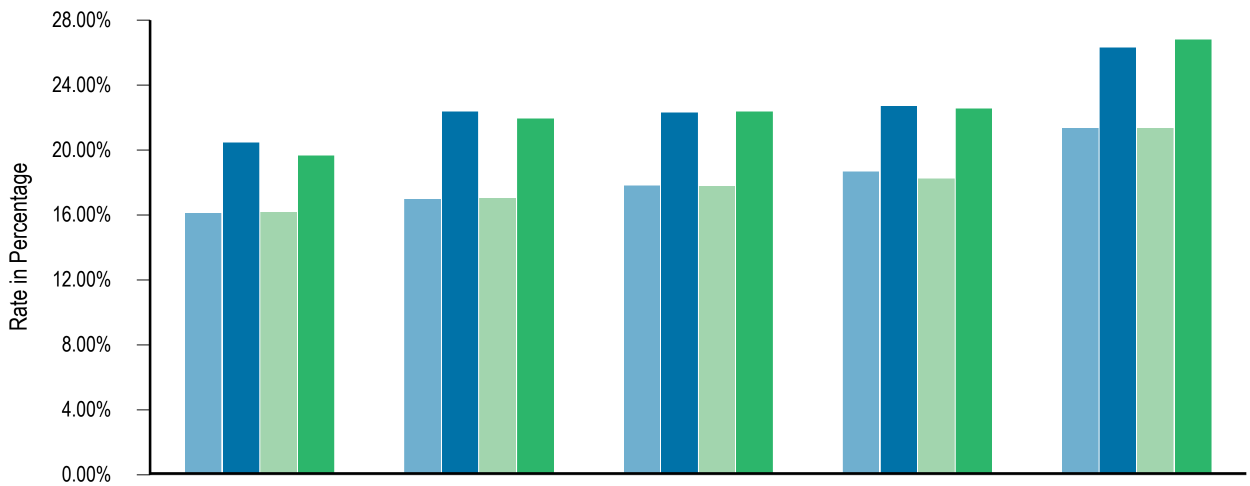
MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Actuarially Determined Contribution (ADC)

History

State and School Divisions
Year-End Actual Contributions/ADC Comparison



	2014	2015	2016	2017	2018
State Actual[1,2,3]	16.11%	16.96%	17.82%	18.68%	**21.35%**
State ARC/ADC[4]	20.45%	22.35%	22.31%	22.71%	**26.30%**
School Actual[2,3]	16.17%	17.03%	17.78%	18.24%	**21.35%**
School ARC/ADC[4]	19.65%	21.94%	22.36%	22.54%	**26.80%**

1 Actual rates are for non-State Troopers.

2 Actual contributions include employer, nonemployer, AED and SAED less the AIR and health care contributions.

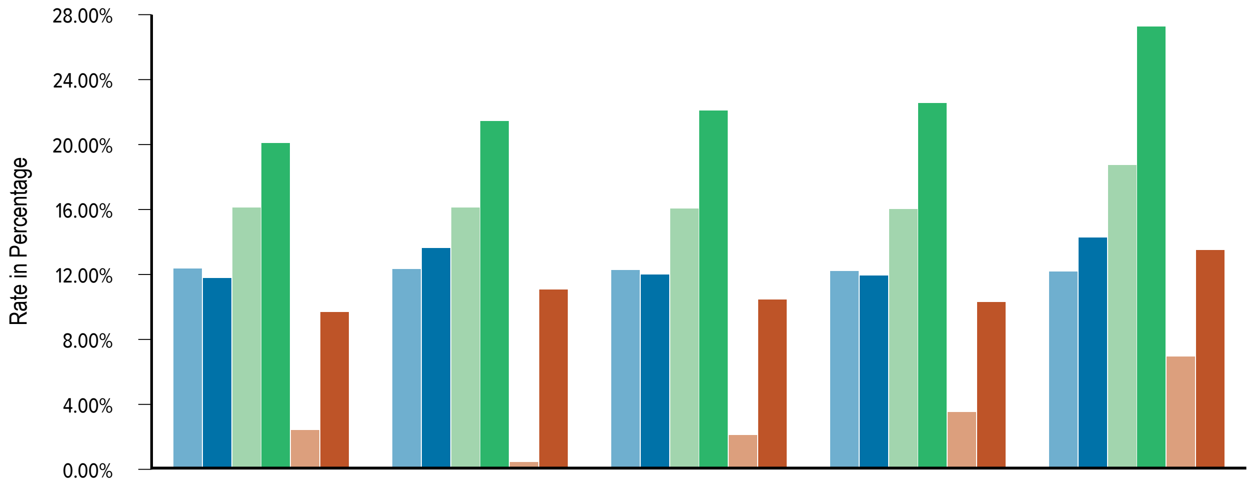
3 2014, 2015, 2016, and 2017 results have been restated to include a reduction for AIR contributions to conform with current year presentation.

4 ADC rates for 2014, 2015, 2016, 2017, and 2018 are based on the 2012, 2013, 2014, 2015, and 2016 actuarial valuations, respectively. The 2012 and 2013 actuarial valuations determined the ARC rates under the parameters allowed by GASB 25.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Local Government, Judicial, and DPS Divisions
Year-End Actual Contributions/ADC Comparision



	2014	2015	2016	2017	2018
Local Govt Actual[1,2]	12.35%	12.31%	12.26%	12.21%	**12.16%**
Local Govt ARC/ADC[3]	11.78%	13.62%	11.98%	11.92%	**14.27%**
Judicial Actual[1,2]	16.12%	16.10%	16.06%	16.03%	**18.72%**
Judicial ARC/ADC[3]	20.07%	21.45%	22.07%	22.54%	**27.26%**
DPS Actual[1,2]	2.41%	0.45%	2.11%	3.53%	**6.94%**
DPS ARC/ADC[3]	9.67%	11.06%	10.46%	10.28%	**13.50%**

1 Actual contributions include employer, nonemployer, AED and SAED less the AIR and health care contributions.

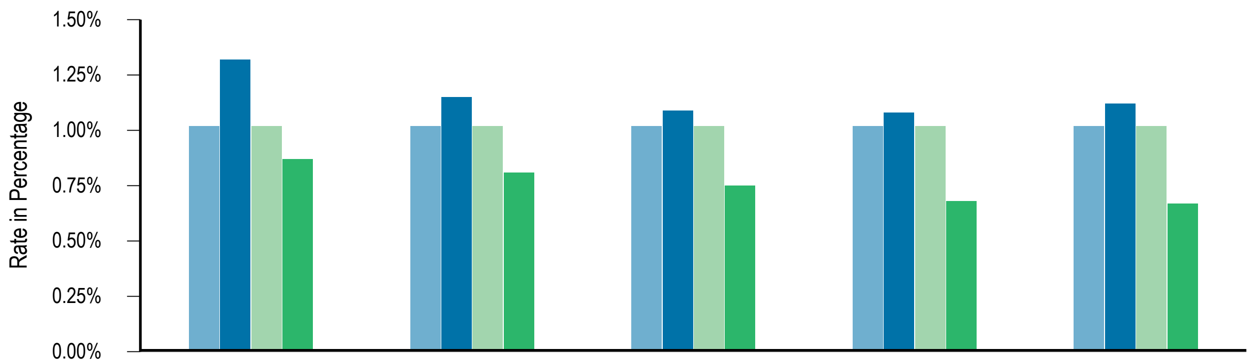
2 2014, 2015, 2016, and 2017 results have been restated to include a reduction for AIR contributions to conform with current year presentation.

3 ADC rates for 2014, 2015, 2016, 2017, and 2018 are based on the 2012, 2013, 2014, 2015, and 2016 actuarial valuations, respectively. The 2012 and 2013 actuarial valuations determined the ARC rates under the parameters allowed by GASB 25.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

HCTF and DPS HCTF
Year-End Actual Employer Contribution/ADC Comparison



	2014	2015	2016	2017	2018
HCTF Actual	1.02%	1.02%	1.02%	1.02%	**1.02%**
HCTF ARC/ADC[1,2]	1.32%	1.15%	1.09%	1.08%	**1.12%**
DPS HCTF Actual	1.02%	1.02%	1.02%	1.02%	**1.02%**
DPS HCTF ARC/ADC[1,2]	0.87%	0.81%	0.75%	0.68%	**0.67%**

[1] The rates shown for years 2014, 2015, and 2016 reflect the ARC rates calculated under GASB 43.

[2] ADC rates for 2017 and 2018 are based on the 2015 and 2016 actuarial valuations, respectively. The 2015 and 2016 actuarial valuation determined the ARC rates under the parameters allowed by the GASB 43.

Contribution Deficiency/(Excess)

Governmental accounting standards require the disclosure of the amount of contributions recognized by the defined benefit plan, the ADC amount, and the difference between these two amounts as Required Supplementary Information (RSI). An annual contribution deficiency arises when actual contributions are less than the ADC. The ADC is calculated using the investment rate of return and discount rate assumptions according to the Board's funding policy. The ADC for 2018 was determined based on the results of the December 31, 2016, actuarial valuation. The 10-year schedules illustrating the annual contribution deficiency can be found in the RSI on pages 117-119 and 128-129.

Contribution deficiency/(excess) on an actuarial funding basis is determined through a similar process. Each year, the actuaries assess the increase or decrease to the expected unfunded liability by comparing the expected dollar inflows into each fund versus the actual dollar amounts recognized. This calculation for funding purposes is slightly different than the approach required by governmental accounting standards in that it considers additional contributions occurring during each year from all sources, as well as the timing of contributions made during the year. Taking these factors into consideration results in a total contribution deficiency of $450.0 million for the Division Trust Funds in 2018. During the past 16 years, shortfalls in funding for the Division Trust Funds totaled $5.4 billion. Even with SB 10-001, which resulted in lower contribution deficiencies for the Division Trust Funds since being signed into law, annual contribution deficiencies continued to occur due to the adoption of closed amortization periods, the timing of future contribution increases prescribed by Colorado statute, and the portion of membership under the revised benefit structure.

SB 18-200 contains an AAP prescribing that the rates for certain contribution and benefit provisions can be adjusted in accordance with State statute beginning July 1, 2020, and each year thereafter. Based on certain statutory parameters, the AAP requires, as necessary, adjustments to member contributions, employer contributions, the direct distribution from the State, and the AI cap. The AAP is designed to help mitigate future contribution deficiencies and to keep PERA on the path to full funding. Additional information on this automatic adjustment provision can be found in Note 4 of the Notes to the Financial Statements, the Actuarial Section and C.R.S. § 24-51-413.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

CONTRIBUTION DEFICIENCY/(EXCESS)

(Dollars in Millions)

Trust Fund	2014	2015	2016	2017	2018	Cumulative Deficiency/(Excess) 2003–2018
State Division	$88.1	$116.7	$59.9	$32.2	**$117.8**[1]	$1,735.4
School Division	120.2	187.7	144.4	133.0	**261.2**[1]	2,673.3
State and School Division[2]	N/A	N/A	N/A	N/A	**N/A**	685.5
Local Government Division	(196.5)[3]	8.4	(3.3)	(7.1)[4]	**17.8**	(188.4)
Judicial Division	1.7	2.6	(0.1)	(0.2)	**4.4**[1]	24.0
DPS Division[4]	41.8	65.5	48.7	37.3	**48.8**[1]	439.1
Total Division Trust Funds	**$55.3**	**$380.9**	**$249.6**	**$195.2**	**$450.0**	**$5,368.9**
HCTF	$7.6[3]	$0.1	($3.6)	($5.0)[4]	**($0.9)**	($89.0)
DPS HCTF[5]	(1.1)	(1.6)	(2.2)	(2.6)	**(2.9)**	(14.1)
Total OPEB Trust Funds	**$6.5**	**($1.5)**	**($5.8)**	**($7.6)**	**($3.8)**	**($103.1)**

1 Includes contributions from a nonemployer contributing entity as required by C.R.S. § 24-51-412 *et seq*.

2 The State and School Divisions merged July 1, 1997, and separated on January 1, 2006.

3 Includes the receipt of the disaffiliation payment for Memorial Health System. See Note 2, “2014 Changes in Assumptions or Other Inputs Since 2013” in the Notes to the RSI–Division Trust Funds for more information on the lawsuit resolution for Memorial Health System.

4 Includes the receipt of the disaffiliation payment for Cunningham Fire Protection District. See Note 1, “2017 Changes in Plan Provisions Since 2016,” in the Notes to the RSI—Division Trust Funds for more information.

5 The DPS Division and DPS HCTF were established on January 1, 2010.

Future ADC

Using the funding policy approved by the Board in March 20, 2015, as amended in January 2018, and the 2017 actuarial funding valuation based on an assumed 7.25 percent investment rate of return and discount rate, the 2019 actuarially determined employer contributions needed to meet the layered, 30-year closed amortization period for the Division Trust Funds are as follows:

- State Division Trust Fund—23.28 percent
- School Division Trust Fund—23.59 percent
- Local Government Division Trust Fund—10.75 percent
- Judicial Division Trust Fund—21.90 percent
- DPS Division Trust Fund—11.14 percent

Using the funding policy approved by the Board on January 19, 2018, and the 2017 actuarial valuation based on an assumed 7.25 percent investment rate of return and discount rate, the 2019 annual required employer contributions needed to meet a 30-year amortization period for the Health Care Trust Funds are as follows:

- HCTF—1.11 percent
- DPS HCTF—0.60 percent

Using the funding policy approved by the Board on March 20, 2015, last amended in November 2018, and the 2018 actuarial funding valuation based on an assumed 7.25 percent investment rate of return and discount rate, the 2020 actuarially determined employer contributions needed to meet the layered, 30-year closed amortization period for the Division Trust Funds are as follows:

- State Division Trust Fund—23.69 percent
- School Division Trust Fund—23.37 percent
- Local Government Division Trust Fund—13.01 percent
- Judicial Division Trust Fund—22.05 percent
- DPS Division Trust Fund—10.42 percent

Using the funding policy approved by the Board on January 19, 2018, and the 2018 actuarial funding valuation based on an assumed 7.25 percent investment rate of return and discount rate, the 2020 actuarially determined employer contributions needed to meet the layered, 30-year closed amortization period for the Health Care Trust Funds are as follows:

- HCTF—0.97 percent
- DPS HCTF—0.51 percent

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Amortization of Unfunded Actuarial Accrued Liabilities

The table to the right shows the amortization periods for the Division Trust Funds and Health Care Trust Funds. The amortization period for the Judicial Division considers the future additional contributions of AED and SAED which are scheduled to begin in 2019. Additionally, no adjustment has been made to the DPS Division for the current PCOP offset. However, considering anticipated reductions in the future PCOP offset to DPS employer contribution requirements for the cost of certain PCOPs as currently structured, the realized amortization period is expected to be lower if the DPS Division's statutory employer contribution amounts are maintained at their current level. Colorado statutes call for a "true-up" in 2020 and every five years following, with the express purpose of adjusting the total DPS employer contribution rate to ensure equalization of the ratio of UAAL over payroll between the DPS and School Divisions at the end of the 30-year period beginning January 1, 2010.

The amortization periods for the five Division Trust Funds do not include the full effect of legislation enacted in 2006, 2010, and 2018. This legislation includes plan changes designed to lower the normal cost over time as new members are added to PERA's population, and to allow a greater proportion of the employers' contribution to be used to amortize the unfunded liability. Additionally, the 2018 legislation also increases future contributions to the Division Trust Funds in order to further accelerate the amortization of the unfunded liability.

The significant decrease in amortization periods from 2016 to 2017 for the Division Trust Funds is primarily due to changes in AI plan provisions required by SB 18-200. These provisions immediately extended the AI waiting period from one to three years, temporarily suspended the AI for years 2018 and 2019, and set the AI cap at 1.5 percent effective July 1, 2020 subject to the automatic adjustment provision required by C.R.S. § 24-51-413. The increase in amortization periods from 2017 to 2018 is primarily due to unfavorable demographic experience and lower than assumed investment performance.

	Actuarial Funding Valuation Results		
Trust Fund	2016 Amortization Period	2017 Amortization Period	2018 Amortization Period
State Division	65 Years	33 Years	**35 Years**
School Division	128 Years	38 Years	**37 Years**
Local Govt Division	42 Years	22 Years	**37 Years**
Judicial Division	Infinite	24 Years	**23 Years**
DPS Division	Infinite	Infinite	**Infinite**
HCTF	37 Years	37 Years	**25 Years**
DPS HCTF	13 Years	11 Years	**8 Years**

The amortization periods shown above consider ongoing employer, member, AED, and SAED contributions, including any future increases required by current statute, and the direct distribution, where applicable.

C.R.S. § 24-51-211 states that a maximum amortization period of 30 years shall be deemed actuarially sound. As stated by Segal Consulting (Segal), in the Certification Letter on pages 165-170 in the Actuarial Section*:*

"The results indicate that for all Division Trust Funds, other than the Denver Public Schools Division, the combined employer and member contribution rates, along with the annual $225 million direct distribution from the State Treasury, are sufficient to fund the normal cost for all members, the unfunded actuarial accrued liability, the Annual Increase Reserve (AIR) Fund, and provide additional contributions to help finance both Health Care Trust Funds.

At the direction of PERA, Segal has prepared deterministic financial projections for all Division Trust Funds with the lower cost benefit structure for new members and using the following assumptions:

- All actuarial assumptions, including achieving 7.25% investment returns are realized
- Performed on an open-group basis with assumed active membership growth, as follows:
  –For State, School and Denver Public Schools—1.25% each year
  –For Local Government and Judicial—1.00% per year

These projections[2] indicate that the goal of funding 100% of the actuarial accrued liability under the PERA revised benefit structure created by SB 18-200, is achievable within a projection period of 34 years when including the anticipated adjustments to take effect July 1, 2020, resulting from the automatic adjustment provisions (AAP).

The employer contribution rate, combined with anticipated future employee growth and service purchase transfers, is sufficient to eventually finance the HCTF's and DPS HCTF's benefits."

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Summary of Benefits and Expenses

Analysis of Benefits and Expenses
Basic Funding Equation I + C = B + E

TOTAL DEDUCTIONS BY TRUST FUND

Trust Fund	Benefit Payments	Refunds	Disability and Life Insurance Premiums	Administrative Expenses	Other	Total Deductions
State Division	$1,608,534	$65,253	$2,093	$11,903	$3,017	$1,690,800
School Division	2,413,387	76,035	3,506	23,560	2,501	2,518,989
Local Government Division	286,745	15,716	442	2,621	3,958	309,482
Judicial Division	26,236	186	41	86	70	26,619
DPS Division	276,223	11,197	405	2,919	5,267	296,011
HCTF	61,777	—	—	20,401	106	82,284
DPS HCTF	4,158	—	—	845	4	5,007
Life Insurance Reserve	—	—	433	111	—	544
2018 Total	**$4,677,060**	**$168,387**	**$6,920**	**$62,446**	**$14,923**	**$4,929,736**
2017 Total	**$4,567,349**	**$158,147**	**$6,604**	**$60,711**	**$30,321**	**$4,823,132**
2016 Total	**$4,516,566**	**$147,420**	**$6,748**	**$59,508**	**$22,383**	**$4,752,625**
2015 Total	**$4,320,646**	**$162,172**	**$6,569**	**$57,461**	**$16,802**	**$4,563,650**
2014 Total	**$4,094,840**	**$170,882**	**$7,143**	**$52,048**	**$12,275**	**$4,337,188**

AVERAGE MONTHLY BENEFIT BY DIVISION[1,2]

(In Actual Dollars)

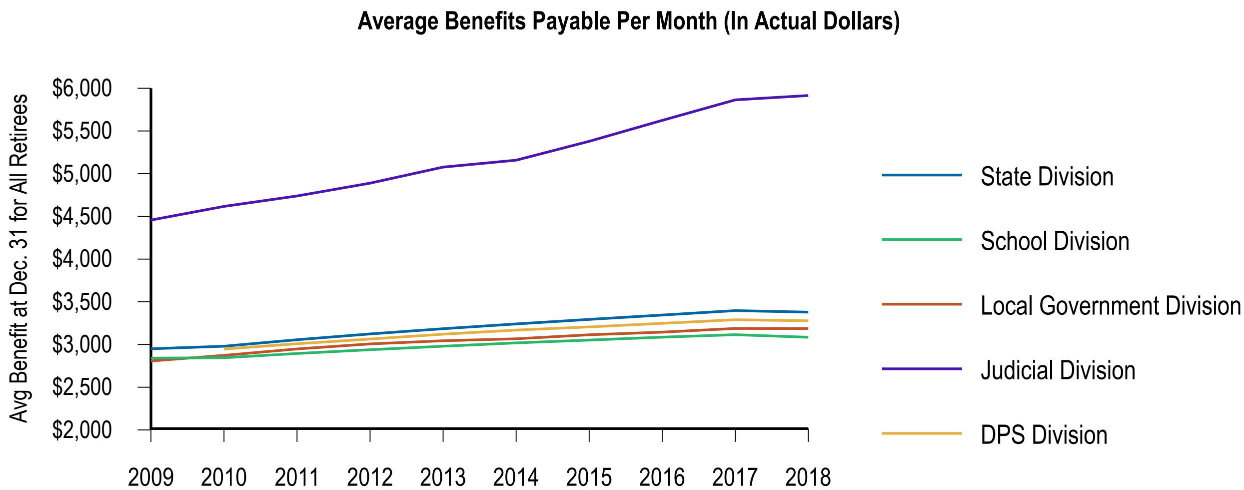
	State Division	School Division	Local Government Division	Judicial Division	DPS Division
For All Retirees Year Ended					
2014	$3,241	$3,019	$3,067	$5,158	$3,169
2015	3,294	3,052	3,114	5,379	3,206
2016	3,345	3,086	3,145	5,624	3,248
2017	3,397	3,115	3,188	5,864	3,290
2018	**3,379**	**3,085**	**3,187**	**5,915**	**3,278**
For Members Who Retired During the Year					
2014	$2,760	$2,405	$2,352	$4,969	$2,593
2015	2,828	2,293	2,750	7,030	2,493
2016	2,812	2,303	2,467	6,192	2,520
2017	2,866	2,304	2,669	7,747	2,608
2018	**2,795**	**2,291**	**2,853**	**7,556**	**2,749**

1 Most employees working for PERA-affiliated employers do not earn Social Security benefits.

2 Includes disability retirements, but not survivor benefits.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)



Note: The DPS Division was established January 1, 2010

PERA Benefit Payments[1, 2]

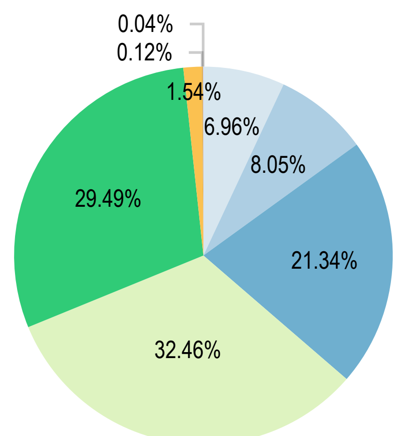
At the end of 2018, PERA was paying benefits to more than 121,000 retired public employees and their beneficiaries who received an average benefit of $3,180 per month. For benefit recipients, this may be the primary source of retirement income as most PERA benefit recipients do not qualify for Social Security payments. Approximately 68.8 percent (83,851) of recipients receive less than $50,000 a year in PERA benefits, as the graph below demonstrates. Slightly less than 1.7 percent (2,070) of PERA benefit recipients receive an annual benefit payment of $100,000 or more. Generally, these benefit recipients had high salaries and a significant number of years of service credit.

1 Includes amounts paid under replacement benefit arrangements.

2 Does not include deferred survivors and benefits that ended or were suspended in 2018.

PERA BENEFIT PAYMENTS BY DOLLAR AMOUNT OF ANNUAL BENEFIT AND NUMBER OF BENEFIT RECIPIENTS

Benefit Range[1]	Number of Benefit Recipients[2]
$0 - $4,999	8,479
$5,000 - $9,999	9,807
$10,000 - $24,999	26,010
$25,000 - $49,999	39,555
$50,000 - $99,999	35,944
$100,000 - $149,999	1,878
$150,000 - $199,999	143
$200,000+	49
Total Benefit Recipients	**121,865**



1 Includes amounts paid under replacement benefit arrangements.

2 Does not include 324 survivors.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

RATIO OF ACTIVE MEMBERS TO RETIREES AND BENEFICIARIES

Year Ended	State Division	School Division	Local Government Division	Judicial Division	DPS Division
2014	1.54	2.06	1.87	1.01	2.30
2015	1.49	2.00	1.80	0.97	2.34
2016	1.46	1.96	1.80	0.93	2.30
2017	1.41	1.91	1.73	0.88	2.27
2018	**1.37**	**1.90**	**1.73**	**0.87**	**2.26**

The decline in the ratio of active members to retirees and beneficiaries is reflective of the aging population. By itself, a declining ratio of active members to retirees and beneficiaries does not pose a problem to a Division Trust Fund's actuarial condition. However, to the extent that a plan is underfunded, a low or declining ratio of active members to retirees and beneficiaries, coupled with increasing life expectancy, can complicate the Division Trust Fund's ability to move toward full funding, as fewer active, contributing members, relatively, are available to amortize the unfunded liability.

RATIO OF BENEFIT PAYMENTS TO CONTRIBUTIONS

Trust Fund	Employer Contributions	Nonemployer Contributions	Member Contributions	Total Contributions	Benefit Payments	Ratio of Benefits/Contributions				
						2018	2017	2016	2015	2014
State Division	$583,164	$78,489	$236,313	$897,966	$1,608,534	**1.8**	2.0	2.0	2.0	2.1
School Division	923,910	126,505	386,811	1,437,226	2,413,387	**1.7**	1.9	1.9	1.9	2.0
Local Government Division	81,358	—	52,421	133,779	286,745	**2.1**	2.1	2.1	2.1	2.1
Judicial Division	8,299	1,385	4,064	13,748	26,236	**1.9**	2.1	1.9	1.8	1.9
DPS Division	35,994	18,621	58,172	112,787	276,223	**2.4**	3.3	3.8	4.4	3.8

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Other Changes—Defined Benefit Funds

Cash and Short-Term Investments

For the year ended December 31, 2018, PERA had cash and short-term investments of $417,071, a decrease of $182,561 from 2017. The decrease was primarily due to a reduced overall need for liquidity.

Securities Lending Collateral and Obligations

For the year ended December 31, 2018, PERA had securities lending collateral of $819,974 and securities lending obligations of $818,544, a decrease of $405,085 and $405,473, respectively, from 2017. The securities lending collateral and obligations decreased primarily due to a decrease in the securities on loan.

Investment Settlements and Other Liabilities

For the year ended December 31, 2018, PERA had investment settlements and other liabilities of $563,935, a decrease of $195,082 from 2017. The decrease was primarily due to lower pending settlements of fixed income investment purchases.

Receivables - Health Care Trust Funds

For the year ended December 31, 2018, the PERA HCTF and DPS HCTF had total receivables of $44,588, an increase of $10,599 from 2017. The increase was primarily due to higher health care subsidy payments and prescription rebates owed to PERA at year-end.

Other Additions and Other Deductions—Division Trust Funds

For the year ended December 31, 2018, other additions decreased by $4,549 and other deductions decreased by $15,402. These changes are primarily due to recording interfund transfers at retirement as an addition for the State, School, and Judicial Divisions and a deduction for the Local Government and DPS Divisions. The amount of interfund transfers, and whether they are recorded as other additions or deductions, depends on the number of retirements where the member has earned service credit in more than one division.

Benefit Payments—Health Care Trust Funds

Benefit payments decreased from $108,359 in 2017 to $65,935 in 2018. The decrease was primarily due to lower medical claims and a reduction in prescription costs as a result of a new contract.

Administrative Expenses—Life Insurance Reserve

Administrative expenses decreased from $493 in 2017 to $111 in 2018. In April 2017, life insurance enrollee premiums were changed to include all carrier administrative costs. The 2017 amount includes three months of carrier administrative fees, where the 2018 amount only reflects PERA staff expense to administer the life insurance program.

Actuarial Valuations: Accounting Versus Funding

Separate actuarial valuations are prepared for accounting and funding purposes for the Division Trust Funds and Health Care Trust Funds. Calculations for purposes of financial reporting for the pension and OPEB plans are determined in accordance with GASB 67 and GASB 74. Calculations for funding purposes for the pension and OPEB plans are performed in accordance with the Board's funding policies and the Actuarial Standards of Practice (ASOPs).

The actuarial valuation for accounting purposes emphasizes the obligation an employer incurs to employees through the employment-exchange process. The primary purpose of the valuation for accounting purposes is to provide a consistent, standardized methodology that allows comparability of amounts and increased transparency of liabilities across U.S. plans complying with GASB 67 and GASB 74. One of the key measurements in the accounting valuation which assesses the pension liabilities for financial reporting purposes is the net pension liability (NPL). The NPL is the difference between the FNP and the total pension liability (TPL). Similarly, one of the key measurements which assesses the OPEB liabilities for financial reporting purposes is the net OPEB liability (NOL). The NOL is the difference between the FNP, which includes the fair value of assets and the total OPEB liability (TOL). The individual components which collectively comprise the FNP can be found in the Statements of Fiduciary Net Position on pages 66-67.

The purpose of the funding valuation is to provide the Board with the information necessary to assess the sufficiency of the current statutory contribution rates to meet current and future benefit obligations to better ensure the long-term sustainability of the funds. One of the key measurements in the funding valuation is the unfunded actuarial accrued liability (UAAL) which is the difference between the actuarial value of assets and the actuarial accrued liability (AAL). Information pertaining to the funding valuations can be found in the Actuarial Section on pages 171-206 for the Division Trust Funds and on pages 207-223 for the Health Care Trust Funds.

Other significant differences between the two actuarial valuation approaches include the determination of the rate used to discount plan liabilities, if any, the asset value used to determine the liability associated with each plan, and the timing rules applied to determine the appropriate recognition of plan provision changes, if applicable.

The discount rate used in the determination of plan liabilities for financial reporting purposes can be different under certain conditions. Governmental accounting standards require that the long-term expected rate of return on the investments of the plan should be applied only to available plan assets that are expected to be invested using a strategy to achieve that return. If there comes a point in the annual projections when plan FNP and allowable contributions are insufficient to cover projected benefit payments and administrative expenses (crossover point), then from that point forward projected benefit payments are discounted using a presumed borrowing rate to determine the discount rate for the reporting period. Governmental accounting standards require a tax-exempt, high-quality, 20-year municipal general obligation bond index rate to be used for this purpose. The resulting single equivalent interest rate to be used for discounting purposes, is a blended rate considering the projected benefits discounted over the "funded" period, at the long-term expected rate of return, and the projected benefits discounted over the "unfunded" period, at the 20-year municipal bond index rate. If the projection process does not determine a crossover point, the long-term expected rate of return is used for discounting purposes. The determination of the discount rate for each plan is performed annually.

For funding purposes, the Board's funding policies require that the long-term expected rate of return is used to discount projected benefit payments.

For financial reporting purposes, governmental accounting standards require the FNP as of the plan's most recent fiscal year-end to be used to determine NPL and NOL.

For funding purposes, the ASOPs permit the use of a market-related value to smooth volatile market returns, and thus, help stabilize funding requirements from year-to-year. PERA's funding policies require the application of a four-year smoothing period in the determination of the "actuarial value of assets". This smoothed or actuarial value is used in the funding valuations for each plan to determine the unfunded liability or the UAAL, the ADC, and other funding metrics.

For inclusion of new or revised plan provisions in the calculation of plan liabilities for financial reporting purposes, Governmental Accounting Standards require the plan provisions in force as of the most recent fiscal year-end be used in the accounting valuation.

For funding purposes, the ASOPs encourage reflection of known new or revised plan provisions in the calculation of plan liabilities for funding purposes, if the effective date of the revision(s) is prior to the production of the funding valuation results.

Actuarial Summary

Segal prepared the December 31, 2018, actuarial valuations for the Division Trust Funds and Health Care Trust Funds for purposes of complying with GASB 67 and GASB 74, respectively. These actuarial valuations, based on a set of actuarial assumptions, examine each fund's assets as compared to actuarial liabilities, compare past and future trends, and calculate the collective liabilities produced for purposes of financial reporting.

The Board studies all economic and demographic actuarial assumptions at least every five years and approves changes, as necessary, to those assumptions. Recently, the Board has reviewed the economic assumptions on a more frequent basis. The Board last completed an experience study in 2016, and the next planned experience study will be in 2020. The actuarial assumptions in effect for the December 31, 2018, actuarial valuation were adopted by the Board during the November 18, 2016, meeting based on the 2016 experience analysis and the October 28, 2016, actuarial assumptions workshop.

The actuarial valuations prepared for purposes of complying with GASB 67 and GASB 74 were based on member data as of December 31, 2017. As permitted by governmental accounting standards, generally accepted actuarial techniques were applied to roll forward the TPL and TOL, based upon this member data, to December 31, 2018. The roll-forward procedures to determine the TPL considered service cost associated with accruing benefits for the year, interest on the TPL, changes in benefit provisions and benefits and refunds paid to recipients during the year. Similarly, the roll-forward procedures to determine the TOL considered service cost associated with accruing benefits for the year and interest on the TOL. The impact of actuarial experience and changes in actuarial assumptions and other inputs were also considered in the roll-forward calculations to determine the TPL and TOL.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

STATUS OF COLORADO PERA DIVISION TRUST FUNDS

	12/31/2017	12/31/2018[1]
State Division Trust Fund[2]		
Total pension liability	$35,241,684	**$25,345,094**
Fiduciary net position	15,223,702	**13,966,421**
Net pension liability	**$20,017,982**	**$11,378,673**
Fiduciary net position as a percentage of the total pension liability	43.2%	**55.1%**
Discount rate	4.72%	**7.25%**
School Division Trust Fund[2]		
Total pension liability	$57,699,176	**$41,184,604**
Fiduciary net position	25,362,730	**23,477,550**
Net pension liability	**$32,336,446**	**$17,707,054**
Fiduciary net position as a percentage of the total pension liability	44.0%	**57.0%**
Discount rate	4.78%	**7.25%**
Local Government Division Trust Fund		
Total pension liability	$5,396,516	**$5,228,602**
Fiduciary net position	4,283,086	**3,971,389**
Net pension liability	**$1,113,430**	**$1,257,213**
Fiduciary net position as a percentage of the total pension liability	79.4%	**76.0%**
Discount rate	7.25%	**7.25%**
Judicial Division Trust Fund[2]		
Total pension liability	$561,946	**$448,104**
Fiduciary net position	329,862	**306,846**
Net pension liability	**$232,084**	**$141,258**
Fiduciary net position as a percentage of the total pension liability	58.7%	**68.5%**
Discount rate	5.41%	**7.25%**
DPS Division Trust Fund		
Total pension liability	$4,374,550	**$4,207,343**
Fiduciary net position	3,478,040	**3,184,442**
Net pension liability	**$896,510**	**$1,022,901**
Fiduciary net position as a percentage of the total pension liability	79.5%	**75.7%**
Discount rate	7.25%	**7.25%**
All Division Trust Funds[3]		
Total pension liability	$103,273,872	**$76,413,747**
Fiduciary net position	48,677,420	**44,906,648**
Net pension liability	**$54,596,452**	**$31,507,099**
Fiduciary net position as a percentage of the total pension liability	47.1%	**58.8%**

[1] Includes the changes to plan provision required by SB 18-200.

[2] The decrease in the TPL is primarily due to changing from a blended discount rate to a discount rate equal to the long-term assumed rate of return in accordance with GASB 67 and shown in the chart above.

[3] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

STATUS OF COLORADO PERA HEALTH CARE TRUST FUNDS

	12/31/2017	12/31/2018
Health Care Trust Fund		
Total OPEB liability	$1,575,822	**$1,639,734**
Fiduciary net position	276,222	**279,192**
Net OPEB liability	**$1,299,600**	**$1,360,542**
Fiduciary net position as a percentage of the total OPEB liability	17.5%	**17.0%**
Discount rate	7.25%	**7.25%**
DPS Health Care Trust Fund		
Total OPEB liability	$73,267	**$69,199**
Fiduciary net position	22,308	**24,029**
Net OPEB liability	**$50,959**	**$45,170**
Fiduciary net position as a percentage of the total OPEB liability	30.4%	**34.7%**
Discount rate	7.25%	**7.25%**
All Health Care Trust Funds[1]		
Total OPEB liability	$1,649,089	**$1,708,933**
Fiduciary net position	298,530	**303,221**
Net OPEB liability	**$1,350,559**	**$1,405,712**
Fiduciary net position as a percentage of the total OPEB liability	18.1%	**17.7%**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

SCHEDULE OF CHANGES IN NET PENSION LIABILITY

	State Division Trust Fund	School Division Trust Fund	Local Government Division Trust Fund	Judicial Division Trust Fund	DPS Division Trust Fund	All Division Trust Funds[1]
2017 Net pension liability[2]	$20,017,982	$32,336,446	$1,113,430	$232,084	$896,510	$54,596,452
Service cost	727,319	1,270,011	84,331	13,516	90,657	2,185,834
Interest	1,658,186	2,759,146	386,381	30,417	313,294	5,147,424
Changes of benefit terms[3]	(1,967,940)	(3,247,230)	(412,930)	(33,997)	(318,480)	(5,980,577)
Differences between expected and actual experience	330,007	443,651	77,207	3,122	35,147	889,134
Changes of assumptions or other inputs	(8,968,282)[4]	(15,247,222)[5]	—	(100,437)[6]	—	(24,315,941)
Contributions—employer	(583,164)	(923,910)	(81,358)	(8,299)	(35,994)	(1,632,725)
Contributions—nonemployer	(78,489)	(126,505)	—	(1,385)	(18,621)	(225,000)
Contributions—active member (includes purchased service)	(261,540)	(414,336)	(58,063)	(4,700)	(61,098)	(799,737)
Net investment loss	497,562	838,899	142,476	11,006	114,070	1,604,013
Administrative expense	11,903	23,560	2,621	86	2,919	41,089
Other	(4,871)	(5,456)	3,118	(155)	4,497	(2,867)
2018 Net pension liability[3]	**$11,378,673**	**$17,707,054**	**$1,257,213**	**$141,258**	**$1,022,901**	**$31,507,099**

1 The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

2 Does not include the changes to plan provisions required by SB 18-200.

3 Includes the changes to plan provision required by SB 18-200.

4 Directly attributable to the change in the discount rate from a blended rate of 4.72 percent to a discount rate equal to the long-term expected rate of return of 7.25 percent.

5 Directly attributable to the change in the discount rate from a blended rate of 4.78 percent to a discount rate equal to the long-term expected rate of return of 7.25 percent.

6 Directly attributable to the change in the discount rate from a blended rate of 5.41 percent to a discount rate equal to the long-term expected rate of return of 7.25 percent.The data in this table is aggregated for informational purposes.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

SCHEDULE OF CHANGES IN NET OPEB LIABILITY

	Health Care Trust Fund	DPS Health Care Trust Fund	All Health Care Trust Funds[1]
2017 Net OPEB liability	$1,299,600	$50,959	$1,350,559
Service cost	19,328	1,420	20,748
Interest	112,849	5,245	118,094
Changes of benefit terms	—	—	—
Differences between expected and actual experience	(2,482)	(6,045)	(8,527)
Changes of assumptions or other inputs	11,438	5	11,443
Contributions—employer	(86,559)	(7,417)	(93,976)
Purchased service transfers	(5,798)	(47)	(5,845)
Net investment loss	9,678	894	10,572
Administrative expense[2]	2,488	156	2,644
2018 Net OPEB liability	**$1,360,542**	**$45,170**	**$1,405,712**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

[2] Excludes administrative and other health care claims processing fees.

SUMMARY OF THE RATIOS OF FIDUCIARY NET POSITION TO TOTAL PENSION LIABILITY

Trust Fund	2014	2015	2016	2017	2018[1]
State Division	59.8%	56.1%	42.6%	43.2%	**55.1%**
School Division	62.8%	59.2%	43.1%	44.0%	**57.0%**
Local Government Division	80.7%	76.9%	73.6%	79.4%	**76.0%**
Judicial Division	66.9%	60.1%	53.2%	58.7%	**68.5%**
DPS Division	83.9%	79.3%	74.0%	79.5%	**75.7%**
Total Division Trust Funds[2]	**64.2%**	**60.4%**	**46.0%**	**47.1%**	**58.8%**

[1] Includes the changes to plan provision required by SB 18-200.

[2] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

SUMMARY OF THE RATIOS OF FIDUCIARY NET POSITION TO TOTAL OPEB LIABILITY[1,2,3]

Trust Fund	2014	2015	2016	2017	2018
HCTF	20.2%	17.8%	16.7%	17.5%	**17.0%**
DPS HCTF	22.4%	22.6%	25.2%	30.4%	**34.7%**
Total Health Care Trust Funds[4]	**20.3%**	**18.0%**	**17.1%**	**18.1%**	**17.7%**

[1] The ratios for 2014 through 2016 are computed by dividing the total fair value of assets available to pay benefits by actuarial accrued liabilities. The ratios for 2017 and 2018 are computed by dividing the FNP by the total OPEB liability.

[2] The AAL for years 2014 through 2016 was based on actuarial valuations which used GASB 43 and the Board's funding policy dated November 2007 as guidance. The total OPEB liability for 2017 and 2018 is based on the actuarial valuation which was prepared in accordance with GASB 74.

[3] The ratios for years 2014 through 2016 have been restated to include the actual fair value of assets for improved comparability. The ratios contained in this schedule in previous annual reports used the actuarial value of assets, which calculated the value of the assets by spreading any market gains or losses above or below the assumed rate of return over four years.

[4] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

The ratios listed on the previous page give an indication of a plan's ability to meet its current and future obligations in accordance with GASB 67 and GASB 74. As an example, for every $1.00 of the TPL or earned benefits for the School Division Trust Fund as of December 31, 2018, approximately $0.57 of assets is available for payment based on the actual fair value of assets. These benefits earned will be payable over the life span of members after their retirement and therefore, it is not necessary that the TPL or earned benefits equal the fair value of assets at any given moment in time.

Sensitivity of Actuarial Valuation to Changes in Assumed Investment Rate of Return and Discount Rate

The most important long-term driver of a defined benefit plan is investment income. Currently, the long-term expected rate of return assumption is 7.25 percent. The investment return assumption and the discount rate for liabilities, as mandated by governmental accounting standards, are based on an estimated long-term investment return for the plan, with consideration given to the nature and mix of current and expected investments as long as projections of plan investments indicate that assets are available to pay benefit obligations. At the point when plan FNP and contributions related to active and inactive employees are no longer projected to be greater than or equal to projected benefit payments related to those employees and administrative expenses (crossover point), then from that point forward the defined benefit plan is required to discount the projected benefit payments using a presumed borrowing rate. Governmental accounting standards require a tax-exempt, high-quality 20-year municipal general obligation bond index rate to be used for this purpose.

Based on the projection test required by GASB, assets are available to pay all future benefit obligations for the Division Trust Funds and the Health Care Trust Funds. As a result, for 2018, the discount rate used to determine the liabilities produced for financial reporting purposes equals the long-term expected rate of return assumption of 7.25 percent. For 2017, the blended discount rates of 4.72 percent, 4.78 percent, and 5.41 percent were used to determine the NPL of the State, School, and Judicial Division Trust Funds, respectively. The statutory plan provisions in effect at the December 31, 2017 measurement date were used in the 2017 projection tests to determine the resulting blended discount rates. The change from the blended discount rates for 2017 to a discount rate equal to the long-term expected rate of return for 2018 had a significant effect on the NPL of these division trust funds for 2018. There are a number of methods to assess the sufficiency of assets available to pay future benefits and the projection test required by GASB does not necessarily reflect a plan's actual ability or inability to cover future benefit obligations.

The long-term expected return on plan assets is reviewed as part of regular experience studies prepared every four to five years for PERA. Recently, this assumption has been reviewed more frequently. The most recent analyses regarding the long-term outlook on the expected rate of return were outlined in presentations to the Board by the retained actuary, the Board's investment consultant, and an additional external actuarial firm during the October 28, 2016, actuarial assumptions workshop. As a result of the October 28, 2016, workshop and the November 18, 2016, Board meeting, the Board decreased the long-term expected return on plan assets from 7.50 percent per year, compounded annually, net of investment expenses to 7.25 percent per year, compounded annually, net of investment expenses. Several factors were considered in establishing the long-term rate of return assumption, including long-term historical data, estimates inherent in current market data, market forecasts from the Board's investment consultant, as well as the 2016 survey of capital market assumptions by Horizon Actuarial Services, LLC, and a log-normal distribution analysis in which best estimate ranges of expected future real rates of return (expected return, net of investment expense and inflation) were developed for each major asset class. These ranges were combined to estimate the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and then adding expected inflation. The mean overall investment rate of return based on this modeling process was 7.47 percent. One standard deviation range around the mean was 5.71 percent to 9.26 percent, which represents 68.2 percent of the possible outcomes. Two standard deviations range around the mean was 4.03 percent to 11.02 percent, which represents 95.4 percent of the possible outcomes.

To understand the importance of the long-term assumed investment rate of return, which is used to determine the discount rate, a 1.0 percent fluctuation in the discount rate would change the liabilities produced for financial reporting purposes and related ratios for the Division Trust Funds and Health Care Trust Funds as shown in the tables on the next two pages. Additional analysis on the Investment Rate of Return Sensitivity Effect on Projected Amortization Periods is presented in the Letter of Transmittal on pages 9-10.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

1.0 PERCENT DECREASE IN DISCOUNT RATE

Trust Fund	Discount Rate	Fiduciary Net Position as a Percentage of the Total Pension Liability	Net Pension Liability
State Division	6.25%	49.7%	$14,145,649
School Division	6.25%	51.1%	22,511,490
Local Government Division	6.25%	67.4%	1,923,276
Judicial Division	6.25%	62.1%	187,468
DPS Division	6.25%	67.7%	1,517,984
Total Division Trust Funds[1]		**52.7%**	**$40,285,867**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Trust Fund	Discount Rate	Fiduciary Net Position as a Percentage of the Total OPEB Liability	Net OPEB Liability
HCTF	6.25%	15.5%	$1,522,328
DPS HCTF	6.25%	31.7%	51,714
Total Health Care Trust Funds[1]		**16.2%**	**$1,574,042**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

CURRENT DISCOUNT RATE

Trust Fund	Discount Rate	Fiduciary Net Position as a Percentage of the Total Pension Liability	Net Pension Liability
State Division	**7.25%**	**55.1%**	**$11,378,673**
School Division	**7.25%**	**57.0%**	**17,707,054**
Local Government Division	**7.25%**	**76.0%**	**1,257,213**
Judicial Division	**7.25%**	**68.5%**	**141,258**
DPS Division	**7.25%**	**75.7%**	**1,022,901**
Total Division Trust Funds[1]		**58.8%**	**$31,507,099**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Trust Fund	Discount Rate	Fiduciary Net Position as a Percentage of the Total OPEB Liability	Net OPEB Liability
HCTF	**7.25%**	**17.0%**	**$1,360,542**
DPS HCTF	**7.25%**	**34.7%**	**45,170**
Total Health Care Trust Funds[1]		**17.7%**	**$1,405,712**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

1.0 PERCENT INCREASE IN DISCOUNT RATE

Trust Fund	Discount Rate	Fiduciary Net Position as a Percentage of the Total Pension Liability	Net Pension Liability
State Division	8.25%	60.7%	$9,037,559
School Division	8.25%	63.2%	13,675,322
Local Government Division	8.25%	85.0%	699,984
Judicial Division	8.25%	75.1%	101,484
DPS Division	8.25%	83.9%	610,872
Total Division Trust Funds[1]		**65.1%**	**$24,125,221**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Trust Fund	Discount Rate	Fiduciary Net Position as a Percentage of the Total OPEB Liability	Net OPEB Liability
HCTF	8.25%	18.6%	$1,222,230
DPS HCTF	8.25%	37.8%	39,568
Total Health Care Trust Funds[1]		**19.4%**	**$1,261,798**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Note: The time-weighted, net-of-fees, annualized rate of return for the pooled investment assets was 5.6 percent for the past five years and 8.8 percent for the past 10 years. The 30-year annualized gross-of-fees rate of return for the pooled investment assets was 8.5 percent.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

DEFINED CONTRIBUTION PENSION AND DEFERRED COMPENSATION TRUST FUNDS

Financial Reporting Highlights

The FNP for the Voluntary Investment Program, the Defined Contribution Retirement Plan, and the Deferred Compensation Plan decreased $285,722 for the year ended December 31, 2018. The decrease in FNP for the three trust funds was principally due to declining global equity markets.

FIDUCIARY NET POSITION

	2018 Change in Fiduciary Net Position	2018 Ending Fiduciary Net Position
Voluntary Investment Program	($233,043)	$3,042,128
Defined Contribution Retirement Plan	(5,303)	205,786
Deferred Compensation Plan	(47,376)	818,223
Total	**($285,722)**	**$4,066,137**

CHANGES IN FIDUCIARY NET POSITION

	(C) Contributions and Other Additions	+ (I) Net Investment Income/(Loss)	– (B) – (E) Benefits Expenses, and Other Deductions	= Change in Fiduciary Net Position
Voluntary Investment Program	$139,920	($165,371)	$207,592	($233,043)
Defined Contribution Retirement Plan	23,785	(15,381)	13,707	(5,303)
Deferred Compensation Plan	58,584	(47,542)	58,418	(47,376)
2018 change in fiduciary net position	**$222,289**	**($228,294)**	**$279,717**	**($285,722)**
2017 change in fiduciary net position	**$225,989**	**$603,632**	**$226,513**	**$603,108**
2016 change in fiduciary net position	**$212,476**	**$270,906**	**$211,432**	**$271,950**
2015 change in fiduciary net position	**$208,613**	**($20,666)**	**$214,063**	**($26,116)**
2014 change in fiduciary net position	**$203,878**	**$227,077**	**$194,890**	**$236,065**
2014–2018 change in fiduciary net position	**$1,073,245**	**$852,655**	**$1,126,615**	**$799,285**

Investment Highlights

Voluntary Investment Program, the Defined Contribution Retirement Plan, and the Deferred Compensation Plan Investment Options

The current investment funds for the three plans are the PERAdvantage Capital Preservation Fund, PERAdvantage Fixed Income Fund, PERAdvantage Real Return Fund, PERAdvantage U.S. Large Cap Stock Fund, PERAdvantage International Stock Fund, PERAdvantage U.S. Small and Mid Cap Stock Fund, PERAdvantage Socially Responsible Investment (SRI) Fund, PERAdvantage Income Fund, PERAdvantage 2020 Fund, PERAdvantage 2025 Fund, PERAdvantage 2030 Fund, PERAdvantage 2035 Fund, PERAdvantage 2040 Fund, PERAdvantage 2045 Fund, PERAdvantage 2050 Fund, PERAdvantage 2055 Fund, PERAdvantage 2060 Fund, and TD Ameritrade Self-Directed Brokerage Account. Each PERAdvantage option is made up of one or more underlying portfolios.

Securities Lending Collateral and Obligations

For the year ended December 31, 2018, the Defined Contribution Pension and Deferred Compensation Trust Funds had an increase of $21,772 and $21,729 in securities lending collateral and securities lending obligations, respectively, from 2017. The increases were due to the addition of securities lending in certain Defined Contribution Pension and Deferred Compensation Trust Fund investment options in 2018.

Investment Income/(Loss)

For the year ended December 31, 2018, the Defined Contribution Pension and Deferred Compensation Trust Funds net investment income changed from $603,632 in 2017 to a loss of $228,294 in 2018, a decrease of $831,926 from 2017. The decrease was primarily due to declining global equity markets.

Refunds

For the year ended December 31, 2018, the Defined Contribution Pension and Deferred Compensation Trust Funds had refunds of $271,974, an increase of $52,295 from 2017. The increase was primarily due to an increase in participant distributions.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

COMPARATIVE FINANCIAL STATEMENTS

Defined Benefit Pension Trust Funds

The five defined benefit funds provide retirement, survivor, and disability benefits to the employees of affiliated State, School, Local Government, Judicial, and DPS employers. Benefits are funded by member, employer, and nonemployer contributions and by earnings on investments.

DEFINED BENEFIT PENSION TRUST FUNDS FIDUCIARY NET POSITION

	December 31, 2018	December 31, 2017	% Change
Assets			
Cash and short-term investments	**$414,063**	$595,444	(30.5%)
Securities lending collateral	**814,060**	1,216,502	(33.1%)
Receivables	**777,943**	771,680	0.8%
Investments, at fair value	**44,215,308**	47,995,647	(7.9%)
Capital assets, net of accumulated depreciation	**13,824**	14,180	(2.5%)
Total assets	**46,235,198**	50,593,453	(8.6%)
Liabilities			
Investment settlements and other liabilities	**515,909**	700,566	(26.4%)
Securities lending obligations	**812,641**	1,215,467	(33.1%)
Total liabilities	**1,328,550**	1,916,033	(30.7%)
Fiduciary net position	**$44,906,648**	**$48,677,420**	**(7.7%)**

DEFINED BENEFIT PENSION TRUST FUNDS CHANGES IN FIDUCIARY NET POSITION

	For the Year Ended December 31, 2018	For the Year Ended December 31, 2017	% Change
Additions			
Employer contributions	**$1,632,725**	$1,535,666	6.3%
Nonemployer contributions[1]	**225,000**	—	100.0%
Member contributions	**737,781**	706,499	4.4%
Purchased service	**61,956**	67,454	(8.2%)
Employer disaffiliation	**—**	1,063	(100.0%)
Investment income (loss)	**(1,604,013)**	7,642,727	(121.0%)
Other	**17,680**	22,229	(20.5%)
Total additions	**1,071,129**	9,975,638	(89.3%)
Deductions			
Benefit payments	**4,611,125**	4,458,990	3.4%
Refunds	**168,387**	158,147	6.5%
Disability insurance premiums	**6,487**	6,231	4.1%
Administrative expenses	**41,089**	40,248	2.1%
Other	**14,813**	30,215	(51.0%)
Total deductions	**4,841,901**	4,693,831	3.2%
Change in fiduciary net position	**(3,770,772)**	5,281,807	(171.4%)
Fiduciary net position			
Beginning of year	**48,677,420**	43,395,613	12.2%
End of year	**$44,906,648**	**$48,677,420**	**(7.7%)**

[1] An annual contribution from a nonemployer contributing entity is required by C.R.S. § 24-51-414 *et seq.* starting on July 1, 2018.

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Other Postemployment Benefit Funds

The HCTF and the DPS HCTF provide a health care premium subsidy to participating PERA benefit recipients and their eligible beneficiaries who choose to enroll in one of the PERA health care plans. They are typically funded by amounts contributed by employers during an employee's working life based on a percentage of pay and by earnings on investments.

OTHER POSTEMPLOYMENT BENEFIT FUNDS FIDUCIARY NET POSITION

	December 31, 2018	December 31, 2017	% Change
Assets			
Cash and short-term investments	**$2,827**	$3,933	(28.1%)
Securities lending collateral	**5,558**	8,036	(30.8%)
Receivables	**44,588**	33,989	31.2%
Investments, at fair value	**301,889**	317,024	(4.8%)
Total assets	**354,862**	362,982	(2.2%)
Liabilities			
Investment settlements and other liabilities	**46,093**	56,423	(18.3%)
Securities lending obligations	**5,548**	8,029	(30.9%)
Total liabilities	**51,641**	64,452	(19.9%)
Fiduciary net position	**$303,221**	**$298,530**	**1.6%**

OTHER POSTEMPLOYMENT BENEFIT FUNDS CHANGES IN FIDUCIARY NET POSITION

	For the Year Ended December 31, 2018	For the Year Ended December 31, 2017	% Change
Additions			
Employer contributions	**$93,976**	$90,007	4.4%
Employer disaffiliation	**—**	96	(100.0%)
Investment income (loss)	**(10,572)**	48,295	(121.9%)
Other	**8,578**	10,002	(14.2%)
Total additions	**91,982**	148,400	(38.0%)
Deductions			
Benefit payments	**65,935**	108,359	(39.2%)
Administrative expenses	**21,246**	19,970	6.4%
Other	**110**	106	3.8%
Total deductions	**87,291**	128,435	(32.0%)
Change in fiduciary net position	**4,691**	19,965	(76.5%)
Fiduciary net position			
Beginning of year	**298,530**	278,565	7.2%
End of year	**$303,221**	**$298,530**	**1.6%**

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Private Purpose Trust Fund

PERA offers an optional life insurance program where members can purchase varying amounts of coverage. The Life Insurance Reserve is an accumulation of dividends received in the past from the insurance company based upon plan experience. The investment income from the Life Insurance Reserve is used to pay the current administrative costs of the plan.

LIFE INSURANCE RESERVE FIDUCIARY NET POSITION

	December 31, 2018	December 31, 2017	% Change
Assets			
Cash and short-term investments	**$181**	$255	(29.0%)
Securities lending collateral	**356**	521	(31.7%)
Receivables	**274**	272	0.7%
Investments, at fair value	**19,319**	20,567	(6.1%)
Total assets	**20,130**	21,615	(6.9%)
Liabilities			
Investment settlements and other liabilities	**1,933**	2,028	(4.7%)
Securities lending obligations	**355**	521	(31.9%)
Total liabilities	**2,288**	2,549	(10.2%)
Fiduciary net position	**$17,842**	**$19,066**	**(6.4%)**

LIFE INSURANCE RESERVE CHANGES IN FIDUCIARY NET POSITION

	For the Year Ended December 31, 2018	For the Year Ended December 31, 2017	% Change
Additions			
Investment income (loss)	**($684)**	$3,241	(121.1%)
Other	**4**	—	100.0%
Total additions	**(680)**	3,241	(121.0%)
Deductions			
Life insurance premiums	**433**	373	16.1%
Administrative expenses	**111**	493	(77.5%)
Total deductions	**544**	866	(37.2%)
Change in fiduciary net position	**(1,224)**	2,375	(151.5%)
Fiduciary net position			
Beginning of year	**19,066**	16,691	14.2%
End of year	**$17,842**	**$19,066**	**(6.4%)**

MANAGEMENT'S DISCUSSION AND ANALYSIS (UNAUDITED)

(Dollars in Thousands)

Defined Contribution Pension and Deferred Compensation Trust Funds

PERA administers two defined contribution pension trust funds and a deferred compensation trust fund. The Voluntary Investment Program and the Deferred Compensation Plan provide benefits at retirement to members of PERA who have voluntarily made contributions during their employment. The Defined Contribution Retirement Plan provides benefits at retirement to eligible employees who selected this plan. Eligibility applies to certain new employees of State agencies and departments, most community colleges, and the District Attorney within each Judicial District, and if authorized by the county and the District Attorney, the attorneys within each Judicial District. Pursuant to C.R.S. § 24-51-1501(4), effective January 1, 2019, Defined Contribution Retirement Plan eligibility was extended to certain new employees in the Local Government Division and certain new classified employees at State Colleges and Universities (see Note 1 of the Notes to the Financial Statements).

DEFINED CONTRIBUTION PENSION AND DEFERRED COMPENSATION TRUST FUNDS FIDUCIARY NET POSITION

	December 31, 2018	December 31, 2017	% Change
Assets			
Cash and short-term investments	**$33,070**	$36,137	(8.5%)
Securities lending collateral	**21,772**	—	100.0%
Receivables	**107,788**	107,480	0.3%
Investments, at fair value	**3,955,337**	4,240,758	(6.7%)
Total assets	**4,117,967**	4,384,375	(6.1%)
Liabilities			
Investment settlements and other liabilities	**30,101**	32,516	(7.4%)
Securities lending obligations	**21,729**	—	100.0%
Total liabilities	**51,830**	32,516	59.4%
Fiduciary net position	**$4,066,137**	**$4,351,859**	**(6.6%)**

DEFINED CONTRIBUTION PENSION AND DEFERRED COMPENSATION TRUST FUNDS CHANGES IN FIDUCIARY NET POSITION

	For the Year Ended December 31, 2018	For the Year Ended December 31, 2017	% Change
Additions			
Employer contributions	**$18,639**	$19,431	(4.1%)
Member contributions	**200,743**	203,802	(1.5%)
Investment income (loss)	**(228,294)**	603,632	(137.8%)
Other	**2,907**	2,756	5.5%
Total additions	**(6,005)**	829,621	(100.7%)
Deductions			
Refunds	**271,974**	219,679	23.8%
Administrative expenses	**5,223**	4,609	13.3%
Other	**2,520**	2,225	13.3%
Total deductions	**279,717**	226,513	23.5%
Change in fiduciary net position	**(285,722)**	603,108	(147.4%)
Fiduciary net position			
Beginning of year	**4,351,859**	3,748,751	16.1%
End of year	**$4,066,137**	**$4,351,859**	**(6.6%)**

STATEMENTS OF FIDUCIARY NET POSITION

As of December 31, 2018

(Dollars in Thousands)

	State Division Trust Fund	School Division Trust Fund	Local Government Division Trust Fund	Judicial Division Trust Fund	Denver Public Schools Division Trust Fund	Total Defined Benefit Pension Plans
Assets						
Cash and short-term investments						
Cash and short-term investments	$128,581	$216,558	$36,675	$2,822	$29,427	$414,063
Securities lending collateral	252,793	425,759	72,105	5,548	57,855	814,060
Total cash and short-term investments	381,374	642,317	108,780	8,370	87,282	1,228,123
Receivables						
Benefit	68,463	69,090	7,224	1,768	3,514	150,059
Interfund	125	212	36	3	29	405
Investment settlements and income	194,853	328,176	55,579	4,276	44,595	627,479
Total receivables	263,441	397,478	62,839	6,047	48,138	777,943
Investments, at fair value						
Global equity	7,373,102	12,417,908	2,103,047	161,825	1,687,433	23,743,315
Fixed income	3,287,805	5,537,377	937,787	72,161	752,459	10,587,589
Private equity	1,228,425	2,068,934	350,387	26,961	281,141	3,955,848
Real estate	1,342,892	2,261,723	383,036	29,474	307,339	4,324,464
Opportunity fund	498,124	838,951	142,081	10,933	114,003	1,604,092
Multi-asset class funds	—	—	—	—	—	—
Self-directed brokerage	—	—	—	—	—	—
Total investments, at fair value	13,730,348	23,124,893	3,916,338	301,354	3,142,375	44,215,308
Capital assets, at cost, net of accumulated depreciation of $29,084	3,970	7,963	896	29	966	13,824
Total assets	14,379,133	24,172,651	4,088,853	315,800	3,278,761	46,235,198
Liabilities						
Investment settlements and other liabilities	160,360	270,085	45,485	3,415	36,564	515,909
Securities lending obligations	252,352	425,016	71,979	5,539	57,755	812,641
Interfund	—	—	—	—	—	—
Total liabilities	412,712	695,101	117,464	8,954	94,319	1,328,550
Commitments and contingencies (Note 7)						
Fiduciary net position restricted for pensions and other postemployment benefits, and held in trust for deferred compensation benefits and private purpose trust fund participants	**$13,966,421**	**$23,477,550**	**$3,971,389**	**$306,846**	**$3,184,442**	**$44,906,648**

The accompanying notes are an integral part of these financial statements.

STATEMENTS OF FIDUCIARY NET POSITION

As of December 31, 2018

(Dollars in Thousands)

Voluntary Investment Program	Defined Contribution Retirement Plan	Deferred Compensation Plan	Health Care Trust Fund	Denver Public Schools Health Care Trust Fund	Life Insurance Reserve	Combined Total
$20,922	$4,648	$7,500	$2,600	$227	$181	**$450,141**
17,827	648	3,297	5,112	446	356	**841,746**
38,749	5,296	10,797	7,712	673	537	**1,291,887**
66,488	2,213	15,819	38,808	1,492	—	**274,879**
—	—	—	3	—	—	**408**
17,600	827	4,841	3,941	344	274	**655,306**
84,088	3,040	20,660	42,752	1,836	274	**930,593**
1,677,723	74,039	375,595	149,106	13,007	10,374	**26,043,159**
554,017	22,255	231,879	66,489	5,800	4,627	**11,472,656**
—	—	—	24,842	2,167	1,728	**3,984,585**
—	—	—	27,157	2,369	1,889	**4,355,879**
—	—	—	10,074	878	701	**1,615,745**
704,853	99,679	174,058	—	—	—	**978,590**
23,153	3,304	14,782	—	—	—	**41,239**
2,959,746	199,277	796,314	277,668	24,221	19,319	**48,491,853**
—	—	—	—	—	—	**13,824**
3,082,583	207,613	827,771	328,132	26,730	20,130	**50,728,157**
22,382	1,127	6,184	43,837	2,256	1,933	**593,628**
17,792	647	3,290	5,103	445	355	**840,273**
281	53	74	—	—	—	**408**
40,455	1,827	9,548	48,940	2,701	2,288	**1,434,309**
$3,042,128	**$205,786**	**$818,223**	**$279,192**	**$24,029**	**$17,842**	**$49,293,848**

STATEMENTS OF CHANGES IN FIDUCIARY NET POSITION

For the Year Ended December 31, 2018

(Dollars in Thousands)

	State Division Trust Fund	School Division Trust Fund	Local Government Division Trust Fund	Judicial Division Trust Fund	Denver Public Schools Division Trust Fund	Total Defined Benefit Pension Plans
Additions						
Contributions						
Employers	$583,164	$923,910	$81,358	$8,299	$35,994	$1,632,725
Nonemployer	78,489	126,505	—	1,385	18,621	225,000
Members	236,313	386,811	52,421	4,064	58,172	737,781
Purchased service	25,227	27,525	5,642	636	2,926	61,956
Total contributions	923,193	1,464,751	139,421	14,384	115,713	2,657,462
Investment income (loss)						
Net depreciation in fair value of investments	(798,777)	(1,343,233)	(227,779)	(17,556)	(182,998)	(2,570,343)
Interest	100,121	167,637	28,354	2,177	22,911	321,200
Dividends	166,312	278,460	47,100	3,617	38,058	533,547
Real estate, private equity, and opportunity fund net operating income	84,012	140,663	23,792	1,827	19,225	269,519
Less investment expense	(52,071)	(87,184)	(14,747)	(1,132)	(11,916)	(167,050)
Net loss from investing activities	(500,403)	(843,657)	(143,280)	(11,067)	(114,720)	(1,613,127)
Securities lending income	3,129	5,240	886	68	716	10,039
Less securities lending expense	(288)	(482)	(82)	(7)	(66)	(925)
Net income from securities lending	2,841	4,758	804	61	650	9,114
Net investment loss	(497,562)	(838,899)	(142,476)	(11,006)	(114,070)	(1,604,013)
Other additions	7,888	7,957	840	225	770	17,680
Total additions	433,519	633,809	(2,215)	3,603	2,413	1,071,129
Deductions						
Benefits						
Benefits paid to retirees/cobeneficiaries	1,593,694	2,397,931	284,251	25,908	274,538	4,576,322
Benefits paid to survivors	14,840	15,456	2,494	328	1,685	34,803
Benefits paid on behalf of health care participants	—	—	—	—	—	—
Total benefits	1,608,534	2,413,387	286,745	26,236	276,223	4,611,125
Refunds of contribution accounts, including match and interest	65,253	76,035	15,716	186	11,197	168,387
Disability and life insurance premiums	2,093	3,506	442	41	405	6,487
Administrative expenses	11,903	23,560	2,621	86	2,919	41,089
Other deductions	3,017	2,501	3,958	70	5,267	14,813
Total deductions	1,690,800	2,518,989	309,482	26,619	296,011	4,841,901
Net increase (decrease) in fiduciary net position	**(1,257,281)**	**(1,885,180)**	**(311,697)**	**(23,016)**	**(293,598)**	**(3,770,772)**
Fiduciary net position restricted for pensions and other postemployment benefits, and held in trust for deferred compensation benefits and private purpose trust fund participants						
Beginning of year	15,223,702	25,362,730	4,283,086	329,862	3,478,040	48,677,420
End of year	**$13,966,421**	**$23,477,550**	**$3,971,389**	**$306,846**	**$3,184,442**	**$44,906,648**

The accompanying notes are an integral part of these financial statements.

STATEMENTS OF CHANGES IN FIDUCIARY NET POSITION

For the Year Ended December 31, 2018

(Dollars in Thousands)

Voluntary Investment Program	Defined Contribution Retirement Plan	Deferred Compensation Plan	Health Care Trust Fund	Denver Public Schools Health Care Trust Fund	Life Insurance Reserve	Combined Total
$5,409	$13,201	$29	$86,559	$7,417	$—	**$1,745,340**
—	—	—	—	—	—	**225,000**
132,189	10,573	57,981	—	—	—	**938,524**
—	—	—	—	—	—	**61,956**
137,598	23,774	58,010	86,559	7,417	—	**2,970,820**
(203,749)	(16,763)	(56,996)	(15,410)	(1,360)	(1,097)	**(2,865,718)**
9,726	436	4,289	1,905	155	137	**337,848**
30,912	1,155	6,005	3,165	257	228	**575,269**
—	—	—	1,598	130	115	**271,362**
(2,312)	(211)	(848)	(991)	(81)	(71)	**(171,564)**
(165,423)	(15,383)	(47,550)	(9,733)	(899)	(688)	**(1,852,803)**
54	2	8	60	5	4	**10,172**
(2)	—	—	(5)	—	—	**(932)**
52	2	8	55	5	4	**9,240**
(165,371)	(15,381)	(47,542)	(9,678)	(894)	(684)	**(1,843,563)**
2,322	11	574	8,373	205	4	**29,169**
(25,451)	8,404	11,042	85,254	6,728	(680)	**1,156,426**
—	—	—	—	—	—	**4,576,322**
—	—	—	—	—	—	**34,803**
—	—	—	61,777	4,158	—	**65,935**
—	—	—	61,777	4,158	—	**4,677,060**
202,684	12,722	56,568	—	—	—	**440,361**
—	—	—	—	—	433	**6,920**
3,310	819	1,094	20,401	845	111	**67,669**
1,598	166	756	106	4	—	**17,443**
207,592	13,707	58,418	82,284	5,007	544	**5,209,453**
(233,043)	**(5,303)**	**(47,376)**	**2,970**	**1,721**	**(1,224)**	**(4,053,027)**
3,275,171	211,089	865,599	276,222	22,308	19,066	**53,346,875**
$3,042,128	**$205,786**	**$818,223**	**$279,192**	**$24,029**	**$17,842**	**$49,293,848**

NOTES TO THE FINANCIAL STATEMENTS

(Dollars in Thousands)

Note 1—Plan Description

Organization

Public Employees' Retirement Association of Colorado (PERA) was established in 1931. The statute governing PERA is Title 24, Article 51 of the Colorado Revised Statutes (C.R.S.). PERA administers the following plans:

Plan Name	Type of Plan
Defined Benefit Pension Plans (Division Trust Funds)	
State Division Trust Fund	Cost-sharing multiple-employer
School Division Trust Fund	Cost-sharing multiple-employer
Local Government Division Trust Fund	Cost-sharing multiple-employer
Judicial Division Trust Fund	Cost-sharing multiple-employer
Denver Public Schools (DPS) Division Trust Fund	Single-employer
Defined Benefit Other Postemployment Benefit Plans (Health Care Trust Funds)	
Health Care Trust Fund (HCTF)	Cost-sharing multiple-employer
Denver Public Schools Health Care Trust Fund (DPS HCTF)	Single-employer
Defined Contribution Plans	
Voluntary Investment Program	Multiple-employer
Defined Contribution Retirement Plan	Multiple-employer
Deferred Compensation Plan	
Deferred Compensation Plan	Multiple-employer
Private Purpose Trust Fund	
Life Insurance Reserve	Multiple-employer

Responsibility for the organization and administration of these plans rests with the PERA Board of Trustees (Board). The Board is composed of the following 16 Trustees:

- Nine members elected by members from their respective Divisions to serve on the Board for four–year terms; four from the School Division, three from the State Division, one from the Local Government Division, and one from the Judicial Division.
- Two retirees elected by retirees to serve on the Board for four-year terms.
- Three Trustees appointed by the Governor and confirmed by the State Senate to serve on the Board for four-year terms.
- The State Treasurer.
- One ex officio (non-voting) member or retiree elected by members and retirees of the DPS Division to serve on the Board for a four-year term.

Listed below is the number of active participating employers for the five Division Trust Funds. Guidance under the Governmental Accounting Standards Board (GASB) Statement No. 67 classifies a primary government and its component units as one employer.

Division	As of December 31, 2018[1]
State	32
School	234
Local Government	141
Judicial	2
DPS	1
Total employers	**410**

[1] This employer count is presented for purposes of complying with GASB 67 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

NOTES TO THE FINANCIAL STATEMENTS

(Dollars in Thousands)

Membership—Division Trust Funds-Defined Benefit Pension Plans

Benefit recipients and members of PERA consisted of the following as of December 31, 2018, with comparative combined totals for 2017:

	State Division	School Division	Local Government Division	Judicial Division	DPS Division	2018	2017
Retirees and beneficiaries	40,446	66,543	7,662	382	7,156	**122,189**	118,480
Terminated employees entitled to benefits but not yet receiving benefits	7,074	17,001	2,696	12	1,780	**28,563**	27,573
Inactive members	78,576	125,944	25,034	4	12,286	**241,844**	230,248
Active members							
Vested general employees	30,115	67,808	6,058	268	7,309	**111,558**	110,255
Vested State Troopers	651	—	—	—	—	**651**	676
Non-vested general employees	24,508	58,525	7,202	64	8,839	**99,138**	96,642
Non-vested State Troopers	237	—	—	—	—	**237**	196
Total active members	55,511	126,333	13,260	332	16,148	**211,584**	207,769
Total	**181,607**	**335,821**	**48,652**	**730**	**37,370**	**604,180**	**584,070**

Membership—Voluntary Investment Program and Defined Contribution Retirement Plan

See Note 8.

Membership—Deferred Compensation Plan

See Note 8.

Membership—Health Care Trust Funds

See Note 9.

Benefit Provisions—Division Trust Funds

Plan benefits are specified in Title 24, Article 51 of the C.R.S. and applicable provisions of the federal Internal Revenue Code (IRC). Colorado State law provisions may be amended from time to time by the Colorado General Assembly.

The Colorado General Assembly passed significant pension reform through Senate Bill (SB) 18-200: *Concerning Modifications To the Public Employees' Retirement Association Hybrid Defined Benefit Plan Necessary To Eliminate with a High Probability the Unfunded Liability of the Plan Within the Next Thirty Years.* The bill was signed into law by Governor Hickenlooper on June 4, 2018. SB 18-200 makes changes to certain benefit provisions of the plans administered by PERA. Some, but not all, of these changes were in effect at the end of 2018.

Plan Eligibility

All employees of PERA employers who work in a position eligible for PERA membership must be enrolled in the PERA Hybrid Defined Benefit Plan, except for employees who are hired into a position that makes them eligible for a choice between enrolling in the PERA Defined Benefit Plan or the PERA Defined Contribution Retirement Plan (PERAChoice).

PERAChoice eligibility applies to certain new employees of State agencies and departments, most community colleges, and the District Attorney within each Judicial District. If authorized by the county and the District Attorney, the attorneys within that Judicial District may also have access to PERAChoice. Pursuant to C.R.S. section 24-51-1501(4), effective January 1, 2019, PERAChoice was extended to certain new employees in the Local Government Division and certain new classified employees at State Colleges and Universities. If an eligible employee does not make a choice of which plan to participate in within 60 days of the starting date of employment, the employee is automatically enrolled in the PERA Defined Benefit Plan. Between the second and fifth year of participation in their original plan, employees may make a one-time, irrevocable election to switch to the other plan. After the fifth year of participation, this option to switch plan participation no longer exists.

Some positions within PERA-affiliated employers are not eligible for PERA membership and may be covered by another separate retirement program.

Benefit Provisions

The Division Trust Funds have various benefit provisions depending upon the member's date of hire or upon the member's date of retirement. The differences in plan benefit provisions are detailed in the following pages in this note as of December 31, 2018. On January 1, 2010, the Denver Public Schools Retirement System (DPSRS) merged with PERA. On that date, all liabilities and assets of DPSRS transferred to and became liabilities and assets of the DPS Division of PERA. The benefit provisions of DPSRS were incorporated into PERA as the DPS benefit structure. The benefit provisions of existing members of PERA on the merger date and all new hires post-merger date are identified as the PERA benefit structure.

Member Accounts

During 2018, members contributed 8 percent of their PERA-includable salary to their member accounts; State Troopers and Colorado Bureau of Investigation (CBI) agents contributed 10 percent.

State law authorizes the Board to determine annually the interest to be credited to member accounts, but in no event may the Board specify a rate that exceeds 5 percent. Effective January 1, 2009, the annual rate was set at 3 percent and has been reconfirmed each November since adoption.

Service Credit

Members earn service credit for each month of work performed as an employee of a PERA-affiliated employer for which salary is earned for such services.

A full month of service credit is earned for each month of work where the salary earned by the employee is equal to or greater than 80 multiplied by the federal minimum hourly wage in effect for that month. Earned salary which is less than this amount results in a partial month of service credit.

Eligible members may purchase additional service credit based upon (1) other employment that is not covered by PERA or another retirement program or (2) the service credit forfeited as the result of a withdrawn PERA member account. Such service credit purchases are subject to limits in State and federal law. The amounts used to purchase service credit are credited to the member's account and may include tax-paid funds and eligible rollovers of tax-deferred funds. Such amounts are eligible for an interest accrual, but no match if the member account is refunded in a lump-sum distribution.

Refund or Distribution Provisions

Upon termination of employment with all PERA employers, members have the following options concerning their member account:

- Leave the account invested in the Division Trust Funds for a future distribution or retirement benefit; however, a distribution must begin by April 1 following the year in which the member reaches age 70½.
- Request a distribution of the member account plus an applicable match. Such a distribution cancels the refunding member's service credit and any benefit entitlements associated with the account. The distribution may be taken as cash with the resulting tax consequences or as a rollover to an eligible qualified plan.

Matching Amounts

Members under the PERA benefit structure who withdraw their accounts on or after reaching retirement eligibility or age 65 receive their member account plus a 100 percent match on eligible amounts. For members under the PERA benefit structure who withdraw their accounts before reaching retirement eligibility, all contributions received prior to January 1, 2011, are eligible for the 50 percent match regardless of how much service credit the member has earned. However, contributions received after January 1, 2011, will not be eligible for the 50 percent match until the member earns five years of service credit.

Members under the DPS benefit structure who terminated employment on or after January 1, 2001, and withdraw their accounts on or after reaching retirement eligibility receive their member account plus a 100 percent match on eligible amounts. Members under the DPS benefit structure who withdraw their accounts before reaching retirement eligibility receive a refund of their member accounts, but do not receive any match.

Members reaching retirement eligibility who choose to take a retirement benefit are entitled to a minimum monthly benefit which incorporates the member's account plus a 100 percent match on eligible amounts, annuitized into a monthly benefit using PERA's expected rate of return.

Highest Average Salary

Plan benefits, described below and on the next page, generally are calculated as a percentage of the member's three- or five- year Highest Average Salary (HAS). The following conditions apply to the HAS calculation:

- ***For all members of the PERA benefit structure, except judges, who were eligible to retire as of January 1, 2011, who were hired before January 1, 2007, and who retire on or after January 1, 2009:*** HAS is determined by the highest annual salaries associated with four periods of 12 consecutive months of service credit. The four 12-month periods selected do not have to be consecutive nor do they have to include the last four years of membership. The lowest of the four periods becomes a base year used as a starting point for a 15 percent cap on annual salary increases for the next three periods used to determine the applicable HAS. This salary cap applies regardless of when the annual salaries used in the HAS calculation occurred.
- ***For all members of the PERA benefit structure, except judges, who were not eligible to retire as of January 1, 2011, or members of the PERA benefit structure who are hired on or after January 1, 2007, who have at least five years of service credit on December 31, 2019:*** HAS is determined by the highest annual salaries associated with four periods of 12 consecutive months of service credit. The four 12-month periods selected do not have to be consecutive nor do

NOTES TO THE FINANCIAL STATEMENTS

(Dollars in Thousands)

they have to include the last four years of membership. The lowest of the four periods becomes a base year used as a starting point for an 8 percent cap on annual salary increases for the next three periods used to determine the applicable HAS. This salary cap applies regardless of when the annual salaries used in the HAS calculation occurred.

- ***For all members of the PERA and DPS benefit structures, except judges, regardless of hire date, who do not have at least five years of service credit on December 31, 2019:*** HAS is determined by the highest annual salaries associated with six periods of 12 consecutive months of service credit. The six 12-month periods selected do not have to be consecutive nor do they have to include the last six years of membership. The lowest of the six periods becomes a base year used as a starting point for an 8 percent cap on annual salary increases for the next five periods used to determine the applicable HAS. This salary cap applies regardless of when the annual salaries used in the HAS calculation occurred.
- ***For members of the Judicial Division Trust Fund (judges) who have at least five years of service credit on December 31, 2019:*** HAS is one-twelfth of the highest annual salary associated with one period of 12 consecutive months of service credit.
- ***For members of the Judicial Division Trust Fund (judges) who do not have at least five years of service credit on December 31, 2019, regardless of the date of hire:*** HAS is determined by the highest annual salaries associated with four periods of 12 consecutive months of service credit. The four 12-month periods selected do not have to be consecutive nor do they have to include the last four years of membership. The lowest of the four periods becomes a base year used as a starting point for an 8 percent cap on annual salary increases for the next three periods used to determine the applicable HAS. This salary cap applies regardless of when the annual salaries used in the HAS calculation occurred.
- ***For members of the DPS benefit structure who are eligible to retire as of January 1, 2011:*** HAS is the average monthly salary of the 36 months of earned service having the highest salaries.
- ***For members of the DPS benefit structure who are not eligible to retire as of January 1, 2011, and have at least five years of service credit on December 31, 2019:*** HAS is determined by the highest annual salaries associated with four periods of 12 consecutive months of service credit. The four 12-month periods selected do not have to be consecutive nor do they have to include the last four years of membership. The lowest of the four periods becomes a base year used as a starting point for an 8 percent cap on annual salary increases for the next three periods used to determine the applicable HAS. This salary cap applies regardless of when the annual salaries used in the HAS calculation occurred.

Service Retirement Benefits—PERA Benefit Structure

Upon termination of PERA-covered employment and reaching eligibility for service retirement benefits, a member may begin receipt of benefits as shown below and on the next page.

Service Retirement Eligibility for Members (Other Than State Troopers) Hired Before July 1, 2005, With Five Years of Service Credit on January 1, 2011

Age Requirement (in years)	Service Credit Requirement (in years)
50	30
55	Age and Service = 80 or more
60	20
65	5
65	Less than 5 but 60 payroll postings[1]

[1] Retiring members who are age 65 and have less than five years of service credit and less than 60 payroll postings will receive a service retirement benefit under the Money Purchase Formula only.

Service Retirement Eligibility for Members (Other Than State Troopers) Hired on or After July 1, 2005, But Before January 1, 2007, With Five Years of Service Credit on January 1, 2011

Age Requirement (in years)	Service Credit Requirement (in years)
Any Age	35
55	Age and Service = 80 or more
60	20
65	5
65	Less than 5 but 60 payroll postings[1]

[1] Retiring members who are age 65 and have less than five years of service credit and less than 60 payroll postings will receive a service retirement benefit under the Money Purchase Formula only.

Service Retirement Eligibility for Members (Other Than State Troopers) Hired on or After January 1, 2007, But Before January 1, 2011, With Five Years of Service Credit on January 1, 2011

Age Requirement (in years)	Service Credit Requirement (in years)
Any Age	35
55	30
55	Age and Service = 85 or more
60	25
65	5
65	Less than 5 but 60 payroll postings[1]

[1] Retiring members who are age 65 and have less than five years of service credit and less than 60 payroll postings will receive a service retirement benefit under the Money Purchase Formula only.

NOTES TO THE FINANCIAL STATEMENTS

(Dollars in Thousands)

Service Retirement Eligibility for Members (Other Than State Troopers) Hired Before January 1, 2011, With Less Than Five Years of Service Credit on January 1, 2011

Age Requirement (in years)	Service Credit Requirement (in years)
Any Age	35
55	30
55	Age and Service = 85 or more
60	25
65	5
65	Less than 5 but 60 payroll postings[1]

1 Retiring members who are age 65 and have less than five years of service credit and less than 60 payroll postings will receive a service retirement benefit under the Money Purchase Formula only.

Service Retirement Eligibility for Members (Other Than State Troopers) Hired on or After January 1, 2011, But Before January 1, 2017, or Hired on or After January 1, 2017, But Before January 1, 2020, Whose Most Recent 10 Years of Service are in the School or DPS Divisions

Age Requirement (in years)	Service Credit Requirement (in years)
Any Age	35
58	30
58	Age and Service = 88 or more
60	28
65	5
65	Less than 5 but 60 payroll postings[1]

1 Retiring members who are age 65 and have less than five years of service credit and less than 60 payroll postings will receive a service retirement benefit under the Money Purchase Formula only.

Service Retirement Eligibility for Members (Other Than State Troopers) Hired on or After January 1, 2017, But Before January 1, 2020, Whose Most Recent 10 Years of Service are not in the School or DPS Divisions

Age Requirement (in years)	Service Credit Requirement (in years)
Any Age	35
60	30
60	Age and Service = 90 or more
65	5
65	Less than 5 but 60 payroll postings[1]

1 Retiring members who are age 65 and have less than five years of service credit and less than 60 payroll postings will receive a service retirement benefit under the Money Purchase Formula only.

Service Retirement Eligibility for State Troopers Hired Before January 1, 2020

Age Requirement (in years)	Service Credit Requirement (in years)
Any Age	30
50	25
55	20
60	Age and Service = 80 or more
65	5
65	Less than 5 but 60 payroll postings[1]

1 Retiring members who are age 65 and have less than five years of service credit and less than 60 payroll postings will receive a service retirement benefit under the Money Purchase Formula only.

In addition to the preceding Service Retirement Eligibility Charts, SB 18-200 made the following changes to the age and service credit requirements for a full service retirement for all new members covered under the plan on or after January 1, 2020:

- For all new members, other than State Troopers, eligibility includes a modified Rule of 94 (age and service must add to 94 with a minimum age of 64).
- For State Troopers who have at least five years of service credit, eligibility will include a modified Rule of 80 (age and service must add to 80 with a minimum age of 55).

"State Trooper" means an employee of the Colorado State Patrol or CBI. For new members, "State Trooper" also includes a county sheriff, undersheriff, deputy sheriff, noncertified deputy sheriff, or detention officer hired by a Local Government Division employer on or after January 1, 2020, and a corrections officer classified as I through IV by a State Division employer on or after January 1, 2020.

The service retirement benefit for all retiring members is the greater of the Defined Benefit Formula or the Money Purchase Formula as explained below:

- **Defined Benefit Formula**
  HAS multiplied by 2.5 percent and then multiplied by years of service credit. The service retirement benefit is limited to 100 percent of HAS.

- **Money Purchase Formula**
  Values the retiring member's account plus a 100 percent match on eligible amounts as of the member's retirement date. This amount is then annuitized into a monthly benefit using the retiring member's life expectancy, expected rates of return, and other actuarial factors.

In all cases, a service retirement benefit cannot exceed the maximum benefit amount allowed by federal law.

NOTES TO THE FINANCIAL STATEMENTS

(Dollars in Thousands)

Reduced Service Retirement—PERA Benefit Structure

Reduced service retirement benefits are calculated in the same manner as a service retirement benefit with a reduction for each month prior to the member's first eligible date for a service retirement. The benefit calculation reduction factors applicable to members who were eligible to retire as of January 1, 2011, are specified in C.R.S. § 24-51-605.

Reduced Service Retirement Eligibility For Members Hired Before January 1, 2020

Age Requirement (in years)		Service Credit Requirement (in years)
50		25
50	(State Troopers only)	20
55		20
60		5

In addition to the Reduced Service Eligibility Chart above, SB 18-200 changed the eligibility for a reduced service benefit for all new members covered under the plan on or after January 1, 2020:

- For all new members, other than State Troopers, a member must have at least 25 years of service credit at age 55, or five years of service credit at age 60.
- For State Troopers, the State Trooper must have at least 20 years of service credit at age 55, or five years of service credit at age 60.

For members not eligible to retire as of January 1, 2011, the early retirement reduction factors used to determine the reduced service retirement benefit reflect an actuarial equivalent reduction.

Service Retirement and Reduced Service Retirement Benefits—DPS Benefit Structure

Members in the DPS benefit structure are eligible to receive a monthly retirement benefit when they meet the age and service requirements listed below and in the next column. If the member has less than five years of service credit under the DPS benefit structure, the member does not have the option to apply for a benefit and the member is only eligible for a refund of his or her account.

If the member has five years of service credit as of January 1, 2011, the following age and service requirements apply:

Service Retirement Benefit

Age Requirement (in years)	Service Credit Requirement (in years)
50	30
55	25[1]
65	5

1 15 years must be earned service credit

Reduced Service Retirement Benefit

Age Requirement (in years)	Service Credit Requirement (in years)
Less than 50	30
Less than 55	25
55	15

If the member does not have five years of service credit as of January 1, 2011, the following age and service requirements apply:

Service Retirement Benefit

Age Requirement (in years)	Service Credit Requirement (in years)
Any Age	35
55	30[1]
55	Age and Service = 85 or more[1]
60	25
65	5

1 20 years must be earned service credit

Reduced Service Retirement Benefit

Age Requirement (in years)	Service Credit Requirement (in years)
50	25
55	20
60	5

The service retirement benefit for all retiring members is the greater of the two calculations as explained below:

- HAS multiplied by 2.5 percent and then multiplied by years of service credit.
- $15 (actual dollars) times the first 10 years of service credit plus $20 (actual dollars) times service credit over 10 years plus a monthly amount equal to the annuitized member balance (which may include matching dollars if eligible) using the retiring member's life expectancy, expected rates of return, and other actuarial factors.

In all cases, a service retirement benefit is limited to 100 percent of HAS and cannot exceed the maximum benefit amount allowed by federal law.

Disability Program

Eligible active members, other than judges, with five or more years of earned service credit are covered by the PERA Disability Program. Judges are immediately covered under the disability program. The earned service credit requirement may be waived for State Troopers who become disabled as the result of injuries in the line of duty.

Medical determinations for the disability program are made by UNUM, PERA's disability program administrator pursuant to C.R.S. § 24-51-703. Applicants found to be disabled receive payments under one of two tiers:

- **Short-Term Disability:** Disability applicants are eligible for short-term disability payments if they are found to be mentally or physically incapacitated from performance of essential job duties after reasonable accommodation, and who are medically unable to earn at least 75 percent of their pre-disability earnings from any job, but who are not totally and permanently incapacitated from regular and substantial gainful employment. PERA's short-term disability program is an insurance product with PERA's disability program administrator, and payments are made directly to the individual from PERA's disability program administrator. The maximum income replacement is 60 percent of the member's pre-disability PERA salary for up to 22 months.
- **Disability Retirement Benefits:** Disability applicants who are found to be totally and permanently mentally or physically incapacitated from regular and substantial gainful employment are eligible for disability retirement benefits. These benefits are paid by PERA for as long as the disability retiree remains disabled. The benefit is calculated as a percentage of the disabled member's HAS using accrued, and in some cases, projected service credit.

Benefit Options

Service retirees in the PERA benefit structure and all members in either the DPS benefit structure or the PERA benefit structure who meet the requirements of a disability retirement may elect to receive their retirement or disability retirement benefits in the form of a single-life benefit payable for the retiree's lifetime only or one of two joint-life benefits payable for the lifetime of the retiree with a continuing benefit paid upon the retiree's death to the retiree's cobeneficiary. Such option designations may only be changed under limited conditions specified in State law. The options are as follows:

- *Option 1:* A single-life benefit payable for the life of the retiree and, upon the death of the retiree, no further monthly benefits are payable.
- *Option 2:* A joint-life benefit payable for the life of the retiree and, upon the death of the retiree, one-half of the benefit becomes payable to the cobeneficiary of the retiree for life. Upon the death of the cobeneficiary prior to the death of the retiree, an Option 1 benefit becomes payable to the retiree.
- *Option 3:* A joint-life benefit payable for the life of the retiree and, upon the death of the retiree, the same benefit becomes payable to the cobeneficiary of the retiree for life. Upon the death of the cobeneficiary prior to the death of the retiree, an Option 1 benefit becomes payable to the retiree.

Options 2 and 3 are the actuarial equivalent of Option 1.

Service retirees in the DPS benefit structure have the following options:

- *Option A:* A single-life benefit payable for the life of the retiree and, upon the death of the retiree, no further monthly benefits are payable.
- *Option B:* A single-life benefit, reduced from an Option A benefit to provide benefits to designated beneficiaries for a fixed period of time after retirement. As part of the retirement calculation, a guaranteed payment period is determined and if the retiree dies before the guaranteed period ends, the benefit will continue to the Option B beneficiary(ies) for the remainder of the guaranteed period. If the death of the retiree occurs after the guaranteed period, the benefit ends.
- *Option P2:* A joint-life benefit payable for the life of the retiree and, upon the death of the retiree, one-half of the benefit becomes payable to the cobeneficiary of the retiree for life. Upon the death of the cobeneficiary prior to the death of the retiree, an Option A benefit becomes payable to the retiree.
- *Option P3:* A joint-life benefit payable for the life of the retiree and, upon the death of the retiree, the same benefit becomes payable to the cobeneficiary of the retiree for life. Upon the death of the cobeneficiary prior to the death of the retiree, an Option A benefit becomes payable to the retiree.

Options B, P2, and P3 are the actuarial equivalent of Option A.

Survivor Benefits Program—PERA Benefit Structure

Members who have at least one year of earned service credit are covered by the PERA survivor benefits program. This one-year requirement is waived if a member's death is job-incurred.

In the event of the covered member's death, monthly survivor benefits may be paid to the qualified survivors of the deceased. Qualified survivors generally include minor children, a surviving spouse, dependent parents, or a cobeneficiary (for deceased members who were eligible for retirement at the time of death).

Monthly benefits are specified in statute and vary based upon the deceased's HAS, years of service credit, the qualified survivor to whom benefits are to be paid, and the number of qualified survivors receiving benefits.

If at the time of death, a member has less than one year of earned service credit or does not have any qualified survivors, the deceased's named beneficiary or the estate receives a lump-sum payment of the deceased member's account plus a 100 percent match on eligible amounts.

NOTES TO THE FINANCIAL STATEMENTS

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Survivor Benefits Program—DPS Benefit Structure

Active members who have at least five years of continuous service under the DPS benefit structure prior to the date of death and DPS disability retirements (prior to age 65) are covered by the survivor benefits program applicable to the DPS benefit structure.

In the event of the covered member's death, the member's qualified survivors are eligible for survivor benefits as long as the named beneficiary(ies) waive their right to receive a refund of the member's contributions. Qualified survivors generally include minor children, a surviving spouse, or dependent parents.

Monthly benefits are specified in statute and vary based upon the deceased's HAS, years of service credit, the qualified survivor to whom benefits are to be paid, and the number of qualified survivors receiving benefits.

If at the time of death, a member has not met the eligibility requirements for the DPS benefit structure survivor benefits program that are specified in statute, the member's named beneficiary(ies) will receive a lump-sum payment of the deceased member's account without a match.

Annual Increases

On an annual basis, eligible benefit recipients receive post-retirement, cost-of-living adjustments called annual increases (AI). The AI eligibility and amounts are determined by the date the retiree or deceased member began membership in PERA.

The AI provisions are explained below:

- For benefit recipients of the PERA benefit structure who began membership before January 1, 2007, and whose benefit is paid based on a retirement date prior to January 1, 2011, and benefit recipients of the DPS benefit structure whose benefit is paid based on a retirement date prior to January 1, 2011:
  - ***Payment Month:*** The AI is paid in July.
  - ***Eligibility:*** The benefit recipient has been receiving benefits for at least seven months immediately preceding the July in which the AI is to be paid.
  - ***AI Amount:*** The AI for 2018 is 0 percent and will be 0 percent in 2019. Thereafter, the AI is 1.5 percent per year unless it is adjusted by the automatic adjustment provision (AAP). The AAP may raise or lower the amount of the AI by up to one-quarter of 1 percent if the AAP ratio of the Division Trust Funds is outside the parameters specified in C.R.S. § 24-51-413. The amount of the first AI will be prorated from the month of retirement to the first AI payment date.
- For benefit recipients of the PERA benefit structure who began membership before January 1, 2007, and whose benefit is paid based on a retirement date on or after January 1, 2011, and benefit recipients of the DPS benefit structure whose benefit is paid based on a retirement date on or after January 1, 2011, the following eligibility criteria is required:
  - ***Payment Month:*** The AI is paid in July.
  - ***Eligibility:*** For full service retirees, disability retirees, and reduced service retirees who are eligible to receive a benefit on January 1, 2011, and survivor benefit recipients, who already received the first AI on or before May 1, 2018, the benefit recipient has received benefit payments for the 12 months prior to the July in which the AI is to be paid.

    For full service retirees, disability retirees, and reduced service retirees who are eligible to receive a benefit on January 1, 2011, and survivor benefit recipients, who had not yet received the first AI on or before May 1, 2018, the benefit recipient has received benefit payments for 36 months total, including for the 12 months prior to the July in which the AI is to be paid.

    For reduced service retirees who are not eligible to retire as of January 1, 2011, but who already received the first AI on or before May 1, 2018: A reduced service retiree is eligible to receive the AI in July of the year in which both of the following conditions are met: (1) the retiree has received benefit payments for 12 months immediately preceding the July in which the AI is to be paid and (2) as of January 1 of the year the AI is paid, the retiree has either reached age 60 or the age and service Rule for unreduced service retirement applicable to the retiree's Plan.

    For reduced service retirees who are not eligible to retire as of January 1, 2011, and who had not yet received the AI on or before May 1, 2018: A reduced service retiree is eligible to receive the AI in July of the year in which all of the following conditions are met: (1) the retiree has received benefit payments for 36 months total; (2) the retiree has received benefit payments for 12 months immediately preceding the July in which the AI is to be paid; and (3) as of January 1 of the year the AI is paid, the retiree has either reached age 60 or the age and service Rule for unreduced service retirement applicable to the retiree's Plan.
  - ***AI Amount:*** The AI for 2018 is 0 percent and will be 0 percent in 2019. Thereafter, the AI is 1.5 percent per year unless it is adjusted by the AAP. The AAP may raise or lower the amount of the AI by up to one-quarter of 1 percent if the AAP ratio of the Division Trust Funds is outside the parameters specified in C.R.S. § 24-51-413.

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- For benefit recipients of the PERA benefit structure who began membership on and after January 1, 2007:
  - ***Payment Month:*** The AI is paid in July.
  - ***Eligibility:*** For full service retirees, disability retirees, and survivor benefit recipients who had already received an AI on or before May 1, 2018: The benefit recipient becomes eligible in July of the calendar year following the calendar year in which the benefit recipient has received 12 months of benefit payments.

    For full service retirees, disability retirees, and survivor benefit recipients who had not yet received an AI on or before May 1, 2018: The benefit recipient becomes eligible in July if the benefit recipient has received 36 months of benefit payments total including 12 months of benefit payments in the prior calendar year.

    A reduced service retiree who had already received an AI on or before May 1, 2018, is eligible to receive the AI in July of the year in which both of the following conditions are met: (1) as of January 1 of the year the AI is to be paid, the retiree has received 12 months of benefit payments in the prior calendar year and (2) as of January 1 of the year the AI is paid, the retiree has either reached age 60 or the age and service Rule for unreduced service retirement applicable to the retiree's Plan.

    A reduced service retiree who had not yet received an AI on or before May 1, 2018, is eligible to receive the AI in July of the year in which all of the following conditions are met: (1) as of January 1 of the year the AI is to be paid, the retiree has received 36 months of benefit payments total; (2) the retiree received 12 months of benefit payments in the prior calendar year; and (3) as of January 1 of the year the AI is paid, the retiree has either reached age 60 or the age and service Rule for unreduced service retirement applicable to the retiree's Plan.
  - ***AI Amount:*** The AI for 2018 is 0 percent and will be 0 percent in 2019. Thereafter, the AI is the lesser of 1.5 percent (unless adjusted by the AAP) or the average of the monthly Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) amounts for the prior calendar year. In no case can the present value of the year's AIs paid to a Division's benefit recipients exceed 10 percent of the Division's Annual Increase Reserve (AIR).

Changes to the 1.5 percent AI Cap: If PERA's overall funded status (actuarial value of assets/actuarial accrued liability) is at or above 103 percent, the AI cap of 1.5 percent will increase by 0.25 percent per year.

Automatic Adjustment Provision

Adjustments may be made to the AI cap, member and employer contribution rates, and, under certain circumstances, the direct distribution from the State of Colorado (State).

Based on the results of the AAP assessment which utilized the December 31, 2018, actuarial valuation performed for funding purposes, effective July 1, 2020, the AI will be lowered by .25 percent.

A summary of AAP provisions is provided in Note 4.

Indexing of Benefits

Inactive members, who meet the following conditions, have their benefit amounts increased by the applicable AI granted by PERA from their date of membership termination to their effective date of retirement.

- Covered by the plan as of December 31, 2006;
- Eligible to retire as of January 1, 2011;
- Have 25 or more years of service credit; and
- Have not started receiving monthly benefits.

Suspending Benefits

If a retiree suspends retirement on or after January 1, 2011, returns to membership, and earns at least one year of service credit, a separate benefit will be earned. In this case, the retiree may opt to refund the contributions remitted with interest and an applicable match or receive a second, separate benefit. The original benefit will not be recalculated. Individuals who suspended retirement prior to January 1, 2011, are eligible to have their original benefit recalculated upon re-retirement.

If less than one year of service credit is earned during the return to membership, the retiree will be required to refund the contributions remitted with interest and an applicable match before the original benefit will resume.

Working After Retirement Without Suspending Benefits

- **Retiree Contributions:** With a few statutory exceptions, employers are required to remit employer contributions, Amortization Equalization Disbursement (AED), and Supplemental Amortization Equalization Disbursement (SAED) on salary earned by retirees who work for them, but do not suspend retirement and return to membership. Beginning January 1, 2011, working retirees are required to make contributions at a percentage equal to the member contribution rate. Under C.R.S. § 24-51-101(53), working retiree contributions are nonrefundable and are not deposited into member accounts. PERA deposits these contributions into the employer reserve.
- **Limits on Working After Retirement:** With a few statutory exceptions, retirees may work up to 110 days/720 hours per calendar year for a PERA employer

with no reduction in benefits. In addition, each employer assigned to the School Division Trust Fund, DPS Division Trust Fund, and each Higher Education Institution assigned to the State Division Trust Fund may designate on a calendar year basis, up to 10 service retirees who may work up to 30 additional days for a total of 140 days/916 hours in a calendar year. The employer contributions, AED, SAED, and working retiree contributions are due on all salary earned.

- **PERA Retirees Employed By Rural School Districts:** Through June 30, 2023, a service retiree who is a teacher, a school bus driver, or a school food services cook and who is hired by an employer in the School Division that satisfies the criteria below may receive salary without a reduction in retirement benefits for any length of employment in a calendar year if the service retiree has not worked for any PERA employer during the month of the effective date of retirement.
  - The employer that hires the service retiree is a rural school district as determined by the Department of Education based on certain criteria and the school district enrolls 6,500 students or fewer in kindergarten through 12th grade;
  - The school district hires the service retiree for the purpose of providing classroom instruction or school bus transportation to students enrolled by the district or for the purpose of being a school food services cook; and
  - The school district determines that there is a critical shortage of qualified teachers, school bus drivers, or school food services cooks, as applicable, and that the service retiree has specific experience, skills, or qualifications that would benefit the district.

  The following provisions concerning employment for the service retiree also apply:
  - Is not required to resume PERA membership upon employment.
  - Will not have a benefit recalculation reflecting additional service credit or any increase in HAS.
  - Will not receive a PERA health care premium subsidy during employment.
  - May not be employed by the school district from which he or she retired until two years after retirement if he or she retired without a full service retirement benefit.
  - May not receive salary without reduction in benefits and without limitation in a calendar year for more than six consecutive years.

In addition, the employer that hires the service retiree is required to provide full payment of all PERA employer contributions, disbursements, and working retiree contributions.

Benefit Provisions—Voluntary Investment Program and Defined Contribution Retirement Plan

See Note 8.

Benefit Provisions—Deferred Compensation Plan

See Note 8.

Benefit Provisions—Health Care Trust Funds

See Note 9.

Life Insurance Reserve

PERA offers an optional life insurance program where members can purchase varying amounts of coverage. The Life Insurance Reserve is an accumulation of dividends received in the past from the insurance company based upon plan experience. The investment income from the Life Insurance Reserve is used to pay the current administrative costs of the plan.

Termination of PERA

If PERA is partially or fully terminated for any reason, C.R.S. § 24-51-217 provides that the rights of all members and benefit recipients to all benefits on the date of termination, to the extent then funded, will become nonforfeitable.

Note 2—Summary of Significant Accounting Policies

Reporting Entity

The Board oversees all funds included in the financial statements of PERA and has the ability to influence operations. The Board's responsibilities include designation of management, membership eligibility, investment of funds, and accountability for fiscal matters.

PERA is an instrumentality of the State of Colorado (State); it is not an agency of State government. In addition, it is not subject to administrative direction by any department, commission, board, bureau, or agency of the State. Accordingly, PERA's financial statements are not included in the financial statements of any other organization.

Basis of Presentation

The accompanying financial statements are prepared in accordance with accounting principles generally accepted in the United States of America that apply to governmental accounting for fiduciary funds.

In January 2017, GASB issued Statement No. 84, "Fiduciary Activities," that establishes criteria for identifying fiduciary activities and guidance on reporting those activities. This Statement provides guidance on four fiduciary funds that should be reported, if applicable: pension (and other employee benefit) trust funds, investment trust funds, private-purpose trust funds, and custodial funds. GASB 84 will be effective for periods

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beginning after December 15, 2018. PERA has chosen not to early adopt GASB 84 and has not yet determined the impact of this standard on its financial statements and disclosures.

Basis of Accounting

The accompanying financial statements for the defined benefit and defined contribution pension trust funds (DB and DC trust funds), the deferred compensation trust fund, the private purpose trust fund, the HCTF, and the DPS HCTF are prepared using the economic resources measurement focus and the accrual basis of accounting. The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires PERA to use estimates and assumptions that affect the accompanying financial statements and disclosures. Actual results could differ from those estimates. Member and employer contributions are recognized as revenues in the period in which the compensation becomes payable to the member and the employer is statutorily committed to pay these contributions to the DB and DC trust funds, the deferred compensation trust fund, the HCTF, and the DPS HCTF. Benefits and refunds are recognized when due and payable.

Fund Accounting

The financial activities of the State Division Trust Fund, the School Division Trust Fund, the Local Government Division Trust Fund, the Judicial Division Trust Fund, the DPS Division Trust Fund, the HCTF, the DPS HCTF, the Life Insurance Reserve, the Voluntary Investment Program, the Defined Contribution Retirement Plan, and the Deferred Compensation Plan are recorded in separate funds. The State, School, Local Government, Judicial, and DPS Division Trust Funds maintain separate accounts, and all actuarial determinations are made using separate division-based information.

The Division Trust Funds, the HCTF, the DPS HCTF, and the Life Insurance Reserve pool their investments into a combined investment portfolio. Investment value and earnings of the investment pool are allocated among the funds based on each fund's percentage ownership. As of December 31, 2018, the ownership percentages of each fund are shown in the table below.

Trust Fund	Ownership Percentage
State Division	30.83%
School Division	51.93%
Local Government Division	8.79%
Judicial Division	0.68%
DPS Division	7.06%
HCTF	0.62%
DPS HCTF	0.05%
Life Insurance Reserve	0.04%
Total	**100.00%**

The administrative activities and operating assets and liabilities are pooled and recorded in a Common Operating Fund. Expenses incurred and net operating assets are allocated from the Common Operating Fund to the Division Trust Funds based on administrative staff workload devoted to these funds and the ratio of the number of active and retired members in each division to the total for all the Division Trust Funds. Expenses are allocated to the HCTF and DPS HCTF based on administrative fees charged to participants. Expenses are allocated to the Voluntary Investment Program, the Defined Contribution Retirement Plan, and the Deferred Compensation Plan based on administrative staff workload and the ratio of fiduciary net position (FNP) of each program or plan to the total for the program and plans. Expenses are allocated to the Life Insurance Reserve based on administrative staff workload.

Fair Value of Investments

Plan investments are presented at fair value in the Statements of Fiduciary Net Position. See Note 5 for additional information.

NOTES TO THE FINANCIAL STATEMENTS

(Dollars in Thousands)

Note 3—Interfund Transfers and Balances

Interfund transfers of assets take place on a regular basis between the Division Trust Funds. The transfers occur upon the initiation of a retirement or survivor benefit where the member earned or purchased service in another division in addition to the Fund that is paying the benefit.

Transfers also occur from the Division Trust Funds to the Health Care Trust Funds to allocate a portion of the amount paid by members to purchase service credit. The transfers for the year ended December 31, 2018, consisted of the following amounts:

INTERFUND TRANSFERS

	State Division Trust Fund	School Division Trust Fund	Local Government Division Trust Fund	Judicial Division Trust Fund	DPS Division Trust Fund	HCTF	DPS HCTF
Transfers in from other Funds for retirements	$22,050	$25,352	$3,469	$161	$3,639	$—	$—
Transfers out to other Funds for retirements	(17,085)	(22,919)	(6,370)	—	(8,297)	—	—
Transfers in from other Funds for survivor benefits	71	627	—	—	81	—	—
Transfers out to other Funds for survivor benefits	(83)	(71)	—	—	(625)	—	—
Transfers out to Health Care Trust Funds for purchased service credit	(2,275)	(2,376)	(1,021)	(70)	(42)	—	—
Transfers in to Health Care Trust Funds for purchased service credit	—	—	—	—	—	5,742	42

As of December 31, 2018, interfund balances existed between funds due to unreimbursed internal operating expenses. The interfund balances consisted of the following amounts:

INTERFUND BALANCES

Trust Fund	Amount
State Division	$125
School Division	212
Local Government Division	36
Judicial Division	3
DPS Division	29
Voluntary Investment Program	(281)
Defined Contribution Retirement Plan	(53)
Deferred Compensation Plan	(74)
HCTF	3
Total	**$—**

NOTES TO THE FINANCIAL STATEMENTS

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Note 4—Contributions

Division Trust Funds—Defined Benefit Pension Plans

Members and employers are required to contribute to PERA at a rate set by Colorado statute. The contribution requirements of plan members and affiliated employers are established under C.R.S. § 24-51-401 *et seq.* Colorado State law provisions may be amended from time to time by the Colorado General Assembly.

SB 18-200 makes changes to contribution provisions of the defined benefit pension plans administered by PERA. Some, but not all, of these changes to contribution provisions were in effect at the end of 2018.

During 2018, members were required to contribute 8 percent of their PERA-includable salary (State Troopers contributed 10 percent). PERA records these contributions in individual member accounts. Member contributions are tax-deferred for federal and Colorado income tax purposes, effective July 1, 1984, (January 1, 1986, for members of the DPS benefit structure) and January 1, 1987, respectively. Prior to those dates, contributions were on an after-tax basis. PERA-affiliated employers contribute a percentage of active member covered payrolls at employer rates ranging from 10.00 percent to 13.66 percent.

Employers that rehire a PERA retiree as an employee or under any other work arrangement (working retiree) are required to report and pay employer contributions on the amounts paid to the working retiree. In addition, effective January 1, 2011, working retirees are required to make contributions at a percentage of salary equal to the member contribution rate. However, under C.R.S. § 24-51-101(53), these contributions are not member contributions, are not deposited into a member account, and therefore, are nonrefundable to the working retiree.

For purposes of deferring federal income tax imposed on salary, member contributions and working retiree contributions shall be treated as employer contributions pursuant to the provisions of 26 U.S.C. § 414 (h)(2), as amended. For all other purposes, these contributions shall be treated as member contributions and working retiree contributions as described above.

Beginning January 1, 2006, employers are required to pay the AED, and beginning January 1, 2008, employers are required to pay the SAED. The employers pay these amounts on the PERA-includable salary for all employees working for the employer who are members of PERA, or who are eligible to elect to become members of PERA on or after January 1, 2006, including any amounts paid in connection with the employment of a retiree by an employer. PERA uses these payments to help amortize the unfunded actuarial accrued liability (UAAL). The AED and SAED are set to increase in future years for the Judicial Division Trust Fund, as described in the table on the next page. SB 10-001 provides for adjustment of the AED and SAED based on the year-end funded status within a particular Division Trust Fund. If a particular Division Trust Fund reaches a funded status of 103 percent, a decrease in the AED and SAED is mandated and if it subsequently falls below a funded status of 90 percent, an increase in the AED and SAED is mandated. For the Local Government and Judicial Divisions, if the funded ratio reaches 90 percent and subsequently falls below 90 percent, an increase in the AED and SAED is mandated. AED and SAED rates cannot exceed the maximums listed in the table on the next page.

C.R.S. § 24-51-412 permits a pension certificates of participation (PCOP) offset to the DPS Division employer contribution rate. The offset, expressed as a percentage of covered payroll, is equal to the annual assumed payment obligations for PCOPs issued in 1997 and 2008, including subsequent refinancing, by the DPS at a fixed effective annual interest rate of 8.50 percent. At a minimum, the DPS Division employer rate, after applying the PCOP offset, must be sufficient to fund the DPS HCTF and the AIR contribution rates applicable to the DPS Division. The staff of Denver Public Schools provided the PCOP offset rate of 14.18 percent for 2018, which is reviewed and analyzed by PERA staff.

C.R.S. § 24-51-401(1.7) (e) recognizes the effort to equalize the funded status of the DPS Division and the School Division, using the actuarial valuation for funding purposes as a basis. As of December 31, 2018, the funded ratio of the DPS Division is 76.8 percent and the funded ratio of the School Division is 57.9 percent. Beginning January 1, 2015, and every fifth year thereafter, the statute requires a true-up calculation to confirm the equalization of the funded status of these two divisions, which is based on the ratio of UAAL over payroll (currently 365.5 percent for the School Division and 136.7 percent for the DPS Division). The true-up calculation is an actuarial projection to assure the funded status of these divisions will be equal in 30 years from 2010. In the event a true-up calculation does not project equalization between these divisions over the 30-year period, the Board shall recommend an adjustment of the DPS Division employer contribution rate to the Colorado General Assembly. An adjustment to the DPS Division contribution rate may result in a significant increase or decrease in the total contributions paid by the DPS Division employers.

As described above, C.R.S. § 24-51-401(1.7) created a mechanism to reduce the funded ratio of the DPS Division from 88.3 percent at its inclusion into PERA in 2010 to the funded ratio of the School Division by 2040. The funded ratio is the actuarial value of assets divided by actuarial accrued liabilities (AALs). This mechanism involves offsetting the employer contributions into the DPS

NOTES TO THE FINANCIAL STATEMENTS

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Division Trust Fund by the amount of the PCOP payments. It is expected that the equalization will occur in approximately 21 years.

PERA-affiliated employers forward the contributions to PERA for deposit. PERA transfers a portion of these contributions, equal to 1.02 percent of the reported salaries, into the HCTF or DPS HCTF for health care benefits. Beginning in 2007, the AIR was created within each division for the purpose of funding future benefit increases. Funding for this reserve comes from the employer contributions and is calculated at 1.0 percent of the salary reported for members in the PERA benefit structure hired on or after January 1, 2007. As of December 31, 2018, post-retirement benefit increases for these members are limited to a maximum of 1.5 percent (unless adjusted by the AAP) compounded annually, subject to the availability of assets in the AIR for each division. As of December 31, 2018, the value of the AIR was $128,558 in the State Division, $172,639 in the School Division, $35,468 in the Local Government Division, $1,543 in the Judicial Division, and $28,704 in the DPS Division. The remainder of these contributions is transferred into a trust fund established for each division for the purpose of meeting current benefit accruals and future benefit payments.

The combined employer contribution rates for retirement and health care benefits along with the member contribution rates from January 1, 2018, through December 31, 2018, are shown below:

CONTRIBUTION RATES

Trust Fund	Membership	Employer Contribution Rate	AED	SAED	PCOP Offset	Total Contribution Rate Paid by Employer	Member Contribution Rate
State Division	All members (except State Troopers)	10.15%	5.00%	5.00%	—%	20.15%	8.00%
State Division	State Troopers	12.85%	5.00%	5.00%	—%	22.85%	10.00%
School Division	All members	10.15%	4.50%	5.50%	—%	20.15%	8.00%
Local Government Division	All members	10.00%	2.20%	1.50%	—%	13.70%	8.00%
Judicial Division	All members	13.66%	2.20%	1.50%	—%	17.36%	8.00%
DPS Division	All members	10.15%	4.50%	5.50%	(14.18%)	5.97%	8.00%

FUTURE AED AND SAED RATES

	2019 Rates		Future Annual Increases in Rates Prescribed by Colorado Revised Statutes		Maximum Allowable Limitations	
Trust Fund	AED	SAED	AED	SAED	AED	SAED
State Division	5.00%	5.00%	N/A	N/A	5.00%	5.00%
School Division	4.50%	5.50%	N/A	N/A	4.50%	5.50%
Local Government Division	2.20%	1.50%	N/A	N/A	5.00%	5.00%
Judicial Division	3.40%	3.40%	Yes[1]	Yes[2]	5.00%	5.00%
DPS Division[3]	4.50%	5.50%	N/A	N/A	4.50%	5.50%

[1] For the calendar year beginning in 2019, C.R.S. § 24-51-411(4.5) increased the AED payment to 3.40 percent of PERA-includable salary and requires the AED payment to increase by 0.40 percent at the start of each of the following four calendar years through 2023 at which time the AED payment will be 5.00 percent of PERA-includable salary.

[2] For the calendar year beginning in 2019, C.R.S. § 24-51-411(7.5) increased the SAED payment to 3.40 percent of PERA-includable salary and requires the SAED payment to increase by 0.40 percent at the start of each of the following four calendar years through 2023 at which time the SAED payment will be 5.00 percent of PERA-includable salary.

[3] DPS Division employers are permitted to reduce the AED and SAED by the PCOP offset, as specified in C.R.S. § 24-51-412 *et seq.*

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Funding of the plan assumes statutory contributions will be made on a timely basis. Any significant reduction in contributions would have an impact on the ability of the plan to make benefit payments in the future.

Direct Distribution

Pursuant to C.R.S. § 24-51-414, PERA is to receive an annual direct distribution from the State in the amount of $225 million (in actual dollars). Beginning in 2018, the distribution will occur each July 1 until there are no unfunded actuarial accrued liabilities in the trust fund of any division that receives such distribution. PERA shall allocate the distribution to the trust funds as it would an employer contribution in a manner that is proportionate to the annual payroll of each division except there shall be no allocation to the Local Government Division.

The allocation for 2018 was as follows:

Trust Fund	Direct Distribution
State Division	$78,489
School Division	126,505
Judicial Division	1,385
DPS Division	18,621
Total	**$225,000**

Future Contribution Changes

Subject to C.R.S. § 21-51-413, the member contribution rates incrementally increase a total of 2.00 percent as follows:

- 0.75 percent on July 1, 2019.
- 0.75 percent on July 1, 2020.
- 0.50 percent on July 1, 2021.

House Bill (HB) 19-1217 repealed the member contribution increases scheduled for the Local Government Division pursuant to SB 18-200. See Note 12 for more information.

Effective July 1, 2019, subject to C.R.S. § 24-51-413, the employer contribution rates increase 0.25 percent for all divisions except the Local Government Division.

"State Trooper" means an employee of the Colorado State Patrol or CBI. For new members, "State Trooper" also includes a county sheriff, undersheriff, deputy sheriff, noncertified deputy sheriff, or detention officer hired by a Local Government Division employer on or after January 1, 2020, and a corrections officer classified as I through IV by a State Division employer on or after January 1, 2020.

Effective January 1, 2021, and every year thereafter, C.R.S. § 24-51-415 adjusts employer contribution rates for the State and Local Government Divisions to include a defined contribution supplement. The defined contribution supplement for these two divisions will be the employer contribution amount paid to defined contribution plan participant accounts that would have otherwise gone to the defined benefit trusts to pay down the unfunded liability plus any defined benefit investment earnings thereon, expressed as a percentage of salary on which employer contributions are made on behalf of eligible employees who commence employment on or after January 1, 2019.

Automatic Adjustment Provision

The primary intent of the AAP is to gauge the adequacy of the contributions coming into the pension trust fund against the amount required, and if determined necessary, to initiate automatic changes to member and employer contribution rates, the AI cap, and, under certain circumstances, the direct distribution from the State. This assessment commenced with the December 31, 2018, actuarial funding valuation and performed annually, thereafter.

Pursuant to C.R.S. § 24-51-413, the AAP assessment involves the comparison of two blended rates, weighted across all five division trust funds, defined as: the ”Blended Total Contribution Amount” (employer contribution rate + member contribution rate + direct distribution as a rate of pay) divided by the “Blended Total Required Contribution” (ADC rate + member contribution rate), determining a resulting ratio. If the resulting ratio falls within an acceptable corridor (98 percent to 119 percent), no adjustments are made. If the resulting ratio does not achieve a minimum benchmark (less than 98 percent), adjustments are applied in an equitable manner of impact resulting in increases in contributions and a decrease in the AI cap. If the resulting ratio exceeds the acceptable corridor (120 percent or greater), adjustments are applied in an equitable manner of impact resulting in decreases in contributions and an increase in the AI cap.

Per statute, the first adjustment required as a result of the AAP cannot occur prior to July 1, 2020. The AAP defines the limited amounts of total adjustment available in each category, and also the increments of adjustments that can occur in any one year. Multiple steps over multiple years are allowed for a required adjustment as is necessary, but cannot exceed the ultimate limits as set forth in statute. An adjustment (increase or decrease) to each of the employer contribution rates and the member contribution rates cannot exceed 0.50 percent in any one year, and cannot exceed 2.00 percent above or fall below the contribution rates in effect prior to the enactment of SB 18-200. An adjustment to the direct distribution cannot exceed $20 million in any one year, and cannot exceed the initially legislated annual $225 million (actual dollars) amount, but can be reduced to $0.

Further, adjustments that are required because funding is below the 98 percent AAP ratio threshold will be made to an extent that will bring the revised AAP ratio to 103 percent following the corrective efforts but in no event can the adjustments in one year be greater than the limits as described above. Similarly, adjustments that are required because funding has reached the 120 percent AAP ratio threshold must not cause the AAP ratio to fall below 103 percent.

Based on the results of the AAP assessment which utilized the December 31, 2018, actuarial valuation performed for funding purposes, effective July 1, 2020, there will be an increase to both member and employer contribution rates of .50 percent. There will be no adjustment to the scheduled direct distribution payment of $225 million (actual dollars) on July 1, 2020.

Replacement Benefit Arrangements

IRC § 415 limits the amount of the benefit payable to a retiree or survivor in a defined benefit plan. In some cases, the IRC limit is lower than the benefit calculated under the plan provisions. For 2018, this limit is set at $220,000 (actual dollars) for retirees who are age 62 or older. This dollar amount is actuarially decreased for retirees younger than 62. IRC § 415(m) allows a government plan to set up a "qualified governmental excess benefit arrangement" to pay the difference to those retirees. To accomplish this, PERA has entered into agreements with the employers who last employed the affected retirees. Under the agreement, the employer pays the benefit difference to the retiree from a portion of the current employer contributions. In 2018, employers under these agreements used current employer contributions to pay retirees $2,984 in the State Division; $975 in the School Division; $1,807 in the Local Government Division; $0 in the Judicial Division, and $0 in the DPS Division.

Contributions—Voluntary Investment Program and Defined Contribution Retirement Plan

See Note 8.

Contributions—Deferred Compensation Plan

See Note 8.

Contributions—Health Care Trust Funds

See Note 9.

(Dollars in Thousands)

Note 5—Investments

Investment Authority

Under C.R.S. § 24-51-206, the Board has complete responsibility for the investment of PERA's funds, with the following investment limitations:

- The aggregate amount of moneys invested in corporate stocks or corporate bonds, notes, or debentures that are convertible into corporate stock or in investment trust shares cannot exceed 65 percent of the then book value of the fund.
- No investment of the fund in common or preferred stock (or both) of any single corporation can exceed 5 percent of the then book value of the fund.
- The fund cannot acquire more than 12 percent of the outstanding stock or bonds of any single corporation.
- The origination of mortgages or deeds of trust on real residential property is prohibited.

Additionally, C.R.S. § 24-54.8-201 *et seq.* imposes targeted divestment from companies that have economic prohibitions against Israel.

Colorado PERA Board's Statutory Fiduciary Responsibility

By State law, the management of PERA's retirement fund is vested in the Board who is held to the standard of conduct of fiduciaries in discharging their responsibilities. According to C.R.S. § 24-51-207(2), the Board, as fiduciaries, must carry out their functions solely in the interest of PERA members and benefit recipients and for the exclusive purpose of providing benefits.

Investment Committee

The Investment Committee is responsible for assisting the Board in overseeing the PERA investment program. Specific responsibilities include recommending to/advising the Board of the following:

- Written statements of investment policy and philosophy, and any amendments thereto.
- Strategies to achieve investment goals and objectives.
- New investment mandates.
- Use of internal or external management for the investment mandates.
- On any other investment matters and make recommendations for Board action when necessary.

Overview of Investment Policy

PERA's investment policy is established and may be amended by a majority vote of the Board. The policy outlines the investment philosophy and guidelines within which the fund's investments will be managed, and includes the following:

- Strategic asset allocation is the most significant factor influencing long-term investment performance and asset volatility.
- The fund's liabilities are long term and the investment strategy will therefore be long term in nature.
- The asset allocation policy will be periodically re-examined to ensure its appropriateness to the then prevailing liability considerations.
- As a long-term investor, PERA will invest across a wide spectrum of investments in a prudent manner.
- Active management may be expected to add value over passive investment alternatives under appropriate conditions.

The Board determines the strategic asset allocation policy for the fund. In 2014, the Board commissioned an asset/liability study prepared by Aon Hewitt Investment Consulting, Inc. (Aon). The objective of the study was to determine the optimal strategic asset allocation policy that would ultimately allow PERA to meet its benefit obligations, while also ensuring that PERA incurs appropriate levels of risk. On March 20, 2015, the Board voted to change the strategic asset allocation policy of the fund effective July 1, 2015. This strategic asset allocation contains a long-term target allocation and specific ranges within which each asset class may operate. Because the long-term target allocation will be achieved over time, an initial interim target allocation was approved as of July 1, 2015, revised as of July 1, 2016, and reviewed again and retained without changes most recently on June 22, 2018. PERA is currently undergoing another asset/liability study which is scheduled to be completed in 2019.

ASSET ALLOCATION TARGETS AND RANGES

	Interim Asset Allocation Target	Long-Term Asset Allocation Target	Target Range
Global Equity	53.5%	53.0%	47.0% – 59.0%
Fixed Income	23.5%	23.0%	18.0% – 28.0%
Private Equity	8.5%	8.5%	5.0% – 12.0%
Real Estate	8.5%	8.5%	5.0% – 12.0%
Opportunity Fund	5.0%	6.0%	0.0% – 9.0%
Cash and Short-Term Investments	1.0%	1.0%	0.0% – 3.0%

The asset/liability study considered expected investment returns, risks, and correlations of returns.

NOTES TO THE FINANCIAL STATEMENTS

(Dollars in Thousands)

The characteristics of the fund's liabilities were analyzed in conjunction with expected investment risks and returns. The targeted strategic asset allocation is designed to provide appropriate diversification and to balance the expected total rate of return with the volatility of expected returns. The asset allocation targets are adhered to through the implementation of a rebalancing policy. Investments are managed and monitored in a manner which seeks to balance return and risk within the asset/liability framework. The Chief Investment Officer is authorized to execute investment transactions on behalf of the Board. Assets are managed both internally and externally. In making investment decisions, the Board and staff utilize external experts in various fields including risk and performance analysis, and other important investment functions and issues.

Investment Performance

For the year ended December 31, 2018, the net-of-fees, money-weighted rate of return on the pooled investment assets was negative 3.3 percent.

A money-weighted rate of return considers the effect of timing of transactions that increase the amount of pension plan investments (such as contributions) and those that decrease the amount of pension plan investments (such as benefit payments). Additionally, the money-weighted rate of return provides information that is comparable with the long-term assumed rate of return on the pooled investment assets.

Fair Value

Investments are measured at fair value in accordance with GASB 72. Fair value is defined as the amount for which an investment could be sold in an orderly transaction between market participants at the measurement date in the principal or most advantageous market of the investment. This Statement establishes a three-tier, hierarchal disclosure framework which prioritizes and ranks the level of market price observability used in measuring fair value. The hierarchy is based on the valuation inputs used to measure the fair value of the investment and gives the highest priority to unadjusted quoted prices in active markets for identical assets or liabilities (Level 1 measurements) and the lowest priority to unobservable inputs (Level 3 measurements). Inputs refer broadly to the assumptions that market participants would use in pricing the asset or liability, including assumptions about risk, for example, the risk inherent in a particular valuation technique used to measure fair value (such as a pricing model) and/or the risk inherent in the inputs to the valuation technique. The categorization of investments within the hierarchy is based upon the pricing transparency of the instrument and should not be perceived as the particular investment's risk. The three-tier framework is summarized below:

- **Level 1—**Unadjusted quoted prices for identical instruments in active markets.
- **Level 2—**Quoted prices for similar instruments in active markets; quoted prices for identical or similar instruments in markets that are not active; and model-derived valuations in which all significant inputs are observable.
- **Level 3—**Valuations derived from valuation techniques in which significant inputs are unobservable.

Investments in certain entities that calculate a net asset value (NAV) per share (or its equivalent) sometimes do not have a readily determinable fair value. For these investments, governmental accounting standards permit establishment of fair value using a practical expedient based on the NAV per share (or its equivalent).

The table on the next page presents PERA's investments within the hierarchal framework, as well as investments where fair value is determined using the practical expedient, as of December 31, 2018.

NOTES TO THE FINANCIAL STATEMENTS

(Dollars in Thousands)

INVESTMENTS MEASURED AT FAIR VALUE

	12/31/2018	Fair Value Measurements Using: Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Global Equity				
Public market investments[1]				
Information technology	$4,091,655	$4,060,666	$30,718	$271
Financials	3,903,277	3,837,208	65,943	126
Health care	3,401,961	3,373,354	26,622	1,985
Consumer discretionary	3,009,281	2,956,322	52,959	—
Industrials	2,926,333	2,890,549	35,741	43
Communication services	1,949,230	1,909,307	39,923	—
Consumer staples	1,879,327	1,847,373	31,954	—
Energy	1,284,126	1,267,438	16,608	80
Materials	1,013,044	993,018	19,641	385
Real estate	808,464	803,218	5,245	1
Utilities	627,016	624,027	2,989	—
Equity mutual funds	113,189	113,189	—	—
Non-public market investments and other	135	—	—	135
Total global equity investments	**25,007,038**	**24,675,669**	**328,343**	**3,026**
Fixed Income				
U.S. government treasuries	3,787,178	3,787,178	—	—
U.S. government mortgage-backed securities	2,571,513	5,594	2,565,919	—
U.S. corporate bonds	1,912,409	—	1,911,126	1,283
Non-U.S. corporate bonds	470,824	—	470,613	211
Non-U.S. government/agency bonds	326,104	—	326,104	—
Non-agency MBS/CMBS	239,371	—	239,371	—
U.S. government agencies	104,977	—	104,977	—
U.S. municipal bonds	78,880	—	73,669	5,211
Fixed income mutual funds	9,078	9,078	—	—
Total fixed income investments	**9,500,334**	**3,801,850**	**5,691,779**	**6,705**
Real estate	857,687	—	—	857,687
Self-directed brokerage	41,239	40,992	247	—
Total investments by fair value level	**$35,406,298**	**$28,518,511**	**$6,020,369**	**$867,418**
Investments Measured at the NAV				
Global equity	1,036,121			
Fixed income	1,527,753			
Private equity	3,984,585			
Real estate	3,498,192			
Opportunity fund	1,615,745			
Multi-asset class funds	978,590			
Total investments measured at the NAV	**12,640,986**			
Total investments measured at fair value	**$48,047,284**			

[1] Approximately $313,000 of public market investments are classified in Level 2 due to the election of fair value pricing for international equity portfolios. This election employs the use of intra-day movements of the Russell 1000 index as a factor in pricing individual equity investments to ensure equitability between participants in the PERAdvantage International Stock Fund.

NOTES TO THE FINANCIAL STATEMENTS

(Dollars in Thousands)

RECONCILIATION OF INVESTMENT LEVELING DISCLOSURE TO THE STATEMENTS OF FIDUCIARY NET POSITION

	Investments by Fair Value Level	Investments Measured at the NAV	Stable Value Fund[1]	Fixed Income Classified as Short-Term Investments	Statements of Fiduciary Net Position Combined Total
Global equity	$25,007,038	$1,036,121	$—	$—	$26,043,159
Fixed income	9,500,334	1,527,753	451,335	(6,766)	11,472,656
Private equity	—	3,984,585	—	—	3,984,585
Real estate	857,687	3,498,192	—	—	4,355,879
Opportunity fund	—	1,615,745	—	—	1,615,745
Multi-asset class funds	—	978,590	—	—	978,590
Self-directed brokerage	41,239	—	—	—	41,239
Total	**$35,406,298**	**$12,640,986**	**$451,335**	**($6,766)**	**$48,491,853**

[1] The Stable Value Fund is the underlying investment in the PERAdvantage Capital Preservation Fund which is available to participants in the two defined contribution and the deferred compensation plans. The value of the investment is based on the contract value, which approximates fair value. Contract value represents what is owed to the plan participants and what the shares of the stable value fund are being bought and sold for.

Global equity investments classified in Level 1 of the hierarchal framework include securities which trade on a national or international exchange. These investments are primarily valued at the official closing price or last reported sales price of the instrument according to the rules of the exchange. Mutual funds classified in Level 1 of the hierarchal framework include instruments which trade on a national exchange and the fund's NAV is the basis for the fund's transactions. Fixed income securities classified as Level 1 include U.S. Treasuries and U.S. mortgage-backed securities purchased in the to-be-announced forward market. These securities are valued using the bid price, which is the price prospective buyer(s) are prepared to pay to purchase the security. Self-directed brokerage is an investment vehicle available to participants in PERA's Voluntary Investment Program, Defined Contribution Retirement Plan, and Deferred Compensation Plan. Equity investments contained in the self-directed brokerage accounts trade on an exchange, and therefore are classified in Level 1 of the hierarchal framework.

Global equity investments classified in Level 2 of the hierarchal framework include securities valued using a theoretical price which utilizes a standardized formula to derive a price from a related security or from the intra-day movement of a market index. Fixed income investments classified as Level 2 typically do not trade on a national or international exchange and their fair value is based on equivalent values of the same or comparable securities with similar yield and risk, otherwise known as matrix pricing. Fixed income investments contained in the self-directed brokerage are typically valued using a matrix pricing approach, and therefore are classified in Level 2 of the hierarchal framework.

Global equity public market investments classified in Level 3 of the hierarchal framework are valued using one or more unobservable inputs. This includes instruments that have been delisted from an exchange, instruments where trading has been suspended, and the instrument lacks recent transaction information. Global equity non-public market investments are typically received as a distribution from PERA's private equity fund investments and are valued by the partnership at the time of distribution. Fixed income securities classified in Level 3 of the hierarchal framework include instruments that are in default and instruments whose values are estimated, out of necessity, using unobservable inputs due to lack of comparable securities in the market place. Real estate investments classified in Level 3 of the hierarchal framework were valued by an independent appraiser.

Typically, pricing information for public market investments is made available to PERA by independent, third-party pricing services and other third-party vendors.

The table on the next page presents PERA's unfunded commitments, the investment redemption frequency and redemption notice period as of December 31, 2018, for PERA investments measured at the NAV.

NOTES TO THE FINANCIAL STATEMENTS

(Dollars in Thousands)

INVESTMENTS MEASURED AT THE NET ASSET VALUE

	12/31/2018	Unfunded Commitments	Redemption Frequency (If Currently Eligible)	Redemption Notice Period
Global equity commingled funds	$1,036,121	$—	Daily	1 - 3 days
Fixed income commingled funds	1,527,753	—	Daily	1 - 3 days
Private equity partnerships	3,984,585	2,411,541		N/A
Private real estate[1]				
Directly held joint ventures	538,446	7,243		N/A
Real estate partnerships	966,214	467,494		N/A
Commingled open-end funds	1,993,532	53,770	Quarterly	30 - 90 days
Opportunity fund				
Opportunity fund partnerships	738,575	642,902	Quarterly, Biennial, Quinquennial	30 - 180 days
Commingled open-end funds	877,170	209,910	Daily, Monthly, Quarterly, Annually	5 - 180 days
Multi-asset class commingled funds	978,590	—	Daily	1 - 3 days
Total investments measured at the NAV	**$12,640,986**	**$3,792,860**		

[1] PERA has $276,305 in unfunded commitments related to real estate presented in Level 3 of the hierarchal framework.

The fair value of the investments in global equity, fixed income, and multi-asset class commingled funds has been determined using NAV of the units held at December 31, 2018. Commingled funds are only offered to a limited group of investors, and the most significant element of the NAV is the fair value of the underlying investment holdings of the fund. Unit values are determined by dividing each fund's net assets by the number of units outstanding on the valuation date. Global equity commingled funds include five funds which primarily consist of investments whose objective is to produce returns that either match or exceed the total rate of return of a particular benchmark. Fixed income commingled funds include four funds that seek results which correspond generally to the price and yield performance of a particular index or to produce returns in excess of the total rate of return of a particular benchmark. Multi-asset class commingled funds include 10 target date retirement funds which are broadly diversified across global asset classes, where asset allocations become more conservative over time with the objective of providing for retirement outcomes consistent with investor preferences throughout the savings and drawdown phase. Additionally, this asset class also includes one fund whose objective is to produce returns that exceed inflation.

Private equity partnerships include 176 private equity limited partnership funds, with various strategies including: buyout, venture capital, generalist debt, mezzanine debt, distressed debt, secondary funds, fund-of-funds, and energy-related strategies. The fair values of the investments in this type have been determined using the NAV per share (or its equivalent) of PERA's ownership interest in partners' capital. The most significant element of NAV is the fair value of the investment holdings. The valuation techniques vary based on investment type and involve a certain degree of expert judgment. These holdings are valued by the general partners in conjunction with management, investment advisers, and valuation specialists and are generally audited annually. These investments cannot be redeemed during the term of the partnership. Typically, private equity partnerships have an approximate life of 10 years, with the first four to six years deemed as the investment period where capital is deployed. The remaining years are typically the harvest period in which distributions are received through the liquidation of the underlying assets of the fund. The fair value for these investments could differ significantly if a ready market for these assets existed.

Private real estate includes 88 funds that invest primarily in U.S. institutional quality commercial real estate across a broad range of real estate asset types and locations. The fair values of the investments in this type have been determined using the NAV per share (or its equivalent) of PERA's ownership interest in partners' capital. The most significant element of NAV is the fair value of the investment holdings. The valuation techniques vary based on investment type and involve a certain degree of expert judgment. These holdings are valued by the general partners in conjunction with management, investment advisers, and valuation specialists and are generally audited annually. There are 63 real estate closed-end limited partnership funds, which are considered illiquid as these investments cannot be redeemed during the term of the partnership. Distributions can be made periodically based on the sole discretion of the General Partner. There are eight majority owned joint venture investments which consist of industrial and multifamily assets in various locations throughout the U.S. These investments are considered illiquid. There are 17 real estate commingled open-ended funds which are considered liquid real estate funds by nature of the open-end structure of the fund. Open-end funds generally offer periodic distributions of net cash flow, which investors may elect to reinvest. Additionally, open-end funds generally offer quarterly redemption windows for requesting portions, or all, of PERA's investments. Two of the open-ended funds contain a lock-out period with respect to redemptions. The fair value for these investments could differ significantly if a ready market for these assets existed.

(Dollars in Thousands)

The Opportunity Fund includes 22 funds that invest in timber, real assets, tactical, credit, global macro, multi-strategy, and other opportunistic strategies. The fair values of the investments in this type have been determined using the NAV per share (or its equivalent) of PERA's ownership interest in partners' capital. The most significant element of NAV is the fair value of the investment holdings. The valuation techniques vary based on investment type and involve a certain degree of expert judgment. These holdings are valued by the general partners in conjunction with management, investment advisers, and valuation specialists and are generally audited annually. There are 12 partnerships within the Opportunity Fund that are considered illiquid as these investments cannot be redeemed during the term of the partnership. Illiquid funds represent approximately 27.9 percent of the value of the Opportunity Fund. There are seven investments within the Opportunity Fund that are considered liquid by nature of the open-end structure of the fund. Open-end funds generally offer periodic distributions of net cash flow, which investors may elect to reinvest. Additionally, open-end funds generally offer daily and monthly redemption windows for requesting portions, or all, of PERA's investments. Distributions from each fund will be received as the underlying investments of the funds are liquidated. It is expected that the underlying assets of the funds will be liquidated over the next two to 10 years. The fair value for these investments could differ significantly if a ready market for these assets existed.

Cash and Short-Term Investments

Cash balances represent both operating cash accounts and investment cash on deposit held by banks. To maximize investment income, the float caused by outstanding checks is invested, thus causing a possible negative book balance. Negative book balances are reflected in the liabilities section of the Statements of Fiduciary Net Position.

The carrying value of cash and short-term investments at December 31, 2018, in the Statements of Fiduciary Net Position includes short-term fixed income securities of $6,766, pending foreign exchange contracts of ($13), and deposit and short-term investment funds of $443,388 for a total of $450,141. PERA considers fixed income securities with a remaining maturity of 12 months or less to be short-term investments.

The table below presents the PERA combined total deposits and short-term investment funds as of December 31, 2018.

	Carrying Value
Deposits with banks (held in accounts insured by the FDIC)	$10,452
Deposits held at bank (uncollateralized, held by PERA's agent in PERA's name)	13,278
Short-term investment funds held at bank (shares in commingled funds, held by PERA's agent in PERA's name)	419,658
Total deposits and short-term investment funds	**$443,388**

Securities Lending Transactions

C.R.S. § 24-51-206 and Board policies permit PERA to lend its securities to broker-dealers and other entities with a simultaneous agreement to return the collateral for the same securities in the future. PERA utilized two lending agents in 2018, its custodian, The Northern Trust Company (Northern Trust) and Deutsche Bank AG, New York Branch (Deutsche Bank).

Northern Trust primarily lends international equity and fixed income securities for cash collateral. U.S. securities are loaned versus collateral valued at 102 percent of the fair value of the securities plus any accrued interest. Non-U.S. securities are loaned versus collateral valued at 105 percent of the fair value of the securities plus any accrued interest. Collateral is marked-to-market daily. PERA cannot pledge or sell the collateral securities unless the borrower defaults.

Northern Trust invests the cash collateral related to PERA's loaned securities in a separate account according to guidelines stipulated by PERA. Northern Trust's Senior Credit Committee sets borrower credit limits. As of December 31, 2018, the total fair value of securities on loan with Northern Trust cannot exceed $600,000.

Deutsche Bank lends domestic and international equities for cash collateral. U.S. securities are loaned versus collateral valued at a minimum of 102 percent of the fair value of the securities. International securities are loaned versus collateral valued at a minimum of 105 percent of the fair value of the securities. Collateral is marked-to-market daily. PERA cannot pledge or sell the collateral securities unless the borrower defaults.

Deutsche Bank invests the cash collateral related to PERA's loaned securities in a separate account according to guidelines stipulated by PERA. Deutsche Bank's Global Credit Risk Department sets borrower credit limits. As of December 31, 2018, the total fair value of

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(Dollars in Thousands)

securities on loan with Deutsche Bank cannot exceed $1,500,000.

The table below details the balances relating to the securities lending transactions at December 31, 2018.

Securities Lent for Cash Collateral	Fair Value of Underlying Securities	Cash Collateral Received	Cash Collateral Investment Value
Cash and cash equivalents	$—	$—	$655,076
Global equity	786,982	808,104	—
Fixed income	31,550	32,169	186,670
Total	**$818,532**	**$840,273**	**$841,746**

PERA's income, including realized and unrealized gain/(loss), net of rebates and fees from securities lending, was $9,240 for the year ended December 31, 2018. Included in net securities lending income for the year ended December 31, 2018, was $163 from commingled funds.

As of December 31, 2018, PERA had no credit risk exposure to borrowers because the associated value of the collateral held exceeded the value of the securities loaned. The contracts with PERA's lending agents provide that the lending agents will indemnify PERA if loaned securities are not returned and PERA suffers direct losses due to a borrower's default or the lending agent's noncompliance with the contract. PERA had no losses on securities lending transactions resulting from the default of a borrower or the lending agent for the year ended December 31, 2018. PERA has limited the total fair value of securities outstanding to one borrower to 25 percent of the total fair value of all borrowed securities in the Deutsche Bank lending program and $50,000 per borrower in the Northern Trust lending program.

PERA or the borrower may terminate any security loan on demand. Though every loaned security may be sold and reclaimed at any time from the borrower, the weighted average loan life of overall loans outstanding at Northern Trust and Deutsche Bank was approximately 28 days and 75 days, respectively as of December 31, 2018. At Northern Trust and Deutsche Bank, all loans were made on an overnight (one day) basis throughout 2018. The weighted average maturity (to the next reset date) at Northern Trust was 2 days and at Deutsche Bank was 16 days as of December 31, 2018. Since all securities loans are made on an overnight basis, there is usually a difference between the weighted average maturity of the investments made with the cash collateral provided by the borrower and the maturities of the securities loans.

As of December 31, 2018, reinvested securities lending collateral of $841,746 primarily consisted of investments totaling $655,076 valued at par, and accordingly are not classified within the fair value hierarchal framework. At December 31, 2018, $186,670 of the $841,746 in reinvested securities lending collateral consisted of fixed income investments and were considered to be Level 2 investments in the fair value hierarchal framework. Fixed income investments classified as Level 2 typically do not trade on a national or international exchange and their fair value is based on equivalent values of the same or comparable securities with similar yield and risk, otherwise known as matrix pricing.

Custodial Credit Risk

Governmental accounting standards limit the disclosure of custodial credit risk to investment securities that are uninsured, held in physical or book entry form, are not registered in PERA's name, and are held by either the counterparty or the counterparty's trust department or agent but not in PERA's name. Disclosure of custodial credit risk is also required when deposits are not covered by depository insurance and are uncollateralized, collateralized with securities held by the pledging financial institution, or collateralized with securities held by the pledging financial institution's trust department or agent but not in PERA's name.

To mitigate custodial credit risk, PERA's custodial credit risk policy has requirements governing how securities are held by the master custodian and for the effective management of cash balances. To further minimize custodial credit risk, periodic reviews are required to be completed on the master custodian's credit quality and capital levels. Additionally, assessments of counterparty risk are completed periodically using internal analysis and information obtained from third-party research and rating agency reports.

Northern Trust is the master custodian for the majority of PERA's securities. At December 31, 2018, there were no investments, or collateral securities subject to custodial credit risk. At December 31, 2018, there were $13,278 of foreign currency deposits and $75,160 of margin which were uninsured and uncollateralized and, therefore, exposed to custodial credit risk.

Concentration of Credit Risk

Concentration of credit risk is the risk of loss that may be attributed to the magnitude of PERA's investment in a single issuer. C.R.S. § 24-51-206(3) requires that no investment of the fund in common or preferred stock, or both, of any single corporation shall be of an amount which exceeds 5 percent of the then book value of the fund, nor shall the fund acquire more than 12 percent of the outstanding stock or bonds of any single corporation. The 12 percent requirement does not apply to governmental securities (U.S. Treasuries, sovereigns, etc.), Government Sponsored Enterprise securities (agencies including FNMA, FHLMC, etc.), mortgage-backed securities (agency or non-agency), commercial

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(Dollars in Thousands)

mortgage-backed securities (CMBS), asset-backed securities, or municipal securities. There is no single issuer exposure that comprises 5 percent of the then book value of the fund and no holdings greater than 12 percent of the outstanding stock or bonds of any single corporation at December 31, 2018.

RECONCILIATION OF CREDIT AND INTEREST RATE RISK DISCLOSURES TO FINANCIAL STATEMENTS

	As of December 31, 2018
Fixed income	$11,472,656
Fixed income securities classified as short term	6,766
Total fixed income securities	**$11,479,422**

Credit Risk

Credit risk is the risk that an issuer or other counterparty to an investment will not fulfill its obligation. As of December 31, 2018, PERA held investments across the credit ratings spectrum, with the majority invested in investment grade issuers defined as having a minimum rating of Baa3/BBB-/BBB-, issued by Moody's, Standard and Poor's (S&P), and Fitch, respectively. PERA's credit risk policy is as follows: Fixed income portfolios generally have guidelines that establish limits on holdings within each credit rating category. Some investment grade managers are allowed to purchase below investment grade securities, but in general are limited to no more than 5 percent exposure to below investment grade securities. The table below provides Moody's credit quality ratings for PERA's fixed income holdings as of December 31, 2018.

CREDIT QUALITY RATING DISPERSION SCHEDULE

Quality Rating Moody's	Total	U.S. Govt Mortgage-Backed Securities	U.S. Corporate Bonds	Non-U.S. Corporate Bonds	Stable Value Fund	Non-U.S. Govt/ Agency Bonds	Non-Agency MBS/CMBS	U.S. Govt Agencies[1]	U.S. Municipal Bonds
Aaa	$492,364	$13,897	$12,868	$—	$—	$180,523	$184,128	$95,101	$5,847
Aa1	48,545	—	5,418	—	—	25,793	4,123	—	13,211
Aa2	114,825	—	58,400	13,810	—	21,870	5,209	—	15,536
Aa3	82,569	—	39,454	18,161	—	—	4,540	—	20,414
A1	119,277	—	65,531	32,113	—	15,267	—	—	6,366
A2	238,883	—	200,131	21,079	—	7,222	—	—	10,451
A3	574,307	—	468,376	85,295	—	20,636	—	—	—
Baa1	433,938	—	302,766	131,172	—	—	—	—	—
Baa2	379,340	—	263,280	94,165	—	21,895	—	—	—
Baa3	373,832	—	330,039	22,638	—	21,126	—	—	29
Ba1	142,056	—	112,762	29,088	—	206	—	—	—
Ba2	37,116	—	14,024	23,092	—	—	—	—	—
B2	7,505	—	7,505	—	—	—	—	—	—
Not rated[2]	2,636,573	2,083,333	31,855	211	451,335	11,566	41,371	9,876	7,026
Subtotal	$5,681,130	$2,097,230	$1,912,409	$470,824	$451,335	$326,104	$239,371	$104,977	$78,880
U.S. govt treasuries	3,787,178								
Explicit U.S. govt agencies[3]	474,283								
Fixed income commingled funds[2,4]	1,527,753								
Fixed income mutual funds[2]	9,078								
Total	**$11,479,422**								

[1] Includes bonds issued by Federal Home Loan Bank, Federal Home Loan Mortgage Corporation, Federal National Mortgage Association, and other government-sponsored agencies.

[2] Not rated by Moody's.

[3] Bonds issued by the Government National Mortgage Association.

[4] The fair value and fund-level credit quality ratings as reported by the commingled fund managers are: $7,055—Aaa; $1,437,574—Aa2; $83,124—A1.

NOTES TO THE FINANCIAL STATEMENTS

(Dollars in Thousands)

Interest Rate Risk

Interest rate risk is the risk that changes in interest rates will adversely affect the fair value of an investment. PERA's policy is to manage its exposure to fair value losses arising from changes in interest rates by requiring that the duration of individual portfolios stays within defined bands of the duration of each portfolio's benchmark. PERA utilizes effective duration as the primary measure of interest rate risk within its fixed income investments. Duration estimates the sensitivity of a bond's price to interest rate changes. Effective duration makes assumptions regarding the most likely timing and amounts of variable cash flows arising from such investments as callable bonds, mortgage-backed securities, and variable-rate debt.

Effective duration for PERA's fixed income holdings as of December 31, 2018, is shown in the table below:

INTEREST RATE RISK—EFFECTIVE DURATION

	Fair Value Total	Fair Value Duration Not Available	Fair Value Duration Available	Effective Weighted Duration in Years
U.S. government treasuries	$3,787,178	$—	$3,787,178	6.08
U.S. government mortgage-backed securities	2,571,513	6,990	2,564,523	4.81
U.S. corporate bonds	1,912,409	2,668	1,909,741	7.43
Fixed income commingled funds	1,527,753	—	1,527,753	5.62
Non-U.S. corporate bonds	470,824	5,227	465,597	5.44
Stable value fund	451,335	—	451,335	3.00
Non-U.S. government/agency bonds	326,104	—	326,104	4.16
Non-agency MBS/CMBS	239,371	—	239,371	5.40
U.S. government agencies	104,977	—	104,977	5.94
U.S. municipal bonds	78,880	5,211	73,669	11.07
Fixed income mutual funds	9,078	—	9,078	5.31
Total	**$11,479,422**	**$20,096**	**$11,459,326**	**5.77**

Mortgage-Backed Securities

PERA invests in residential and commercial mortgage-backed securities which are reported at fair value in the Statements of Fiduciary Net Position under Investments at fair value, fixed income. PERA invests in mortgage-backed securities for diversification and to enhance fixed income returns.

A residential mortgage-backed security depends on the underlying pool of single-family mortgage loans to provide the cash flow to make principal and interest payments on the security. Mortgage-backed securities are subject to credit risk, the risk that the borrower will be unable to meet its obligations. In many cases, the payment of principal and interest is guaranteed by an agency of the U.S. Government, or a Government Sponsored Enterprise. While these guarantees reduce credit risk, residential mortgage-backed securities are also subject to prepayment risk as the timing of principal and interest payments remains uncertain. A decline in interest rates can result in call risk as prepayments accelerate, which reduces the weighted average life of the security. Alternatively, an increase in interest rates can result in extension risk as prepayment rates decline, which may cause the weighted average life of a mortgage investment to be longer than anticipated.

CMBS depend on underlying pools of commercial real estate loans to provide the cash flow to make principal and interest payments on the security. CMBS are subject to credit risk, the risk that the borrower will be unable to meet its obligations. These loans are typically for a fixed term, cannot be repaid early by the borrower without penalty and, accordingly, have lower prepayment risk than residential mortgage-backed securities.

To reduce PERA's counterparty credit risk while trading residential mortgage-backed securities, PERA has entered into Master Securities Forward Transaction Agreements with a number of counterparties which require margin collateral to be pledged or received when the change in net value of unsettled trades exceeds an agreed-upon threshold. As of December 31, 2018, the change in net value of all unsettled trades above agreed upon thresholds resulted in collateral of $294 held by PERA.

As of December 31, 2018, the fair value of residential and commercial mortgage-backed securities was $2,517,024 and $293,860, respectively, which excludes the fair value of mortgage-backed securities held in commingled funds.

NOTES TO THE FINANCIAL STATEMENTS

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Foreign Currency Risk

Foreign currency risk is the risk that changes in exchange rates will adversely impact the fair value of an investment or a deposit. PERA's currency risk exposure resides primarily within the Global Equity asset class. In accordance with governmental accounting standards, this disclosure is limited to investments denominated in non-U.S. dollars. There may be additional foreign currency risk in investments that contain underlying securities or business operations exposed to a foreign currency. PERA's formal policy regarding foreign currency risk is to evaluate the risk as part of the fund's periodic asset/liability study and to consider it in determining the total fund asset allocation. At December 31, 2018, PERA did not have a currency hedging program at the total fund level. However, at the manager level, hedging currency risk may be permitted which allows the manager to actively manage currency exposure at their discretion in accordance with their individual investment guidelines. PERA monitors currency risk at the total fund, asset class, and portfolio levels.

PERA's exposure to foreign currency risk as of December 31, 2018, is shown in the following table.

FOREIGN CURRENCY RISK

Currency	Total	Global Equity	Private Equity	Real Estate	Income Receivable	Cash and Short-Term Investments	Corporate Bonds	Pending Trades	Pending Foreign Exchange Trades
Euro	$2,691,465	$2,353,061	$317,317	$2,993	$12,475	$5,621	$—	$18,605	($18,607)
Japanese yen	1,647,551	1,644,718	—	—	2,701	133	—	2,509	(2,510)
British pound sterling	1,479,595	1,417,449	58,049	—	3,376	721	—	2,237	(2,237)
Hong Kong dollar	652,151	651,722	—	—	28	401	—	2,773	(2,773)
Canadian dollar	613,609	611,057	—	—	1,480	1,072	—	—	—
Swiss franc	558,604	548,314	—	—	10,288	2	—	—	—
Australian dollar	398,352	396,679	—	—	691	982	—	—	—
Swedish krona	281,272	280,996	—	—	248	28	—	—	—
South Korean won	200,485	197,086	—	—	2,298	53	—	1,848	(800)
Indian rupee	196,270	196,074	—	—	—	585	—	(389)	—
Singapore dollar	162,461	161,726	—	—	405	330	—	—	—
Danish krone	144,656	141,564	—	—	2,989	103	—	—	—
New Taiwan dollar	133,348	130,926	—	—	—	2,422	—	—	—
Brazilian real	122,908	121,870	—	—	1,138	198	136	(977)	543
South African rand	73,981	72,862	—	—	32	(260)	—	1,347	—
Norwegian krone	57,102	57,050	—	—	—	52	—	205	(205)
Malaysian ringgit	46,800	46,728	—	—	15	57	—	—	—
Indonesian rupiah	43,102	42,957	—	—	7	57	—	81	—
Mexican peso	42,532	40,181	—	1,727	1	183	—	892	(452)
Chinese yuan renminbi (offshore)	42,496	42,055	—	—	—	441	—	—	—
Thai baht	34,287	34,285	—	—	—	2	—	—	—
Israeli shekel	28,297	28,275	—	—	6	16	—	—	—
Polish zloty	19,607	19,601	—	—	—	6	—	—	—
Turkish lira	17,600	17,506	—	—	—	—	—	282	(188)
New Zealand dollar	16,214	16,185	—	—	—	29	—	—	—
United Arab Emirates dirham	12,894	12,878	—	—	—	16	—	—	—
Czech koruna	12,485	12,478	—	—	—	7	—	—	—
Hungarian forint	11,965	11,965	—	—	—	—	—	—	—
Philippine peso	6,120	6,106	—	—	—	14	—	—	—
Qatari riyal	4,422	4,422	—	—	—	—	—	—	—
Russian ruble	1,698	1,691	—	—	7	—	—	—	—
Colombian peso	313	313	—	—	—	—	—	—	—
Chilean peso	23	23	—	—	—	—	—	—	—
Egyptian pound	18	18	—	—	—	—	—	—	—
Peruvian sol	7	—	—	—	—	7	—	—	—
Total	**$9,754,690**	**$9,320,821**	**$375,366**	**$4,720**	**$38,185**	**$13,278**	**$136**	**$29,413**	**($27,229)**

(Dollars in Thousands)

Note 6—Derivative Instruments

PERA reports derivative instruments at fair value. These derivative instruments involve, to varying degrees, elements of market risk to the extent of future market movements in excess of amounts recognized in the Statements of Fiduciary Net Position. For accounting purposes, derivative instruments are considered to be investments and not hedges.

The following table summarizes the derivative instruments outstanding as of December 31, 2018, that have been deemed significant by management. These instruments are recorded in investment receivables in the Statements of Fiduciary Net Position and the changes in fair value are included in investment income in the Statements of Changes in Fiduciary Net Position. Investments in limited partnerships and commingled funds include derivative instruments that are not reported in the following disclosure.

DERIVATIVE INSTRUMENTS—DEFINED BENEFIT PLANS

	Changes in Fair Value		Fair Value at December 31, 2018	
Investment Derivatives	Classification	Amount	Classification	Amount
Fixed income futures	Investment income	$1,099	Investment receivables	$75,160
Equity futures	Investment income	(41,718)		
Total		**($40,619)**	**Total**	**$75,160**

Equity/Fixed Income Futures

Equity and fixed income futures represent contracts between two parties to purchase or sell securities or cash at a future date for a specified price. Futures contracts trade on organized exchanges. Recognition of investment income, with a corresponding change to the amount of investment receivables or liabilities, occurs on a daily basis according to the fluctuation of value of the futures contract. Payments are received or made to settle the fluctuation of the contract's value on a periodic basis. Upon entering into a futures contract, PERA is required to pledge an amount of cash or securities (known as an initial margin deposit) equal to a percentage of the contract amount.

Investment in futures contracts exposes PERA to credit risk. No losses related to counterparty nonperformance occurred in 2018. Credit risk is minimized by central counterparty clearing, margin deposits, and periodic settlement payments.

At December 31, 2018, PERA's defined benefit plans had 3,240 outstanding futures contracts with a total notional market exposure of $312,835 and total investment receivables of $75,160 reflecting counterparty margin deposits and fluctuation of the contract value since the last periodic settlement payment.

FUTURES CONTRACTS OUTSTANDING—DEFINED BENEFIT PLANS

As of December 31, 2018

Contract Type	Year of Maturity	Notional Amount (Market Exposure)
Equity	2019	$237,881
Fixed income	2019	74,954
Total		**$312,835**

Note 7—Commitments and Contingencies

As of December 31, 2018, PERA had commitments for future investments in Private Equity of $2,411,541, Real Estate of $804,812, and the Opportunity Fund of $852,812.

Pending or Threatened Litigation

PERA is involved in various lawsuits or threatened legal proceedings arising in the normal course of business. In the opinion of management, the ultimate resolution of these other matters will not have a material effect on the financial condition of PERA.

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Note 8—Voluntary Investment Program, Defined Contribution Retirement Plan, and Deferred Compensation Plan

PERA administers the Voluntary Investment Program, the Defined Contribution Retirement Plan, and the Deferred Compensation Plan (collectively, Plans). The Voluntary Investment Program (PERAPlus 401(k) Plan) and Defined Contribution Retirement Plan (DC Plan) are both defined contribution plans. The Deferred Compensation Plan (PERAPlus 457 Plan) is a deferred compensation plan. The Board has the authority to establish and amend the Plans pursuant to C.R.S. § 24-51-1401, C.R.S. § 24-51-1501, and C.R.S. § 24-51-1601, respectively. The complete provisions of the PERAPlus 401(k) Plan and the DC Plan are incorporated into *PERA's 401(k) and Defined Contribution Plan and Trust Document.* The complete provisions of the PERAPlus 457 Plan are incorporated into *The PERA Deferred Compensation Plan Document.*

All Plans

The following investment, distribution, and fee provisions are the same under all three Plans.

- Participants have the choice of contributing to 18 different investment options. In addition, participants may also make transfers, at any time, among the following listed investment options:
  - PERAdvantage Capital Preservation Fund
  - PERAdvantage Fixed Income Fund
  - PERAdvantage Real Return Fund
  - PERAdvantage U.S. Large Cap Stock Fund
  - PERAdvantage International Stock Fund
  - PERAdvantage U.S. Small and Mid-Cap Stock Fund
  - PERAdvantage Socially Responsible Investment (SRI) Fund
  - PERAdvantage Income Fund
  - PERAdvantage 2020 Fund
  - PERAdvantage 2025 Fund
  - PERAdvantage 2030 Fund
  - PERAdvantage 2035 Fund
  - PERAdvantage 2040 Fund
  - PERAdvantage 2045 Fund
  - PERAdvantage 2050 Fund
  - PERAdvantage 2055 Fund
  - PERAdvantage 2060 Fund
  - TD Ameritrade Self-Directed Brokerage Account
- The participant's entire account balance becomes available for distribution upon termination from all PERA-affiliated and/or PERAPlus 457-affiliated employers. All distributions are in accordance with the Plan documents and IRC requirements.
- Voya Institutional Plan Services, LLC, administers the recordkeeping for all participant transactions. Northern Trust provides an array of financial services in support of day to day operations of the Plans, including custodial services.
- TD Ameritrade, Inc. provides brokerage services for the Self-Directed Brokerage Account. The TD Ameritrade Self-Directed Brokerage Account, which consists of cash, equities, fixed income, mutual funds, and exchange traded funds, is presented at fair value.
- The Great-West Stable Value Fund is offered within PERAdvantage Capital Preservation Fund through a group fixed and variable deferred annuity contract issued by Great-West Life & Annuity Insurance Company. As of December 31, 2018, the value of the variable deferred annuity contract including interest receivable and pending trade payable was $451,335. Fair value as of December 31, 2018, was $442,262.
- Cash balances represent both operating cash accounts and investment cash on deposit held by the custodians.
- Plan administration expenses are paid through a monthly administrative fee charged to participant accounts and an asset-based fee paid directly from each PERAdvantage fund and/or self-directed brokerage account. In addition, the underlying investment portfolio managers within each PERAdvantage fund charge an investment management fee, which is paid directly from investment proceeds.

PERAPlus 401(k) Plan

The PERAPlus 401(k) Plan was established January 1, 1985, and is an IRC § 401(k) plan that allows for voluntary participation to provide additional benefits at retirement for PERA members. All employees working for a PERA-affiliated employer may contribute to the PERAPlus 401(k) Plan. There were 410 employers eligible to participate in 2018 (see Note 1). The employer count is presented for purposes of complying with GASB 67 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

In 2018, participants could contribute the lesser of $18,500 (actual dollars) or 100 percent of compensation less PERA member contributions. Catch-up contributions up to $6,000 (actual dollars) in 2018 were allowed for participants who had attained age 50 before the close of the plan year, subject to the limitations of IRC § 414(v). Employer matching and discretionary contributions are allowable with total participant and employer contributions limited to $55,000 (actual dollars) per participant in 2018.

Provisions of the PERAPlus 401(k) Plan permit in-service withdrawals by participants while employed with a PERA-affiliated employer through loans, hardship withdrawals, or by a trustee-to-trustee transfer to the PERA defined benefit plan to purchase service credit. The balance of outstanding loans as of December 31, 2018, was $60,169 and was recorded as a benefit receivable on the Statements of Fiduciary Net Position. As of December 31, 2018, there were 68,700 participants with balances. Of the participants with balances, 24,557 made contributions within the last three months of the year, including 758 retirees. There were 13,290 terminated participants and 18,614 non-contributing retirees with balances. During 2018, the PERAPlus 401(k) Plan had a total of 2,499 terminated participants take full distributions of their accounts.

DC Plan

The DC Plan was established January 1, 2006, and is an IRC § 401(a) governmental profit-sharing plan. Its purpose is to offer a defined contribution alternative to the PERA defined benefit plan. Participation is available to certain new employees of State agencies and departments, most community college employees, and the District Attorney within each Judicial District, and if authorized by the county and the District Attorney, the attorneys within that Judicial District. Pursuant to C.R.S. section 24-51-1501(4), DC Plan eligibility was extended to certain new employees in the Local Government Division and certain new classified employees at State Colleges and Universities beginning on January 1, 2019 (see Note 1 for additional details). The eligible employees have the option to choose the PERA defined benefit plan or the DC Plan. There were 23 employers eligible to participate in 2018. The employer count is presented for purposes of complying with GASB 67 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

Between the second and fifth year of participation in the DC Plan, eligible participants may elect to terminate membership in the DC Plan and become a member of the PERA defined benefit plan. Similarly, an eligible employee of the PERA defined benefit plan may elect, between the second and fifth year of membership, to terminate membership in the PERA defined benefit plan and become a participant of the DC Plan. Either election is irrevocable.

During 2018, participants in the DC Plan are required to contribute 8.00 percent and employers are required to contribute 10.15 percent of includable salary (for State Troopers and CBI agents, the participant and employer rates are 10.00 percent and 12.85 percent, respectively). Effective July 1, 2019, the participant contribution rates will incrementally increase a total of 2 percent over three years. In addition, employers in the State and Local Government Divisions contribute the AED and SAED to the respective division trust fund. Effective July 1, 2019, employers in the State Division will contribute an additional 0.25 percent to the State Division Trust Fund (see Note 4 for additional details). DC Plan participants immediately vest in 50 percent of their employer contributions, together with accumulated investment earnings on the vested portion. For each full year of participation, vesting increases by 10 percent. Contribution requirements are established under C.R.S. § 24-51-1505.

Provisions of the DC Plan allow for the transfer of DC funds to the PERAPlus 401(k) Plan if a participant is still a PERA member but not active in the DC Plan. Additionally, the election to purchase service is available to those who are eligible and who are members of the PERA defined benefit plan with an existing DC Plan account. As of December 31, 2018, the DC Plan had 6,363 participants with balances. Of the participants with balances, 2,407 made contributions within the last three months of the year, including six retirees. There were 3,321 terminated participants and 26 non-contributing retirees with balances. During the year, 462 participants took full distributions of their accounts.

PERAPlus 457 Plan

On July 1, 2009, PERA assumed the administrative and fiduciary responsibilities for the State of Colorado Deferred Compensation Plan previously administered under C.R.S. Part 1 of Article 52 of Title 24, as said part existed prior to its repeal in 2009.

The PERAPlus 457 Plan is an IRC § 457 plan that allows for voluntary participation to provide additional benefits at retirement. All employees working for a PERA employer affiliated with the PERAPlus 457 Plan may contribute to the PERAPlus 457 Plan. All employers that were affiliated with the State 457 Plan prior to July 1, 2009, including those that are not PERA-affiliated employers, remained affiliated with the PERAPlus 457 Plan and their employees remained eligible to contribute. In 2018, participants could defer the lesser of $18,500 (actual dollars) or 100 percent of compensation less PERA member contributions. Catch-up deferrals, up to the greater of $6,000 (actual dollars) for participants who had attained age 50 before the close of the plan year or the limits of the special section 457 plan catch-up, were allowed in 2018, subject to the limitations of IRC § 414(v) and § 457(b).

Provisions of the PERAPlus 457 Plan permit in-service withdrawals by participants while employed with a PERAPlus 457 Plan-affiliated employer through loans, unforeseen emergency withdrawals, de minimis distributions, or by a trustee-to-trustee transfer to the PERA defined benefit plan to purchase service. The balance of outstanding loans as of December 31, 2018, was $12,035 and was recorded as a benefit receivable on the Statements of Fiduciary Net Position. As of December 31, 2018, there were 18,479 participants with balances. Of the participants with balances, 9,189 made contributions within the last three months of the year, including 234 retirees. There were 2,915 terminated participants and 4,160 non-contributing retirees with balances. During the year, the PERAPlus 457 Plan had a total of 859 terminated participants take full distributions of their accounts.

Note 9—Health Care Trust Funds—Defined Benefit Health Care Plans

PERA offers two defined benefit other postemployment benefit (OPEB) health care plans to benefit recipients and retirees. The HCTF and the DPS HCTF were created under C.R.S. § 24-51-1201(1) and (2), respectively. The HCTF is a cost-sharing multiple-employer plan and the DPS HCTF is a single-employer plan. These funds provide a health care premium subsidy to eligible participating PERA benefit recipients and retirees who choose to enroll in one of the PERA health care plans, however, the subsidy is not available if only enrolled in the dental and/or vision plan (s). The health care premium subsidy is based upon the benefit structure under which the member retires and the member's years of service credit. For members who retire having service credit with employers in the DPS Division and one or more of the other four divisions, the premium subsidy is allocated between the two Health Care Trust Funds. The basis for the amount of the premium subsidy funded by each trust fund is the percentage of the member contribution account balance from each division as it relates to the total member contribution account balance from which the retirement benefit is paid.

PERA Board Authority

Title 24, Article 51, Part 12 of the C.R.S., as amended, sets forth a framework that grants authority to the Board to contract, self-insure, and authorize disbursements necessary in order to carry out the purposes of the PERACare program, including the administration of the premium subsidies. PERA contracts with a national insurance carrier to administer claims for the self-insured health care plans, with a national prescription benefit manager to administer a pharmacy benefit for the self-insured plans, and with health insurance companies to provide fully insured health care plans providing services within Colorado.

Plan Description and Benefit Provisions

C.R.S. § 24-51-1202 *et seq.* specifies the eligibility for enrollment in the health care plans offered by PERA and the amount of the premium subsidy. The law governing a benefit recipient's eligibility for the subsidy and the amount of the subsidy differs slightly depending under which benefit structure the benefits are calculated. All benefit recipients under the PERA benefit structure and all retirees under the DPS benefit structure are eligible for a premium subsidy, if enrolled in a health care plan under PERACare. Upon the death of a DPS benefit structure retiree, no further subsidy is paid.

Membership Eligibility

Enrollment in the PERACare health care program is voluntary and available to the following eligible individuals:

- Benefit recipients and their dependents.
- Guardians of children receiving PERA survivor benefits if the children are enrolled in the health care program.
- Surviving spouses of deceased retirees who chose single-life annuity options, if the surviving spouse was enrolled in the program when the retiree's death occurred.
- Divorced spouses of retirees who are not receiving PERA benefits, but were enrolled in the program when the divorce occurred.
- Members while receiving short-term disability program payments.
- Members whose employers have elected to provide coverage through the health care program and such members' dependents.

Available Health Care Premium Subsidy

PERA Benefit Structure

The maximum service-based premium subsidy is $230 (actual dollars) per month for benefit recipients who are under 65 years of age and who are not entitled to Medicare; the maximum service-based subsidy is $115 (actual dollars) per month for benefit recipients who are 65 years of age or older or who are under 65 years of age and entitled to Medicare. The basis for the maximum service-based subsidy, in each case, is for benefit recipients with retirement benefits based on 20 or more years of service credit. There is a 5 percent reduction in the subsidy for each year less than 20. The benefit recipient pays the remaining portion of the premium to the extent the subsidy does not cover the entire amount.

For benefit recipients who have not participated in Social Security and who are not otherwise eligible for premium-

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free Medicare Part A for hospital-related services, C.R.S. § 24-51-1206(4) provides an additional subsidy. According to the statute, PERA cannot charge premiums to benefit recipients without Medicare Part A that are greater than premiums charged to benefit recipients with Part A for the same plan option, coverage level, and service credit. Currently, for each individual PERACare enrollee, the total premium for Medicare coverage is determined assuming plan participants have both Medicare Part A and Part B and the difference in premium cost is paid by the HCTF or the DPS HCTF on behalf of benefit recipients not covered by Medicare Part A.

DPS Benefit Structure

The maximum service-based premium subsidy is $230 (actual dollars) per month for retirees who are under 65 years of age and who are not entitled to Medicare; the maximum service-based subsidy is $115 (actual dollars) per month for retirees who are 65 years of age or older or who are under 65 years of age and entitled to Medicare. The basis for the maximum subsidy, in each case, is for retirees with retirement benefits based on 20 or more years of service credit. There is a 5 percent reduction in the subsidy for each year less than 20. The retiree pays the remaining portion of the premium to the extent the subsidy does not cover the entire amount.

For retirees who have not participated in Social Security and who are not otherwise eligible for premium-free Medicare Part A for hospital-related services, the HCTF or the DPS HCTF pays an alternate service-based premium subsidy. Each individual retiree meeting these conditions receives the maximum $230 (actual dollars) per month subsidy reduced appropriately for service less than 20 years, as described above. Retirees who do not have Medicare Part A pay the difference between the total premium and the monthly subsidy.

Medicare Prescription Drugs

The Medicare Prescription Drug, Improvement, and Modernization Act of 2003 established prescription drug coverage for Medicare beneficiaries under Medicare Part D. Beginning January 1, 2014, PERACare's prescription drug coverage for the self-insured Medicare supplement plans was moved to Employer Group Waiver Plan (EGWP) Medicare Part D prescription drug coverage. The EGWP provides three types of anticipated subsidies which the HCTF and DPS HCTF use to reduce the required premiums collected from the enrollees. Each fund pays for the full claims during the year and recoups the additional cost offsetting claims expense when the subsidies are received from the EGWP.

The subsidies provided by the EGWP include the following:

- A monthly direct subsidy based on the number of enrollees in the plan.
- A quarterly Coverage Gap Discount Program which is funded by pharmaceutical manufacturers and reimburses the funds a portion of the cost of certain drugs retirees have filled.
- An annual catastrophic coverage federal reinsurance which reimburses a portion of drug costs for retirees who reach a certain level of drug costs in a year.

The following amounts were recognized by the funds in 2018:

Subsidy	HCTF	DPS HCTF
Monthly direct subsidy	$2,389	$87
Quarterly Coverage Gap Discount	10,859	397
Annual federal reinsurance	19,607	718
Total	**$32,855**	**$1,202**

Contributions

Contribution requirements are established by statute under C.R.S. § 24-51-208. Colorado State law provisions may be amended from time to time by the Colorado General Assembly. PERA-affiliated employers must submit contributions for all PERA members equal to 1.02 percent of covered salaries. PERA-affiliated employers of the State Division, School Division, Local Government Division, and Judicial Division contribute to the HCTF. Affiliated employers of the DPS Division contribute to the DPS HCTF.

Listed below is the number of active participating employers for the two Health Care Trust Funds. Guidance under GASB 74 classifies a primary government and its component units as one employer.

Trust Fund	As of December 31, 2018[1]
HCTF	409
DPS HCTF	1
Total employers	**410**

[1] This employer count is presented for purposes of complying with GASB 74 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

Employer contributions and investment earnings on the assets primarily pay for the cost of the premium subsidies and the administrative costs incurred by the funds.

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Plan Data

Benefit recipients and members of PERA consisted of the following as of December 31, 2018:

MEMBERSHIP—HEALTH CARE TRUST FUNDS

	HCTF	DPS HCTF	2018
Retirees and beneficiaries	115,033	7,156	**122,189**
Terminated employees eligible but not yet receiving benefits	26,783	1,780	**28,563**
Inactive members not eligible for benefits	229,558	12,286	**241,844**
Active members	195,436	16,148	**211,584**
Total	**566,810**	**37,370**	**604,180**

PARTICIPATION IN THE HEALTH CARE PLANS FOR RETIREES AND SURVIVORS CURRENTLY RECEIVING RETIREMENT BENEFITS

	HCTF	DPS HCTF	Total
Enrolled in PERACare			
Under age 65	11,919	514	12,433
Age 65 and older	44,723	3,111	47,834
	56,642	3,625	60,267
Not enrolled in PERACare			
Under age 65	14,453	595	15,048
Age 65 and older	43,938	2,936	46,874
	58,391	3,531	61,922
Total retirees and survivors currently receiving benefits	**115,033**	**7,156**	**122,189**

Summary of HCTF and DPS HCTF

PERA offers two general types of health plans: fully insured plans offered through a health care organization and self-insured plans administered by third-party vendors. The plans offered include HMO, PPO, Medicare Supplement, Medicare Advantage, and Medicare Cost plans.

Premiums collected and payments made are reported in two ways, depending on whether or not the funds bear any level of risk with regard to the health coverage. When there is no transfer of risk to the funds, the premiums collected are reported as a liability and the liability is relieved when the premiums are paid to the health insurance company that provides the fully insured health plan. When there is no health coverage risk, the only benefit payment reported is the subsidy benefit which is equal to the difference between the premiums collected from the enrollees and the full premium due to the health insurance company.

The health care plan that involves risk to the funds is the self-insured plan administered by Anthem Blue Cross Blue Shield (Anthem). When the health care plan bears risk, all claims paid are reported as benefit payments and premiums collected are reported as a reduction to benefit payments. PERA uses an outside consultant to determine the premiums required to cover anticipated health claims. The cost to the enrollee is reduced by the amount of the enrollee's calculated subsidy, if applicable. Implicit in this process is the risk that actual claims experience and the subsidies received from the EGWP could be different from the consultant's determination resulting in either a gain or a loss to the funds. In addition, other estimates and assumptions are made for these funds. It is possible that actual results could significantly differ from these estimates.

Dental and Vision Plans

Dental and vision plans are also available to benefit recipients. PERA offers fully insured and self-insured dental plans and self-insured vision plans. The funds provide no subsidy and the participants pay the full premiums for dental and vision coverage. For the fully insured dental plan, premiums collected are reported as a liability and the liability is relieved when the premiums are paid to the insurance company who provides the coverage. For this plan, the risk is borne by the insurance company contracted to provide the coverage. The claims paid for the self-insured dental and vision plans are recorded as benefit payments and the premiums collected are recorded as a reduction to benefit payments. PERA uses an outside consultant to determine the premiums required to cover anticipated claims. The risk to these plans is that actual claims experience could be different from the estimates resulting in either a gain or loss to the funds. As of December 31, 2018, there were 62,786 participants enrolled in the dental plans and 50,545 participants enrolled in the vision plans in both the HCTF and the DPS HCTF.

PERA-Affiliated Employer Program Participation

In addition, fully insured pre-Medicare health plans offered through Anthem and Kaiser Permanente are available to any PERA-affiliated employer who voluntarily elects to provide health care coverage through the health care plan for its employees who are PERA members. The program acts as a purchaser of private insurance to obtain economies of scale for the employers that elect to join in the joint purchasing arrangement. As of December 31, 2018, there were 15 employers in the program with 145 active members enrolled.

Fully insured dental and vision plans are also available to eligible employees of employers who have elected to provide health care coverage through PERA. As of

(Dollars in Thousands)

December 31, 2018, there were 202 participants enrolled in the dental plans and 225 participants enrolled in the vision plans.

The insurance companies, who provide coverage through the program, set the rates for each employer group. There is no transfer of risk to the funds, PERA, or between the participating employers. The funds provide no subsidy and the insurance companies providing the benefits bear the risk for the plans. The participants and/or employers pay the full premiums for the coverage. PERA collects the premiums and remits them to the insurance companies who provide the coverage.

Note 10—Net Pension Liability of the Division Trust Funds

The components of the net pension liability (NPL) for participating employers for each Division Trust Fund as of December 31, 2018, are as follows:

	State Division	School Division	Local Government Division	Judicial Division	DPS Division
Total pension liability	$25,345,094	$41,184,604	$5,228,602	$448,104	$4,207,343
Plan fiduciary net position	13,966,421	23,477,550	3,971,389	306,846	3,184,442
Net pension liability	**$11,378,673**	**$17,707,054**	**$1,257,213**	**$141,258**	**$1,022,901**
Plan fiduciary net position as a percentage of the total pension liability	55.11%	57.01%	75.96%	68.48%	75.69%

Actuarial Methods and Assumptions

Actuarial valuations involve estimates of the value of reported amounts and assumptions about the probability of events far into the future. Actuarially determined amounts are subject to continual revision as actual results are compared to past expectations and new estimates are made about the future. A Schedule of Net Pension Liability is included in the RSI, which follows the Notes to the Financial Statements. It presents multi-year trend information about whether the FNP is increasing or decreasing over time relative to the total pension liability (TPL). Calculations are based on the benefits provided under the terms of the substantive plan in effect at the time of each pension actuarial valuation and on the pattern of sharing of costs between employers of each Division Trust Fund and/or plan members to that point. Actuarial calculations reflect a long-term perspective.

The TPL for the Division Trust Funds was determined by actuarial valuations as of December 31, 2017, and generally accepted actuarial techniques were applied to roll forward the TPL to December 31, 2018 (measurement date). The December 31, 2017, actuarial valuations used the following actuarial cost method and key actuarial assumptions and other inputs:

	State Division	School Division	Local Government Division	Judicial Division	DPS Division
Actuarial cost method	Entry age	Entry age	Entry age	Entry age	Entry age
Price inflation	2.40%	2.40%	2.40%	2.40%	2.40%
Real wage growth	1.10%	1.10%	1.10%	1.10%	1.10%
Wage inflation	3.50%	3.50%	3.50%	3.50%	3.50%
Salary increases, including wage inflation	3.50%–9.17%	3.50%–9.70%	3.50%–10.45%	4.00%–5.00%	3.50%–9.70%
Long-term investment rate of return, net of pension plan investment expenses, including price inflation	7.25%	7.25%	7.25%	7.25%	7.25%
Discount rate at prior measurement date	4.72%	4.78%	7.25%	5.41%	7.25%
Discount rate at measurement date	7.25%	7.25%	7.25%	7.25%	7.25%
Post-retirement benefit increases:					
PERA benefit structure hired prior to 1/1/07 and DPS benefit structure	0% through 2019 and 1.5% compounded annually thereafter	0% through 2019 and 1.5% compounded annually thereafter	0% through 2019 and 1.5% compounded annually thereafter	0% through 2019 and 1.5% compounded annually thereafter	0% through 2019 and 1.5% compounded annually thereafter
PERA benefit structure hired after 12/31/06[1]	Financed by the AIR	Financed by the AIR	Financed by the AIR	Financed by the AIR	Financed by the AIR

[1] Post-retirement benefit increases are provided by the AIR, accounted separately within each Division Trust Fund, and subject to moneys being available; therefore, liabilities related to increases for members of these benefit tiers can never exceed available assets.

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Healthy mortality assumptions for active members were based on the RP-2014 White Collar Employee Mortality Table, a table specifically developed for actively working people. To allow for an appropriate margin of improved mortality prospectively, the mortality rates incorporate a 70 percent factor applied to male rates and a 55 percent factor applied to female rates.

Healthy, post-retirement mortality assumptions for State and Local Government Divisions were based on the RP-2014 Healthy Annuitant Mortality Table, adjusted as follows:

- Males: Mortality improvement projected to 2018 using the MP-2015 projection scale, a 73 percent factor applied to rates for ages less than 80, a 108 percent factor applied to rates for ages 80 and above, and further adjustments for credibility.
- Females: Mortality improvement projected to 2020 using the MP-2015 projection scale, a 78 percent factor applied to rates for ages less than 80, a 109 percent factor applied to rates for ages 80 and above, and further adjustments for credibility.

Healthy, post-retirement mortality assumptions for School, Judicial, and DPS Divisions were based on the RP-2014 White Collar Healthy Annuitant Mortality Table, adjusted as follows:

- Males: Mortality improvement projected to 2018 using the MP-2015 projection scale, a 93 percent factor applied to rates for ages less than 80, a 113 percent factor applied to rates for ages 80 and above, and further adjustments for credibility.
- Females: Mortality improvement projected to 2020 using the MP-2015 projection scale, a 68 percent factor applied to rates for ages less than 80, a 106 percent factor applied to rates for ages 80 and above, and further adjustments for credibility.

The mortality assumption for disabled retirees was based on 90 percent of the RP-2014 Disabled Retiree Mortality Table.

The actuarial assumptions used in the December 31, 2017, valuations were based on the results of the 2016 experience analysis for the periods January 1, 2012, through December 31, 2015, as well as the October 28, 2016, actuarial assumptions workshop and were adopted by the Board during the November 18, 2016, Board meeting.

The long-term expected return on plan assets is reviewed as part of regular experience studies prepared every four or five years for PERA. Recently, this assumption has been reviewed more frequently. The most recent analyses were outlined in presentations to the Board on October 28, 2016.

Several factors were considered in evaluating the long-term rate of return assumption, including long-term historical data, estimates inherent in current market data, and a log-normal distribution analysis in which best-estimate ranges of expected future real rates of return (expected return, net of investment expense and inflation) were developed for each major asset class. These ranges were combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and then adding expected inflation. The capital market assumptions may cover a shorter investment horizon and may not be useful in setting the long-term rate of return for funding pension plans which covers a longer time frame. The assumption is intended to be a long-term assumption and is not expected to change absent a significant change in the asset allocation, a change in the inflation assumption, or a fundamental change in the market that alters expected returns in future years.

As of the most recent adoption of the long-term rate of return by the Board, the target asset allocation and best estimates of geometric real rates of return for each major asset class are summarized in the table as follows:

Asset Class	Target Allocation	30-Year Expected Geometric Real Rate of Return
U.S. Equity – Large Cap	21.20%	4.30%
U.S. Equity – Small Cap	7.42%	4.80%
Non-U.S. Equity – Developed	18.55%	5.20%
Non-U.S. Equity – Emerging	5.83%	5.40%
Core Fixed Income	19.32%	1.20%
High Yield	1.38%	4.30%
Non-U.S. Fixed Income – Developed	1.84%	0.60%
Emerging Market Debt	0.46%	3.90%
Core Real Estate	8.50%	4.90%
Opportunity Fund	6.00%	3.80%
Private Equity	8.50%	6.60%
Cash	1.00%	0.20%
Total	**100.00%**	

Note: In setting the long-term expected rate of return for the plan, projections employed to model future returns provide a range of expected long-term returns that, including expected inflation, ultimately support a long-term expected rate of return assumption of 7.25 percent.

Discount Rate/Single Equivalent Interest Rate

The projection of cash flows used to determine the discount rate was performed in accordance with GASB 67. The basis for the projection of the liabilities and the FNP was an actuarial valuation performed as of December 31, 2017, and the financial status of the funds as of the prior measurement date (December 31, 2017). In addition to the actuarial cost method and assumptions of the December 31, 2017, actuarial valuation presented earlier, the projection of cash flows applied the following methods and assumptions:

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- Total covered payroll for the initial projection year consists of the covered payroll of the active membership present on the valuation date and the covered payroll of future plan members assumed to be hired during the year. In subsequent projection years, total covered payroll was assumed to increase annually at a rate of 3.50 percent.
- Employee contributions were assumed to be made at the member contribution rates in effect for each year, including the scheduled increases in SB 18-200. Employee contributions for future plan members were used to reduce the estimated amount of total service costs for future plan members.
- Employer contributions were assumed to be made at rates equal to the fixed statutory rates specified in law for each year, including the scheduled increase in SB 18-200. Employer contributions also include current and estimated future AED and SAED, until the actuarial value funding ratio reaches 103 percent, at which point the AED and SAED will each drop 0.50 percent every year until they are zero. Additionally, estimated employer contributions reflect reductions for the funding of the AIR and retiree health care benefits. For future plan members, employer contributions were further reduced by the estimated amount of total service costs for future plan members not financed by their member contributions.
- Employer contributions for the DPS Division Trust Fund are reduced by an amount equal to the principal payments plus interest necessary each year to finance the PCOPs issued in 1997 and 2008 and refinanced thereafter.
- As specified in law, the State, as a nonemployer contributing entity, will provide an annual direct distribution of $225 million (actual dollars), commencing July 1, 2018, that is proportioned between the State, School, Judicial, and DPS Division Trust Funds based upon the covered payroll of each Division. The annual direct distribution ceases when all Division Trust Funds are fully funded.
- Employer contributions and the amount of total service costs for future plan members were based upon a process to estimate future ADCs assuming an analogous future plan member growth rate.
- The AIR balance was excluded from the initial FNP, as per statute, AIR amounts cannot be used to pay benefits until transferred to either the retirement benefits reserve or the survivor benefits reserve, as appropriate. AIR transfers to the FNP and the subsequent AIR benefit payments were estimated and included in the projections.
- Benefit payments and contributions were assumed to be made at the middle of the year.

Based on those methods and assumptions and the GASB 67 projection test methodology, the FNP for all Division Trust Funds were projected to be available to make all projected future benefit payments of current plan members and were not projected to reach a depletion date. Therefore, the long-term expected rate of return on plan investments was applied to all periods of projected benefit payments to determine the TPL for each fund. The discount rate determination did not use a municipal bond index rate, and therefore, the discount rate used to measure the TPL for these funds as of the measurement date (December 31, 2018) was 7.25 percent.

The results of the GASB 67 projection test methodology and development of the discount rate for each fund do not necessarily indicate the fund's ability to make benefit payments in the future.

Sensitivity of the Net Pension Liability to Changes in the Discount Rate

The following presents the NPL for participating employers for each fund using the current discount rate, as well the fund's NPL if calculated using a discount rate that is one percentage point lower or one percentage point higher than the current rate:

Trust Fund	1.0 Percent Decrease in Discount Rate	Net Pension Liability
State Division	6.25%	$14,145,649
School Division	6.25%	22,511,490
Local Government Division	6.25%	1,923,276
Judicial Division	6.25%	187,468
DPS Division	6.25%	1,517,984

Trust Fund	Current Discount Rate	Net Pension Liability
State Division	**7.25%**	**$11,378,673**
School Division	**7.25%**	**17,707,054**
Local Government Division	**7.25%**	**1,257,213**
Judicial Division	**7.25%**	**141,258**
DPS Division	**7.25%**	**1,022,901**

Trust Fund	1.0 Percent Increase in Discount Rate	Net Pension Liability
State Division	8.25%	$9,037,559
School Division	8.25%	13,675,322
Local Government Division	8.25%	699,984
Judicial Division	8.25%	101,484
DPS Division	8.25%	610,872

(Dollars in Thousands)

As shown, if there is a significant deviation, over a long period, in the actual rate of return compared to the assumed discount rate, the measurement of the NPL could be materially under- or over-reported as of December 31, 2018.

Note 11—Net OPEB Liability of the Health Care Trust Funds

The components of the net OPEB liability (NOL) for participating employers for each Health Care Trust Fund as of December 31, 2018, are as follows:

	HCTF	DPS HCTF
Total OPEB liability	$1,639,734	$69,199
Plan fiduciary net position	279,192	24,029
Net OPEB liability	**$1,360,542**	**$45,170**
Plan fiduciary net position as a percentage of the total OPEB liability	17.03%	34.72%

Actuarial Methods and Assumptions

Actuarial valuations involve estimates of the value of reported amounts and assumptions about the probability of events far into the future. Actuarially determined amounts are subject to continual revision as actual results are compared to past expectations and new estimates are made about the future. A Schedule of Net OPEB Liability is included in the RSI, which follows the Notes to the Financial Statements. It presents multi-year trend information about whether the FNP is increasing or decreasing over time relative to the total OPEB liability (TOL). Calculations are based on the benefits provided under the terms of the substantive plan in effect at the time of each actuarial valuation and on the pattern of sharing of costs between employers of each fund to that point. Actuarial calculations reflect a long-term perspective.

The TOL for the Health Care Trust Funds was determined by actuarial valuations as of December 31, 2017, and generally accepted actuarial techniques were applied to roll forward the TOL to December 31, 2018 (measurement date). The December 31, 2017, actuarial valuations used the following actuarial cost method and key actuarial assumptions and other inputs:

	HCTF	DPS HCTF
Actuarial cost method	Entry age	Entry age
Price inflation	2.40%	2.40%
Real wage growth	1.10%	1.10%
Wage inflation	3.50%	3.50%
Salary increases, including wage inflation	3.50% in aggregate	3.50% in aggregate
Long-term investment rate of return, net of OPEB plan investment expenses, including price inflation	7.25%	7.25%
Discount rate	7.25%	7.25%
Health care cost trend rates		
PERA benefit structure:		
Service-based premium subsidy	0.00%	0.00%
PERACare Medicare plans	5.00%	5.00%
Medicare Part A premiums	3.25% for 2018, gradually rising to 5.00% in 2025	3.25% for 2018, gradually rising to 5.00% in 2025
DPS benefit structure:		
Service-based premium subsidy	0.00%	0.00%
PERACare Medicare plans	N/A	N/A
Medicare Part A premiums	N/A	N/A

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In determining the additional liability for PERACare enrollees who are age 65 or older and who are not eligible for premium–free Medicare Part A, the following monthly costs/premiums (in actual dollars) are assumed for 2018 for the PERA benefit structure:

Medicare Plan	Cost for Members Without Medicare Part A	Premiums for Members Without Medicare Part A
Self-Funded Medicare Supplement Plans	$736	$367
Kaiser Permanente Medicare Advantage HMO	602	236
Rocky Mountain Health Plans Medicare HMO	611	251
UnitedHealthcare Medicare HMO	686	213

The 2018 Medicare Part A premium is $422 (actual dollars) per month.

In determining the additional liability for PERACare enrollees in the PERA benefit structure who are age 65 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 (in actual dollars), 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	$289
Kaiser Permanente Medicare Advantage HMO	300
Rocky Mountain Health Plans Medicare HMO	270
UnitedHealthcare Medicare HMO	400

All costs are subject to the health care cost trend rates, as discussed below.

Health care cost trend rates reflect the change in per capita health costs over time due to factors such as medical inflation, utilization, plan design, and technology improvements. For the PERA benefit structure, health care cost trend rates are needed to project the future costs associated with providing benefits to those PERACare enrollees not eligible for premium-free Medicare Part A.

Health care cost trend rates for the PERA benefit structure are based on published annual health care inflation surveys in conjunction with actual plan experience (if credible), building block models and heuristics developed by health plan actuaries and administrators, and projected trends for the Federal Hospital Insurance Trust Fund (Medicare Part A premiums) provided by the Centers for Medicare & Medicaid Services. Effective December 31, 2017, the health care cost trend rates for Medicare Part A premiums were revised to reflect the current expectation of future increases in rates of inflation applicable to Medicare Part A premiums.

The PERA benefit structure health care cost trend rates that were used to measure the TOL are summarized in the table below:

Year	PERACare Medicare Plans	Medicare Part A Premiums
2018	5.00%	3.25%
2019	5.00%	3.50%
2020	5.00%	3.75%
2021	5.00%	4.00%
2022	5.00%	4.25%
2023	5.00%	4.50%
2024	5.00%	4.75%
2025+	5.00%	5.00%

Mortality assumptions detailed in Note 10 for the determination of the TPL for each the Division Trust Funds as shown below are applied, as applicable, in the determination of the TOL for the Health Care Trust Funds. Affiliated employers of the State, School, Local Government, and Judicial Divisions participate in the HCTF. Affiliated employers of the DPS Division participate in the DPS HCTF.

Healthy mortality assumptions for active members were based on the RP-2014 White Collar Employee Mortality Table, a table specifically developed for actively working people. To allow for an appropriate margin of improved mortality prospectively, the mortality rates incorporate a 70 percent factor applied to male rates and a 55 percent factor applied to female rates.

Healthy, post-retirement mortality assumptions for State and Local Government Divisions were based on the RP-2014 Healthy Annuitant Mortality Table, adjusted as follows:

- Males: Mortality improvement projected to 2018 using the MP-2015 projection scale, a 73 percent factor applied to rates for ages less than 80, a 108 percent factor applied to rates for ages 80 and above, and further adjustments for credibility.
- Females: Mortality improvement projected to 2020 using the MP-2015 projection scale, a 78 percent factor applied to rates for ages less than 80, a 109 percent factor applied to rates for ages 80 and above, and further adjustments for credibility.

Healthy, post-retirement mortality assumptions for School, Judicial, and DPS Divisions were based on the RP-2014 White Collar Healthy Annuitant Mortality Table, adjusted as follows:

- Males: Mortality improvement projected to 2018 using the MP-2015 projection scale, a 93 percent factor applied to rates for ages less than 80, a 113 percent factor applied to rates for ages 80 and above, and further adjustments for credibility.

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- Females: Mortality improvement projected to 2020 using the MP-2015 projection scale, a 68 percent factor applied to rates for ages less than 80, a 106 percent factor applied to rates for ages 80 and above, and further adjustments for credibility.

The mortality assumption for disabled retirees was based on 90 percent of the RP-2014 Disabled Retiree Mortality Table.

The following health care costs assumptions were updated and used in the measurement of the obligations for the HCTF and DPS HCTF:

- Initial per capita health care costs for those PERACare enrollees under the PERA benefit structure who are expected to attain age 65 and older ages and are not eligible for premium-free Medicare Part A benefits were updated to reflect the change in costs for the 2018 plan year.
- The health care cost trend rates for Medicare Part A premiums were revised to reflect the then-current expectation of future increases in rates of inflation applicable to Medicare Part A premiums.

The actuarial assumptions used in the December 31, 2017, valuations were based on the results of the 2016 experience analysis for the periods January 1, 2012, through December 31, 2015, as well as, the October 28, 2016, actuarial assumptions workshop and were adopted by the Board during the November 18, 2016, Board meeting. In addition, certain actuarial assumptions pertaining to per capita health care costs and their related trend rates are analyzed and updated annually by the Board's actuary, as discussed above.

The long-term expected return on plan assets is reviewed as part of regular experience studies prepared every four or five years for PERA. Recently, this assumption has been reviewed more frequently. The most recent analyses were outlined in presentations to the Board on October 28, 2016.

Several factors were considered in evaluating the long-term rate of return assumption, including long-term historical data, estimates inherent in current market data, and a log-normal distribution analysis in which best-estimate ranges of expected future real rates of return (expected return, net of investment expense and inflation) were developed for each major asset class. These ranges were combined to produce the long-term expected rate of return by weighting the expected future real rates of return by the target asset allocation percentage and then adding expected inflation. The capital market assumptions may cover a shorter investment horizon and may not be useful in setting the long-term rate of return for funding OPEB plans which covers a longer time frame. The assumption is intended to be a long-term assumption and is not expected to change absent a significant change in the asset allocation, a change in the inflation assumption, or a fundamental change in the market that alters expected returns in future years.

As of the most recent adoption of the long-term rate of return by the Board, the target asset allocation and best estimates of geometric real rates of return for each major asset class are summarized in the table as follows:

Asset Class	Target Allocation	30-Year Expected Geometric Real Rate of Return
U.S. Equity – Large Cap	21.20%	4.30%
U.S. Equity – Small Cap	7.42%	4.80%
Non-U.S. Equity – Developed	18.55%	5.20%
Non-U.S. Equity – Emerging	5.83%	5.40%
Core Fixed Income	19.32%	1.20%
High Yield	1.38%	4.30%
Non-U.S. Fixed Income – Developed	1.84%	0.60%
Emerging Market Debt	0.46%	3.90%
Core Real Estate	8.50%	4.90%
Opportunity Fund	6.00%	3.80%
Private Equity	8.50%	6.60%
Cash	1.00%	0.20%
Total	**100.00%**	

Note: In setting the long-term expected rate of return for the plan, projections employed to model future returns provide a range of expected long-term returns that, including expected inflation, ultimately support a long-term expected rate of return assumption of 7.25 percent.

Sensitivity of the Net OPEB Liability to Changes in the Health Care Cost Trend Rates

The following presents the NOL using the current health care cost trend rates applicable to the PERA benefit structure, as well as the fund's NOL if calculated using health care cost trend rates that are one percentage point lower or one percentage point higher than the current rates:

	1.0 Percent Decrease in Trend Rates	Current Trend Rates	1.0 Percent Increase in Trend Rates
PERACare Medicare trend rate	4.00%	5.00%	6.00%
Initial Medicare Part A trend rate	2.25%	3.25%	4.25%
Ultimate Medicare Part A trend rate	4.00%	5.00%	6.00%
Net OPEB liability			
HCTF	$1,322,972	$1,360,542	$1,403,754
DPS HCTF	45,157	45,170	45,185

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(Dollars in Thousands)

Discount Rate/Single Equivalent Interest Rate

The projection of cash flows used to determine the discount rate was performed in accordance with GASB 74. The basis for the projections of the liabilities and the FNP was an actuarial valuation performed as of December 31, 2017 and the financial status of the fund as of the prior measurement date (December 31, 2017). In addition to the actuarial cost method and assumptions of the December 31, 2017, actuarial valuation presented earlier, the projection of cash flows applied the following methods and assumptions:

- Updated health care cost trend rates for Medicare Part A premiums as of the December 31, 2018, measurement date.
- Total covered payroll for the initial projection year consists of the covered payroll of the active membership present on the valuation date and the covered payroll of future plan members assumed to be hired during the year. In subsequent projection years, total covered payroll was assumed to increase annually at a rate of 3.50 percent.
- Employer contributions were assumed to be made at rates equal to the fixed statutory rates specified in law and effective as of the measurement date.
- Employer contributions and the amount of total service costs for future plan members were based upon a process to estimate future ADCs assuming an analogous future plan member growth rate.
- Transfers of a portion of purchase service agreements intended to cover the costs associated with OPEB benefits were estimated and included in the projections.
- Benefit payments and contributions were assumed to be made at the middle of the year.

Based on those methods and assumptions and the GASB 74 projection test methodology, the FNP for the HCTF and DPS HCTF were projected to be available to make all projected future benefit payments of current plan members and were not projected to reach a depletion date. Therefore, the long-term expected rate of return on plan investments was applied to all periods of projected benefit payments to determine the TOL for each fund. The discount rate determination did not use a municipal bond index rate, and therefore, the discount rate used to measure the TOL for these funds as of the measurement date (December 31, 2018) was 7.25 percent.

The results of the GASB 74 projection test methodology and development of the discount rate for each fund do not necessarily indicate the fund's ability to make benefit payments in the future.

Sensitivity of the Net OPEB Liability to Changes in the Discount Rate

The following presents the NOL for participating employers for each fund using the current discount rate, as well as the fund's NOL if calculated using a discount rate that is one percentage point lower or one percentage point higher than the current rate:

	1.0 Percent Decrease in Discount Rate	Net OPEB Liability
HCTF	6.25%	$1,522,328
DPS HCTF	6.25%	51,714

	Current Discount Rate	Net OPEB Liability
HCTF	**7.25%**	**$1,360,542**
DPS HCTF	**7.25%**	**45,170**

	1.0 Percent Increase in Discount Rate	Net OPEB Liability
HCTF	8.25%	$1,222,230
DPS HCTF	8.25%	39,568

As shown, if there is a significant deviation, over a long period, in the actual rate of return compared to the assumed discount rate, the measurement of the NOL could be materially under- or over-reported as of December 31, 2018.

Note 12—Subsequent Events

Legislation Impacting Future Years

During the 2019 legislative session, the Colorado General Assembly passed HB 19-1217: *PERA Public Employees' Retirement Association Local Government Division Member Contribution Rate.* The bill was signed into law by Governor Polis on May 20, 2019, and eliminates the 2 percent increase in the contribution rate for members in the Local Government Division mandated by SB 18-200.

REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF CHANGES IN NET PENSION LIABILITY—STATE DIVISION[1]

For the Years Ended December 31

	2018	2017	2016	2015	2014
Total pension liability					
Service cost	**$727,319**	$518,360	$317,466	$309,351	$285,311
Interest	**1,658,186**	1,640,426	1,741,390	1,700,903	1,663,542
Changes of benefit terms	**(1,967,940)**	—	—	—	—
Difference between expected and actual experience	**330,007**	416,731	176,889	237,147	(1,069)
Changes of assumptions or other inputs	**(8,968,282)**	2,286,877	7,313,068	(192,776)	—
Benefit payments, refunds, and disability premiums	**(1,675,880)**	(1,615,021)	(1,546,071)	(1,483,517)	(1,415,754)
Net change in total pension liability	**(9,896,590)**	3,247,373	8,002,742	571,108	532,030
Total pension liability – beginning	**35,241,684**	31,994,311	23,991,569	23,420,461	22,888,431
Total pension liability – ending (a)	**$25,345,094**	**$35,241,684**	**$31,994,311**	**$23,991,569**	**$23,420,461**
Plan fiduciary net position					
Contributions – employer	**$583,164**	$563,977	$521,804	$484,005	$444,372
Contributions – nonemployer	**78,489**	—	—	—	—
Contributions – active member (includes purchased service)	**261,540**	256,420	247,533	244,926	234,056
Net investment income (loss)	**(497,562)**	2,391,683	947,981	210,337	780,762
Benefit payments, refunds, and disability premiums	**(1,675,880)**	(1,615,021)	(1,546,071)	(1,483,517)	(1,415,754)
Administrative expense	**(11,903)**	(11,745)	(11,271)	(10,779)	(10,067)
Other additions and deductions	**4,871**	12,208	5,668	1,617	118
Net change in plan fiduciary net position	**(1,257,281)**	1,597,522	165,644	(553,411)	33,487
Plan fiduciary net position – beginning	**15,223,702**	13,626,180	13,460,536	14,013,947	13,980,460
Plan fiduciary net position – ending (b)	**$13,966,421**	**$15,223,702**	**$13,626,180**	**$13,460,536**	**$14,013,947**
Net pension liability – ending (a)-(b)	**$11,378,673**	**$20,017,982**	**$18,368,131**	**$10,531,033**	**$9,406,514**

[1] Information is not available prior to 2014. In future reports, additional years will be added until 10 years of historical data are presented.

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REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF CHANGES IN NET PENSION LIABILITY—SCHOOL DIVISION[1]

For the Years Ended December 31

	2018	2017	2016	2015	2014
Total pension liability					
Service cost	**$1,270,011**	$954,368	$567,247	$548,358	$511,059
Interest	**2,759,146**	2,690,433	2,722,256	2,652,731	2,582,865
Changes of benefit terms	**(3,247,230)**	—	—	—	—
Difference between expected and actual experience	**443,651**	564,155	346,658	278,464	(1,387)
Changes of assumptions or other inputs	**(15,247,222)**	3,547,294	13,572,334	(298,005)	—
Benefit payments, refunds, and disability premiums	**(2,492,928)**	(2,411,987)	(2,300,644)	(2,208,452)	(2,113,547)
Net change in total pension liability	**(16,514,572)**	5,344,263	14,907,851	973,096	978,990
Total pension liability – beginning	**57,699,176**	52,354,913	37,447,062	36,473,966	35,494,976
Total pension liability – ending (a)	**$41,184,604**	**$57,699,176**	**$52,354,913**	**$37,447,062**	**$36,473,966**
Plan fiduciary net position					
Contributions – employer	**$923,910**	$857,740	$812,740	$754,182	$686,323
Contributions – nonemployer	**126,505**	—	—	—	—
Contributions – active member (includes purchased service)	**414,336**	399,053	386,481	372,378	356,520
Net investment income (loss)	**(838,899)**	3,982,275	1,569,026	344,000	1,274,862
Benefit payments, refunds, and disability premiums	**(2,492,928)**	(2,411,987)	(2,300,644)	(2,208,452)	(2,113,547)
Administrative expense	**(23,560)**	(23,019)	(21,991)	(20,865)	(19,290)
Other additions and deductions	**5,456**	(22,378)	(17,334)	(9,082)	(4,264)
Net change in plan fiduciary net position	**(1,885,180)**	2,781,684	428,278	(767,839)	180,604
Plan fiduciary net position – beginning	**25,362,730**	22,581,046	22,152,768	22,920,607	22,740,003
Plan fiduciary net position – ending (b)	**$23,477,550**	**$25,362,730**	**$22,581,046**	**$22,152,768**	**$22,920,607**
Net pension liability – ending (a)-(b)	**$17,707,054**	**$32,336,446**	**$29,773,867**	**$15,294,294**	**$13,553,359**

[1] Information is not available prior to 2014. In future reports, additional years will be added until 10 years of historical data are presented.

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REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF CHANGES IN NET PENSION LIABILITY—LOCAL GOVERNMENT DIVISION[1]

For the Years Ended December 31

	2018	2017	2016	2015	2014
Total pension liability					
Service cost	**$84,331**	$75,417	$65,250	$63,005	$58,676
Interest	**386,381**	360,995	346,944	338,616	329,156
Changes of benefit terms	**(412,930)**	(110)	—	—	—
Difference between expected and actual experience	**77,207**	125,585	42,105	14,930	(322)
Changes of assumptions or other inputs	**—**	**—**	179,802	(36,449)	—
Benefit payments, refunds, and disability premiums	**(302,903)**	(289,218)	(272,344)	(265,789)	(256,972)
Net change in total pension liability	**(167,914)**	272,669	361,757	114,313	130,538
Total pension liability – beginning	**5,396,516**	5,123,847	4,762,090	4,647,777	4,517,239
Total pension liability – ending (a)	**$5,228,602**	**$5,396,516**	**$5,123,847**	**$4,762,090**	**$4,647,777**
Plan fiduciary net position					
Contributions – employer	**$81,358**	$78,291	$75,132	$70,415	$68,719
Contributions – nonemployer	**—**	—	—	—	—
Contributions – employer disaffiliation	**—**	1,063	—	—	186,006
Contributions – active member (includes purchased service)	**58,063**	56,797	52,451	51,986	49,290
Net investment income (loss)	**(142,476)**	669,011	261,276	56,328	200,394
Benefit payments, refunds, and disability premiums	**(302,903)**	(289,218)	(272,344)	(265,789)	(256,972)
Administrative expense	**(2,621)**	(2,541)	(2,395)	(2,253)	(2,091)
Other additions and deductions	**(3,118)**	(3,823)	(1,123)	(1,646)	(2,190)
Net change in plan fiduciary net position	**(311,697)**	509,580	112,997	(90,959)	243,156
Plan fiduciary net position – beginning	**4,283,086**	3,773,506	3,660,509	3,751,468	3,508,312
Plan fiduciary net position – ending (b)	**$3,971,389**	**$4,283,086**	**$3,773,506**	**$3,660,509**	**$3,751,468**
Net pension liability – ending (a)-(b)	**$1,257,213**	**$1,113,430**	**$1,350,341**	**$1,101,581**	**$896,309**

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REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF CHANGES IN NET PENSION LIABILITY—JUDICIAL DIVISION[1]

For the Years Ended December 31

	2018	2017	2016	2015	2014
Total pension liability					
Service cost	**$13,516**	$14,364	$12,639	$10,813	$9,024
Interest	**30,417**	27,480	25,774	25,005	24,820
Changes of benefit terms	**(33,997)**	—	—	—	—
Difference between expected and actual experience	**3,122**	16,644	22,804	7,289	(5)
Changes of assumptions or other inputs	**(100,437)**	(14,394)	43,576	21,485	21,294
Benefit payments, refunds, and disability premiums	**(26,463)**	(25,298)	(22,888)	(21,200)	(19,903)
Net change in total pension liability	**(113,842)**	18,796	81,905	43,392	35,230
Total pension liability – beginning	**561,946**	543,150	461,245	417,853	382,623
Total pension liability – ending (a)	**$448,104**	**$561,946**	**$543,150**	**$461,245**	**$417,853**
Plan fiduciary net position					
Contributions – employer	**$8,299**	$8,080	$8,024	$7,702	$7,070
Contributions – nonemployer	**1,385**	—	—	—	—
Contributions – active member (includes purchased service)	**4,700**	4,863	4,037	4,197	4,296
Net investment income (loss)	**(11,006)**	51,173	19,783	4,149	15,299
Benefit payments, refunds, and disability premiums	**(26,463)**	(25,298)	(22,888)	(21,200)	(19,903)
Administrative expense	**(86)**	(86)	(81)	(77)	(72)
Other additions and deductions	**155**	2,226	2,678	3,081	156
Net change in plan fiduciary net position	**(23,016)**	40,958	11,553	(2,148)	6,846
Plan fiduciary net position – beginning	**329,862**	288,904	277,351	279,499	272,653
Plan fiduciary net position – ending (b)	**$306,846**	**$329,862**	**$288,904**	**$277,351**	**$279,499**
Net pension liability – ending (a)-(b)	**$141,258**	**$232,084**	**$254,246**	**$183,894**	**$138,354**

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REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF CHANGES IN NET PENSION LIABILITY—DPS DIVISION[1]

For the Years Ended December 31

	2018	2017	2016	2015	2014
Total pension liability					
Service cost	**$90,657**	$91,986	$85,988	$82,079	$76,564
Interest	**313,294**	295,838	283,862	281,752	274,862
Changes of benefit terms	**(318,480)**	—	—	—	—
Difference between expected and actual experience	**35,147**	47,121	(2,839)	45,767	(174)
Changes of assumptions or other inputs	**—**	—	205,645	(113,772)	—
Benefit payments, refunds, and disability premiums	**(287,825)**	(281,844)	(272,071)	(263,323)	(255,434)
Net change in total pension liability	**(167,207)**	153,101	300,585	32,503	95,818
Total pension liability – beginning	**4,374,550**	4,221,449	3,920,864	3,888,361	3,792,543
Total pension liability – ending (a)	**$4,207,343**	**$4,374,550**	**$4,221,449**	**$3,920,864**	**$3,888,361**
Plan fiduciary net position					
Contributions – employer	**$35,994**	$27,578	$17,071	$8,494	$18,478
Contributions – nonemployer	**18,621**	—	—	—	—
Contributions – active member (includes purchased service)	**61,098**	56,820	54,852	53,558	49,409
Net investment income (loss)	**(114,070)**	548,585	218,415	49,172	182,823
Benefit payments, refunds, and disability premiums	**(287,825)**	(281,844)	(272,071)	(263,323)	(255,434)
Administrative expense	**(2,919)**	(2,857)	(2,754)	(2,599)	(2,377)
Other additions and deductions	**(4,497)**	3,781	3,135	(1,764)	(1,547)
Net change in plan fiduciary net position	**(293,598)**	352,063	18,648	(156,462)	(8,648)
Plan fiduciary net position – beginning	**3,478,040**	3,125,977	3,107,329	3,263,791	3,272,439
Plan fiduciary net position – ending (b)	**$3,184,442**	**$3,478,040**	**$3,125,977**	**$3,107,329**	**$3,263,791**
Net pension liability – ending (a)-(b)	**$1,022,901**	**$896,510**	**$1,095,472**	**$813,535**	**$624,570**

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REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF NET PENSION LIABILITY[1]

For the Years Ended December 31

State Division	2018	2017	2016	2015
Total pension liability	**$25,345,094**	$35,241,684	$31,994,311	$23,991,569
Plan fiduciary net position	**13,966,421**	15,223,702	13,626,180	13,460,536
Net pension liability	**$11,378,673**	**$20,017,982**	**$18,368,131**	**$10,531,033**
Plan fiduciary net position as a percentage of the total pension liability	**55.11%**	43.20%	42.59%	56.11%
Covered payroll	**$2,898,827**	$2,774,207	$2,710,651	$2,641,867
Net pension liability as a percentage of covered payroll	**392.53%**	721.57%	677.63%	398.62%

	2014	2013
Total pension liability	$23,420,461	$22,888,431
Plan fiduciary net position	14,013,947	13,980,460
Net pension liability	**$9,406,514**	**$8,907,971**
Plan fiduciary net position as a percentage of the total pension liability	59.84%	61.08%
Covered payroll	$2,564,670	$2,474,965
Net pension liability as a percentage of covered payroll	366.77%	359.92%

School Division	2018	2017	2016	2015
Total pension liability	**$41,184,604**	$57,699,176	$52,354,913	$37,447,062
Plan fiduciary net position	**23,477,550**	25,362,730	22,581,046	22,152,768
Net pension liability	**$17,707,054**	**$32,336,446**	**$29,773,867**	**$15,294,294**
Plan fiduciary net position as a percentage of the total pension liability	**57.01%**	43.96%	43.13%	59.16%
Covered payroll	**$4,789,503**	$4,471,357	$4,349,320	$4,235,290
Net pension liability as a percentage of covered payroll	**369.71%**	723.19%	684.56%	361.12%

	2014	2013
Total pension liability	$36,473,966	$35,494,976
Plan fiduciary net position	22,920,607	22,740,003
Net pension liability	**$13,553,359**	**$12,754,973**
Plan fiduciary net position as a percentage of the total pension liability	62.84%	64.07%
Covered payroll	$4,063,236	$3,938,650
Net pension liability as a percentage of covered payroll	333.56%	323.84%

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REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF NET PENSION LIABILITY[1]

For the Years Ended December 31

Local Government Division	2018	2017	2016	2015
Total pension liability	**$5,228,602**	$5,396,516	$5,123,847	$4,762,090
Plan fiduciary net position	**3,971,389**	4,283,086	3,773,506	3,660,509
Net pension liability	**$1,257,213**	**$1,113,430**	**$1,350,341**	**$1,101,581**
Plan fiduciary net position as a percentage of the total pension liability	**75.96%**	79.37%	73.65%	76.87%
Covered payroll	**$660,998**	$632,768	$608,223	$561,518
Net pension liability as a percentage of covered payroll	**190.20%**	175.96%	222.01%	196.18%

	2014	2013
Total pension liability	$4,647,777	$4,517,239
Plan fiduciary net position	3,751,468	3,508,312
Net pension liability	**$896,309**	**$1,008,927**
Plan fiduciary net position as a percentage of the total pension liability	80.72%	77.66%
Covered payroll	$540,468	$529,003
Net pension liability as a percentage of covered payroll	165.84%	190.72%

Judicial Division	2018	2017	2016	2015
Total pension liability	**$448,104**	$561,946	$543,150	$461,245
Plan fiduciary net position	**306,846**	329,862	288,904	277,351
Net pension liability	**$141,258**	**$232,084**	**$254,246**	**$183,894**
Plan fiduciary net position as a percentage of the total pension liability	**68.48%**	58.70%	53.19%	60.13%
Covered payroll	**$50,506**	$48,948	$48,700	$46,870
Net pension liability as a percentage of covered payroll	**279.69%**	474.14%	522.07%	392.35%

	2014	2013
Total pension liability	$417,853	$382,623
Plan fiduciary net position	279,499	272,653
Net pension liability	**$138,354**	**$109,970**
Plan fiduciary net position as a percentage of the total pension liability	66.89%	71.26%
Covered payroll	$42,977	$39,942
Net pension liability as a percentage of covered payroll	321.93%	275.32%

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REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF NET PENSION LIABILITY[1]

For the Years Ended December 31

DPS Division	2018	2017	2016	2015
Total pension liability	**$4,207,343**	$4,374,550	$4,221,449	$3,920,864
Plan fiduciary net position	**3,184,442**	3,478,040	3,125,977	3,107,329
Net pension liability	**$1,022,901**	**$896,510**	**$1,095,472**	**$813,535**
Plan fiduciary net position as a percentage of the total pension liability	**75.69%**	79.51%	74.05%	79.25%
Covered payroll	**$722,040**	$658,198	$642,177	$621,115
Net pension liability as a percentage of covered payroll	**141.67%**	136.21%	170.59%	130.98%

	2014	2013
Total pension liability	$3,888,361	$3,792,543
Plan fiduciary net position	3,263,791	3,272,439
Net pension liability	**$624,570**	**$520,104**
Plan fiduciary net position as a percentage of the total pension liability	83.94%	86.29%
Covered payroll	$584,319	$547,660
Net pension liability as a percentage of covered payroll	106.89%	94.97%

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REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF EMPLOYER AND NONEMPLOYER CONTRIBUTIONS

For the Years Ended December 31

State Division	2018	2017	2016	2015	2014
Actuarially determined contribution rate (a)	**26.30%**	22.71%	22.31%	22.35%	20.45%
Covered payroll (b)	**$2,898,827**	$2,774,207	$2,710,651	$2,641,867	$2,564,670
Annual Increase Reserve contribution (c)	**15,919**	14,355	12,838	11,400	9,984
Actuarially determined contribution (a) x (b) + (c)	**778,311**	644,377	617,584	601,857	534,459
Contributions in relation to the actuarially determined contribution[1]	**661,653**	563,977	521,804	484,005	444,372
Annual contribution deficiency	**$116,658**	**$80,400**	**$95,780**	**$117,852**	**$90,087**
Actual contributions as a percentage of covered payroll	**22.82%**	20.33%	19.25%	18.32%	17.33%

	2013	2012	2011	2010	2009
Actuarially determined contribution rate (a)	20.01%	16.52%	13.63%	18.93%	17.91%
Covered payroll (b)	$2,474,965	$2,384,934	$2,393,791	$2,392,080	$2,384,137
Annual Increase Reserve contribution (c)	N/A	N/A	N/A	N/A	N/A
Actuarially determined contribution (a) x (b) + (c)	495,241	393,991	326,274	452,821	426,999
Contributions in relation to the actuarially determined contribution	393,218	328,055	277,122	282,640	293,234
Annual contribution deficiency	**$102,023**	**$65,936**	**$49,152**	**$170,181**	**$133,765**
Actual contributions as a percentage of covered payroll	15.89%	13.76%	11.58%	11.82%	12.30%

School Division	2018	2017	2016	2015	2014
Actuarially determined contribution rate (a)	**26.80%**	22.54%	22.36%	21.94%	19.65%
Covered payroll (b)	**$4,789,503**	$4,471,357	$4,349,320	$4,235,290	$4,063,236
Annual Increase Reserve contribution (c)	**22,497**	19,903	17,868	15,648	13,280
Actuarially determined contribution (a) x (b) + (c)	**1,306,084**	1,027,747	990,376	944,871	811,706
Contributions in relation to the actuarially determined contribution[1]	**1,050,415**	857,740	812,740	754,182	686,323
Annual contribution deficiency	**$255,669**	**$170,007**	**$177,636**	**$190,689**	**$125,383**
Actual contributions as a percentage of covered payroll	**21.93%**	19.18%	18.69%	17.81%	16.89%

	2013	2012	2011	2010	2009
Actuarially determined contribution rate (a)	19.79%	17.60%	15.73%	18.75%	16.56%
Covered payroll (b)	$3,938,650	$3,819,066	$3,821,603	$3,900,662	$3,922,175
Annual Increase Reserve contribution (c)	N/A	N/A	N/A	N/A	N/A
Actuarially determined contribution (a) x (b) + (c)	779,459	672,156	601,138	731,374	649,512
Contributions in relation to the actuarially determined contribution	613,738	564,444	534,230	512,391	474,872
Annual contribution deficiency	**$165,721**	**$107,712**	**$66,908**	**$218,983**	**$174,640**
Actual contributions as a percentage of covered payroll	15.58%	14.78%	13.98%	13.14%	12.11%

[1] Includes an annual contribution from a nonemployer contributing entity required by C.R.S. § 24-51-414 *et seq.* starting on July 1, 2018.

The accompanying notes are an integral part of the Required Supplementary Information.

REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF EMPLOYER AND NONEMPLOYER CONTRIBUTIONS

For the Years Ended December 31

Local Government Division	2018	2017	2016	2015	2014
Actuarially determined contribution rate (a)	**14.27%**	11.92%	11.98%	13.62%	11.78%
Covered payroll (b)	**$660,998**	$632,768	$608,223	$561,518	$540,468
Annual Increase Reserve contribution (c)	**3,779**	3,390	2,969	2,522	2,180
Actuarially determined contribution (a) x (b) + (c)	**98,103**	78,816	75,834	79,001	65,847
Contributions in relation to the actuarially determined contribution	**81,358**	78,291[1]	75,132	70,415	68,719[2]
Annual contribution deficiency (excess)	**$16,745**	**$525**	**$702**	**$8,586**	**($2,872)**
Actual contributions as a percentage of covered payroll	**12.31%**	12.37%	12.35%	12.54%	12.71%

	2013	2012	2011	2010	2009
Actuarially determined contribution rate (a)	10.62%	9.79%	8.98%	12.31%	11.14%
Covered payroll (b)	$529,003	$523,668	$718,169	$705,265	$705,097
Annual Increase Reserve contribution (c)	N/A	N/A	N/A	N/A	N/A
Actuarially determined contribution (a) x (b) + (c)	56,180	51,267	64,492	86,818	78,548
Contributions in relation to the actuarially determined contribution	65,329	83,816	89,536	87,731	82,986
Annual contribution deficiency (excess)	**($9,149)**	**($32,549)**	**($25,044)**	**($913)**	**($4,438)**
Actual contributions as a percentage of covered payroll	12.35%	16.01%	12.47%	12.44%	11.77%

Judicial Division	2018	2017	2016	2015	2014
Actuarially determined contribution rate (a)	**27.26%**	22.54%	22.07%	21.45%	20.07%
Covered payroll (b)	**$50,506**	$48,948	$48,700	$46,870	$42,977
Annual Increase Reserve contribution (c)	**207**	191	164	141	116
Actuarially determined contribution (a) x (b) + (c)	**13,975**	11,224	10,912	10,195	8,741
Contributions in relation to the actuarially determined contribution[3]	**9,684**	8,080	8,024	7,702	7,070
Annual contribution deficiency	**$4,291**	**$3,144**	**$2,888**	**$2,493**	**$1,671**
Actual contributions as a percentage of covered payroll	**19.17%**	16.51%	16.48%	16.43%	16.45%

	2013	2012	2011	2010	2009
Actuarially determined contribution rate (a)	21.53%	18.28%	16.30%	18.63%	17.08%
Covered payroll (b)	$39,942	$39,045	$39,033	$37,412	$37,583
Annual Increase Reserve contribution (c)	N/A	N/A	N/A	N/A	N/A
Actuarially determined contribution (a) x (b) + (c)	8,599	7,137	6,362	6,970	6,419
Contributions in relation to the actuarially determined contribution	6,494	5,840	5,356	5,605	5,749
Annual contribution deficiency	**$2,105**	**$1,297**	**$1,006**	**$1,365**	**$670**
Actual contributions as a percentage of covered payroll	16.26%	14.96%	13.72%	14.98%	15.30%

[1] Contributions do not include the disaffiliation payment of $1,063 for Cunningham Fire Protection District.

[2] Contributions do not include the disaffiliation payment of $186,006 for Memorial Health System.

[3] Includes an annual contribution from a nonemployer contributing entity required by C.R.S. § 24-51-414 *et seq.* starting on July 1, 2018.

The accompanying notes are an integral part of the Required Supplementary Information.

REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF EMPLOYER AND NONEMPLOYER CONTRIBUTIONS

For the Years Ended December 31

DPS Division[1]	2018	2017	2016	2015	2014
Actuarially determined contribution rate (a)	**13.50%**	10.28%	10.46%	11.06%	9.67%
Covered payroll (b)	**$722,040**	$658,198	$642,177	$621,115	$584,319
Annual Increase Reserve contribution (c)	**4,624**	4,100	3,685	3,186	2,633
Actuarially determined contribution (a) x (b) + (c)	**102,099**	71,763	70,857	71,881	59,137
Contributions in relation to the actuarially determined contribution[2]	**54,615**	27,578	17,071	8,494	18,478
Annual contribution deficiency	**$47,484**	**$44,185**	**$53,786**	**$63,387**	**$40,659**
Actual contributions as a percentage of covered payroll	**7.56%**	4.19%	2.66%	1.37%	3.16%

	2013	2012	2011	2010
Actuarially determined contribution rate (a)	11.53%	9.60%	11.85%	14.61%
Covered payroll (b)	$547,660	$510,872	$491,646	$470,774
Annual Increase Reserve contribution (c)	N/A	N/A	N/A	N/A
Actuarially determined contribution (a) x (b) + (c)	63,145	49,044	58,260	68,780
Contributions in relation to the actuarially determined contribution	23,104	13,145	11,722	5,733
Annual contribution deficiency	**$40,041**	**$35,899**	**$46,538**	**$63,047**
Actual contributions as a percentage of covered payroll	4.22%	2.57%	2.38%	1.22%

1 The DPS Division Trust Fund was established on January 1, 2010, and received the net assets of the Denver Public Schools Retirement System.

2 Includes an annual contribution from a nonemployer contributing entity required by C.R.S. § 24-51-414 *et seq.* starting on July 1, 2018.

The accompanying notes are an integral part of the Required Supplementary Information.

SCHEDULE OF INVESTMENT RETURNS[1]

For the Years Ended December 31

	2018	2017	2016	2015	2014
Annual money-weighted rate of return, net of investment expenses	**(3.3%)**	18.1%	7.3%	1.6%	5.8%

1 Information is not available prior to 2014. In future reports, additional years will be added until 10 years of historical data are presented.

The accompanying notes are an integral part of the Required Supplementary Information.

NOTES TO THE REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

Note 1—Significant Changes in Plan Provisions Affecting Trends in Actuarial Information

2018 Changes in Plan Provisions Since 2017

- The following changes were made to the plan provisions as part of Senate Bill (SB) 18-200:
  - Member contribution rates increase by 0.75 percent effective July 1, 2019, an additional 0.75 percent effective July 1, 2020, and an additional 0.50 percent effective July 1, 2021.
  - Employer contribution rates increase by 0.25 percent effective July 1, 2019 for State, School, Judicial, and DPS Divisions.
  - An annual direct distribution of $225 million (actual dollars) from the State of Colorado, recognized as a nonemployer contributing entity, is distributed between the State, School, Judicial, and DPS Divisions proportionally based on payroll.
  - Annual Increase (AI) cap is lowered from 2.00 percent per year to 1.50 percent per year.
  - Initial AI waiting period is extended from one year after retirement to three years after retirement.
  - AI payments are suspended for 2018 and 2019.
  - The number of years used in the Highest Average Salary calculation for non-vested members as of January 1, 2020, increases from three to five years for the State, School, Local Government, and DPS Divisions and increases from one to three years for the Judicial Division.
- 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 thereafter.

2017 Changes in Plan Provisions Since 2016

- The Cunningham Fire Protection District (CFPD) disaffiliated from the Local Government Division on December 2, 2017. For the purpose of the December 31, 2017, measurement date, liabilities were determined assuming no additional benefit accruals for the disaffiliated membership of the CFPD that had not refunded their PERA member contribution accounts. The total disaffiliation payment of $1,159 was allocated to the Local Government Division Trust Fund and the Health Care Trust Fund (HCTF) in the amount of $1,063 and $96, respectively.
- Pursuant to House Bill (HB) 17-1265, the Amortization Equalization Disbursement (AED) and Supplemental Amortization Equalization Disbursement (SAED) contribution rates are adjusted for employers in the Judicial Division as follows:
  - For the calendar year beginning in 2019, C.R.S. § 24-51-411(4.5) increased the AED payment to 3.40 percent of PERA-includable salary and requires the AED payment to increase by 0.40 percent at the start of each of the following four calendar years through 2023 at which time the AED payment will be 5.00 percent of PERA-includable salary.
  - For the calendar year beginning in 2019, C.R.S. § 24-51-411(7.5) increased the SAED payment to 3.40 percent of PERA-includable salary and requires the SAED payment to increase by 0.40 percent at the start of each of the following four calendar years through 2023 at which time the SAED payment will be 5.00 percent of PERA-includable salary.
- 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 PCOPs issued in 1997 and 2008 and refinanced thereafter.

2016 Changes in Plan Provisions Since 2015

- 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 PCOPs issued in 1997 and 2008 and refinanced thereafter.

2015 Changes in Plan Provisions Since 2014

- 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 PCOPs issued in 1997 and 2008 and refinanced thereafter.
- As required under C.R.S. § 24-51-401(1.7)(e), PERA calculated and provided to the Colorado General Assembly an adjustment to the DPS Division's employer contribution rate to assure the equalization of the School Division's and the DPS Division's ratios of unfunded actuarial accrued liability (UAAL) to payroll as of December 31, 2039. Subsequently, the Colorado General Assembly passed HB 15-1391, reducing the employer contribution rate of the DPS Division from 13.75 percent to 10.15 percent, effective January 1, 2015.

2014 Changes in Plan Provisions Since 2013

- 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 PCOPs issued in 1997 and 2008 and refinanced thereafter.

2013 Changes in Plan Provisions Since 2012

- 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 PCOPs issued in 1997 and 2008 and refinanced thereafter.

NOTES TO THE REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

2012 Changes in Plan Provisions Since 2011

- The valuation reflects the disaffiliation of Memorial Health System (Memorial), formerly the largest employer of the Local Government Division, as of October 1, 2012. For the purposes of the December 31, 2012, actuarial valuation, liabilities were determined assuming no additional benefit accruals for the disaffiliated membership of Memorial that had not refunded their PERA member contribution accounts. Additionally, no additional incoming dollars were assumed added to the Local Government Division Trust Fund, as there was ongoing litigation regarding the potential dollars owed to the Local Government Division Trust Fund due to the disaffiliation.
- Pursuant to SB 11-076, there was a short-term contribution “swap” between employers and active members in the State and Judicial Divisions covering the period July 1, 2011, through June 30, 2012. Active member contributions for the period were increased by 2.5 percent of pensionable payroll and employer contributions were reduced by that amount.
- 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 PCOPs issued in 1997 and 2008 and refinanced thereafter.

2011 Changes in Plan Provisions Since 2010

- Pursuant to SB 10-146, there was a short-term contribution ”swap” between employers and active members in the State and Judicial Divisions covering the period July 1, 2010, through June 30, 2011. The enactment of SB 11-076 extended the contribution swap an additional year, from July 1, 2011, through June 30, 2012. Active member contributions for both periods were increased by 2.5 percent of pensionable payroll and employer contributions were reduced by that amount.
- 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 PCOPs issued in 1997 and 2008 and refinanced thereafter.

2010 Changes in Plan Provisions Since 2009

- The valuation reflects the addition of the DPS benefit structure as a result of the merger of DPSRS into PERA as a separate division, effective January 1, 2010. Major plan provisions adopted as part of the merger legislation (SB 09-282) include:
  - Transfers from the DPS Division to other Divisions may build upon a DPS benefit structure benefit within those Divisions.
  - Hourly and part-time employees of Denver Public Schools become members of the DPS Division as of January 1, 2010, with no past service credit.
  - 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 PCOPs issued in 1997 and 2008. Colorado statutes call for a ”true-up” in 2015, and every five years following, with the expressed purpose of adjusting the total DPS contribution rate to ensure equalization of the ratio of UAAL over payroll between the DPS and School Divisions at the end of the 30-year period beginning January 1, 2010.
- Pursuant to SB 10-146, there was a short-term contribution “swap” between employers and active members in the State and Judicial Divisions covering the period July 1, 2010, through June 30, 2011. Active member contributions for this period were increased by 2.5 percent of pensionable payroll and employer contributions were reduced by that amount.

2009 Changes in Plan Provisions Since 2008

- The following changes were made to the plan provisions as part of SB 10-001:
  - For the State Division, the AED continues to increase by 0.4 percent per year to a total rate of 5.0 percent by 2017. In addition, the SAED continues to increase by 0.5 percent per year to a total rate of 5.0 percent by 2017. However, if the funding ratio reaches 103 percent, the AED and SAED will be reduced by 0.5 percent of pay each.
  - For the School Division, the AED will continue to increase by 0.4 percent per year from 2013 through 2015 and by 0.3 percent in 2016 for a total rate of 4.5 percent. In addition, the SAED will continue to increase by 0.5 percent per year to a total rate of 5.5 percent by 2018. Also, the 0.4 percent increase in the statutory employer contribution rate in 2013 was eliminated. However, if the funding ratio reaches 103 percent, the AED and SAED will be reduced by 0.5 percent of pay each.
  - For the Local Government and Judicial Divisions, the AED is frozen at the 2010 level of 2.20 percent. In addition, the SAED is frozen at the 2010 level of 1.50 percent. However, if the funding ratio reaches 103 percent, the AED and SAED will be reduced by 0.5 percent of pay each.
  - For benefit recipients of the PERA benefit structure based upon a membership date before January 1, 2007, or for benefit recipients of the DPS benefit structure, future post-retirement benefit increases (AI) were reduced to an amount equal to 2 percent (the lesser of that or the annual Consumer Price Index for Urban Wage Earners and Clerical Workers [CPI-W] increase for 2010). However, if the investment return for the prior year is negative, then the AI is an amount equal to the annual CPI-W increase with a cap of 2 percent.

NOTES TO THE REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

The 2 percent cap may be adjusted based upon the year-end funded status, with increases mandated when the funded status reaches 103 percent and decreases mandated when the funded status subsequently falls below 90 percent. The cap will not be reduced below 2 percent. In addition, the AI is first paid on the July 1st 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 AI.

- Effective January 1, 2011, other than in the Judicial Division, for all active members who are not eligible for retirement on January 1, 2011, the annual salary increase cap in determination of Highest Average Salary was lowered from 15 percent to 8 percent for PERA benefit structure members and for DPS benefit structure members, a change from the average of salaries of the highest 36 months of earned service to the PERA benefit structure method with an annual salary increase cap of 8 percent.
- Effective January 1, 2011, a new requirement was added that PERA benefit structure members must have five years of earned service credit in order to receive a 50 percent match on a refund.
- Effective January 1, 2011, the reduction factors for a reduced service retirement benefit for members not eligible to retire as of January 1, 2011, were changed to an actuarial equivalent basis.
- Effective January 1, 2011, a modified Rule of 85 for service retirement eligibility was implemented for members with less than 5 years of service credit as of January 1, 2011 (this rule does not apply to State Troopers).
- Effective January 1, 2011, a modified Rule of 88 with a minimum age of 58 for service retirement eligibility was implemented for members hired on or after January 1, 2011, but before January 1, 2017 (this rule does not apply to State Troopers).
- Effective January 1, 2011, a modified Rule of 90 with a minimum age of 60 for service retirement eligibility was implemented for members hired on or after January 1, 2017 (this rule does not apply to State Troopers and to participants whose last 10 years of service were in the School or DPS Divisions).

Note 2—Significant Changes in Assumptions or Other Inputs Affecting Trends in Actuarial Information

2018 Changes in Assumptions or Other Inputs Since 2017

- The single equivalent interest rate (SEIR) for the State Division was increased from 4.72 percent to 7.25 percent to reflect the changes to the projection's valuation basis which no longer resulted in a projected year of depletion of the fiduciary net position (FNP), thereby eliminating the need to apply the municipal bond index rate.
- The SEIR for the School Division was increased from 4.78 percent to 7.25 percent to reflect the changes to the projection's valuation basis which no longer resulted in a projected year of depletion of the FNP, thereby eliminating the need to apply the municipal bond index rate.
- The SEIR for the Judicial Division was increased from 5.41 percent to 7.25 percent to reflect the changes to the projection's valuation basis which no longer resulted in a projected year of depletion of the FNP, thereby eliminating the need to apply the municipal bond index rate.

2017 Changes in Assumptions or Other Inputs Since 2016

- The SEIR for the State Division was lowered from 5.26 percent to 4.72 percent to reflect the changes to the projection's valuation basis, a projected year of depletion of the FNP, and the resulting application of the municipal bond index rate.
- The SEIR for the School Division was lowered from 5.26 percent to 4.78 percent to reflect the changes to the projection's valuation basis, a projected year of depletion of the FNP, and the resulting application of the municipal bond index rate.
- The SEIR for the Judicial Division was increased from 5.18 percent to 5.41 percent to reflect the changes to the projection's valuation basis, a projected year of depletion of the FNP, and the resulting application of the municipal bond index rate.
- The municipal bond index rate used in the determination of the SEIR for the State, School, and Judicial Divisions changed from 3.86 percent on the prior measurement date to 3.43 percent on the measurement date.

2016 Changes in Assumptions or Other Inputs Since 2015

- The investment return assumption was lowered from 7.50 percent to 7.25 percent.
- The price inflation assumption was lowered from 2.80 percent to 2.40 percent.
- The wage inflation assumption was lowered from 3.90 percent to 3.50 percent.

NOTES TO THE REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

- The post-retirement mortality assumption for healthy lives for the State and Local Government Divisions was changed to the RP-2014 Healthy Annuitant Mortality Table with adjustments for credibility and gender adjustments of a 73 percent factor applied to ages below 80 and a 108 percent factor applied to age 80 and above, projected to 2018, for males, and a 78 percent factor applied to ages below 80 and a 109 percent factor applied to age 80 and above, projected to 2020, for females.
- The post-retirement mortality assumption for healthy lives for the School, Judicial, and DPS Divisions was changed to the RP-2014 White Collar Healthy Annuitant Mortality Table with adjustments for credibility and gender adjustments of a 93 percent factor applied to ages below 80 and a 113 percent factor applied to age 80 and above, projected to 2018, for males, and a 68 percent factor applied to ages below 80 and a 106 percent factor applied to age 80 and above, projected to 2020, for females.
- For disabled retirees, the mortality assumption was changed to reflect 90 percent of RP-2014 Disabled Retiree Mortality Table.
- The mortality assumption for active members was changed to RP-2014 White Collar Employee Mortality Table, a table specifically developed for actively working people. To allow for an appropriate margin of improved mortality prospectively, the mortality rates incorporate a 70 percent factor applied to male rates and a 55 percent factor applied to female rates.
- The rates of retirement, withdrawal, and disability were revised to reflect more closely actual experience.
- The estimated administrative expense as a percentage of covered payroll was increased from 0.35 percent to 0.40 percent.
- The SEIR for the State and School Divisions was lowered from 7.50 percent to 5.26 percent to reflect the changes to the projection's valuation basis, a projected year of depletion of the FNP, and the resulting application of the municipal bond index rate of 3.86 percent on the measurement date.
- The SEIR for the Local Government Division was lowered from 7.50 percent to 7.25 percent, reflecting the change in the long-term expected rate of return.
- The SEIR for the Judicial Division was lowered from 5.73 percent to 5.18 percent to reflect the changes to the projection's valuation basis, a projected year of depletion of the FNP, and the resulting application of the municipal bond index rate from 3.57 percent on the prior measurement date to 3.86 percent on the measurement date.
- The SEIR for the DPS Division was lowered from 7.50 percent to 7.25 percent, reflecting the change in the long-term expected rate of return.

2015 Changes in Assumptions or Other Inputs Since 2014

- The SEIR for the Judicial Division was lowered from 6.14 percent to 5.73 percent to reflect the changes to the projection's valuation basis, a projected year of depletion of the FNP, and the resulting application of the municipal bond index rate from 3.70 percent on the prior measurement date to 3.57 percent on the measurement date.
- The following programming changes were made:
  - Valuation of the full survivor benefit without any reduction for possible remarriage.
  - Reflection of the employer match on separation benefits for all eligible years.
  - Reflection of one year of service eligibility for survivor annuity benefit.
  - Refinement of the 18-month AI timing.
  - Refinements to directly value certain and life, modified cash refund and pop-up benefit forms.
- The following methodology changes were made:
  - Recognition of merit salary increases in the first projection year.
  - Elimination of the assumption that 35 percent of future disabled members elect to receive a refund.
  - Removal of the negative value adjustment for liabilities associated with refunds of future terminating members.
  - Adjustments to the timing of the normal cost and UAAL payment calculations to reflect contributions throughout the year.

2014 Changes in Assumptions or Other Inputs Since 2013

- The SEIR for the Judicial Division was lowered from 6.66 percent to 6.14 percent to reflect the changes to the projection's valuation basis, a projected year of depletion of the FNP, and the resulting application of the municipal bond index rate from 4.73 percent on the prior measurement date to 3.70 percent on the measurement date.
- In 2012, a lawsuit was initiated to determine the amount owed to PERA by Memorial and the City of Colorado Springs (City) for Memorial's departure from PERA. In September 2014, PERA and the City agreed to resolve the lawsuit. The agreement provided for the City to pay PERA $190,000 for the liabilities associated with the retirement and health care benefits already earned by 7,666 Memorial employees for the work that they performed before Memorial ceased to be a PERA

NOTES TO THE REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—DIVISION TRUST FUNDS

(Dollars in Thousands)

employer. On October 3, 2014, PERA received a disaffiliation payment from the City, which was allocated to the Local Government Division Trust Fund and the HCTF in the amount of $186,006 and $3,994, respectively.

2013 Changes in Assumptions or Other Inputs Since 2012

- The investment return assumption was lowered from 8.00 percent to 7.50 percent.
- The price inflation assumption was lowered from 3.50 percent to 2.80 percent.
- The wage inflation assumption was lowered from 4.25 percent to 3.90 percent.

2012 Changes in Assumptions or Other Inputs Since 2011

- The price inflation assumption was lowered from 3.75 percent to 3.50 percent.
- The wage inflation assumption was lowered from 4.50 percent to 4.25 percent.
- The rates of retirement, withdrawal, mortality and disability were revised to more closely reflect actual experience.
- The post-retirement mortality tables used were changed to the RP-2000 Combined Mortality tables projected with Scale AA to 2020, set back one year for males and two years for females.
- The investment return assumption was changed to be only net of investment expenses to better represent the investment consultant's assumptions and predictions and also to better align with recent changes in GASB accounting and reporting requirements. An ongoing estimated administrative expense of 0.35 percent of pensionable payroll was added to the normal cost beginning with the December 31, 2012, actuarial valuation.
- To reflect the short-term contribution "swap" between employers and active members covering the period July 1, 2010, through June 30, 2012, the actuarially determined contribution (ADC) has been adjusted in the State and Judicial Divisions.

2011 Changes in Assumptions or Other Inputs Since 2010

- To reflect the short-term contribution ″swap″ between employers and active members covering the period July 1, 2010, through June 30, 2012, the ADC has been adjusted in the State and Judicial Division.

2010 Changes in Assumptions or Other Inputs Since 2009

- Assumptions were supplemented to provide for the valuation of the DPS benefit structure added as a result of the merger of DPSRS into PERA as a separate division, effective January 1, 2010.
- To reflect the short-term contribution ″swap″ between employers and active members covering the period July 1, 2010, through June 30, 2012, the ADC has been adjusted in the State and Judicial Division.

2009 Changes in Assumptions or Other Inputs Since 2008

- The investment return assumption was lowered from 8.50 percent to 8.00 percent.
- The withdrawal rates, pre-retirement mortality rates, disability rates and retirement rates were revised to more closely reflect the actual experience of PERA.
- The post-retirement mortality tables used for service retirements and dependents of deceased pensioners were changed to the 1994 Group Annuity Mortality Table set back three years for males and set back two years for females.
- The deferral period for deferred vested members was revised to more closely reflect the actual experience of PERA.

Note 3—Methods and Assumptions Used in Calculations of ADC

The ADC rates, as a percentage of covered payroll, used to determine the ADC amounts in the Schedule of Employer and Nonemployer Contributions are calculated as of December 31, two years prior to the end of the year in which ADC amounts are reported. The following actuarial methods and assumptions from the December 31, 2016, actuarial valuation were used to determine contribution rates reported in that schedule for the year ending December 31, 2018:

Actuarial cost method	Entry age
Amortization method	Level percentage of payroll
Amortization period	30 years, closed, layered
Equivalent single amortization period	28 years (27 years for State Division)
Asset valuation method	4-year smoothed market
Price inflation	2.40 percent
Real wage growth	1.10 percent
Wage inflation	3.50 percent
Salary increases, including wage inflation	3.50 to 10.45 percent
Long-term investment rate of return, net of pension plan investment expense, including price inflation	7.25 percent
Future post-retirement benefit increases	
PERA benefit structure hired prior to 1/1/07 and DPS benefit structure	2.00 percent compounded annually
PERA benefit structure hired after 12/31/06	0.00 percent, as financed by the AIR

REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF CHANGES IN NET OPEB LIABILITY—HEALTH CARE TRUST FUND[1]

For the Years Ended December 31

	2018	2017
Total OPEB liability		
Service cost	**$19,328**	$20,036
Interest	**112,849**	108,625
Changes of benefit terms	**—**	5
Difference between expected and actual experience	**(2,482)**	7,354
Changes of assumptions or other inputs	**11,438**	—
Benefit payments and health care claims/ administrative processing fees[2]	**(77,221)**	(116,960)
Net change in total OPEB liability	**63,912**	19,060
Total OPEB liability – beginning	**1,575,822**	1,556,762
Total OPEB liability – ending (a)	**$1,639,734**	**$1,575,822**
Plan fiduciary net position		
Contributions – employer	**$86,559**	$83,077
Contributions – employer disaffiliation	**—**	96
Other additions (includes purchased service transfers)	**8,373**	9,760
Net investment income (loss)	**(9,678)**	44,990
Benefit payments	**(61,777)**	(102,665)
Administrative expense	**(20,401)**	(19,162)
Other deductions	**(106)**	(102)
Net change in plan fiduciary net position	**2,970**	15,994
Plan fiduciary net position – beginning	**276,222**	260,228
Plan fiduciary net position – ending (b)	**$279,192**	**$276,222**
Net OPEB liability – ending (a)-(b)	**$1,360,542**	**$1,299,600**

1 Information is not available prior to 2017. In future reports, additional years will be added until 10 years of historical data are presented.

2 Administrative and other health care claims processing fees are included in administrative expenses, other additions and other deductions in the Statements of Changes in Fiduciary Net Position.

The accompanying notes are an integral part of the Required Supplementary Information.

REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF CHANGES IN NET OPEB LIABILITY—DPS HEALTH CARE TRUST FUND[1]

For the Years Ended December 31

	2018	2017
Total OPEB liability		
Service cost	**$1,420**	$1,591
Interest	**5,245**	5,057
Changes of benefit terms	**—**	—
Difference between expected and actual experience	**(6,045)**	(35)
Changes of assumptions or other inputs	**5**	—
Benefit payments and health care claims/ administrative processing fees[2]	**(4,693)**	(6,191)
Net change in total OPEB liability	**(4,068)**	422
Total OPEB liability – beginning	**73,267**	72,845
Total OPEB liability – ending (a)	**$69,199**	**$73,267**
Plan fiduciary net position		
Contributions – employer	**$7,417**	$6,930
Other additions (includes purchased service transfers)	**205**	242
Net investment income (loss)	**(894)**	3,305
Benefit payments	**(4,158)**	(5,694)
Administrative expense	**(845)**	(808)
Other deductions	**(4)**	(4)
Net change in plan fiduciary net position	**1,721**	3,971
Plan fiduciary net position – beginning	**22,308**	18,337
Plan fiduciary net position – ending (b)	**$24,029**	**$22,308**
Net OPEB liability – ending (a)-(b)	**$45,170**	**$50,959**

1 Information is not available prior to 2017. In future reports, additional years will be added until 10 years of historical data are presented.

2 Administrative and other health care claims processing fees are included in administrative expenses, other additions and other deductions in the Statements of Changes in Fiduciary Net Position.

The accompanying notes are an integral part of the Required Supplementary Information.

REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF NET OPEB LIABILITY[1]

For the Years Ended December 31

Health Care Trust Fund	2018	2017	2016
Total OPEB liability	**$1,639,734**	$1,575,822	$1,556,762
Plan fiduciary net position	**279,192**	276,222	260,228
Net OPEB liability	**$1,360,542**	**$1,299,600**	**$1,296,534**
Plan fiduciary net position as a percentage of the total OPEB liability	**17.03%**	17.53%	16.72%
Covered payroll	**$8,399,835**	$7,927,280	$7,716,894
Net OPEB liability as a percentage of covered payroll	**16.20%**	16.39%	16.80%

DPS Health Care Trust Fund	2018	2017	2016
Total OPEB liability	**$69,199**	$73,267	$72,845
Plan fiduciary net position	**24,029**	22,308	18,337
Net OPEB liability	**$45,170**	**$50,959**	**$54,508**
Plan fiduciary net position as a percentage of the total OPEB liability	**34.72%**	30.45%	25.17%
Covered payroll	**$722,040**	$658,198	$642,177
Net OPEB liability as a percentage of covered payroll	**6.26%**	7.74%	8.49%

[1] Information is not available prior to 2016. In future reports, additional years will be added until 10 years of historical data are presented.

The accompanying notes are an integral part of the Required Supplementary Information.

REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF CONTRIBUTIONS FROM EMPLOYERS AND OTHER CONTRIBUTING ENTITIES

For the Years Ended December 31

Health Care Trust Fund	2018	2017	2016	2015	2014
Actuarially determined contribution rate (a)	**1.12%**	1.08%	1.09%	1.15%	1.32%
Covered payroll (b)	**$8,399,835**	$7,927,280	$7,716,894	$7,485,545	$7,211,351
Actuarially determined contribution (a) x (b)	**94,078**	85,615	84,114	86,084	95,190
Contributions in relation to the actuarially determined contribution	**86,559**	83,077[1]	80,825	78,463	75,631[2]
Annual contribution deficiency	**$7,519**	**$2,538**	**$3,289**	**$7,621**	**$19,559**
Actual contributions as a percentage of covered payroll	**1.03%**	1.05%	1.05%	1.05%	1.05%

	2013	2012	2011	2010	2009
Actuarially determined contribution rate (a)	1.24%	1.18%	1.28%	1.12%	1.12%
Covered payroll (b)	$6,982,560	$6,766,713	$6,972,596	$7,035,419	$7,048,992
Retiree drug subsidy (c)	15,731	14,198	14,151	14,169	13,633
Actuarially determined contribution (a) x (b) + (c)	102,315	94,045	103,400	92,966	92,582
Contributions in relation to the actuarially determined contribution	88,515	86,751	87,600	88,216	87,706
Annual contribution deficiency	**$13,800**	**$7,294**	**$15,800**	**$4,750**	**$4,876**
Actual contributions as a percentage of covered payroll	1.27%	1.28%	1.26%	1.25%	1.24%

1 Contributions do not include the disaffiliation payment of $96 for Cunningham Fire Protection District.

2 Contributions do not include the disaffiliation payment of $3,994 for Memorial Health System.

The accompanying notes are an integral part of the Required Supplementary Information.

REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

SCHEDULE OF CONTRIBUTIONS FROM EMPLOYERS AND OTHER CONTRIBUTING ENTITIES

For the Years Ended December 31

DPS Health Care Trust Fund[1]	2018	2017	2016	2015	2014
Actuarially determined contribution rate (a)	**0.67%**	0.68%	0.75%	0.81%	0.87%
Covered payroll (b)	**$722,040**	$658,198	$642,177	$621,115	$584,319
Actuarially determined contribution (a) x (b)	**4,838**	4,476	4,816	5,031	5,084
Contributions in relation to the actuarially determined contribution	**7,417**	6,930	6,723	6,371	6,003
Annual contribution deficiency (excess)	**($2,579)**	**($2,454)**	**($1,907)**	**($1,340)**	**($919)**
Actual contributions as a percentage of covered payroll	**1.03%**	1.05%	1.05%	1.03%	1.03%

	2013	2012	2011	2010
Actuarially determined contribution rate (a)	0.86%	0.92%	0.92%	0.95%[2]
Covered payroll (b)	$547,660	$510,872	$491,646	$470,774
Retiree drug subsidy (c)	563	488	499	537
Actuarially determined contribution (a) x (b) + (c)	5,273	5,188	5,022	5,002
Contributions in relation to the actuarially determined contribution	6,121	5,731	5,528	5,298
Annual contribution deficiency (excess)	**($848)**	**($543)**	**($506)**	**($296)**
Actual contributions as a percentage of covered payroll	1.12%	1.12%	1.12%	1.13%

[1] The DPS HCTF was established on January 1, 2010, and received the balance of the Denver Public Schools Retiree Health Benefit Trust.

[2] The actuarially determined contribution rate of 0.9484 percent has been rounded to two decimal places for presentation purposes.

The accompanying notes are an integral part of the Required Supplementary Information.

SCHEDULE OF INVESTMENT RETURNS[1]

For the Years Ended December 31

	2018	2017	2016	2015	2014
Annual money-weighted rate of return, net of investment expenses	**(3.3%)**	18.1%	7.3%	1.6%	5.8%

[1] Information is not available prior to 2014. In future reports, additional years will be added until 10 years of historical data are presented.

The accompanying notes are an integral part of the Required Supplementary Information.

NOTES TO THE REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

Note 1—Significant Changes in Plan Provisions Affecting Trends in Actuarial Information

2018 Changes in Plan Provisions Since 2017

- There were no changes made to plan provisions.

2017 Changes in Plan Provisions Since 2016

- The Cunningham Fire Protection District (CFPD) disaffiliated from the Local Government Division, thereby ending participation in the Health Care Trust Fund (HCTF) on December 2, 2017. For the purpose of disclosure as of the December 31, 2017, measurement date, liabilities were determined assuming no additional service accruals impacting possible future premium subsidies for the disaffiliated membership of the CFPD that had not refunded their PERA member contribution accounts. The total disaffiliation payment of $1,159 was allocated to the Local Government Division Trust Fund and the HCTF in the amount of $1,063 and $96, respectively.

2016 Changes in Plan Provisions Since 2015

- There were no changes made to plan provisions.

2015 Changes in Plan Provisions Since 2014

- There were no changes made to plan provisions.

2014 Changes in Plan Provisions Since 2013

- There were no changes made to plan provisions.

2013 Changes in Plan Provisions Since 2012

- There were no changes made to plan provisions.

2012 Changes in Plan Provisions Since 2011

- The Memorial Health System (Memorial), disaffiliated from the Local Government Division, hence ending participation in the HCTF, on October 1, 2012. For the purpose of disclosure as of the December 31, 2012, measurement date, liabilities were determined assuming no additional service accruals impacting possible future premium subsidies for the disaffiliated membership of Memorial that had not refunded their PERA member contribution accounts. Additionally, no additional incoming dollars were assumed added to the HCTF as of December 31, 2012, as there was ongoing litigation regarding the potential dollars owed to the Local Government Division Trust Fund and the HCTF due to the disaffiliation.

2011 Changes in Plan Provisions Since 2010

- There were no changes made to plan provisions.

2010 Changes in Plan Provisions Since 2009

- The Denver Public Schools Retirement System (DPSRS) merged into PERA, effective January 1, 2010, as a separate division, the Denver Public Schools (DPS) Division. Also effective January 1, 2010, the liabilities and assets of the Denver Public Schools Retiree Health Benefit Trust were transferred into the newly created DPS HCTF. The valuation reflects the addition of the DPS benefit structure as a result of the merger. Hence, transfers from the DPS Division to the other PERA divisions covered by the HCTF may build upon a DPS benefit structure benefit within the HCTF and transfers from the other PERA divisions to the DPS Division covered by the DPS HCTF may build upon a PERA benefit structure benefit within the DPS HCTF.

2009 Changes in Plan Provisions Since 2008

- The following changes were made to the plan provisions as part of Senate Bill 10-001:
  - Effective January 1, 2011, a modified Rule of 85 for service retirement eligibility was implemented for members with less than 5 years of service credit as of January 1, 2011 (this rule does not apply to State Troopers).
  - Effective January 1, 2011, a modified Rule of 88 with a minimum age of 58 for service retirement eligibility was implemented for members hired on or after January 1, 2011 but before January 1, 2017 (this rule does not apply to State Troopers).
  - Effective January 1, 2011, a modified Rule of 90 with a minimum age of 60 for service retirement eligibility was implemented for members hired on or after January 1, 2017 (this rule does not apply to State Troopers).

Note 2—Significant Changes in Assumptions or Other Inputs Affecting Trends in Actuarial Information

2018 Changes in Assumptions or Other Inputs Since 2017

- There were no changes made to the actuarial methods or assumptions.

2017 Changes in Assumptions or Other Inputs Since 2016

- There were no changes made to the actuarial methods or assumptions.

2016 Changes in Assumptions or Other Inputs Since 2015

- The following methodology change was made:
  - The Entry Age Normal actuarial cost method allocation basis has been changed from a level dollar amount to a level percentage of pay.
- The following changes were made to the actuarial assumptions:
  - The investment rate of return assumption decreased from 7.50 percent to 7.25 percent.
  - The price inflation assumption decreased from 2.80 percent to 2.40 percent.

NOTES TO THE REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)— HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

- The wage inflation assumption decreased from 3.90 percent to 3.50 percent.
- The mortality assumption for active members was changed to RP-2014 White Collar Employee Mortality Table, a table specifically developed for actively working people. To allow for an appropriate margin of improved mortality prospectively, the mortality rates incorporate a 70 percent factor applied to male rates and a 55 percent factor applied to female rates.
- The post-retirement mortality assumption for healthy lives for the State and Local Government Divisions was changed to the RP-2014 Healthy Annuitant Mortality Table with adjustments for credibility and gender adjustments of a 73 percent factor applied to ages below 80 and a 108 percent factor applied to age 80 and above, projected to 2018, for males, and a 78 percent factor applied to ages below 80 and a 109 percent factor applied to age 80 and above, projected to 2020, for females.
- The post-retirement mortality assumption for healthy lives for the School, Judicial, and DPS Divisions was changed to the RP-2014 White Collar Healthy Annuitant Mortality Table with adjustments for credibility and gender adjustments of a 93 percent factor applied to ages below 80 and a 113 percent factor applied to age 80 and above, projected to 2018, for males, and a 68 percent factor applied to ages below 80 and a 106 percent factor applied to age 80 and above, projected to 2020, for females.
- For disabled retirees, the mortality assumption was changed to reflect 90 percent of RP-2014 Disabled Retiree Mortality Table.
- The assumed rates of withdrawal, retirement, and disability have been adjusted to more closely reflect experience.
- 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 attain age 65 and older ages 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 percentage of PERACare enrollees who will attain age 65 and older ages and are assumed to not qualify for premium-free Medicare Part A coverage 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 has been revised to reflect more closely actual experience.
- The health care cost trend rates for Medicare Part A premiums have been revised to reflect the then-current expectation of future increases in rates of inflation applicable to Medicare Part A premiums.
- Assumed election rates for the PERACare coverage options that would be available to future PERACare enrollees who will qualify for the “No Part A Subsidy” when they retire have been revised to more closely reflect actual experience.
- Assumed election rates for the PERACare coverage options that will be available to those current PERACare enrollees, who qualify for the “No Part A Subsidy” but have not reached age 65, have been revised to more closely reflect actual experience.
- The rates of PERACare coverage election for spouses of eligible inactive members and future retirees 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.

2015 Changes in Assumptions or Other Inputs Since 2014

- The following methodology changes were made:
  - Rates of morbidity to model the growth in assumed claims as a PERACare enrollee ages have been added to the process used to project per capita health care costs of those PERACare enrollees under the PERA benefit structure who have attained age 65 and older and are not eligible for premium-free Medicare Part A benefits.
  - Adjustments were made to the timing of the normal cost and unfunded actuarial accrued liability (UAAL) payment calculations to reflect contributions throughout the year.
- The following changes were made to the actuarial assumptions:
  - The percentage of PERACare enrollees who will attain age 65 and older ages and are assumed to not qualify for premium-free Medicare Part A coverage have been revised to more closely reflect actual experience.
  - Initial per capita health care costs for those PERACare enrollees under the PERA benefit structure who are expected to attain age 65 and older ages and are not eligible for premium-free Medicare Part A benefits have been updated to reflect the change in costs for the 2016 plan year.
  - The health care cost trend rates for Medicare Part A premiums have been revised to reflect the current expectation of future increases in rates of inflation applicable to Medicare Part A premiums.

NOTES TO THE REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

2014 Changes in Assumptions or Other Inputs Since 2013

- The following change was made to the actuarial assumptions:
  - Initial per capita health care costs for those PERACare enrollees under the PERA benefit structure who are expected to attain age 65 and older ages and are not eligible for premium-free Medicare Part A benefits have been updated to reflect the change in costs for the 2015 plan year.
- The following other change was made:
  - In 2012, a lawsuit was initiated to determine the amount owed to PERA by Memorial and the City of Colorado Springs (City) for Memorial's disaffiliation from PERA. In September 2014, PERA and the City agreed to resolve the lawsuit. The agreement provided for the City to pay PERA $190,000 for the liabilities associated with the retirement and health care benefits already earned by 7,666 Memorial employees for the work that they performed before Memorial ceased to be a PERA employer. On October 3, 2014, PERA received a disaffiliation payment from the City, which was allocated to the Local Government Division Trust Fund and the HCTF in the amount of $186,006 and $3,994, respectively.

2013 Changes in Assumptions or Other Inputs Since 2012

- The following changes were made to the actuarial assumptions:
  - The investment rate of return assumption decreased from 8.00 percent to 7.50 percent per annum.
  - The price inflation assumption decreased from 3.50 percent to 2.80 percent per annum.
  - The wage inflation assumption decreased from 4.25 percent to 3.90 percent per annum.
  - Effective January 1, 2014, PERACare no longer participates in the Centers for Medicare & Medicaid Services (CMS) Retiree Drug Subsidy (RDS) program. PERACare enrollees participating in the self-insured Medicare supplement plans and the Medicare HMO plan offered by Rocky Mountain Health Plans now receive their prescription drug benefits through a Medicare Prescription Drug Plan. The liability associated with the RDS has been eliminated.
  - Initial per capita health care costs for those PERACare enrollees under the PERA benefit structure who are expected to attain age 65 and older ages and are not eligible for premium-free Medicare Part A benefits have been updated to reflect the change in costs for the 2014 plan year.
  - The health care cost trend rates for Medicare Part A premiums have been revised to reflect the current expectation of future increases in rates of inflation applicable to Medicare Part A premiums.
  - The utilization rates for the No Part A subsidy of both retirees and their spouses have been revised.

2012 Changes in Assumptions or Other Inputs Since 2011

- The following changes were made to the actuarial assumptions:
  - The price inflation assumption decreased from 3.75 percent to 3.50 percent.
  - The wage inflation assumption decreased from 4.50 percent to 4.25 percent.
  - The post-retirement mortality assumption for healthy lives changed to the RP-2000 Combined Mortality Table rates projected with Scale AA to 2020 (set back one year for males and two years for females).
  - The active member mortality assumption was revised to match the post-retirement mortality table. However, the percentages of the post-retirement mortality tables reflected on active member lives were changed to 55 percent for males and 40 percent for females.
  - The RP-2000 Disability Mortality Table was retained. The setback applied to the male disability mortality rates remains unchanged at two years, however, the setback applied to the female mortality rates changed from five years to two years.
  - The rates of withdrawal were revised to more closely reflect actual experience.
  - The rates of early, reduced retirement for all divisions decreased and the rates for unreduced retirements increased to more closely reflect actual experience.
  - The rates of disability from active service decreased slightly to more closely reflect actual experience.
  - The investment return assumption was changed to be only net of investment expenses to better represent the investment consultant's assumptions and predictions and also to better align with recent changes in GASB accounting and reporting requirements.
  - The rates of participation in PERACare for current and future participants of all divisions and DPS Division deferred vested members have been revised to more closely reflect actual experience.
  - The percentage of PERACare enrollees who will attain age 65 and older ages and are assumed to not qualify for premium-free Medicare Part A coverage have been revised to more closely reflect actual experience.
  - The average age difference between covered male and female spouses has been updated to reflect actual experience.

NOTES TO THE REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)— HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

- Initial per capita health care costs for those PERACare enrollees under the PERA benefit structure who are expected to attain age 65 and older ages and are not eligible for premium-free Medicare Part A benefits have been updated to reflect the change in costs for the 2013 plan year.
- The initial per capita payments estimated to be made by CMS under the RDS program have been updated based upon the most recent attestation of actuarial equivalence.
- The health care cost trend rates for Medicare Part A premiums and RDS payments have been revised to reflect the current expectation of future increases in rates of inflation applicable to Medicare Part A premiums.
- The last year in which the prescription drug benefit provided to those members eligible for Medicare Part D is deemed to be actuarially equivalent has been increased to 2023.

2011 Changes in Assumptions or Other Inputs Since 2010

- The following changes were made to the actuarial assumptions:
  - Initial per capita health care costs for those PERACare enrollees under the PERA benefit structure who are expected to attain age 65 and older ages and are not eligible for premium-free Medicare Part A benefits have been updated to reflect the change in costs for the 2012 plan year.
  - The initial per capita payments estimated to be made by CMS under the RDS have been updated based upon the most recent attestation of actuarial equivalence.
  - The health care cost trend rates for Medicare Part A premiums and RDS payments have been revised to reflect the current expectation of future increases in rates of inflation applicable to Medicare Part A premiums.
  - The last year in which the prescription drug benefit provided to those members eligible for Medicare Part D is deemed to be actuarially equivalent has been increased to 2019.

2010 Changes in Assumptions or Other Inputs Since 2009

- The following changes were made to the actuarial assumptions:
  - Assumptions were supplemented to provide for the valuation of the DPS benefit structure added as a result of the merger of the DPSRS into PERA, effective January 1, 2010.
  - DPS HCTF was created on January 1, 2010, to provide health care subsidies for DPS retirees participating in PERACare.
  - Initial per capita health care costs for those PERACare enrollees under the PERA benefit structure who are expected to attain age 65 and older ages and are not eligible for premium-free Medicare Part A benefits have been updated to reflect the change in costs for the 2011 plan year.
  - PERACare funding rates are used to determine the health care costs for participants enrolled in the self-insured plans who are expected to attain age 65 and older ages and not eligible for premium-free Medicare Part A.
  - The starting per capita payments estimated to be made by the CMS under the RDS have been updated based upon the most recent attestation of actuarial equivalence.
  - The health care cost trend rates for Medicare Part A premiums and RDS payments have been revised to reflect the current expectation of future increases in rates of inflation applicable to Medicare Part A premiums.
  - The percentage of PERACare enrollees who are projected to be age 65 and older, and estimated to not be eligible for premium-free Medicare Part A has been revised to reflect plan experience.
  - The last year in which the prescription drug benefit provided to those members eligible for Medicare Part D is deemed to be actuarially equivalent has been increased to 2018.
  - Liabilities for those members represented under both the PERA benefit structure and the DPS benefit structure have been allocated based upon member contribution account balances.

2009 Changes in Assumptions or Other Inputs Since 2008

- The following changes were made to the actuarial assumptions:
  - The investment rate of return decreased from 8.50 percent to 8.00 percent per annum.
  - The withdrawal rates, retirement rates, pre-retirement mortality rates, and disability rates for all divisions have been revised to more closely reflect the actual experience of PERA.
  - The post-retirement mortality tables used for service retirements and dependents of deceased pensioners have been changed to the 1994 Group Annuity Mortality Table set back three years for males and set back two years for females.

NOTES TO THE REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

- The deferral period for deferred vested members was revised to reflect more closely the actual experience of PERA.
- The rates of participation in PERACare for current members, future members, deferred vested members, and spouses have been revised to more closely reflect the actual experience of PERA.
- Initial per capita health care costs for those PERACare enrollees under the PERA benefit structure who are expected to attain age 65 and older ages and are not eligible for premium-free Medicare Part A benefits have been updated to reflect the change in costs for the 2010 plan year.
- The starting per capita payments estimated to be made by CMS under the RDS Program have been updated based upon the most recent attestation of actuarial equivalence.
- The health care cost trend rates have been revised to reflect the expectation of future increases in rates of inflation applicable to Medicare Part A premiums.
- The last year in which the prescription drug benefit provided to those members eligible for Medicare Part D is deemed to be actuarially equivalent has been reduced to 2017.

NOTES TO THE REQUIRED SUPPLEMENTARY INFORMATION (UNAUDITED)—HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

Note 3—Methods and Assumptions Used in Calculations of ADC

The ADC rates, as a percentage of covered payroll, used to determine the ADC amounts in the Schedule of Contributions from Employers and Other Contributing Entities are calculated as of December 31, two years prior to the end of the year in which ADC amounts are reported. The following actuarial methods and assumptions from the December 31, 2016, actuarial valuation were used to determine contribution rates reported in that schedule for the year ending December 31, 2018:

Actuarial cost method	Entry age
Amortization method	Level percentage of payroll
Amortization period	Open 30-year period
Asset valuation method	4-year smoothed market
Price inflation	2.40 percent
Real wage growth	1.10 percent
Wage inflation	3.50 percent
Salary increases, including wage inflation	3.50 percent in aggregate
Long-term investment rate of return, net of pension plan investment expense, including price inflation	7.25 percent
Health care inflation factors	
PERA benefit structure:	
Service-based premium subsidy	0.00 percent
Medicare Part A premiums	3.00 percent initial 4.25 percent ultimate
Carrier premiums	5.00 percent
DPS benefit structure:	
Service-based premium subsidy	0.00 percent
Medicare Part A premiums	N/A
Carrier premiums	N/A

SUPPLEMENTARY SCHEDULES

(Dollars in Thousands)

SCHEDULE OF ADMINISTRATIVE EXPENSES
For the Years Ended December 31

	2018	2017
Personnel Services		
Salaries	**$33,091**	$31,996
Employee benefits	**12,079**	11,864
Total personnel services	**45,170**	43,860
Professional Services		
Actuarial contracts	**416**	490
Audits	**171**	259
Investment services	**2,969**	2,760
Legal and legislative counsel	**2,398**	2,577
Computer services and consulting	**1,495**	1,202
Management consulting	**1,492**	1,481
Health care consulting	**385**	322
Other	**1,572**	1,007
Total professional services	**10,898**	10,098
Miscellaneous		
Equipment rental and services	**1,851**	1,685
Memberships	**329**	370
Publications and subscriptions	**68**	62
Travel and local expense	**758**	731
Auto expense	**22**	19
Telephone	**351**	232
Postage	**1,940**	1,732
Insurance	**535**	520
Printing	**444**	593
Office supplies	**805**	657
Building rent, supplies, and utilities	**1,003**	982
Total miscellaneous	**8,106**	7,583
Direct Expense		
Life Insurance Reserve	**—**	353
Health Care Trust Fund	**17,913**	16,693
DPS Health Care Trust Fund	**689**	651
Voluntary Investment Program	**1,442**	1,432
Defined Contribution Retirement Plan	**372**	366
Deferred Compensation Plan	**605**	600
Total direct expense	**21,021**	20,095
Depreciation expense	**358**	340
Tenant and other expense	**804**	992
Internal investment manager expense	**(18,688)**	(17,648)
Total administrative expense	**$67,669**	**$65,320**

SUPPLEMENTARY SCHEDULES

(Dollars in Thousands)

SCHEDULE OF ADMINISTRATIVE EXPENSES (CONTINUED)

For the Years Ended December 31

	2018	2017
Allocation of Administrative Expenses		
State Division Trust Fund	**$11,903**	$11,745
School Division Trust Fund	**23,560**	23,019
Local Government Division Trust Fund	**2,621**	2,541
Judicial Division Trust Fund	**86**	86
DPS Division Trust Fund	**2,919**	2,857
Voluntary Investment Program	**3,310**	2,877
Defined Contribution Retirement Plan	**819**	739
Deferred Compensation Plan	**1,094**	993
Health Care Trust Fund	**20,401**	19,162
DPS Health Care Trust Fund	**845**	808
Life Insurance Reserve	**111**	493
Total administrative expense	**$67,669**	**$65,320**

Note: The ratio of administrative expenses to fiduciary net position for the Division Trust Funds is nine basis points (0.09 percent) for 2018 and eight basis points (0.08 percent) for 2017.

See accompanying Independent Auditors' Report.

SUPPLEMENTARY SCHEDULES

(Dollars in Thousands)

SCHEDULE OF OTHER ADDITIONS
For the Years Ended December 31

	State Division Trust Fund	School Division Trust Fund	Local Govt Division Trust Fund	Judicial Division Trust Fund	DPS Division Trust Fund	Voluntary Investment Program	Defined Contribution Retirement Plan	Deferred Compensation Plan	HCTF	DPS HCTF	Life Insurance Reserve	TOTAL 2018	TOTAL 2017
Administrative fee income	$—	$—	$—	$—	$—	$—	$—	$—	$2,488	$156	$—	**$2,644**	$2,627
Revenue sharing	—	—	—	—	—	143	11	57	—	—	—	**211**	204
Participant loan interest	—	—	—	—	—	2,157	—	489	—	—	—	**2,646**	2,469
Interfund transfers at retirement	4,953	2,989	—	161	—	—	—	—	—	—	—	**8,103**	22,007
Purchase service transfer to health care	—	—	—	—	—	—	—	—	5,742	42	—	**5,784**	7,343
Settlement income	2,957	4,950	838	64	677	—	—	—	135	7	4	**9,632**	152
Miscellaneous	(22)	18	2	—	93	22	—	28	8	—	—	**149**	185
Total other additions	**$7,888**	**$7,957**	**$840**	**$225**	**$770**	**$2,322**	**$11**	**$574**	**$8,373**	**$205**	**$4**	**$29,169**	**$34,987**

SCHEDULE OF OTHER DEDUCTIONS
For the Years Ended December 31

	State Division Trust Fund	School Division Trust Fund	Local Govt Division Trust Fund	Judicial Division Trust Fund	DPS Division Trust Fund	Voluntary Investment Program	Defined Contribution Retirement Plan	Deferred Compensation Plan	HCTF	DPS HCTF	Life Insurance Reserve	TOTAL 2018	TOTAL 2017
Interfund transfers at retirement	$—	$—	$2,901	$—	$5,202	$—	$—	$—	$—	$—	$—	**$8,103**	$22,007
Purchase service transfer to health care	2,275	2,376	1,021	70	42	—	—	—	—	—	—	**5,784**	7,343
Miscellaneous	742	125	36	—	23	1,598	166	756	106	4	—	**3,556**	3,196
Total other deductions	**$3,017**	**$2,501**	**$3,958**	**$70**	**$5,267**	**$1,598**	**$166**	**$756**	**$106**	**$4**	**$—**	**$17,443**	**$32,546**

See accompanying Independent Auditors' Report.

SUPPLEMENTARY SCHEDULES

(Dollars in Thousands)

SCHEDULE OF INVESTMENT EXPENSES
For the Years Ended December 31

	2018	2017
External Manager Expenses		
Global equity	**$27,885**	$31,800
Fixed income	**2,585**	4,806
Private equity	**54,183**	54,878
Real estate	**44,669**	43,911
Opportunity fund	**17,875**	15,836
Cash and short-term investments	**470**	427
Total external manager expenses	**147,667**	151,658
Internal manager expenses	**18,688**	17,648
Other investment expenses and custody fees	**1,838**	3,495
Defined contribution and deferred compensation plan investment expenses	**3,371**	5,445
Total investment expenses	**$171,564**	**$178,246**

SCHEDULE OF PAYMENTS TO CONSULTANTS
For the Years Ended December 31

	2018	2017
Professional Contracts		
Actuarial	**$416**	$490
Audits	**171**	259
Legal and legislative counsel	**2,398**	2,577
Computer services and consulting	**1,495**	1,202
Management consulting	**1,492**	1,481
Health care consulting	**385**	322
Other	**1,572**	1,007
Total payments to consultants[1]	**$7,929**	**$7,338**

[1] Excludes investment advisers.

The Schedule of Commissions and other information related to investment expenses can be found in the Investment Section on pages 145-147.

See accompanying Independent Auditors' Report.

COLORADO PERA®

INVESTMENT SECTION

COLORADO PERA REPORT ON INVESTMENT ACTIVITY

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds

State Law

State law gives complete responsibility for the investment of PERA's funds to the PERA Board of Trustees (Board), with some stipulations including:

- The aggregate amount of moneys invested in corporate stocks or corporate bonds, notes, or debentures, which are convertible into corporate stock or in investment trust shares cannot exceed 65 percent of the then book value of the fund.
- No investment of the fund in common or preferred stock, or both, of any single corporation can exceed 5 percent of the then book value of the fund.
- The fund cannot acquire more than 12 percent of the outstanding stock or bonds of any single corporation.
- The origination of mortgages or deeds of trust on real residential property is prohibited.

Additionally, Colorado Revised Statutes (C.R.S.) § 24-54.8-201 *et seq.* imposes targeted divestment from companies that have economic prohibitions against Israel.

Colorado PERA Board's Statutory Fiduciary Responsibility

By State law, the management of PERA's retirement fund is vested in the Board who is held to the standard of conduct of fiduciaries in discharging their responsibilities. According to C.R.S. § 24-51-207(2), the Board, as fiduciaries, must carry out their functions solely in the interest of PERA members and benefit recipients and for the exclusive purpose of providing benefits.

Goal

The function of PERA is to provide present and future retirement or survivor benefits for its members. The investment function is managed in a manner to promote long-term financial security for our membership while maintaining the stability of the fund.

Overview of Investment Policy

PERA's investment policy outlines the investment philosophy and guidelines within which the fund's investments will be managed, and includes the following:

- Strategic asset allocation is the most significant factor influencing long-term investment performance and asset volatility.
- The fund's liabilities are long term and the investment strategy will therefore be long term in nature.
- The asset allocation policy will be periodically re-examined to ensure its appropriateness to the then-prevailing liability considerations.
- As a long-term investor, PERA will invest across a wide spectrum of investments in a prudent manner.
- Active management may be expected to add value over passive investment alternatives under appropriate conditions.

The Board determines the strategic asset allocation policy for the fund. In 2014, the Board commissioned an asset/liability study prepared by Aon Hewitt Investment Consulting, Inc. (Aon). The objective of the study was to determine the optimal strategic asset allocation policy that would ultimately allow PERA to meet its benefit obligations, while also ensuring that PERA incurs appropriate levels of risk. On March 20, 2015, the Board voted to change the strategic asset allocation policy of the fund effective July 1, 2015. This strategic asset allocation contains a long-term target allocation and specific ranges within which each asset class may operate. Because the long-term target allocation will be achieved over time, an initial interim target allocation was approved as of July 1, 2015, revised as of July 1, 2016, and reviewed again and retained without changes most recently on June 22, 2018. PERA is currently undergoing another asset/liability study which is scheduled to be completed in 2019.

ASSET ALLOCATION TARGETS AND RANGES[1]

	Interim Asset Allocation Target	Long-Term Asset Allocation Target	Target Range
Global Equity	53.5%	53.0%	47.0% – 59.0%
Fixed Income	23.5%	23.0%	18.0% – 28.0%
Private Equity	8.5%	8.5%	5.0% – 12.0%
Real Estate	8.5%	8.5%	5.0% – 12.0%
Opportunity Fund	5.0%	6.0%	0.0% – 9.0%
Cash and Short-Term Investments	1.0%	1.0%	0.0% – 3.0%

[1] See Note 5 of the Notes to the Financial Statements in the Financial Section for detailed disclosures about each asset class.

The asset/liability study considered expected investment returns, risks, and correlations of returns. The characteristics of the fund's liabilities were analyzed in conjunction with expected investment risks and returns. The targeted strategic asset allocation is designed to provide appropriate diversification and to balance the expected total rate of return with the volatility of expected returns. The asset allocation targets are adhered to through the implementation of a rebalancing policy. Investments are managed and monitored in a manner which seeks to balance return and risk within the asset/liability framework. The Chief Investment Officer is authorized to execute investment transactions on behalf of the Board. Assets are managed both internally and externally. In making investment decisions, the Board and staff utilize external experts in various fields including risk and

COLORADO PERA REPORT ON INVESTMENT ACTIVITY

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds

performance analysis, and other important investment functions and issues.

Basis of Presentation

Aon, the Board's Investment Performance consultant, provides the investment returns for the fund based on data made available by the fund's custodian, The Northern Trust Company (Northern Trust). Performance calculations were prepared using time-weighted rates of return and are net-of-fees unless otherwise indicated. Returns for periods longer than one year are annualized.

Corporate Governance

General Policy

Although PERA is not subject to the Employee Retirement Income Security Act of 1974 (ERISA), the Board complies with the position taken by the U.S. Department of Labor (DOL) in February 1988. The DOL has stated that the right to vote shares of stock owned by a pension plan is, in itself, an asset of the plan, and therefore the fiduciary's responsibility to manage the assets includes proxy voting. PERA regularly works with various member organizations and federal oversight committees to promote and support national standards of corporate governance that protect long-term investor interests.

Colorado PERA Board's Shareholder Responsibility Committee

To assist the Board in carrying out its fiduciary responsibilities in voting proxies, the Board established a Shareholder Responsibility Committee. PERA's General Counsel serves as an adviser to the Committee. The Board and the Shareholder Responsibility Committee have delegated to its staff in the Corporate Governance and Legal Services Division the authority to execute and vote all proxies according to PERA's Proxy Voting Policy. Proxy issues are reviewed by staff on a case-by-case basis and then voted according to guidelines established by PERA's Proxy Voting Policy. PERA retains proxy advisers to assist in the proxy voting process.

Proxy Voting Policy

PERA's Proxy Voting Policy sets forth directives on a broad range of issues. The voting of proxy ballots for all domestic and non-U.S. stocks is accomplished by PERA's Corporate Governance and Legal Services Department. PERA regularly reviews and revises the Proxy Voting Policy to keep it up to date with established corporate governance standards. PERA's Proxy Voting Policy can be viewed on PERA's website at www.copera.org.

(The Colorado PERA Report on Investment Activity was prepared by internal staff.)

INVESTMENT BROKERS/ADVISERS (INTERNALLY MANAGED ASSETS)

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds

Amherst Pierpont Securities, LLC
Baird (Robert W.) & Co., Inc.
Bank of America Merrill Lynch
Barclays Capital, Inc.
BMO Capital Markets Corp.
BNP Paribas Securities Corp.
Cantor Fitzgerald & Co.
Citigroup Global Markets, Inc.
Credit Suisse Securities (USA), LLC
Deutsche Bank Securities, Inc.
FTN Financial Services Corp.
Goldman Sachs & Co.
HSBC Securities (USA), Inc.
J.P. Morgan Securities, Inc.
Jefferies & Co., Inc.
Jones Trading Institutional Services, LLC
Keybanc Capital Markets, Inc.
Liquidnet, Inc.
Loop Capital Markets, LLC
MarketAxess Corp.
Mitsubishi UFJ Securities (USA), Inc.
Mizuho Securities USA, Inc.
Morgan Stanley & Co., Inc.
National Bank of Canada
Nomura Securities International, Inc.
RBC Capital Markets Corp.
RBS Securities, Inc.
Sanford C. Bernstein & Co., LLC
SG Americas Securities, LLC
State Street Global Markets, LLC
Stifel, Nicolaus & Company, Inc.
Sumitomo Mitsui Banking Corp.
Sun Trust Robinson Humphrey, Inc.
Susquehanna International Group, LLC
The Bank of NewYork Mellon Corp.
The Northern Trust Company
Themis Trading, LLC
U.S. Bancorp
UBS Securities, LLC
Wells Fargo Securities, LLC

Note: A list of investment managers is available upon request.

SCHEDULE OF COMMISSIONS[1]

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds
For the Year Ended December 31, 2018

(Dollars in Thousands)

	Internally Managed Investments		Externally Managed Investments		
Asset Class	Commissions	Percentage of Asset Class	Commissions	Percentage of Asset Class	Total Commissions
Global Equity	$935	74%	$3,810	26%	**$4,745**
Fixed Income[2]	16,298	88%	3,180	12%	**19,478**
Total commissions	**$17,233**		**$6,990**		**$24,223**

[1] Does not include commingled funds or commissions within Private Equity, Real Estate, and the Opportunity Fund.

[2] Fixed Income commissions are estimated.

SCHEDULE OF INVESTMENT EXPENSES

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds
For the Year Ended December 31, 2018

(Dollars in Thousands)

Total investment expenses for internal and external management of PERA's $45.1 billion (actual dollars) investment portfolio were $168,193 representing about 37 basis points. By judiciously combining internal and external management of PERA's investment portfolio, PERA is able to invest at a relatively low cost.

	Investment Expense[1]
Global Equity	$27,885
Fixed Income	2,585
Private Equity	54,183
Real Estate	44,669
Opportunity Fund	17,875
Cash and Short-Term Investments	470
Total External Manager Expenses	**147,667**
Internal Manager Expenses	18,688
Other Investment Expenses and Custody Fees	1,838
Total Investment Expenses	**$168,193**

[1] See the Investment Summary on page 147 for information about fair value of investments.

SCHEDULE OF INVESTMENT INCOME AND EXPENSE BY ASSET CLASS

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds
For the Year Ended December 31, 2018

(Dollars in Thousands)

Asset Class	Net Appreciation/ (Depreciation) in Fair Value[1]	Interest and Dividends	Net Operating Income[2]	Investment Expenses[3]	Net Securities Lending Income	Net Investment Income/(Loss)
Global Equity	($2,913,058)	$539,864	$—	($37,817)	$8,086	($2,402,925)
Fixed Income	(326,447)	312,391	—	(6,476)	703	(19,829)
Private Equity	316,246	6	39,438	(57,297)	—	298,393
Real Estate	307,569	—	185,516	(46,657)	—	446,428
Opportunity Fund	64,982	—	46,408	(19,449)	—	91,941
Cash and Short-Term Investments	(37,502)	8,333	—	(497)	389	(29,277)
Total	**($2,588,210)**	**$860,594**	**$271,362**	**($168,193)**	**$9,178**	**($1,615,269)**

[1] Global Equity and Fixed Income include realized gain/(loss) recognized on securities sold during 2018, current year unrealized gain/(loss) and unrealized translation gain/(loss), and class action revenue. Private Equity, Real Estate, and Opportunity Fund include current year realized and unrealized gain/(loss), paid carried interest, and adjustments to accrued carried interest as reported by the General Partner.

[2] Private Equity, Real Estate, and Opportunity Fund include investment income and expenses as reported by the General Partner.

[3] Includes external and internal investment management, custody, and other investment expenses.

SCHEDULE OF ALTERNATIVE INVESTMENT CONTRIBUTIONS, DISTRIBUTIONS, AND PAID CARRIED INTEREST

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds
For the Year Ended December 31, 2018

(Dollars in Thousands)

Asset Class	Contributions[1]	Distributions[2]	Paid Carried Interest[3]
Private Equity	$804,304	$1,016,642	$68,697
Real Estate	246,473	564,693	7,390
Opportunity Fund	188,286	132,152	4,070
Total	**$1,239,063**	**$1,713,487**	**$80,157**

[1] Represents money sent to external entities for the purpose of funding alternative investments and/or fees during the current fiscal year.

[2] Represents money or shares of companies received from external entities during the current fiscal year, generally due to PERA receiving its proportionate share of an investment's exited value.

[3] Represents the share of profits paid to external entities due to investment returns surpassing agreed-upon thresholds. Amounts will vary, potentially significantly, from year to year depending on the timing of sales of the underlying investments and the magnitude of the gains. Amounts are based on best available information provided by external entities. Actual results could differ from those amounts.

INVESTMENT SUMMARY

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds

(Dollars in Thousands)

	Fair Value Per Financial Statement December 31, 2018	Reallocation of Investment Amounts[1]	Non-Investment Amounts[2]	Fair Value Per Investment Portfolio December 31, 2018	Interim Asset Allocation Target During 2018[3]	Actual Asset Allocation (Percent of Fair Value) 12/31/18	12/31/17	12/31/16
Global Equity	$23,915,802	$147,509	$—	$24,063,311	53.5%	**53.4%**	57.7%	55.9%
Fixed Income	10,664,505	172,910	—	10,837,415	23.5%	**24.0%**	21.9%	22.7%
Private Equity	3,984,585	1,522	—	3,986,107	8.5%	**8.8%**	8.0%	8.4%
Real Estate	4,355,879	(22,625)	—	4,333,254	8.5%	**9.6%**	8.6%	9.0%
Opportunity Fund	1,615,745	—	—	1,615,745	5.0%	**3.6%**	3.4%	2.6%
Cash and Short-Term Investments								
Operating Cash	83	—	(83)	—				
Cash and Short-Term Investments	416,988	(150,532)	—	266,456	1.0%	**0.6%**	0.4%	1.4%
Net securities lending collateral and obligations	1,430	(1,430)	—	—				
Net investment settlements and income and other liabilities[4]	68,103	(147,354)	79,251	—				
Benefit and interfund receivables and capital assets[5]	204,591	—	(204,591)	—				
Total	**$45,227,711**	**$—**	**($125,423)**	**$45,102,288**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

[1] Investment receivables, payables, accruals, securities lending collateral, securities lending obligations, and cash and short-term investments are allocated back to the investment portfolios that hold them.

[2] Non-investment amounts are not included in the determination of actual investment asset allocation.

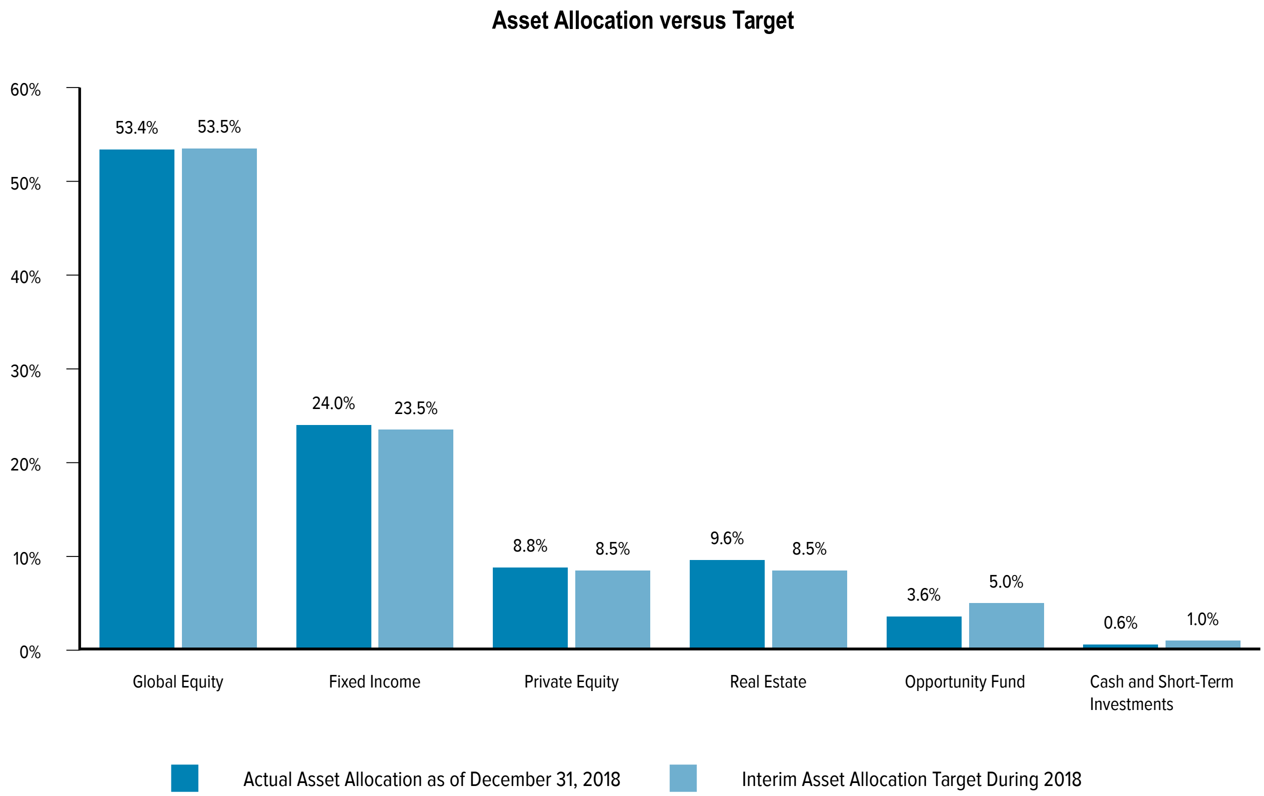
[3] See page 143 for more information about the strategic asset allocation policy of the fund.

[4] Includes non-investment payables of $79,251.

[5] Includes benefit receivables of $190,359, interfund receivables of $408, and capital assets of $13,824.

ASSET ALLOCATION AT FAIR VALUE

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds
As of December 31, 2018



SCHEDULE OF INVESTMENT RESULTS

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds
As of December 31, 2018

Aon provides the investment returns for the fund based on data made available by Northern Trust. Listed below are the annualized one-, three-, five-, and ten-year net-of-fees time-weighted rates of return for each asset class and their respective benchmarks.

	2018	3–Year	5–Year	10–Year
PERA Total Portfolio	**(3.5%)**	6.9%	5.6%	8.8%
Total Fund Policy Benchmark[1]	**(3.6%)**	6.3%	5.0%	8.9%
Median Plan (BNY Mellon Performance and Risk Analytics' and Investment Metrics' Median Public Fund Universe)	**(3.0%)**	6.6%	5.3%	8.9%
Global Equity	**(9.1%)**	7.2%	5.0%	10.5%
Global Equity Custom Benchmark[2]	**(9.9%)**	6.5%	4.2%	10.1%
Fixed Income	**(0.1%)**	2.6%	2.9%	4.3%
Fixed Income Custom Benchmark[3]	**0.1%**	2.7%	2.8%	4.1%
Private Equity	**7.6%**	12.5%	10.7%	12.4%
Private Equity Custom Benchmark[4]	**10.2%**	12.1%	11.4%	16.5%
Real Estate	**11.1%**	10.7%	12.5%	8.1%
Real Estate Custom Benchmark[5]	**7.9%**	7.8%	9.9%	6.7%
Opportunity Fund	**5.6%**	8.1%	4.6%	3.8%
Opportunity Fund Benchmark[6]	**2.2%**	6.0%	3.8%	6.5%
Cash and Short-Term Investments	**2.0%**	1.2%	0.7%	0.6%
ICE BofAML U.S. 3-Month Treasury Bill Index	**1.9%**	1.0%	0.6%	0.4%

Note: Performance calculations were prepared using net-of-fees time-weighted rates of return.

1 The PERA Board adopted benchmarks beginning April 1, 2004, for each of the various asset classes. The adopted benchmarks have changed over time and, accordingly, the benchmark returns presented represent a blend, as follows:

- The Total Fund Policy Benchmark—A combination of 53.5 percent of the Global Equity Custom Benchmark; 23.5 percent of the Fixed Income Custom Benchmark; 8.5 percent of the Private Equity Custom Benchmark; 8.5 percent of the Real Estate Custom Benchmark; 5.0 percent of the Opportunity Fund Benchmark; and 1.0 percent of the ICE BofAML U.S. 3-Month Treasury Bill Index. Prior to July 2016, a combination of 55.0 percent of the Global Equity Custom Benchmark; 24.0 percent of the Fixed Income Custom Benchmark; 7.5 percent of the Real Estate Custom Benchmark; 7.5 percent of the Private Equity Custom Benchmark, 5.0 percent of the Opportunity Fund Benchmark; and 1.0 percent of the ICE BofAML U.S. 3-Month Treasury Bill Index. Prior to July 2015, a combination of 56.0 percent of the Global Equity Custom Benchmark; 25.0 percent of the Fixed Income Custom Benchmark; 7.0 percent of the Real Estate Custom Benchmark; 7.0 percent of the Private Equity Custom Benchmark, and 5.0 percent of the Opportunity Fund Benchmark. Prior to January 2012, a combination of 56.0 percent of the Global Equity Custom Benchmark; 25.0 percent of the Fixed Income Custom Benchmark; 7.0 percent of the Real Estate Custom Benchmark; 7.0 percent of the Private Equity Custom Benchmark, and 5.0 percent of the Public Markets Benchmark. Prior to January 2011, a combination of 58.0 percent of the Global Equity Custom Benchmark; 25.0 percent of the Fixed Income Custom Benchmark; 7.0 percent of the Real Estate Custom Benchmark; 7.0 percent of the Private Equity Custom Benchmark, and 3.0 percent of the Public Markets Benchmark.

2 MSCI ACWI IMI (Net) with USA Gross. Prior to July 1, 2018, MSCI ACWI IMI. Prior to February 1, 2013, 52.0 percent DJ U.S. Total Stock Market Index and 48.0 percent MSCI ACWI ex-U.S. Index. Prior to October 1, 2012, 58.0 percent DJ U.S. Total Stock Market Index and 42.0 percent MSCI ACWI ex-U.S. Index. Prior to April 1, 2012, 64.0 percent DJ U.S. Total Stock Market Index and 36.0 percent MSCI ACWI ex-U.S. Index. Prior to October 1, 2011, 69.0 percent DJ U.S. Total Stock Market Index and 31.0 percent MSCI ACWI ex-U.S. Index. Prior to April 1, 2011, 74.1 percent DJ U.S. Total Stock Market Index (replaced the DJ Wilshire 5000 in 2009) and 25.9 percent MSCI ACWI ex-U.S. Index.

3 Bloomberg Barclays U.S. Aggregate. Prior to August 1, 2018, Bloomberg Barclays U.S. Universal Bond Index. Prior to July 1, 2015, 98.0 percent of the Bloomberg Barclays Capital U.S. Universal Bond Index and 2.0 percent of the Bloomberg Barclays Capital U.S. Long Government/Credit Index. Prior to July 1, 2010, Bloomberg Barclays Capital U.S. Universal Bond Index.

4 The Burgiss Time Weighted Rate of Return Benchmark. Prior to January 1, 2015, the DJ U.S. Total Stock Market Index plus 250 basis points annually. Prior to January 1, 2012, DJ U.S. Total Stock Market Index (replaced the DJ Wilshire 5000 in 2009) plus 300 basis points annually.

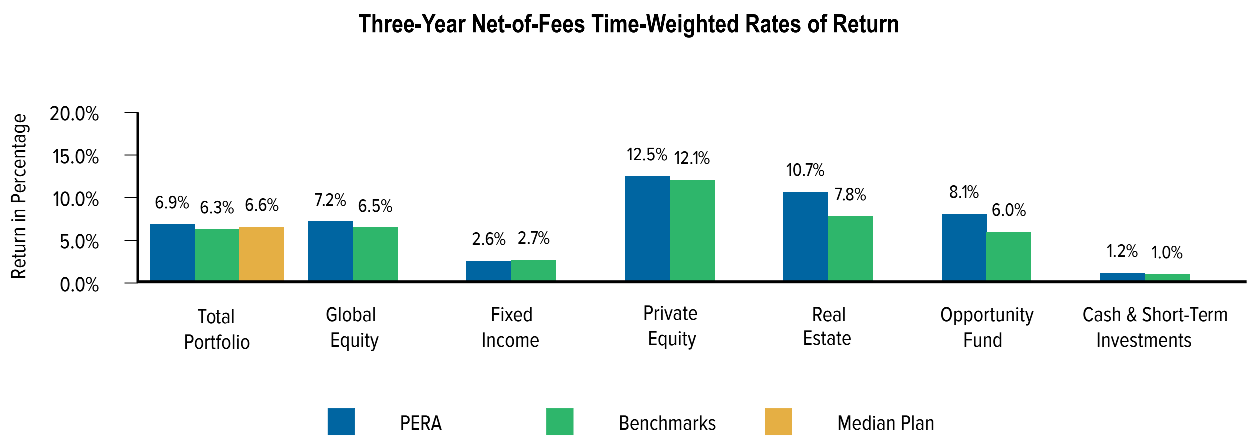
5 NCREIF Open End Diversified Core Equity Index (NFI-ODCE) plus 50 basis points annually. Prior to January 1, 2012, the NFI-ODCE plus 100 basis points annually.

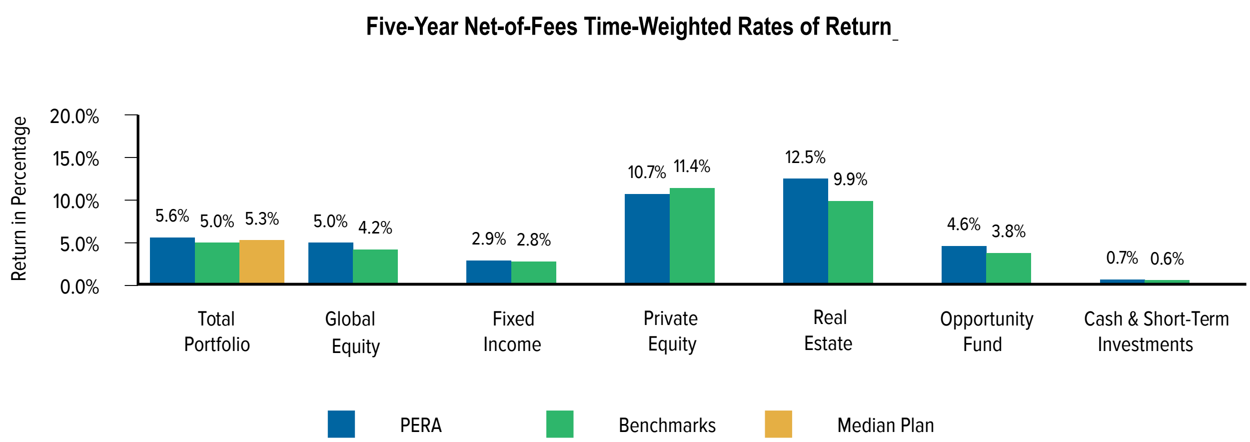
6 A market value weighted aggregate of the benchmarks of the individual strategies included in the Opportunity Fund. (Note, the term "market value" is used in this instance to be consistent with the language approved by the Board. The term "market value" is synonymous with the term "fair value" as used elsewhere in this *CAFR*). Prior to January 1, 2012, a combination of 69.1 percent of the Global Equity Custom Benchmark and 30.9 percent of the Fixed Income Custom Benchmark. Prior to January 1, 2011, a combination of 51.8 percent DJ U.S. Total Stock Market Index (replaced the DJ Wilshire 5000 in 2009), 18.1 percent MSCI ACWI ex-U.S. Index, and 30.1 percent Fixed Income Custom Benchmark.

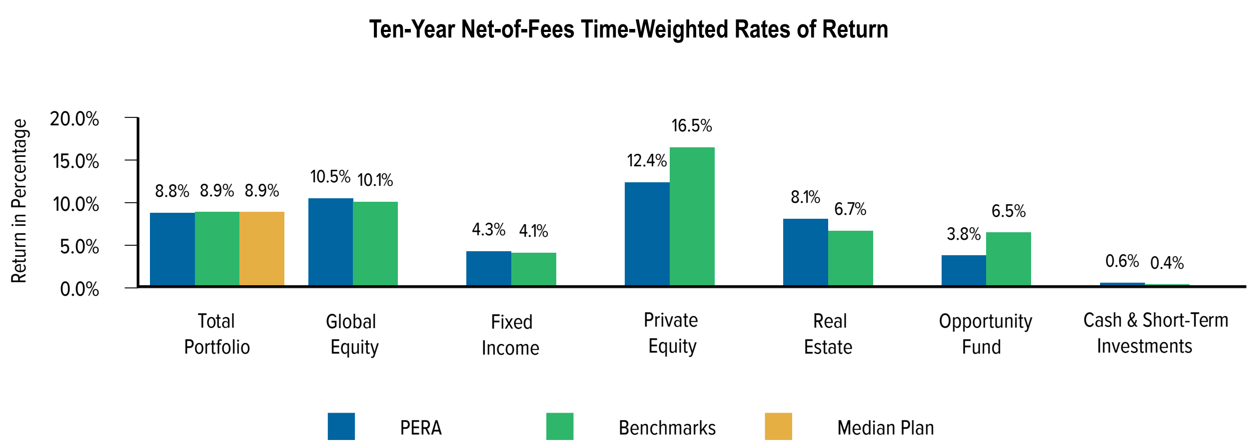
SCHEDULE OF INVESTMENT RESULTS

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds
As of December 31, 2018

Listed below are the three-, five-, and ten-year net-of-fees time-weighted rates of return for the total fund and each asset class and their respective benchmarks.







FUND PERFORMANCE EVALUATION

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds
(Performance returns are net-of-fees unless otherwise indicated)

Evaluation

Aon and Northern Trust are retained by PERA to evaluate fund performance. Aon is also used for the Real Estate portfolio performance evaluation and industry comparisons. In their analysis, Aon and Northern Trust include all investments within the portfolio, including cash and accrued income. They also compute the annual rates of return. In order to provide fund returns inclusive of all asset classes, performance calculations are prepared using time-weighted rates of return and are annualized for periods greater than one year.

Asset Allocation

PERA's long-term strategic asset allocation policy sets forth specific portfolio targets. Interim asset allocation targets effective at the end of 2018, approved by the Board in 2016, are as follows: Global Equity 53.5 percent, Fixed Income 23.5 percent, Private Equity 8.5 percent, Real Estate 8.5 percent, Opportunity Fund 5.0 percent, and Cash 1.0 percent.

Total Portfolio Results

For the year ended December 31, 2018, PERA's total fund returned negative 3.5 percent, outperforming the policy benchmark's return of negative 3.6 percent. PERA adopted a policy benchmark, which is a passive representation of the asset allocation policy, as of April 1, 2004. The total fund has outperformed the policy benchmark on the one-, three-, and five-year time periods and underperformed slightly over the ten-year period.

For the year ended December 31, 2018, the total fund returned negative 3.5 percent, compared to the BNY Mellon Performance and Risk Analytics' and Investment Metrics' Median Public Fund Universe return of negative 3.0 percent. As of December 31, 2018, the BNY Mellon Performance and Risk Analytics' and Investment Metrics' Median Public Fund Universe measure was comprised of 97 public pension funds with assets of approximately $2.3 trillion. The total fund has performed better than the BNY Mellon Performance and Risk Analytics' and Investment Metrics' Median Public Fund Universe over the three- and five-year time periods and underperformed it on the one- and ten-year time periods.

For the year ended December 31, 2018, the total fund returned negative 3.5 percent, compared to a hypothetical portfolio consisting of 60 percent global equities, based on the MSCI ACWI IMI Index, and 40 percent fixed income, based on the Bloomberg Barclay's U.S. Aggregate Bond Index, which collectively returned negative 5.9 percent. The total fund has performed better than this hypothetical portfolio on the one-, three-, five- and ten-year time periods (6.9 percent versus 4.9 percent, 5.6 percent versus 3.7 percent, and 8.8 percent versus 7.5 percent, for the three-, five-, and ten-year time periods, respectively).

Global Equity

During 2018, numerous concerns weighed down global equity markets, including rising interest rates, slowing economic growth, trade wars, U.S. dollar strength, and political uncertainty. The 2017 stock market boom continued into January 2018, as investors brimmed with confidence in light of the Tax Cuts and Jobs Act that Congress passed before the start of the new year. However, investor confidence waned in February, as investors began to express fear after the U.S. Department of Labor reported rising wage growth and the Federal Reserve (Fed) said it expected an uptick in inflation. Throughout the year, concerns about rising inflation and interest rates continued. Political considerations also caused heightened uncertainty and volatility in the markets, as trade tensions with China increased, with both sides threatening to raise tariffs on billions of dollars' worth of products. Global stocks stumbled in the fourth quarter, with an intense retreat by investors that showed little signs of slowing and upended the nearly ten-year bull market. The year-end stock sell-off saddled major equity markets with their worst annual decline since 2008.

U.S. stocks generally outperformed non-U.S. stocks, while emerging markets notably lagged developed markets. The continued strength of the U.S. dollar incrementally hurt emerging market stocks. Much of the world's debt, both company- and government-issued, is borrowed in U.S. dollars. For foreign borrowers, U.S. dollar denominated debt becomes more expensive to repay, which hurts foreign company profits and increases foreign government deficits. This dynamic added to the relative pressure on emerging market stocks, and non-U.S. stocks in general, compared to U.S. stocks.

Utilities and health care were the only two global sectors in positive territory in 2018. They are traditionally referred to as "defensive" sectors because demand for the goods and services they supply is typically not discretionary. Among the worst performing sectors were materials, energy, and industrials. These are traditionally referred to as "cyclical" sectors because demand for the goods and services they supply is typically dependent on the health of the global economy.

In 2018, PERA's Global Equity portfolio returned negative 9.1 percent, outperforming its custom benchmark's return of negative 9.9 percent. The Global Equity portfolio has outperformed its custom benchmark over the one-, three-, five-, and ten-year periods.

Fixed Income

2018 witnessed wide trading ranges for both interest rates and credit spreads driven by a downshift in macro fundamentals combined with heightened global political risks. After strong and coordinated global growth during 2017, the new year brought slower and more disparate

FUND PERFORMANCE EVALUATION

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds
(Performance returns are net-of-fees unless otherwise indicated)

economic performance. The U.S. continued to lead developed markets, while Europe and China slowed more dramatically. Ongoing trade disputes, Brexit negotiations, and tighter monetary policy also weighed on sentiment.

The yield of the 10-year Treasury note traded in a range from a low of 2.4 percent in January to a high of 3.2 percent in November, before finishing the year at 2.7 percent, only modestly higher than where it started. The Fed continued to let their balance sheet run off and raised their target for the Federal Funds rate 1.0 percent over the course of four quarterly hikes. The result was a continued and dramatic flattening of the yield curve, sparking concerns that the curve was signaling an increased probability of a sharp economic slowdown over the next one to three years. In the fourth quarter, markets became concerned that the Fed was tightening monetary policy too rapidly, leading to a dramatic correction in risk assets and a rapid drop in Treasury yields into year-end.

Heightened uncertainty and volatility weighed on the performance of spread products, leading U.S. Treasuries to outperform all other major fixed income sectors. Corporate credit underperformed dramatically amidst elevated corporate leverage and late-cycle dynamics. Investment grade corporate bonds underperformed Treasuries by 315 basis points as credit spreads widened 60 basis points.

During 2018, PERA's Fixed Income portfolio returned negative 0.1 percent, underperforming its custom benchmark's return of 0.1 percent. The portfolio has underperformed its custom benchmark over the one- and three-year time periods and outperformed its custom benchmark over the five- and ten-year time periods.

Private Equity

Private equity investment activity was robust in 2018, posting the highest ever activity by number of deals and second highest activity by total value. Despite weakness in the public equity markets in the fourth quarter, both deal levels and private equity valuations remained high in 2018. Private equity capital reserves, or "dry powder", reached all-time highs, helping propel both private equity buying and selling to elevated levels. Value creation initiatives spurred an active deal environment providing strategic and corporate acquirers, other private equity firms and, to a lesser extent, public markets with increased transaction volume while also providing sellers ample exit routes.

Private equity fundraising declined modestly after near-record levels in prior years, but the trend of fewer managers raising larger funds continued in 2018 with high levels of capital concentration going to a handful of funds. Despite high private equity deal activity, capital raising continued to outpace deployments as institutional investors remained supportive of higher private equity allocations in their portfolios. Private equity sponsors continued to have access to inexpensive financing with favorable terms for most of the year until investor appetite for syndicated loans for private equity deals reversed course late in the fourth quarter.

Venture capital investment activity also continued to be strong in 2018. Consistent with other private equity strategies, venture funds have seen a meaningful increase in funds sizes. Not only has this elevated venture investment activity, it has also enabled longer holding periods for venture-backed companies, negating or delaying the need to access the public markets for fundraising and a path to liquidity.

Cash flow for the year was positive due to significant activity throughout the year. The portfolio paid $804 million in capital calls and received $1.02 billion in distributions for the year.

PERA's Private Equity portfolio returned 7.6 percent in 2018 compared with its custom benchmark's return of 10.2 percent. The portfolio underperformed its custom benchmark over the one-, five-, and ten-year time frames, but outperformed its custom benchmark over the three-year time frame. The portfolio's since inception net internal rate of return as of December 31, 2018, was 10.5 percent compared to its custom benchmark's since inception internal rate of return of 10.2 percent.

Real Estate

In 2018, U.S. real estate transaction volume increased over 15 percent from 2017, driven by several large portfolio and entity level transactions, with activity accelerating in both number and value of institutional grade properties as investors continued to target real estate. While treasury rates increased in 2018, capitalization rates remained consistent across all property types and debt financing remained widely available. The real estate risk premium remained intact in 2018 at approximately 360 basis points over 10-year treasury rates, but the spread continued narrowing toward long-term averages. Real estate equity and debt markets were mostly in sync with broader markets, as stable fundamentals and a positive outlook for slower, but still healthy, economic growth appeared to influence pricing.

Late cycle dynamics have caused investors to be more strategic in their selection process by identifying property in markets with strong income potential, rather than relying on capital markets to drive appreciation. The U.S. continues to be one of the most attractive commercial real estate markets. The industrial sector is experiencing one of the longest expansions on record as it benefits from the impact of e-commerce. The multifamily sector has experienced some weakness in pricing, but while supply remains robust, deliveries have not surpassed demand and the long-term outlook remains favorable. The office sector appears to have plateaued after a period of cyclical expansion, and fundamentals are more balanced than

FUND PERFORMANCE EVALUATION

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds
(Performance returns are net-of-fees unless otherwise indicated)

prior cycles as the job market is nearing full employment. Retail, bolstered by growth in consumer confidence and spending, continues to evolve and become more experience oriented. While supply and demand remain largely in balance due to low deliveries, it remains unclear what long-term impacts e-commerce will have on physical retail stores. Steady real estate fundamentals and widely available global capital should generally lead to increasing, but moderating, property values.

In 2018, the Real Estate portfolio had a total return of 11.1 percent, compared to its custom benchmark's return of 7.9 percent. The Real Estate portfolio has outperformed its custom benchmark over the one-, three-, five-, and ten-year periods.

Opportunity Fund

After years of low interest rates, below average volatility, and steadily rising market returns, the capital markets environment changed dramatically in 2018. Volatility surged, especially in the fourth quarter, driven in part by macroeconomic concerns over decelerating growth, trade policy tensions, negative political headlines, and less accommodative monetary policy. Against this challenging backdrop, the performance of the Opportunity Fund highlights the value of a diversified, multi-asset class portfolio of alternative investments. In a period when many public market asset classes produced negative returns, the Opportunity Fund provided a relative haven from the market volatility experienced during the closing months of the year.

The Opportunity Fund is an actively managed, multi-asset class portfolio, which strives to achieve good risk-adjusted returns with a portfolio mix of various opportunistic private market strategies, real assets (excluding real estate) and risk mitigation strategies that have the ability to dampen market risk.

While private markets are not immune from market turbulence, PERA's opportunistic portfolio continues to mature and increase in value, resulting in attractive returns generated over a medium- to long-term investment horizon. Although private market valuations remain high and significant amounts of capital have been raised over the past several years, there were selective opportunities to identify mispriced niches within the capital markets. Some recent themes include direct lending in the healthcare sector, specialty finance, European distressed credit, and special situations in the energy sector. The less constrained approach of these investment managers provides the flexibility to take advantage of market dislocations.

With higher correlations among public markets during periods of rising volatility and increasing ambiguity surrounding the outlook for inflation, private real assets provided a diversifying return stream. The real assets portfolio had strong performance in 2018 and consisted of investments in developed markets, timberland properties, and cattle feedlot operations across the western United States.

Strategies within the risk mitigation portfolio are constructed to minimize correlation to equity markets and protect capital in down markets. This objective was achieved in 2018 as both the multi-strategy and global macro strategies generated positive returns. Multi-strategy funds had positive returns across a broad range of underlying strategies, and global macro funds took advantage of increased volatility, divergent monetary policies and differing growth outlooks among developed and emerging markets.

In 2018, PERA's Opportunity Fund portfolio returned 5.6 percent compared to its benchmark's return of 2.2 percent. The Opportunity Fund has outperformed its benchmark over the one-, three- and five-year periods, and underperformed its benchmark over the ten-year period.

INVESTMENT SECTION SCHEDULES

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds

(Dollars in Thousands)

PROFILE OF INVESTMENTS IN COLORADO

As of December 31, 2018

	Fair Value
Public Equity[1]	$102,690
Bonds	
Bonds and notes[1]	15,045
Colorado Housing Finance Authority	5,211
Total Bonds	20,256
Real Estate	57,947
Private Equity	
Partnership investments[2]	190,321
Future commitments to Colorado-based general partnerships or funds	93,118
Total Private Equity	283,439
Opportunity Fund	102,586
Total	**$566,918**

1 Companies headquartered in Colorado.

2 Private equity partnership investments domiciled in Colorado.

LARGEST EQUITY HOLDINGS BY FAIR VALUE[1]

As of December 31, 2018

	Shares	Fair Value
Microsoft Corp.	5,000,330	$507,884
Amazon.com, Inc.	336,951	506,090
Apple Inc.	2,891,465	456,100
Alphabet Inc.	337,466	352,638
Visa Inc.	1,749,261	230,797
Johnson & Johnson	1,521,705	196,376
JP Morgan Chase & Co.	1,980,804	193,366
Facebook Inc.	1,448,875	189,933
Honeywell Intl. Inc.	1,257,558	166,149
Costco Wholesale Corp.	801,701	163,315

1 Does not include commingled funds.

Note: A complete list of holdings is available upon request.

INVESTMENT SECTION SCHEDULES

Does Not Include the Two Defined Contribution Pension and Deferred Compensation Trust Funds

(Dollars in Thousands)

LARGEST FIXED INCOME HOLDINGS BY FAIR VALUE[1]

As of December 31, 2018

	Par Value	Income Rate	Maturity Date	Fair Value
US Treasury Notes	$260,000	1.750%	5/15/23	$251,936
US Treasury Notes	225,000	2.875%	5/15/28	228,454
US Treasury Notes	215,000	2.625%	8/15/20	215,302
US Treasury Notes	170,000	1.125%	3/31/20	167,045
US Treasury Bonds	170,000	2.500%	2/15/46	153,478
US Treasury Notes	150,000	1.375%	1/31/20	148,037
US Treasury Notes	150,000	1.250%	2/29/20	147,691
US Treasury Notes	142,000	1.250%	7/31/23	134,295
US Treasury Bonds	100,000	4.625%	2/15/40	126,734
US Treasury Notes	118,000	2.750%	2/15/24	119,263

[1] Does not include commingled funds.

Note: A complete list of holdings is available upon request.

VOLUNTARY INVESTMENT PROGRAM, DEFINED CONTRIBUTION RETIREMENT PLAN, AND DEFERRED COMPENSATION PLAN (PLANS) REPORT ON INVESTMENT ACTIVITY

(Dollars in Thousands)

Overview

PERA established the Voluntary Investment Program (PERAPlus 401(k) Plan) on January 1, 1985, under Section 401(k) of the Internal Revenue Code (IRC). The Defined Contribution Retirement Plan (DC Plan) was established January 1, 2006, as an IRC § 401(a) governmental profit-sharing plan. On July 1, 2009, PERA assumed the administrative and fiduciary responsibility for the State of Colorado Deferred Compensation Plan, now known as the PERAPlus 457 Plan. PERA publishes an Annual Report for the PERAPlus 401(k), the DC Plan, and the PERAPlus 457 Plan and distributes it to all plan participants.

The PERAPlus 401(k) Plan includes voluntary contributions made by employees of PERA-affiliated employers in the State, School, Local Government, Judicial, and Denver Public Schools Division Trust Funds. These contributions are entirely separate from those that members make to the defined benefit plan each month. On December 31, 2018, the PERAPlus 401(k) Plan had a fiduciary net position (FNP) of $3,042,128 and 68,700 accounts, representing decreases of 7.12 percent in the FNP and 0.28 percent in the number of accounts from December 31, 2017.

The DC Plan offers a defined contribution alternative to the PERA defined benefit plan for certain new employees of State agencies and departments, most community colleges, and the District Attorney within each Judicial District, and if authorized by the county and the District Attorney, the attorneys within each Judicial District. Pursuant to C.R.S. section 24-51-1501(4), DC Plan eligibility was extended to certain new employees in the Local Government Division and certain new classified employees at State Colleges and Universities beginning on January 1, 2019 (see Note 1 of the Notes to the Financial Statements in the Financial Section for additional details). On December 31, 2018, the DC Plan had a FNP of $205,786 and 6,363 accounts, representing a decrease of 2.51 percent in the FNP and an increase of 4.36 percent in the number of accounts from December 31, 2017.

The PERAPlus 457 Plan includes voluntary contributions made by employees working for a PERA-affiliated employer that have also affiliated with the PERAPlus 457 Plan. The employees of some employers that had affiliated with the State of Colorado Deferred Compensation Plan prior to July 1, 2009, and were not affiliated with PERA, remain eligible to contribute. On December 31, 2018, the PERAPlus 457 Plan had a FNP of $818,223 and 18,479 accounts, representing a decrease of 5.47 percent in the FNP and an increase of 1.47 percent in the number of accounts from December 31, 2017.

PERAPLUS 401(K) PLAN YEAR-END STATISTICS

Year	Fiduciary Net Position	Number of Accounts	Actively Contributing Participants[1]
2009	$1,674,861	75,819	36,270
2010	1,902,325	73,860	33,740
2011	1,891,347	71,620	28,859
2012	2,105,675	69,559	26,406
2013	2,509,750	68,691	26,022
2014	2,682,000	68,270	25,481
2015	2,644,099	68,791	25,726
2016	2,829,663	68,752	25,263
2017	3,275,171	68,891	24,796
2018	**3,042,128**	**68,700**	**24,557**

[1] Defined as contributing within the last three months of the year.

DC PLAN YEAR-END STATISTICS

Year	Fiduciary Net Position	Number of Accounts	Actively Contributing Participants[1]
2009	$37,475	3,039	1,716
2010	53,384	3,479	1,850
2011	63,597	4,029	2,080
2012	83,267	4,362	2,099
2013	113,500	4,719	2,216
2014	131,466	5,046	2,261
2015	141,026	5,403	2,357
2016	167,406	5,761	2,373
2017	211,089	6,097	2,370
2018	**205,786**	**6,363**	**2,407**

[1] Defined as contributing within the last three months of the year.

PERAPLUS 457 PLAN YEAR-END STATISTICS

Year	Fiduciary Net Position	Number of Accounts	Actively Contributing Participants[1]
2009	$393,352	18,007	9,057
2010	458,881	18,215	9,916
2011	483,965	17,821	10,004
2012	544,518	17,469	9,469
2013	643,602	17,462	9,469
2014	689,451	17,738	9,551
2015	691,676	17,814	9,323
2016	751,682	17,921	9,107
2017	865,599	18,211	9,209
2018	**818,223**	**18,479**	**9,189**

[1] Defined as contributing within the last three months of the year.

VOLUNTARY INVESTMENT PROGRAM, DEFINED CONTRIBUTION RETIREMENT PLAN, AND DEFERRED COMPENSATION PLAN (PLANS) REPORT ON INVESTMENT ACTIVITY

Outline of Investment Policies

Objectives

The Board is responsible for approving an appropriate range of investments that addresses the needs of the participants in the Plans. The objectives of selecting the investment options under each Plan are to:

- Provide a wide range of investment opportunities in various asset classes so as to allow for diversification and to cover a wide risk/return spectrum.
- Maximize returns within reasonable and prudent levels of risk.
- Provide returns comparable to returns for similar investment options.
- Control administrative and management costs to the plan and participants.

Responsibilities

The Investment Advisory Committee (IAC), a committee of internal management staff, monitors and evaluates the investment asset classes and the underlying portfolio asset mix and allocation range for each investment option. The IAC also monitors and evaluates the portfolio managers and other service providers. RVK, Inc. serves as consultant to the IAC and the Benefits Committee.

Recommendations of the IAC are presented to PERA's Executive Director and Chief Investment Officer. Upon their concurrence, the recommendations are presented to the Board for consideration if required by the investment policy.

The Board is responsible for:

- The oversight of the Plans and portfolio composition.
- Approving changes to the plan documents.
- Approving the investment policies and amendments thereto.
- Accepting or rejecting the IAC's recommendations with regard to policies, objectives, specific investment options, and service providers.

PERAdvantage Investment Options

The PERAdvantage investments provide diversification within each of the six primary funds, one additional specialized fund, and ten target retirement date funds. The PERAdvantage investments simplify choices, increase diversification, and help participants identify investments based on how the fund invests the money rather than name familiarity. In addition, the Plans also provide a self-directed brokerage account for participants to select their own investments.

Participants invest assets in one or more of the following investments:

Primary Investment Options

PERAdvantage Capital Preservation Fund

The fund seeks to provide consistent investment income with a stable net asset value primarily by investing in a portfolio of high-quality, medium-term fixed income securities. This fund invests in securities issued by the U.S. Government or one of its agencies, including agency mortgage bonds, as well as high-grade corporate bonds. Since the underlying fixed income investments fluctuate in fair value with changes in the market, the portfolio is paired with one or more insurance contracts offered by high-quality insurance companies to provide a more stable return and to offer participants the ability to withdraw or transfer their funds subject to plan rules without any fair value risk or other penalty for premature withdrawal. The fund is managed by GW Capital Management, LLC.

PERAdvantage Fixed Income Fund

The fund seeks to generate income, preserve capital, and provide long-term capital appreciation by investing in a diversified portfolio of fixed-income instruments of varying maturities. The fund objective is to combine actively managed core and passive core styles. The fund is managed by BlackRock (targeted at 50 percent of the portfolio) and Wells Fargo Asset Management (targeted at 50 percent of the portfolio).

PERAdvantage Real Return Fund

The fund seeks to provide broad exposure to real assets and U.S. Treasury Inflation Protected Securities (TIPS) and to produce a return over a full market cycle that exceeds the rate of inflation. The fund invests in U.S. TIPS, Real Estate Investment Trusts (REITs), global commodity and natural resource stocks, and commodities. State Street Global Advisors manages the fund.

PERAdvantage U.S. Large Cap Stock Fund

The fund seeks to provide long-term capital appreciation and dividend income primarily by investing in the common stock of companies located in the United States with large market capitalizations similar to those found in the Russell 1000™ Index. The fund combines active and passive management styles. The fund is 100 percent managed by PERA. Securities lending for assets held in the fund was implemented in 2018. See "2018 Changes" on the next page.

PERAdvantage International Stock Fund

The fund seeks to provide long-term capital appreciation and dividend income primarily by investing in the common stock of companies located outside the United States. The fund invests in a wide array of non-U.S. stocks similar to those found in the MSCI All Countries World

VOLUNTARY INVESTMENT PROGRAM, DEFINED CONTRIBUTION RETIREMENT PLAN, AND DEFERRED COMPENSATION PLAN (PLANS) REPORT ON INVESTMENT ACTIVITY

Index (ACWI) ex-U.S. Index. The fund combines a fundamental process focused on investing in high-quality businesses and a quantitative strategy that invests based on quality, market, and value factors.

The fund is managed by Schroder Investment Management (targeted at 60 percent of the portfolio), and PERA (targeted at 40 percent of the portfolio). Securities lending for assets held in the fund was implemented in 2018. See "2018 Changes" to the right.

PERAdvantage U.S. Small and Mid Cap Stock Fund

The fund seeks to provide long-term capital appreciation and dividend income primarily by investing in the common stock of companies located in the United States with small and mid-market capitalizations similar to the securities included in the Russell 2500™ Index. The fund combines growth and value investment styles and active and passive management styles. The fund is managed by TimesSquare Capital Management (targeted at 35 percent of the portfolio), Dimensional Fund Advisors (targeted at 35 percent of the portfolio), and BlackRock (targeted at 30 percent of the portfolio).

Additional Investment Options

PERAdvantage Target Retirement Date Funds

There are ten funds with varying asset mixes and risk levels based on expected retirement date. Each of the funds is invested in the corresponding BlackRock LifePath® Index Target Retirement Date Fund. These funds use passive management strategies and become more conservative as the retirement date approaches. BlackRock manages the funds.

PERAdvantage Socially Responsible Investment (SRI) Fund

The fund seeks to invest in a portfolio of developed market stocks screened on environmental, social, and governance (ESG) factors, and U.S. government fixed income securities. The equity portion seeks to replicate the return of the MSCI World ESG Index. The fixed income portion invests in U.S. Government securities, and may invest a significant portion or all of its assets in mortgage-backed securities. The fund is managed by Northern Trust Investments (targeted at 60 percent of the portfolio), and J.P. Morgan Asset Management (targeted at 40 percent of the portfolio).

TD Ameritrade Self-Directed Brokerage Account

This account allows selection from numerous mutual funds and other types of securities, such as stocks and bonds, for an additional fee. Investment in the self-directed brokerage account is offered through TD Ameritrade, a Division of TD Ameritrade, Inc.

2018 Changes

During December 2018, the portions of the PERAdvantage International Stock Fund managed by Harding Loevner (targeted at 35 percent of the portfolio) and Dodge & Cox (targeted at 35 percent of the portfolio) were reallocated to Schroder Investment Management and a PERA managed portfolio.

During the last two months of 2018, PERA utilized Deutsche Bank AG, New York Branch to implement securities lending for assets held in the PERAdvantage U.S. Large Cap Stock Fund and PERAdvantage International Stock Fund.

An asset-based fee was lowered from up to 0.07 percent in 2017 to up to 0.03 percent in 2018 on each underlying PERAdvantage portfolio. See "Administrative Fees" below.

Loans

Participants in the PERAPlus 401(k) and PERAPlus 457 Plans may access their funds through loans as allowed under plan policy and the Internal Revenue Service. The DC Plan prohibits participant loans.

Administrative Fees

Plan administrative fees pay for recordkeeping, custodial services, consulting, and internal PERA administrative expenses.

The administrative fee consists of a flat $1.00 per month per participant per plan and an asset-based fee of up to 0.03 percent on each underlying PERAdvantage portfolio. Investments with revenue sharing reduce the asset-based administrative fee by the amount of such revenue sharing.

(The Colorado PERA Report on Investment Activity was prepared by internal staff.)

VOLUNTARY INVESTMENT PROGRAM, DEFINED CONTRIBUTION RETIREMENT PLAN, AND DEFERRED COMPENSATION PLAN (PLANS) SCHEDULE OF INVESTMENT RESULTS

Fund/Benchmark	2018	3-Year	5-Year
PERAdvantage Capital Preservation Fund	**2.0%**	1.9%	1.9%
Hueler Stable Value Index (Equal Wtd Avg)	**2.2%**	2.0%	1.9%
PERAdvantage Fixed Income Fund	**(0.2%)**	2.0%	2.4%
Bloomberg Barclays U.S. Aggregate Bond Index	**0.0%**	2.1%	2.5%
PERAdvantage Real Return Fund	**(5.5%)**	3.9%	0.1%
70% SSgA Real Asset Strategy[1]/30% Bloomberg Barclays U.S. TIPS Index	**(5.3%)**	4.1%	0.3%
PERAdvantage U.S. Large Cap Stock Fund	**(4.5%)**	8.9%	7.9%
Russell 1000™ Index	**(4.8%)**	9.1%	8.2%
PERAdvantage International Stock Fund	**(16.1%)**	4.4%	1.0%
MSCI ACWI Ex-US Index	**(14.2%)**	4.5%	0.7%
PERAdvantage U.S. Small and Mid Cap Stock Fund	**(12.5%)**	5.7%	3.3%
Russell 2500™ Index	**(10.0%)**	7.3%	5.2%
PERAdvantage SRI Fund	**(4.0%)**	4.6%	3.8%
SRI Fund Custom Index[2]	**(4.1%)**	4.4%	3.6%
PERAdvantage Income Fund	**(3.6%)**	4.0%	3.1%
BlackRock LifePath® Retirement Index	**(3.5%)**	4.1%	3.2%
PERAdvantage 2020 Fund	**(4.0%)**	4.5%	3.4%
BlackRock LifePath® 2020 Index	**(3.9%)**	4.6%	3.6%
PERAdvantage 2025 Fund	**(4.9%)**	5.0%	3.8%
BlackRock LifePath® 2025 Index	**(4.9%)**	5.0%	3.9%
PERAdvantage 2030 Fund	**(5.8%)**	5.5%	4.0%
BlackRock LifePath® 2030 Index	**(5.8%)**	5.5%	4.1%
PERAdvantage 2035 Fund	**(6.5%)**	5.9%	4.3%
BlackRock LifePath® 2035 Index	**(6.6%)**	5.8%	4.3%
PERAdvantage 2040 Fund	**(7.3%)**	6.3%	4.5%
BlackRock LifePath® 2040 Index	**(7.3%)**	6.2%	4.5%
PERAdvantage 2045 Fund	**(7.9%)**	6.4%	4.6%
BlackRock LifePath® 2045 Index	**(8.0%)**	6.3%	4.6%
PERAdvantage 2050 Fund	**(8.1%)**	6.5%	4.6%
BlackRock LifePath® 2050 Index	**(8.3%)**	6.3%	4.7%
PERAdvantage 2055 Fund	**(8.2%)**	6.5%	4.6%
BlackRock LifePath® 2055 Index	**(8.3%)**	6.3%	4.7%
PERAdvantage 2060 Fund	**(8.2%)**	6.4%	N/A
BlackRock LifePath® 2060 Index	**(8.3%)**	6.3%	N/A

Note: Performance is net of management and administrative fees. Performance is calculated using time-weighted net asset values. All performance is calculated by RVK, Inc.

1 Index consists of 25 percent Bloomberg Barclays U.S. TIPS Index; 15 percent Dow Jones U.S. Select REIT Index; 25 percent Bloomberg Roll Select Commodity Index; 25 percent S&P Global LargeMidCap Commodity and Resources Index; and 10 percent S&P Global Infrastructure Index.

2 The SRI Fund Custom Index consists of 60 percent MSCI World ESG Index (Net) and 40 percent Bloomberg Barclays U.S. Government Bond Index.

VOLUNTARY INVESTMENT PROGRAM, DEFINED CONTRIBUTION RETIREMENT PLAN, AND DEFERRED COMPENSATION PLAN (PLANS) INVESTMENT SUMMARY

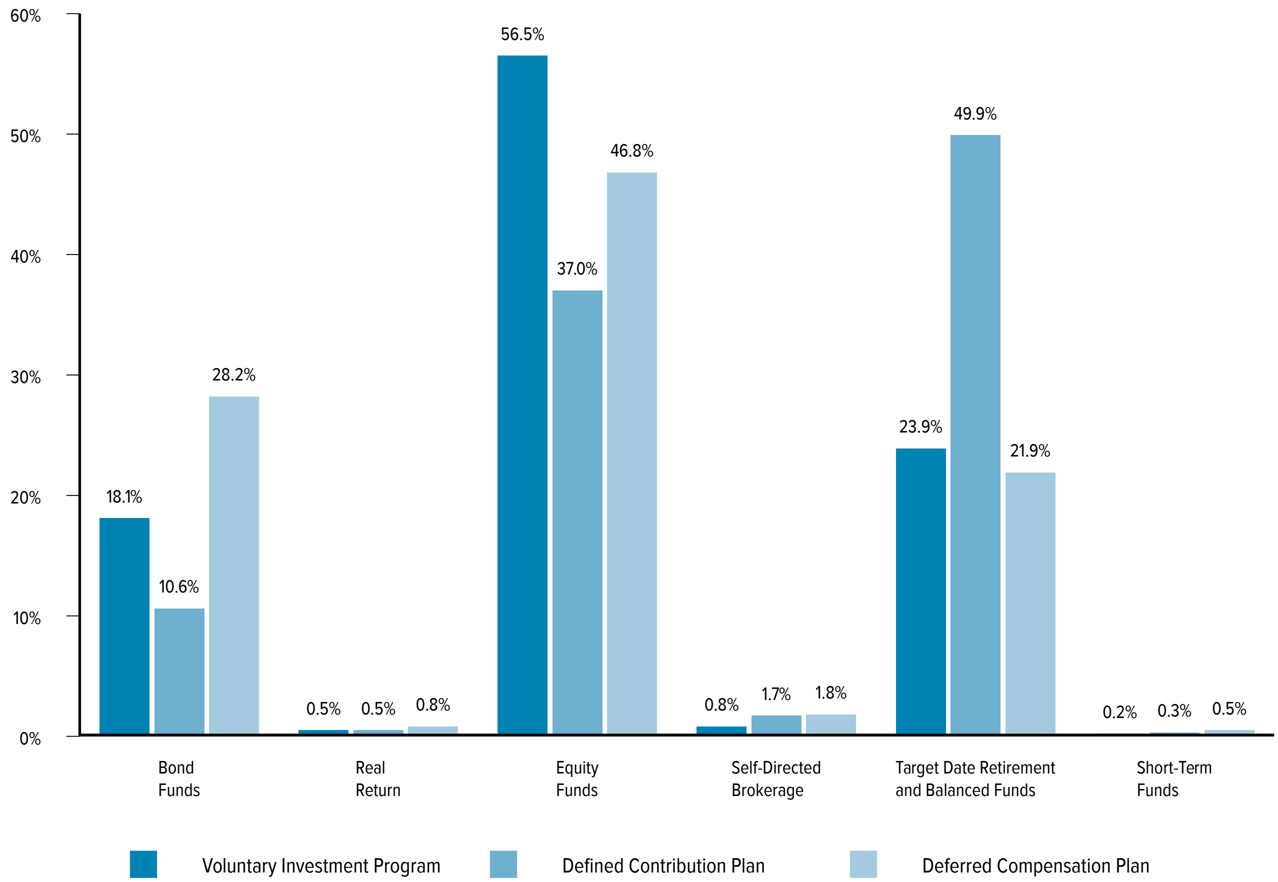
(Dollars in Thousands)

	Fair Value as of December 31, 2018		
Fund	Voluntary Investment Program	Defined Contribution Retirement Plan	Deferred Compensation Plan
PERAdvantage Capital Preservation Fund[1]	$280,883	$11,529	$158,923
PERAdvantage Fixed Income Fund	256,387	9,746	66,893
Bond Funds	**537,270**	**21,275**	**225,816**
PERAdvantage Real Return Fund	15,934	1,069	6,096
Real Return	**15,934**	**1,069**	**6,096**
PERAdvantage U.S. Large Cap Stock Fund	1,261,201	35,892	191,477
PERAdvantage International Stock Fund	249,058	17,473	83,465
PERAdvantage U.S. Small and Mid Cap Stock Fund	164,989	20,565	99,751
Equity Funds	**1,675,248**	**73,930**	**374,693**
PERAdvantage SRI Fund	15,686	915	5,378
PERAdvantage Income Fund	114,288	5,894	25,128
PERAdvantage 2020 Fund	108,234	7,638	26,856
PERAdvantage 2025 Fund	126,183	8,225	33,565
PERAdvantage 2030 Fund	103,144	10,289	23,466
PERAdvantage 2035 Fund	90,377	10,396	22,965
PERAdvantage 2040 Fund	60,769	12,652	15,934
PERAdvantage 2045 Fund	40,343	19,095	9,481
PERAdvantage 2050 Fund	28,007	15,130	6,357
PERAdvantage 2055 Fund	17,799	8,022	3,933
PERAdvantage 2060 Fund	4,474	1,591	2,134
Target Retirement Date and Balanced Funds	**709,304**	**99,847**	**175,197**
TD Ameritrade Insured Deposit Account	4,663	613	4,062
Short-Term Funds	**4,663**	**613**	**4,062**
TD Ameritrade Self-Directed Brokerage Account	23,153	3,303	14,782
Self-Directed Brokerage	**23,153**	**3,303**	**14,782**
Total	**$2,965,572**	**$200,037**	**$800,646**

[1] The Stable Value Fund in the PERAdvantage Capital Preservation Fund is reported at contract value.

VOLUNTARY INVESTMENT PROGRAM, DEFINED CONTRIBUTION RETIREMENT PLAN, AND DEFERRED COMPENSATION PLAN (PLANS) INVESTMENT SUMMARY

Asset Breakdown as of December 31, 2018



COLORADO PERA®

ACTUARIAL SECTION

ACTUARY'S CERTIFICATION LETTER

Segal Consulting

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T 312.984.8537 www.segalco.com

June 12, 2019

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

Re: **Actuarial Certification of PERA Division and Health Care Trust Funds**

Dear Members of the Board:

Per the "Colorado PERA Defined Benefit Pension Plan Funding Policy", adopted by the Board of Trustees on March 20, 2015 and most recently revised on November 16, 2018 and the "Colorado PERA Defined Benefit OPEB Plan Funding Policy", adopted by the Board of Trustees on January 19, 2018, the main funding objectives of the Public Employees' Retirement Association of Colorado (Colorado PERA) are:

- Preservation of the defined benefit plan structure,
- Demonstration of transparency and accountability,
- Achievement of a funded ratio greater than or equal to 110%,
- Balance of contribution rate stability and intergenerational equity,
- Reduction of Unfunded Actuarial Accrued Liabilities, and
- Recognition of beneficial elements of pooled risk.

With these goals in mind, an annual actuarial valuation is performed as a measure of the progress towards them. The most recent valuations are based on the plan provisions and actuarial assumptions and methods in effect on December 31, 2018. The valuation reflects change to the Local Government Division enacted by HB 19-1217, which allows the 8.0% member contribution rate to continue without any scheduled increases as initially adopted under SB 18-200. In completing the valuation of the five defined benefit pension plans, referred to as the Division Trust Funds, and the two defined benefit Other Post-employment Benefit plans, referred to as the Health Care Trust Funds (HCTFs), Segal Consulting (Segal) relied on membership and financial data provided by Colorado PERA. We have reviewed this data for reasonableness, and made some general edit checks to impute certain information that may not have been provided with the original employee data. We have not audited this data, but we have reconciled the data used in the prior year's valuation with this current valuation data.

ACTUARY'S CERTIFICATION LETTER

Board of Trustees
June 12, 2019
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This valuation reflects the following changes from the prior valuation including:

- The methodology used to calculate the actuarially determined contribution for the Division Trust Funds was revised to better align the 30-year period to achieve 100% funding as targeted through the enactment of SB 18-200. Therefore, the legacy unfunded actuarial accrued liability as of December 31, 2017, is being amortized over a closed 30-year period, with 29 years remaining as of December 31, 2018.

- HB 19-1217 allows the members of the Local Government Division to continue to contribute 8.0%, without any scheduled increases as initially adopted under SB 18-200.

- Changes to plan provisions required by SB 18-200 were first recognized in the December 31, 2017, actuarial valuation for funding purposes. SB 18-200 reforms will be recognized, as appropriate, in the current and future actuarial valuations commensurate with or following the coordinating effective dates of each reform.

- Changes to retiree health care plan options and related health care cost, trend and morbidity assumptions.

In our opinion, the assumptions are individually reasonable, taking into account the experience of the Division Trust Funds and the HCTFs and reasonable expectations, are internally consistent, and, in combination, offer our best estimate of anticipated experience affecting the Division Trust Funds and the HCTFs.

Future actuarial results may differ significantly from the current results 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.

Additionally, retiree group benefits models necessarily rely on the use of approximations and estimates, and are sensitive to changes in these approximations and estimates. Small variations in these approximations and estimates may lead to significant changes in actuarial measurements. 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.

ACTUARY'S CERTIFICATION LETTER

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Segal provided the following information and/or schedules for the December 31, 2018 CAFR:

Financial Section

- Prepared for the Division Trust Funds and HCTFs
  - Yearly Contribution Deficiency
  - Required Discount Rate Sensitivity Information providing the Net Pension Liability and the Net OPEB Liability at a discount rate that is one percentage point lower and one percentage point higher than the discount rate at Measurement Date
  - Membership Data
  - Notes to Required Supplementary Information
- Prepared for the Division Trust Funds Only
  - Average Monthly Benefit By Division – for 2018, considering entire retired population and those retiring in 2018
  - Required Supplementary Information
    - Schedule of Changes in Net Pension Liability
    - Schedule of the Net Pension Liability
    - Schedule of Employer Contributions
- Prepared for the HCTFs Only
  - Required Health Care Cost Trend Rate Sensitivity Information at health care cost trend rates that are one percentage point lower and one percentage point higher than the health care cost trend rates applied at Measurement Date.
  - Participation Data
  - Required Supplementary Information
    - Schedule of Changes in Net OPEB Liability
    - Schedule of the Net OPEB Liability
    - Schedule of Employer Contributions

Actuarial Section

- Prepared for the Division Trust Funds and HCTFs
  - Schedule of Retirees and Beneficiaries Added to and Removed from the Benefit Payroll
  - Solvency Test
  - Schedule of Funding Progress
  - Analysis of Financial Experience
  - Schedule of Gains and Losses in Accrued Liabilities and Reconciliation of Unfunded Actuarial Accrued Liabilities
  - Schedule of Computed Employer Contribution Rates for the 2020 Fiscal Year
  - Actuarial Statistics
  - Actuarially Determined Contributions (ADCs)
  - Alternative ADCs using 25-year, 20-year and 15-year amortization periods
  - Funded Ratios
  - Funded Ratio, Unfunded Actuarial Accrued Liability and Actuarially Determined Contributions using 6.25%, 7.25% and 8.25% investment return assumptions
  - Schedule of Active Member Actuarial Valuation Data
- Prepared for the Division Trust Funds Only
  - Member – Retiree Comparison

ACTUARY'S CERTIFICATION LETTER

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Statistical Section

- Prepared for the Division Trust Funds and HCTFs
  - Schedule of Average Benefit Payments
- Prepared for the Division Trust Funds Only
  - Member and Benefit Recipient Statistics
  - Breakdown of Membership by Tiers
  - PERA Benefit Payments
    - Benefit Payments by Benefit Range
    - Benefit Payments by Benefit Range including RBA amounts
    - Benefit Payments by Decile
  - Schedule of Average Retirement Benefits Payable by Year of Retirement
    - For all retirees
    - For members who retired during the year
  - Schedule of Retirees and Survivors by Types of Benefits

In aggregate, the Division Trust Funds have a funded ratio of 60% based on the Actuarial Value of Assets and 58% based on the Market Value of Assets. For the HCTFs combined, the funded ratios are 20% on both an Actuarial Value of Assets basis and on a Market Value of Assets basis.

The results indicate that for all Division Trust Funds, other than the Denver Public Schools Division, the combined employer and member contribution rates, along with the annual $225 million direct distribution from the State Treasury, are sufficient to fund the normal cost for all members, the unfunded actuarial accrued liability, the Annual Increase Reserve (AIR) Fund, and provide additional contributions to help finance both Health Care Trust Funds.

The resulting amortization periods for each division as of December 31, 2018, recognizing future increases to member contributions and the Amortization Equalization Disbursement (AED) and the Supplemental Amortization Equalization Disbursement (SAED), are shown in the following table:

Division Trust Fund	Amortization Period[1]
State Division	35 years
School Division	37 years
Local Government Division	37 years
Judicial Division	23 years
Denver Public Schools Division	Infinite

[1] Calculations completed on an actuarial valuation basis with a closed population (i.e., based upon the membership, normal cost rate and unfunded accrued actuarial liability as of December 31, 2018)

ACTUARY'S CERTIFICATION LETTER

Board of Trustees
June 12, 2019
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At the direction of PERA, Segal has prepared deterministic financial projections for all Division Trust Funds with the lower cost benefit structure for new members and using the following assumptions:

- All actuarial assumptions, including achieving 7.25% investment returns are realized
- Performed on an open-group basis with assumed active membership growth, as follows:
  - For State, School and Denver Public Schools – 1.25% each year
  - For Local Government and Judicial — 1.00% per year

These projections[2] indicate that the goal of funding 100% of the actuarial accrued liability under the PERA revised benefit structure created by SB 18-200, is achievable within a projection period of 34 years when including the anticipated adjustments to take effect July 1, 2020, resulting from the automatic adjustment provisions (AAP). The projected number of years until each division is expected to be 100% funded is follows:

Division Trust Fund	Projected Years Until 100% Funded	Projected Years Until 100% Funded Including the Anticipated AAP
State Division	33 years	28 years
School Division	41 years	34 years
Local Government Division	40 years	29 years
Judicial Division	24 years	21 years
Denver Public Schools Division	20 years	17 years

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

Actuarial computations presented in the December 31, 2018 actuarial valuation report are for purposes of determining the actuarially determined contribution rates and evaluating the funding of the Division Trust Funds and HCTFs. Determinations for purposes other than meeting these requirements may be significantly different from the results shown in the December 31, 2018 actuarial valuation reports.

[2] Completed on a projected basis with an open, increasing population (i.e., active members expected to retire, terminate, or die are replaced by new members who will accrue benefits under a lower cost basis)

ACTUARY'S CERTIFICATION LETTER

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We also prepared actuarial computations as of December 31, 2018 for purposes of fulfilling financial accounting requirements for PERA under Governmental Accounting Standards Board (GASB) Statement No. 67 and Statement No. 74. The actuarial assumptions used in the funding valuations were also used for GASB 67 and GASB 74 reporting. In addition, the entry age normal actuarial cost method, which is required to be used under GASB 67 and GASB 74, is also used for purposes of the funding valuations. The actuarial assumptions used in the funding and the GASB 67 and GASB 74 accounting valuations, as detailed in Segal's reports, meet the parameters set by Actuarial Standards of Practice (ASOPs), as issued by the Actuarial Standards Board, and generally accepted accounting principles (GAAP) applicable in the United States of America as promulgated by the Governmental Accounting Standards Board.

On the basis of the foregoing, we hereby certify that, to the best of our knowledge and belief, this information is complete and accurate and that the valuation was performed in accordance with standards of practice and by qualified actuaries as prescribed by the American Academy of Actuaries and the Actuarial Standards Board. The undersigned are members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. All of the consultants listed below have experience in performing valuations for large statewide public retirement systems.

Sincerely yours,

Kim Nicholl, FSA, MAAA, EA
Senior Vice President and Actuary

Matthew A. Strom, FSA, MAAA, EA
Vice President and Actuary

Jake Libauskas, FSA, MAAA, EA
Actuary

Brad Ramirez, FSA, MAAA, EA, FCA
Vice President and Consulting Actuary

Tatsiana Dybal, FSA, MAAA, EA
Actuary

Melissa Krumholz, FSA, MAAA
Senior Health Consultant, Actuary

Thomas Bergman, ASA, MAAA, EA
Retiree Health Actuary

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DIVISION TRUST FUNDS—PENSION

Introduction

The standard promulgated by the Governmental Accounting Standards Board (GASB) Statement No. 67, results in the preparation of two actuarial valuations—one for funding purposes and one for accounting and financial reporting purposes. Unless otherwise noted, this Division Trust Funds subsection reports on the actuarial valuation performed for funding purposes, but also includes information on specific differences between the two actuarial valuations. This subsection covers information on PERA's five defined benefit pension plans, which includes the State Division, School Division, Local Government Division, and Judicial Division Trust Funds all of which are cost-sharing multiple-employer plans and the Denver Public Schools (DPS) Division Trust Fund which is a single-employer plan.

The Public Employees' Retirement Association of Colorado (PERA) Board of Trustees (Board) is responsible for maintaining a pension funding policy applicable to these plans. The current pension funding policy was initially adopted by the Board on March 20, 2015, effective for the December 31, 2014, funding actuarial valuation and last amended on November 16, 2018. The pension funding policy requires the calculation of an actuarially determined contribution (ADC) for each of the five Division Trust Funds for the purpose of assessing the adequacy of the statutory contribution rates of each Division Trust Fund. The ADC is determined in accordance with pension plan provisions in effect as of the date of the actuary's Letter of Certification.

The Board retains an external actuary, and effective November 1, 2018, Segal Consulting (Segal) was retained to perform annual actuarial valuations and sustainability projections as well as periodic experience studies to review the actuarial assumptions versus actual plan experience. Within their actuarial valuation report they state:

> "Segal strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and a portion of the principal balance. The pension funding policy adopted by PERA meets this standard."

The plan provisions in effect on December 31, 2018 are summarized in Note 1 of the Notes to the Financial Statements in the Financial Section and include the changes required by Senate Bill (SB) 18-200.

Actuarial Methods and Assumptions

Actuarial Methods

The Board is responsible for the actuarial methods and assumptions used in the actuarial valuations in accordance with Colorado Revised Statutes (C.R.S.) § 24-51-204(5). Through formal action, the Board updates, replaces, or adopts new actuarial methods and assumptions as deemed necessary. In addition to annual actuarial valuations and periodic assumption reviews, the Board established the practice of conducting actuarial audits every three to five years.

The ultimate cost that a defined benefit retirement plan, such as PERA, incurs is equal to the benefits paid plus expenses. Contributions to the plan and investment earnings on plan assets pay for the ultimate cost.

Using the plan's schedule of benefits, the member data, and the carefully selected actuarial assumptions, the plan's actuary annually estimates the cost of the benefits to be paid. Following the Actuarial Standards of Practice (ASOPs) and the Board-adopted pension funding policy, the actuary allocates these costs and determines a systematic manner to fund future plan benefits.

Entry Age Normal Cost Method

For PERA (as well as most public sector plans), one important funding policy objective is to fund the plan in a manner that keeps contribution rates approximately level from generation to generation. The funding method best designed to keep annual costs level as a percent of covered payroll is the Entry Age Normal (EAN) cost method. It is for this reason that the EAN cost method was selected by the Board to be used in the actuarial valuations. Under the EAN cost method, early and service retirement, termination (including the possibility of refunds), disability, and death benefits are projected for all active members. Cost factors, which are developed to produce level annual costs in each year from the age at hire (entry age) to the assumed retirement age, are applied to the projected benefits to determine the normal cost. The normal cost is the portion of the total plan cost allocated to the current year. Normal cost is determined only for active members currently accruing benefits. Those in receipt of benefits, terminated or beyond assumed retirement age have no allocated normal cost. The actuarial accrued liability (AAL) for active members is the portion of the total plan cost allocated to prior years. The total AAL for the plan includes the AAL for active members and the present value of the expected benefit payments to members currently receiving benefits and inactive members entitled to future benefits. The excess of the total AAL over the actuarial value of plan assets is the unfunded actuarial accrued liability (UAAL).

The effect of differences between the actuarial assumptions and the actual experience of the plan is calculated each year when the annual actuarial valuation is performed. These differences produce actuarial gains or losses that result in an adjustment of the UAAL.

Amortization Method

Under the pension funding policy, an ADC is determined by adding the normal cost and the cost to amortize, over defined, closed periods, any existing UAAL or new UAAL, including the impact of any experience actuarial gains and losses, actuarial assumption changes, and changes in plan provisions. Implementing a layered amortization approach requires each amortized item to be tracked over the closed period defined for that category.

The legacy UAAL as of December 31, 2017, is being recognized over a closed 30-year period from that date. All gains, losses, and changes in actuarial methods and assumptions on and after January 1, 2018, are being recognized each year and amortized separately over closed 30-year periods. The impact of any changes in plan provisions will be recognized over a closed period relating to the demographics of the group affected and/or the duration of the enhancement provided, not to exceed 25 years. If any future 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 percent. 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 percent funded ratio.

Once determined, the ADC is then expressed as a level percentage of assumed future covered payroll and compared, as a benchmark, against the current statutory employer contribution rates for each division.

Asset Valuation Method

In 1992, the Board adopted a method for valuing assets that determines a smoothed market value of assets. The smoothed market value of assets recognizes the differences between actual and expected investment experience for each year in equal amounts over a four–year period. The smoothed market value of assets excludes the Annual Increase Reserve (AIR). Note, the term "market value" is used in the Board's pension funding policy regarding the description of the determination of the asset valuation method used for funding purposes. The term "market value" is used consistently throughout the Actuarial Section, which has the identical meaning of the term "fair value" as is used in other sections of this *CAFR*.

Actuarial Assumptions

The determination of the AAL includes recognition of a number of economic and non-economic assumptions in addition to the applied actuarial methods described above. Unless otherwise noted, it can be assumed that the economic and demographic actuarial assumptions applied to the actuarial valuation for funding purposes also were applied to the actuarial valuation for accounting and financial reporting purposes.

Economic Assumptions

Periodically, the Board participates in an actuarial assumptions workshop to ensure understanding and to provide for the retention or adoption of all economic assumptions under the guidance provided by ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, as prescribed by the Actuarial Standards Board. The most recent workshop took place on October 28, 2016. Presentations were given to the Board by the retained actuary, Cavanaugh Macdonald Consulting, LLC (CMC), which included a detailed description of the results of the 2016 experience analysis, review of long-term historical data, the 2016 survey of capital market assumptions by Horizon Actuarial Services, LLC, and a log-normal distribution analysis. The Board's investment consultant, Aon Hewitt Investment Consulting, Inc. (Aon), and other actuarial and investment experts also provided their economic and market outlooks. In addition, the Board reviewed a variety of current and projected economic and financial information prior to the meeting.

As a result of the October 28, 2016, actuarial assumptions workshop and the November 18, 2016, Board meeting, the following economic assumptions were adopted, effective for the December 31, 2016, actuarial valuation:

- Investment rate of return assumption of 7.25 percent per year, compounded annually, net of investment expenses.
- Price inflation assumption of 2.40 percent per year.
- Real rate of investment return assumption of 4.85 percent per year, net of investment expenses.
- Wage inflation assumption of 3.50 percent per year.

Exhibits A, B, C, D, and E show sample pay increase assumptions for individual members effective with the December 31, 2016, actuarial valuation.

Annually, the Board reviews the rate at which interest is credited to member accounts. The Board originally adopted the general policy regarding the annual review during 2006, with slight revisions to the policy details since adoption. In November 2018, the Board voted to continue the annual interest rate at 3.00 percent for interest earned during 2019.

Non-Economic Assumptions

ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, is followed for the selection and adoption of appropriate demographic assumptions. As a result of the 2016 experience analysis and the October 28, 2016, actuarial assumptions workshop, revised demographic assumptions including withdrawal rates, retirement rates for early reduced and unreduced retirement, disability rates, and pre- and post-retirement and disability mortality rates, for all divisions, were adopted as of November 18, 2016, to more closely reflect PERA's actual experience. The revised demographic assumptions became effective for the December 31, 2016, actuarial valuation.

Beginning in 1986, PERA has used a select and ultimate approach, for all members except State Troopers and members of the Judicial Division, in applying rates of withdrawal or termination when estimating the number of members who will leave service prior to retirement. This approach recognizes the fact that regardless of age, a significant number of members leave PERA-covered employment within the first five years of service. Based on the results of the 2016 experience analysis, the first year withdrawal assumption was decreased and the rates for the remaining years within the five-year select period were increased for the State Division and the School and DPS Divisions. The rates of withdrawal for each year within the select period were increased for the Local Government Division. Since more than five years has passed since the merger of the Denver Public School Retirement System (DPSRS) into PERA, the application of a select period was discontinued for the members in the DPS benefit structure. The ultimate withdrawal rates were increased for the State, School and DPS, and Local Government Divisions as well as for the DPS benefit structure, but decreased for the Judicial Division and State Troopers. The revised withdrawal assumptions became effective for the December 31, 2016, actuarial valuation.

The results of the 2016 experience analysis supported the current assumption for the refund of member accounts; that 35 percent of the vested members who terminate will elect to withdraw their accounts while the remaining 65 percent will elect to leave their accounts in the plan to be eligible for a benefit at their retirement date. This assumption was last revised and adopted in 2009, for all non-Judicial Division members in both the PERA and DPS benefit structures. As a result, the actuary did not recommend adjustments to this assumption for these members. The same assumption for members of the Judicial Division also was retained, which assumes that 100 percent of vested members who terminate elect to leave their contributions in the plan in order to be eligible for a benefit at their retirement date.

As a result of the 2016 experience analysis, minor changes were made to the reduced early retirement rates applicable to all members. In addition, based on CMC recommendations, the Board adopted minor increases in all the rates of unreduced retirement and an extension of the certain retirement age from age 70 to age 75 for all members except State Troopers. The revised reduced and unreduced retirement assumptions became effective for the December 31, 2016, actuarial valuation.

Based on the results of the 2016 experience analysis, the rates of disability from active service were decreased at most ages for the State, School and DPS, and Judicial Divisions, State Troopers, and the DPS benefit structure and slightly increased for the Local Government Division. The revised disability assumptions became effective for the December 31, 2016, actuarial valuation.

The probabilities of withdrawal from service (rates for the ultimate period) and disability are shown for sample ages in Exhibits A, B, C, D, and E. Exhibit F shows the select rates of withdrawal applicable to certain members in the first four years of employment (rates for the select period, if applicable). The probabilities of age and service retirements are shown in Exhibits G and H.

As a result of the 2016 experience analysis, CMC recommended a change to more recently published mortality tables, adjusted to reflect PERA's experience and to provide a reasonable margin for improved mortality in the future. Therefore, effective with the December 31, 2016, actuarial valuation, healthy mortality assumptions for pre-retirement were based on the RP-2014 White Collar Employee Mortality Table, a table specifically developed for pre-retirement mortality for actively working people. To allow for an appropriate margin of improved mortality prospectively, the mortality rates incorporate a 70 percent factor applied to male rates and a 55 percent factor applied to female rates.

Based on the results of the 2016 experience analysis, which showed greater longevity for benefit recipients in the School, DPS, and Judicial Divisions than in the State and Local Government Divisions, CMC recommended that PERA use two different base mortality tables for healthy post-retirement mortality. Effective with the December 31, 2016, actuarial valuation, the following tables were adopted:

- For the State and Local Government Divisions: The RP-2014 Healthy Annuitant Mortality Table with adjustments for credibility and gender adjustments of a 73 percent factor applied to ages below 80 and a 108 percent factor applied to age 80 and above, projected to 2018, for males, and a 78 percent factor applied to ages below 80 and a 109 percent factor applied to age 80 and above, projected to 2020, for females.
- For the School, DPS, and Judicial Divisions: The RP-2014 White Collar Healthy Annuitant Mortality Table with adjustments for credibility and gender adjustments of a 93 percent factor applied to ages below 80 and a 113 percent factor applied to age 80 and above, projected to 2018, for males, and a 68 percent factor applied to ages below 80 and a 106 percent factor applied to age 80 and above, projected to 2020, for females.

The results of the 2016 experience analysis indicated that assumptions regarding mortality after disability retirement also should be updated. Effective for the December 31, 2016, actuarial valuation, the RP-2014 Disabled Retiree Mortality Table was implemented with a 90 percent factor applied to both male and female mortality rates.

The recently revised pre- and post-retirement and disability retirement mortality assumptions appropriately reflect PERA's recent and anticipated plan experience and are used to estimate the value of expected future benefit payments. Exhibits A, B, C, D, and E list the healthy pre-retirement mortality rates at sample ages and Exhibit I lists all the healthy post-retirement mortality rates and values at sample ages.

The element of the normal cost for each division, referred to as the administrative expense load, was first adopted by the Board effective for the December 31, 2012, actuarial valuation, resulting from a CMC recommendation from the 2012 experience analysis. Based on the results of the 2016 experience analysis, the estimated administrative expense as a percentage of covered payroll was increased from 0.35 percent to 0.40 percent, effective with the December 31, 2016, actuarial valuation.

Annual Increase Assumptions

Regardless of benefit structure, effective for years 2018 and 2019 the annual increase (AI) rate is assumed to be 0.00 percent. Effective for 2020 and thereafter, the maximum AI rate, known as the AI cap, that may be awarded by the Board is 1.50 percent. Pursuant to C.R.S. § 24-51-413, regarding automatic adjustment provisions, the AI cap may be adjusted as necessary in future years, but cannot be reduced below 0.50 percent or increased above 2.00 percent. In addition, the assumed waiting period to meet the eligibility for AI payments was extended from 12 months to 36 months, effective with enactment of SB 18-200 (June 4, 2018).

For PERA benefit structure members with a membership date prior to January 1, 2007, and DPS benefit structure members, it is assumed, effective for 2020 and thereafter, that these members will receive the AI cap of 1.50 percent per year after payments begin and eligibility requirements for payment of the AI have been met. This AI cap is subject to the required adjustments as defined in C.R.S. § 24-51-413. These AI assumptions were effective for the December 31, 2017, actuarial valuation in recognition of changes made to the AI provisions pursuant to SB 18-200.

For members in the PERA benefit structure with a membership date after December 31, 2006, an AIR was established for each Division Trust Fund to provide AIs, to the extent affordable, once benefits become payable for these members. From the employer statutory contributions submitted for these members, an amount equal to one percent of covered payroll and a certain percentage of reinstatement of service purchase dollars are transferred into the AIR to fund the current and future increases related to the AIR provisions. Pursuant to C.R.S. § 24-51-1009(4), and effective for the year 2020 and thereafter, the AI rate that may be awarded by the Board equals the lesser of the 1.50 percent AI cap or the average of the Consumer Price Index for Urban Wage Earners and Clerical Workers (CPI-W) for each of the months during the prior calendar year. The present value of the total amount of increases paid in any year cannot exceed 10.00 percent of the total funds available in the AIR in the division from which they retire or decease. This AI cap is subject to the required adjustments as defined in C.R.S. § 24-51-413. Therefore, the actuarial assumption applied to these members assumes that benefits do not increase with respect to the annual assessment of actuarial liability associated with the Division Trust Funds, since they receive AIs only to the extent affordable in accordance with C.R.S. § 24-51-1009. This assumption was adopted as of the December 31, 2007, actuarial valuation in recognition of AI provisions enacted in 2006.

Held within the trust and accounted for separately for each division, the dollars within each AIR are excluded from the Division Trust Fund assets for purposes of the annual funding actuarial valuation. The AIR is subject to a separate annual actuarial calculation to determine the extent of the payment, if any, of AIs each year to eligible individuals.

Actuarial Studies

Accumulated investment income is a significant contributor to the success of a defined benefit plan, often providing between 50 to 80 percent of the total inflows over the life of a plan. The financial market's major decline in 2008 prompted the Board to pursue additional actuarial studies over the last few years to evaluate the appropriateness of PERA's investment return assumption in concert with other pertinent economic assumptions. Following their adopted governance procedures and practices, the Board performs periodic asset/liability modeling studies, actuarial audits, and actuarial experience analyses approximately every three to five years.

At the March 21, 2014, Board meeting, the Board approved an asset/liability modeling study to be conducted by Aon. Based on the study, the Board adopted a new Asset Allocation policy on March 20, 2015, as described in Note 5 of the Notes to the Financial Statements in the Financial Section. The next asset/liability modeling study is scheduled to be completed in 2019.

In 2016, the Board requested an experience analysis covering plan experience for the four-year period from 2012 through 2015, to provide an updated view of all economic and demographic assumptions. CMC completed the experience analysis in October 2016, for purposes of discussion at the actuarial assumption workshop held October 28, 2016. Based on CMC's plan experience analysis and presentations from CMC and other experts, the Board adopted updated economic and demographic assumptions at the November 18, 2016, Board meeting to be effective for the December 31, 2016, actuarial valuation.

The primary focus of an actuarial audit is to ensure independence, accuracy, and conformity with the accepted ASOPs with regard to results of the annual actuarial valuation and the appropriateness of the actuarial assumptions used to calculate those results. The actuarial audit originally scheduled for 2019 is satisfied by a change in the actuarial service provider, as detailed in the Board's Governance Manual. In assuming responsibility for actuarial services, Segal's initial tasks included review of the current actuarial methods and assumptions, and replication of the most recent actuarial valuation results within a reasonable margin in accordance with the ASOPs.

During the replication of the December 31, 2017, actuarial valuation results, Segal was able to produce a very close match of the Actuarial Present Value of Projected Benefits to those calculated by CMC, and considered the overall match results to be within a reasonable tolerance of variance. Within their letter detailing the transition of actuarial services they state:

> "Segal determined that the data used by CMC were reasonable, were able to closely match benefit and valuation asset amounts, and determined that the actuarial methods and assumptions applied were in conformity with the Actuarial Standards of Practice. Segal found no grounds on which to suggest a revision of the previous year's actuarial valuations."

Changes Since Last Actuarial Valuation

Changes in Actuarial Methods

Effective November 16, 2018, the Board revised the pension funding policy by re-initializing the 30-year period over which to amortize the existing UAAL as of December 31, 2017, with the intention of aligning the 30-year amortization period used to determine each ADC with the targeted 30-year funding period established in SB 18-200.

Changes in Actuarial Assumptions

There are no changes in economic and demographic actuarial assumptions incorporated into the actuarial valuation as of December 31, 2018, since the last actuarial valuation as of December 31, 2017.

Changes in Plan Provisions

The following changes to contribution provisions for the Local Government Division Trust Funds have been recognized since the last actuarial valuation as of December 31, 2017.

- House Bill 19-1217, which was passed into law on May 20, 2019, requires the member contribution rate for the general members of the Local Government Division to remain at 8.0 percent. Member contribution rates will not increase over time as required by SB 18-200, which was passed into law on June 4, 2018.

Significant Events

There were no significant events during 2018.

Differences in Actuarial Valuation Methods and Assumptions

- The actuarial valuation for funding purposes was performed as of December 31, 2018. The actuarial valuation for accounting and financial reporting purposes was performed as of December 31, 2017, and the total pension liability (TPL) was rolled forward to the measurement date as of December 31, 2018.
- Census data used for the actuarial valuation for funding purposes reflects membership data as of December 31, 2018, and the census data used for the actuarial valuation for accounting and financial reporting purposes reflects membership data as of December 31, 2017. Therefore, all summaries and schedules, regarding actuarial valuation results for funding purposes, shown in the Actuarial Section, reflect census data as of December 31, 2018.
- The actuarial valuation for funding purposes applies an asset valuation method that recognizes a four-year smoothed market value of assets for purposes of determining the UAAL. The actuarial valuation for accounting and financial reporting purposes applies the fair value of assets to determine the net pension liability.
- The actuarial valuation for funding purposes does not apply an AI assumption for members of the PERA benefit structure hired on or after January 1, 2007, in the determination of the AAL. Therefore, the ADC established by the funding valuation does not consider future increases for this member group and the assets attributable to the AIR are not included in the actuarial value of assets. A separate annual actuarial valuation is performed on the AIR to determine the applicable AI payable to eligible members after benefit commencement. AIR plan provisions are deemed substantively automatic, ad hoc cost-of-living adjustments. Liabilities associated with the AIR statutorily can never exceed available assets. As a result, the actuarial valuation for accounting and financial reporting purposes includes the balance of the AIR both in the plan assets, at fair value, and in the TPL of the applicable division.

DIVISION TRUST FUNDS—PENSION

Actuarial Assumptions: Exhibits A–I

Exhibit A: Separations from Employment Before Retirement and Individual Pay Increase Assumptions—State Division

	Percent of Members Separating Within the Next Year						Pay Increase Assumptions for an Individual Member		
	Ultimate Withdrawal[1]		Death[2]		Disability		Merit and Seniority	Inflation and Productivity	Total Increase (Next Year)
Sample Ages	Male	Female	Male	Female	Male	Female			
State Members *(Other Than State Troopers)*									
20	30.00%	20.00%	0.020%	0.008%	0.01%	0.01%	5.67%	3.50%	9.17%
25	10.00%	14.50%	0.024%	0.008%	0.01%	0.01%	3.75%	3.50%	7.25%
30	7.00%	10.00%	0.022%	0.010%	0.01%	0.01%	2.80%	3.50%	6.30%
35	6.00%	7.50%	0.026%	0.013%	0.03%	0.03%	2.05%	3.50%	5.55%
40	5.00%	6.75%	0.031%	0.018%	0.05%	0.05%	1.50%	3.50%	5.00%
45	4.25%	5.50%	0.048%	0.031%	0.09%	0.09%	0.85%	3.50%	4.35%
50	4.25%	5.25%	0.083%	0.051%	0.20%	0.20%	0.50%	3.50%	4.00%
55	4.25%	5.25%	0.137%	0.078%	0.27%	0.27%	0.10%	3.50%	3.60%
60	4.25%	5.25%	0.230%	0.113%	0.30%	0.30%	0.00%	3.50%	3.50%
65	4.25%	5.25%	0.406%	0.172%	0.30%	0.30%	0.00%	3.50%	3.50%
70	4.25%	5.25%	0.720%	0.299%	0.30%	0.30%	0.00%	3.50%	3.50%
State Troopers									
20	8.00%	8.00%	0.020%	0.008%	0.01%	0.01%	5.50%	3.50%	9.00%
25	6.00%	6.00%	0.024%	0.008%	0.02%	0.02%	3.75%	3.50%	7.25%
30	4.00%	4.00%	0.022%	0.010%	0.04%	0.04%	2.80%	3.50%	6.30%
35	3.75%	3.75%	0.026%	0.013%	0.06%	0.06%	2.05%	3.50%	5.55%
40	3.00%	3.00%	0.031%	0.018%	0.10%	0.10%	1.50%	3.50%	5.00%
45	3.00%	3.00%	0.048%	0.031%	0.25%	0.25%	1.20%	3.50%	4.70%
50	3.00%	3.00%	0.083%	0.051%	0.30%	0.30%	0.80%	3.50%	4.30%
55	3.00%	3.00%	0.137%	0.078%	0.30%	0.30%	0.40%	3.50%	3.90%
60	3.00%	3.00%	0.230%	0.113%	0.30%	0.30%	0.00%	3.50%	3.50%
65	3.00%	3.00%	0.406%	0.172%	0.30%	0.30%	0.00%	3.50%	3.50%
70	3.00%	3.00%	0.720%	0.299%	0.30%	0.30%	0.00%	3.50%	3.50%

1 There are no select withdrawal assumptions for State Troopers.

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

DIVISION TRUST FUNDS—PENSION

Exhibit B: Separations from Employment Before Retirement and Individual Pay Increase Assumptions—School Division and Denver Public Schools (DPS) Division—PERA Benefit Structure

	Percent of Members Separating Within the Next Year						Pay Increase Assumptions for an Individual Member		
	Ultimate Withdrawal		Death[1]		Disability				
Sample Ages	Male	Female	Male	Female	Male	Female	Merit and Seniority	Inflation and Productivity	Total Increase (Next Year)
20	20.00%	14.50%	0.020%	0.008%	0.01%	0.01%	6.20%	3.50%	9.70%
25	10.00%	12.00%	0.024%	0.008%	0.01%	0.01%	4.10%	3.50%	7.60%
30	6.50%	8.00%	0.022%	0.010%	0.01%	0.01%	2.95%	3.50%	6.45%
35	5.25%	6.50%	0.026%	0.013%	0.02%	0.02%	2.50%	3.50%	6.00%
40	4.25%	5.00%	0.031%	0.018%	0.04%	0.04%	1.95%	3.50%	5.45%
45	4.00%	5.00%	0.048%	0.031%	0.06%	0.06%	1.35%	3.50%	4.85%
50	4.00%	5.00%	0.083%	0.051%	0.09%	0.09%	0.80%	3.50%	4.30%
55	4.00%	5.00%	0.137%	0.078%	0.15%	0.15%	0.35%	3.50%	3.85%
60	4.00%	5.00%	0.230%	0.113%	0.21%	0.21%	0.00%	3.50%	3.50%
65	4.00%	5.00%	0.406%	0.172%	0.21%	0.21%	0.00%	3.50%	3.50%
70	4.00%	5.00%	0.720%	0.299%	0.21%	0.21%	0.00%	3.50%	3.50%

[1] Rates are shown for active members. Separate post-retirement and disability mortality tables are used for retirees.

Exhibit C: Separations from Employment Before Retirement and Individual Pay Increase Assumptions—Local Government Division

	Percent of Members Separating Within the Next Year						Pay Increase Assumptions for an Individual Member		
	Ultimate Withdrawal		Death[1]		Disability				
Sample Ages	Male	Female	Male	Female	Male	Female	Merit and Seniority	Inflation and Productivity	Total Increase (Next Year)
20	13.00%	16.00%	0.020%	0.008%	0.01%	0.01%	6.95%	3.50%	10.45%
25	12.00%	16.00%	0.024%	0.008%	0.01%	0.01%	4.30%	3.50%	7.80%
30	8.00%	11.00%	0.022%	0.010%	0.01%	0.01%	2.64%	3.50%	6.14%
35	6.00%	9.00%	0.026%	0.013%	0.03%	0.03%	1.72%	3.50%	5.22%
40	5.25%	6.50%	0.031%	0.018%	0.04%	0.04%	1.23%	3.50%	4.73%
45	4.50%	6.50%	0.048%	0.031%	0.11%	0.11%	0.99%	3.50%	4.49%
50	4.50%	6.00%	0.083%	0.051%	0.15%	0.15%	0.79%	3.50%	4.29%
55	4.50%	6.00%	0.137%	0.078%	0.17%	0.17%	0.60%	3.50%	4.10%
60	4.50%	6.00%	0.230%	0.113%	0.25%	0.25%	0.25%	3.50%	3.75%
65	4.50%	6.00%	0.406%	0.172%	0.25%	0.25%	0.00%	3.50%	3.50%
70	4.50%	6.00%	0.720%	0.299%	0.25%	0.25%	0.00%	3.50%	3.50%

[1] Rates are shown for active members. Separate post-retirement and disability mortality tables are used for retirees.

DIVISION TRUST FUNDS—PENSION

Exhibit D: Separations from Employment Before Retirement and Individual Pay Increase Assumptions—Judicial Division

	Percent of Members Separating Within the Next Year						Pay Increase Assumptions for an Individual Member		
	Withdrawal[1]		Death[2]		Disability		Merit and	Inflation and	Total Increase
Sample Ages	Male	Female	Male	Female	Male	Female	Seniority[3]	Productivity	(Next Year)
30	1.65%	1.65%	0.022%	0.010%	0.01%	0.01%	1.50%	3.50%	5.00%
35	1.65%	1.65%	0.026%	0.013%	0.02%	0.02%	1.50%	3.50%	5.00%
40	1.65%	1.65%	0.031%	0.018%	0.04%	0.04%	0.67%	3.50%	4.17%
45	1.65%	1.65%	0.048%	0.031%	0.08%	0.08%	0.50%	3.50%	4.00%
50	1.65%	1.65%	0.083%	0.051%	0.10%	0.10%	0.50%	3.50%	4.00%
55	1.65%	1.65%	0.137%	0.078%	0.20%	0.20%	0.50%	3.50%	4.00%
60	1.65%	1.65%	0.230%	0.113%	0.30%	0.30%	0.50%	3.50%	4.00%
65	1.65%	1.65%	0.406%	0.172%	0.30%	0.30%	0.50%	3.50%	4.00%
70	1.65%	1.65%	0.720%	0.299%	0.30%	0.30%	0.50%	3.50%	4.00%

1 There are no select withdrawal assumptions for members in the Judicial Division.

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

3 Pay raises are subject to legislative approval. Percentages shown are based on prior experience.

Exhibit E: Separations from Employment Before Retirement and Individual Pay Increase Assumptions—All Division Trust Funds—DPS Benefit Structure

	Percent of Members Separating Within the Next Year						Pay Increase Assumptions for an Individual Member		
	Withdrawal[1]		Death[2]		Disability		Merit and	Inflation and	Total Increase
Sample Ages	Male	Female	Male	Female	Male	Female	Seniority	Productivity	(Next Year)
20	8.00%	10.00%	0.020%	0.008%	0.01%	0.01%	3.50%	3.50%	7.00%
25	8.00%	10.00%	0.024%	0.008%	0.01%	0.01%	3.50%	3.50%	7.00%
30	7.00%	9.00%	0.022%	0.010%	0.01%	0.01%	3.20%	3.50%	6.70%
35	7.00%	8.00%	0.026%	0.013%	0.02%	0.02%	2.76%	3.50%	6.26%
40	5.75%	6.50%	0.031%	0.018%	0.05%	0.05%	2.12%	3.50%	5.62%
45	5.00%	4.50%	0.048%	0.031%	0.09%	0.09%	1.34%	3.50%	4.84%
50	4.50%	4.50%	0.083%	0.051%	0.20%	0.20%	0.80%	3.50%	4.30%
55	4.25%	4.50%	0.137%	0.078%	0.24%	0.24%	0.42%	3.50%	3.92%
60	4.25%	4.50%	0.230%	0.113%	0.38%	0.38%	0.20%	3.50%	3.70%
65	4.25%	4.50%	0.406%	0.172%	0.40%	0.40%	0.00%	3.50%	3.50%
70	4.25%	4.50%	0.720%	0.299%	0.40%	0.40%	0.00%	3.50%	3.50%

1 There are no select withdrawal assumptions for members in the DPS benefit structure.

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

DIVISION TRUST FUNDS—PENSION

Exhibit F: Select Rates of Separation Assumptions—State Division, School and DPS Divisions, and Local Government Division

Percent of Members With Less Than Five Years of Service Withdrawing from Employment Next Year[1]

Completed Years of Service	State Division		School and DPS Divisions[2]		Local Government Division	
	Male	Female	Male	Female	Male	Female
0	41.5%	41.5%	37.0%	34.0%	41.0%	39.0%
1	20.5%	21.5%	21.0%	20.0%	24.0%	23.0%
2	14.5%	16.0%	16.0%	15.0%	17.0%	18.0%
3	11.5%	13.0%	12.0%	12.0%	12.0%	14.0%
4	9.5%	11.5%	11.0%	11.0%	10.0%	11.0%

[1] There are no select withdrawal assumptions for State Troopers or Judicial Division members.

[2] Rates shown are for PERA benefit structure members in the School or DPS Divisions. Effective December 31, 2016, a select withdrawal period is no longer applied to members in the DPS benefit structure.

Exhibit G: Percent of Members Eligible for Reduced Retirement Benefits Retiring Next Year

Retirement Ages	State Division		State Troopers	School and DPS Divisions[1]		Local Government Division		Judicial Division	DPS Benefit Structure[2]	
	Male	Female		Male	Female	Male	Female		Male	Female
50	9.5%	10.0%	10.0%	8.0%	8.0%	8.0%	9.0%	6.0%	8.0%	5.0%
51	9.5%	10.0%	10.0%	8.0%	8.0%	8.0%	9.0%	6.0%	8.0%	5.0%
52	9.5%	10.0%	10.0%	8.0%	8.0%	8.0%	9.0%	6.0%	8.0%	5.0%
53	9.5%	10.0%	10.0%	8.0%	8.0%	8.0%	9.0%	6.0%	8.0%	10.0%
54	9.5%	10.0%	10.0%	10.0%	10.0%	8.0%	9.0%	6.0%	11.0%	10.0%
55	9.5%	10.0%	5.0%	10.0%	10.0%	8.0%	12.0%	6.0%	11.0%	10.0%
56	9.5%	10.0%	5.0%	10.0%	11.0%	8.0%	12.0%	6.0%	11.0%	10.0%
57	9.5%	10.0%	5.0%	10.0%	11.0%	8.0%	12.0%	6.0%	11.0%	10.0%
58	9.5%	10.0%	5.0%	10.0%	11.0%	8.0%	12.0%	6.0%	11.0%	10.0%
59	9.5%	10.0%	5.0%	10.0%	11.0%	10.0%	11.5%	6.0%	15.0%	12.0%
60	9.5%	10.0%	10.0%	10.0%	11.0%	11.0%	11.5%	8.0%	15.0%	15.0%
61	9.5%	10.0%	10.0%	12.0%	11.0%	11.0%	11.5%	8.0%	17.0%	15.0%
62	9.5%	10.0%	10.0%	12.0%	11.0%	11.0%	11.5%	8.0%	17.0%	15.0%
63	9.5%	10.0%	10.0%	12.0%	11.0%	11.0%	11.5%	8.0%	17.0%	15.0%
64	9.5%	10.0%	10.0%	12.0%	11.0%	11.0%	11.5%	8.0%	17.0%	15.0%
65 and over	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[1] Rates shown are for PERA benefit structure members in the School or DPS Divisions.

[2] Rates shown are for DPS benefit structure members in any division.

DIVISION TRUST FUNDS—PENSION

Exhibit H: Percent of Members Eligible for Unreduced Retirement Benefits Retiring Next Year

Retirement	State Division		State	School and DPS Divisions[2]		Local Government Division		Judicial	DPS Benefit Structure[3]	
Ages	Male	Female	Troopers[1]	Male	Female	Male	Female	Division	Male	Female
50	60%	55%	40%	55%	60%	60%	60%	6%	40%	40%
51	50%	40%	32%	48%	54%	46%	52%	6%	40%	40%
52	42%	36%	32%	46%	48%	30%	40%	6%	35%	30%
53	38%	34%	32%	42%	42%	25%	40%	6%	35%	30%
54	32%	26%	32%	40%	40%	22%	40%	6%	30%	30%
55	25%	25%	32%	28%	29%	22%	28%	6%	30%	30%
56	20%	24%	32%	25%	25%	25%	30%	6%	20%	25%
57	20%	20%	32%	25%	25%	22%	21%	6%	24%	25%
58	18%	18%	32%	22%	22%	20%	21%	6%	22%	20%
59	20%	18%	32%	22%	22%	20%	21%	6%	25%	24%
60	20%	21%	32%	25%	25%	22%	21%	8%	22%	30%
61	18%	18%	32%	25%	24%	22%	20%	8%	20%	28%
62	22%	19%	32%	24%	27%	24%	27%	8%	25%	30%
63	20%	19%	32%	24%	24%	25%	22%	8%	40%	30%
64	20%	19%	32%	24%	24%	25%	22%	8%	20%	30%
65	24%	22%	100%	27%	26%	25%	25%	15%	30%	35%
66	26%	26%	100%	28%	28%	30%	25%	15%	30%	35%
67	25%	24%	100%	25%	25%	20%	30%	15%	30%	32%
68	22%	25%	100%	24%	22%	25%	20%	15%	30%	30%
69	22%	24%	100%	24%	22%	25%	20%	15%	30%	30%
70	25%	25%	100%	22%	25%	25%	24%	40%	30%	30%
71	25%	25%	100%	22%	23%	25%	24%	40%	30%	30%
72	25%	25%	100%	22%	23%	25%	24%	40%	30%	30%
73	25%	25%	100%	22%	23%	25%	24%	40%	30%	30%
74	25%	25%	100%	22%	23%	25%	24%	40%	30%	30%
75 and over	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

1 For State Troopers prior to age 50, it is assumed that 40 percent of the eligible members will retire at each age from age 45 through age 49.

2 Rates shown are for PERA benefit structure members in the School or DPS Divisions.

3 Rates shown are for DPS benefit structure members in any division.

DIVISION TRUST FUNDS—PENSION

Exhibit I: Rates of Post-Retirement Mortality and Single Life Retirement Values[1]

(In Actual Dollars)

MORTALITY ASSUMPTIONS–STATE AND LOCAL GOVERNMENT DIVISIONS

Sample Attained Ages	Percent of Retirees Deceasing Within the Next Year		Present Value of $1 Monthly for Life		Present Value of $1 Monthly Increasing 1.5% Annually		Future Life Expectancy in Years	
	Male	Female	Male	Female	Male	Female	Male	Female
40	0.031%	0.018%	$160.33	$162.36	$192.67	$195.98	43.97	46.33
45	0.048%	0.031%	155.77	158.53	185.38	189.60	39.04	41.38
50	0.297%	0.198%	149.50	153.23	176.00	181.34	34.15	36.46
55	0.458%	0.277%	143.13	147.36	166.49	172.33	29.71	31.84
60	0.635%	0.393%	135.41	139.72	155.38	161.21	25.44	27.30
65	0.831%	0.595%	125.54	129.88	141.87	147.63	21.27	22.88
70	1.185%	0.965%	112.83	117.53	125.37	131.43	17.18	18.63
75	1.830%	1.627%	96.82	102.49	105.67	112.64	13.25	14.62
80	3.824%	3.123%	77.84	85.09	83.47	91.90	9.63	10.97
85	7.940%	6.061%	60.12	67.51	63.45	71.72	6.81	7.93

MORTALITY ASSUMPTIONS–SCHOOL, DPS, AND JUDICIAL DIVISIONS

Sample Attained Ages	Percent of Retirees Deceasing Within the Next Year		Present Value of $1 Monthly for Life		Present Value of $1 Monthly Increasing 1.5% Annually		Future Life Expectancy in Years	
	Male	Female	Male	Female	Male	Female	Male	Female
40	0.031%	0.018%	$160.92	$163.72	$193.61	$198.28	44.55	48.09
45	0.048%	0.031%	156.60	160.46	186.62	192.62	39.63	43.14
50	0.257%	0.130%	150.69	155.97	177.64	185.33	34.74	38.22
55	0.397%	0.181%	144.43	150.57	168.21	176.84	30.23	33.48
60	0.544%	0.257%	136.67	143.39	157.01	166.15	25.87	28.80
65	0.728%	0.422%	126.61	133.99	143.23	152.94	21.59	24.22
70	1.117%	0.690%	113.71	121.96	126.49	136.92	17.43	19.78
75	1.849%	1.191%	97.88	106.82	106.96	117.81	13.48	15.54
80	3.630%	2.537%	79.48	88.79	85.31	96.17	9.88	11.63
85	7.332%	5.320%	61.30	70.46	64.72	75.03	6.95	8.38

[1] Rates are shown for healthy members. Separate disability mortality tables are used for disabled retirees.

DIVISION TRUST FUNDS—PENSION

Summary of Funding Progress

The PERA funding objective is to pay long-term benefit promises through contributions that remain approximately level from year to year as a percent of covered payroll earned by PERA members. The information in this section provides an overview of funding progress:

- The solvency test shows the degree to which existing liabilities are funded, including prior history.
- A schedule of funding progress shows the UAAL as a percentage of annual covered payroll, including prior history.
- Schedules detailing actuarial gains and losses, by source, including prior history and a reconciliation of UAAL considering the total of all five Division Trust Funds, over the past five years.
- The scheduled contribution requirements based on the December 31, 2018, actuarial valuation for the period ending December 31, 2020.

Consideration of the plans' current funded ratio, the unfunded liabilities in relation to annual covered payroll, historic trends, including significant gains and losses, and the schedule of future contributions should provide sufficient information to appropriately measure funding progress.

Solvency Test

The solvency test is one means of checking PERA's funding progress. In this test, the plan's actuarial value of assets are compared with: (A) member contributions (with interest) on deposit, (B) the liabilities for future benefits to persons who have retired, died or become disabled, and to those who have terminated service with the right to a future benefit, and (C) the liabilities for service already rendered by active members.

The actuarial valuation of December 31, 2018, shows that plan assets fully cover liability A. In addition, the remainder of plan assets covers a portion of the liabilities for future benefits to persons who have retired or terminated service with the right to a future benefit (liability B). Generally, if the system follows the discipline of level contribution rate financing, the funded portion of liability B and C will increase over time.

DIVISION TRUST FUNDS—PENSION

SOLVENCY TEST

(Dollars in Thousands)

	Aggregate Accrued Liabilities				Portion of Actuarial Accrued Liabilities Covered by Valuation Assets		
Valuation Date	Active Member Contributions (A)[1]	Retirees, Beneficiaries, and Inactive Members (B)	Employer-Financed Portion of Active Members (C)	Actuarial Value of Plan Assets	Liability (A)	Liability (B)	Liability (C)
State Division							
12/31/2009	$2,568,287	$12,660,958	$4,747,972	$13,382,736	100.0%	85.4%	0.0%
12/31/2010	2,569,046	13,149,658	4,637,472	12,791,946	100.0%	77.7%	0.0%
12/31/2011	2,629,640	13,710,393	4,486,510	12,010,045	100.0%	68.4%	0.0%
12/31/2012	2,668,942	14,191,469	4,331,084	12,538,675	100.0%	69.5%	0.0%
12/31/2013	2,675,469	15,296,368	4,871,888	13,129,460	100.0%	68.3%	0.0%
12/31/2014	2,688,514	15,846,200	4,873,607	13,523,488	100.0%	68.4%	0.0%
12/31/2015	2,685,014	16,470,370	4,930,287	13,882,820	100.0%	68.0%	0.0%
12/31/2016	2,678,312	17,933,227	5,058,377	14,026,332	100.0%	63.3%	0.0%
12/31/2017	2,668,406	17,395,423	4,718,256	14,256,410	100.0%	66.6%	0.0%
12/31/2018	**2,682,956**	**18,095,951**	**4,730,945**	**14,303,726**	**100.0%**	**64.2%**	**0.0%**
School Division							
12/31/2009	$3,769,100	$18,830,712	$7,813,003	$21,054,910	100.0%	91.8%	0.0%
12/31/2010	3,779,760	19,658,749	7,901,245	20,321,736	100.0%	84.1%	0.0%
12/31/2011	3,783,336	20,666,021	7,536,842	19,266,110	100.0%	74.9%	0.0%
12/31/2012	3,823,348	21,466,078	7,329,607	20,266,574	100.0%	76.6%	0.0%
12/31/2013	3,881,145	23,301,641	8,254,526	21,369,380	100.0%	75.1%	0.0%
12/31/2014	3,915,705	24,247,868	8,222,959	22,143,356	100.0%	75.2%	0.0%
12/31/2015	4,003,251	25,133,168	8,540,734	22,871,661	100.0%	75.1%	0.0%
12/31/2016	4,108,961	27,922,423	9,321,584	23,263,344	100.0%	68.6%	0.0%
12/31/2017	4,212,088	26,937,539	8,896,588	23,780,045	100.0%	72.6%	0.0%
12/31/2018	**4,344,574**	**27,922,414**	**9,331,412**	**24,094,442**	**100.0%**	**70.7%**	**0.0%**
Local Government Division							
12/31/2009	$678,519	$1,963,925	$1,208,377	$2,932,628	100.0%	100.0%	24.0%
12/31/2010	657,847	2,180,451	1,167,268	2,926,045	100.0%	100.0%	7.5%
12/31/2011	666,794	2,330,543	1,162,678	2,882,691	100.0%	95.1%	0.0%
12/31/2012	528,029	2,750,956	878,636	3,098,721	100.0%	93.4%	0.0%
12/31/2013	533,003	2,991,177	978,102	3,291,298	100.0%	92.2%	0.0%
12/31/2014	534,695	3,114,436	961,836	3,629,400	100.0%	99.4%	0.0%
12/31/2015	533,262	3,275,093	972,343	3,777,161	100.0%	99.0%	0.0%
12/31/2016	545,507	3,573,344	1,094,201	3,879,197	100.0%	93.3%	0.0%
12/31/2017	544,525	3,482,526	1,018,881	4,009,413	100.0%	99.5%	0.0%
12/31/2018	**549,499**	**3,679,915**	**1,011,471**	**4,070,679**	**100.0%**	**95.7%**	**0.0%**

Please see page 184 for footnote references.

DIVISION TRUST FUNDS—PENSION

SOLVENCY TEST (CONTINUED)

(Dollars in Thousands)

	Aggregate Accrued Liabilities				Portion of Actuarial Accrued Liabilities Covered by Valuation Assets		
Valuation Date	Active Member Contributions (A)[1]	Retirees, Beneficiaries, and Inactive Members (B)	Employer-Financed Portion of Active Members (C)	Actuarial Value of Plan Assets	Liability (A)	Liability (B)	Liability (C)
Judicial Division							
12/31/2009	$52,754	$165,904	$77,038	$228,714	100.0%	100.0%	13.1%
12/31/2010	53,742	171,904	78,193	227,814	100.0%	100.0%	2.8%
12/31/2011	54,688	186,420	78,329	221,515	100.0%	89.5%	0.0%
12/31/2012	57,762	193,774	75,361	238,807	100.0%	93.4%	0.0%
12/31/2013	59,348	208,236	84,014	256,800	100.0%	94.8%	0.0%
12/31/2014	60,973	214,541	95,739	270,866	100.0%	97.8%	0.0%
12/31/2015	60,118	232,303	109,545	286,891	100.0%	97.6%	0.0%
12/31/2016	58,119	273,416	115,582	297,888	100.0%	87.7%	0.0%
12/31/2017	54,973	277,542	95,593	310,085	100.0%	91.9%	0.0%
12/31/2018	**57,922**	**286,045**	**103,790**	**315,970**	**100.0%**	**90.2%**	**0.0%**
DPS Division[2]							
12/31/2010	$317,442	$2,370,217	$645,155	$2,961,720	100.0%	100.0%	42.5%
12/31/2011	333,550	2,435,504	673,473	2,804,706	100.0%	100.0%	5.3%
12/31/2012	348,739	2,479,706	667,104	2,936,695	100.0%	100.0%	16.2%
12/31/2013	364,126	2,672,260	749,486	3,075,895	100.0%	100.0%	5.3%
12/31/2014	379,240	2,665,352	771,501	3,151,456	100.0%	100.0%	13.9%
12/31/2015	394,306	2,732,879	778,055	3,207,327	100.0%	100.0%	10.3%
12/31/2016	402,849	2,999,767	843,814	3,220,935	100.0%	93.9%	0.0%
12/31/2017	419,239	2,867,254	802,033	3,257,770	100.0%	99.0%	0.0%
12/31/2018	**438,008**	**2,941,988**	**868,606**	**3,261,338**	**100.0%**	**96.0%**	**0.0%**
All Division Trust Funds[3,4]							
12/31/2009	$7,068,660	$33,621,499	$13,846,390	$37,598,988	100.0%	90.8%	0.0%
12/31/2010	7,377,837	37,530,979	14,429,333	39,229,261	100.0%	84.9%	0.0%
12/31/2011	7,468,008	39,328,881	13,937,832	37,185,067	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%
12/31/2013	7,513,091	44,469,682	14,938,016	41,122,833	100.0%	75.6%	0.0%
12/31/2014	7,579,127	46,088,397	14,925,642	42,718,566	100.0%	76.2%	0.0%
12/31/2015	7,675,951	47,843,813	15,330,964	44,025,860	100.0%	76.0%	0.0%
12/31/2016	7,793,748	52,702,177	16,433,558	44,687,696	100.0%	70.0%	0.0%
12/31/2017	7,899,231	50,960,284	15,531,351	45,613,723	100.0%	74.0%	0.0%
12/31/2018	**8,072,959**	**52,926,313**	**16,046,224**	**46,046,155**	**100.0%**	**71.7%**	**0.0%**

[1] Includes accrued interest on member contributions.

[2] The DPS Division Trust Fund was established on January 1, 2010, and received the net assets of the DPSRS.

[3] Results prior to December 31, 2010, do not include the DPS Division.

[4] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Unfunded Actuarial Accrued Liability

UAAL is the difference between actuarially calculated liability for service already rendered and the valuation assets of the retirement fund.

In 2017, the ratio of PERA's valuation assets to accrued liabilities was 61.3 percent and decreased to 59.8 percent by the end of 2018.

The following factors resulted in higher liabilities (or losses) to PERA during 2018:

- Lower investment returns than assumed in 2015, 2016, and 2018.
- More members retired at earlier ages than expected.
- More service and disability retirements were experienced than expected.
- Member pay increases were greater than expected
- New PERA members had some service resulting in accrued liabilities.
- Actual payroll contributions were less than the determined ADC.
- Retirees experienced longer lifespans than expected.
- Higher than expected administrative expenses

The following factors resulted in lower liabilities (or gains) during 2018:

- Higher investment return than assumed in 2017.
- More members terminated PERA-covered employment and withdrew their accounts than expected.

Since 2000, PERA's funded ratio has declined from a high of 105.2 percent to the current funded status of 59.8 percent at the end of 2018. In response to the declining funded ratio, legislation was enacted in 2004 and 2006, to strengthen PERA's future funded status by creating two additional contribution provisions; the Amortization Equalization Disbursement (AED) and the Supplemental Amortization Equalization Disbursement (SAED). The 2008 global financial crisis further necessitated major pension reform. The enactment of SB 10-001 in 2010 significantly affected benefit and eligibility provisions, structure of AIs, and employer funding mechanisms with the intent to return PERA to a 100 percent funded ratio within the next 30 years.

Between 2010 and 2016, PERA's funded status was negatively affected primarily by the recognition of adverse economic experience and by the adoption of more conservative economic and demographic assumptions to better reflect anticipated future behaviors, longevity, and economic conditions.

To address PERA's risk profile and funded status, the Board brought forth to the membership, employers, and the General Assembly, the need to consider additional reforms for the 2018 Legislative Session. The Colorado General Assembly passed significant pension reform through SB 18-200 which changes plan provisions with the goal of eliminating the UAAL within a 30-year window from 2017.

Liabilities for members are based on service rendered toward their retirement benefits payable in the future. UAAL exists because the present value of future liabilities for earned service exceeds assets currently on hand. The Solvency Test shows that benefits to all PERA retirees are funded at 71.7 percent.

Since inflation decreases the dollar's value, it is important to examine more than basic actuarial metrics and data when assessing the plan's financial status. The ratio of UAAL dollars divided by member covered payroll can provide a meaningful index. The lower the ratio, the greater is the strength of the system.

Below are some of the primarily contributing factors to changes in this ratio:

- Increase for 2008-2011: recognition of four-year smoothing of the significant investment loss in 2008.
- Increase for 2013: increase in plan liabilities due to the adoption of more conservative economic actuarial assumptions.
- Decrease for 2014-2015: recognition of asset gains reflecting the strong investment performance in 2012 and 2013, and a decrease in plan liabilities due to changes to actuarial methods in 2014.
- Increase for 2016: increase in plan liabilities due to the adoption of more conservative economic actuarial assumptions.
- Decrease for 2017: decrease in plan liabilities due to the adoption of SB 18-200 pension reforms and recognition of asset gains reflecting the strong investment performance in 2017.
- Increase for 2018: recognition of losses in 2018, reflecting unfavorable demographic experience and lower than assumed investment performance.

DIVISION TRUST FUNDS—PENSION

SCHEDULE OF FUNDING PROGRESS

(Dollars in Thousands)

(A) Valuation Date	(B) Actuarial Value of Plan Assets	(C) Actuarial Accrued Liabilities	(D) Unfunded Actuarial Accrued Liabilities (UAAL) (C) – (B)	(E) Funded Ratio (B)/(C)	(F) Annual Covered Payroll	(G) UAAL As a % of Covered Payroll (D)/(F)
State Division						
12/31/2009	$13,382,736	$19,977,217	$6,594,481	67.0%	$2,384,137	276.6%
12/31/2010	12,791,946	20,356,176	7,564,230	62.8%	2,392,080	316.2%
12/31/2011	12,010,045	20,826,543	8,816,498	57.7%	2,393,791	368.3%
12/31/2012	12,538,675	21,191,495	8,652,820	59.2%	2,384,934	362.8%
12/31/2013	13,129,460	22,843,725	9,714,265	57.5%	2,474,965	392.5%
12/31/2014	13,523,488	23,408,321	9,884,833	57.8%	2,564,670	385.4%
12/31/2015	13,882,820	24,085,671	10,202,851	57.6%	2,641,867	386.2%
12/31/2016	14,026,332	25,669,916	11,643,584	54.6%	2,710,651	429.5%
12/31/2017	14,256,410	24,782,085	10,525,675	57.5%	2,774,207	379.4%
12/31/2018	**14,303,726**	**25,509,852**	**11,206,126**	**56.1%**	**2,898,827**	**386.6%**
School Division						
12/31/2009	$21,054,910	$30,412,815	$9,357,905	69.2%	$3,922,175	238.6%
12/31/2010	20,321,736	31,339,754	11,018,018	64.8%	3,900,662	282.5%
12/31/2011	19,266,110	31,986,199	12,720,089	60.2%	3,821,603	332.8%
12/31/2012	20,266,574	32,619,033	12,352,459	62.1%	3,819,066	323.4%
12/31/2013	21,369,380	35,437,312	14,067,932	60.3%	3,938,650	357.2%
12/31/2014	22,143,356	36,386,532	14,243,176	60.9%	4,063,236	350.5%
12/31/2015	22,871,661	37,677,153	14,805,492	60.7%	4,235,290	349.6%
12/31/2016	23,263,344	41,352,968	18,089,624	56.3%	4,349,320	415.9%
12/31/2017	23,780,045	40,046,215	16,266,170	59.4%	4,471,357	363.8%
12/31/2018	**24,094,442**	**41,598,400**	**17,503,958**	**57.9%**	**4,789,503**	**365.5%**
Local Government Division						
12/31/2009	$2,932,628	$3,850,821	$918,193	76.2%	$705,097	130.2%
12/31/2010	2,926,045	4,005,566	1,079,521	73.0%	705,265	153.1%
12/31/2011	2,882,691	4,160,015	1,277,324	69.3%	718,169	177.9%
12/31/2012	3,098,721	4,157,621	1,058,900	74.5%	523,668	202.2%
12/31/2013	3,291,298	4,502,282	1,210,984	73.1%	529,003	228.9%
12/31/2014	3,629,400	4,610,967	981,567	78.7%	540,468	181.6%
12/31/2015	3,777,161	4,780,698	1,003,537	79.0%	561,518	178.7%
12/31/2016	3,879,197	5,213,052	1,333,855	74.4%	608,223	219.3%
12/31/2017	4,009,413	5,045,932	1,036,519	79.5%	632,768	163.8%
12/31/2018	**4,070,679**	**5,240,885**	**1,170,206**	**77.7%**	**660,998**	**177.0%**
Judicial Division						
12/31/2009	$228,714	$295,696	$66,982	77.3%	$37,583	178.2%
12/31/2010	227,814	303,839	76,025	75.0%	37,412	203.2%
12/31/2011	221,515	319,437	97,922	69.3%	39,033	250.9%
12/31/2012	238,807	326,897	88,090	73.1%	39,045	225.6%
12/31/2013	256,800	351,598	94,798	73.0%	39,942	237.3%
12/31/2014	270,866	371,253	100,387	73.0%	42,977	233.6%
12/31/2015	286,891	401,966	115,075	71.4%	46,870	245.5%
12/31/2016	297,888	447,117	149,229	66.6%	48,700	306.4%
12/31/2017	310,085	428,108	118,023	72.4%	48,948	241.1%
12/31/2018	**315,970**	**447,757**	**131,787**	**70.6%**	**50,506**	**260.9%**

Please see page 187 for footnote references.

DIVISION TRUST FUNDS—PENSION

SCHEDULE OF FUNDING PROGRESS (CONTINUED)

(Dollars in Thousands)

(A) Valuation Date	(B) Actuarial Value of Plan Assets	(C) Actuarial Accrued Liabilities	(D) Unfunded Actuarial Accrued Liabilities (UAAL) (C) – (B)	(E) Funded Ratio (B)/(C)	(F) Annual Covered Payroll	(G) UAAL As a % of Covered Payroll (D)/(F)
DPS Division[1]						
12/31/2010	$2,961,720	$3,332,814	$371,094	88.9%	$470,774	78.8%
12/31/2011	2,804,706	3,442,527	637,821	81.5%	491,646	129.7%
12/31/2012	2,936,695	3,495,549	558,854	84.0%	510,872	109.4%
12/31/2013	3,075,895	3,785,872	709,977	81.2%	547,660	129.6%
12/31/2014	3,151,456	3,816,093	664,637	82.6%	584,319	113.7%
12/31/2015	3,207,327	3,905,240	697,913	82.1%	621,115	112.4%
12/31/2016	3,220,935	4,246,430	1,025,495	75.9%	642,177	159.7%
12/31/2017	3,257,770	4,088,526	830,756	79.7%	658,198	126.2%
12/31/2018	**3,261,338**	**4,248,602**	**987,264**	**76.8%**	**722,040**	**136.7%**
All Division Trust Funds[2,3]						
12/31/2009	$37,598,988	$54,536,549	$16,937,561	68.9%	$7,048,992	240.3%
12/31/2010	39,229,261	59,338,149	20,108,888	66.1%	7,506,193	267.9%
12/31/2011	37,185,067	60,734,721	23,549,654	61.2%	7,464,242	315.5%
12/31/2012	39,079,472	61,790,595	22,711,123	63.2%	7,277,585	312.1%
12/31/2013	41,122,833	66,920,789	25,797,956	61.5%	7,530,220	342.6%
12/31/2014	42,718,566	68,593,166	25,874,600	62.3%	7,795,670	331.9%
12/31/2015	44,025,860	70,850,728	26,824,868	62.1%	8,106,660	330.9%
12/31/2016	44,687,696	76,929,483	32,241,787	58.1%	8,359,071	385.7%
12/31/2017	45,613,723	74,390,866	28,777,143	61.3%	8,585,478	335.2%
12/31/2018	**46,046,155**	**77,045,496**	**30,999,341**	**59.8%**	**9,121,874**	**339.8%**

1 The DPS Division Trust Fund was established on January 1, 2010, and received the net assets of the DPSRS.

2 Results prior to December 31, 2010, do not include the DPS Division.

3 The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Note: A history of contributions by Division Trust Fund, the ADC compared to the actual contributions paid, including the deficiency (or excess), for each of the last ten years, is shown in the Schedule of Employer and Nonemployer Contributions, found on pages 117-119 in the Required Supplementary Information (RSI) in the Financial Section.

DIVISION TRUST FUNDS—PENSION

Actuarial Gains and Losses

ANALYSIS OF FINANCIAL EXPERIENCE

(Dollars in Millions)

	State Division	School Division	Local Government Division	Judicial Division	DPS Division
Amounts					
From differences between assumed and actual experience on liabilities					
Age and service retirements[1]	$62.6	$96.7	$9.7	($0.5)	$9.0
Disability retirements[2]	5.6	5.2	1.8	(0.1)	0.8
Deaths[3]	38.1	71.3	5.2	2.6	0.8
Withdrawals[4]	(24.0)	60.5	0.7	(0.4)	(42.0)
New members[5]	65.7	107.6	15.1	1.8	41.2
Pay increases[6]	36.9	85.4	(4.0)	(0.7)	44.4
Administrative expenses and other[7]	176.0	248.8	56.8	4.5	24.9
Subtotal	360.9	675.5	85.3	7.2	79.1
From differences between assumed and actual experience on assets	182.5	302.1	50.1	3.9	41.8
From changes in plan assumptions and methods	—	—	—	—	—
From changes in plan provisions	—	—	(5.6)	—	—
Total actuarial (gains)/losses on 2018 activities	**$543.4**	**$977.6**	**$129.8**	**$11.1**	**$120.9**
Total actuarial (gains)/losses on 2017 activities	**($1,417.8)**	**($2,412.7)**	**($322.1)**	**($35.9)**	**($269.6)**

[1] *Age and service retirements*: If members retire at older ages than assumed, there is a gain. If members retire at younger ages than assumed, there is a loss.

[2] *Disability retirements*: If disability claims are lower than assumed, there is a gain. If disability claims are higher than assumed, there is a loss.

[3] *Deaths*: If survivor claims are lower than assumed, there is a gain. If survivor claims are higher than assumed, there is a loss. If retirees die sooner than assumed, there is a gain. If retirees live longer than assumed, there is a loss.

[4] *Withdrawal from employment*: If more members terminate and more liabilities are released by withdrawals than assumed, there is a gain. If fewer liabilities are released by terminations than assumed, there is a loss.

[5] *New members*: If new members entering the plan have prior service, there is a loss.

[6] *Pay increases*: If there are smaller salary increases than assumed, there is a gain. If greater salary increases occur than assumed, there is a loss.

[7] *Administrative expenses and other:* Also includes miscellaneous gains and losses resulting from a change in actuarial service provider and valuation software, data adjustments, timing of financial transactions, etc. Although the total present value of benefits matched closely as determined by the prior and current actuarial service provider, the loss shown represents the different methods of attribution applied to allocate costs between future normal costs and AAL for earned service.

DIVISION TRUST FUNDS—PENSION

The table below identifies the components that contributed to the growth in the underfunded status of the Division Trust Funds for the period 2014 to 2018.

SCHEDULE OF GAINS AND LOSSES IN ACCRUED LIABILITIES AND RECONCILIATION OF UNFUNDED ACTUARIAL ACCRUED LIABILITIES

(Dollars in Millions)

	$ (Gain) or Loss for Years Ended December 31					
Type of Activity	**2014**	**2015**	**2016**	**2017**	**2018**	**2014 - 2018**
UAAL beginning of year	$25,798.0	$25,874.6	$26,824.9	$32,241.8	**$28,777.1**	$25,798.0
Experience (gains) and losses						
Age and service retirements	180.4	132.1	139.0	211.4	**177.5**	840.4
Disability retirements	23.9	22.7	22.3	22.9	**13.3**	105.1
Deaths	67.1	68.5	79.9	(21.0)	**118.0**	312.5
Withdrawal from employment	204.1	172.7	205.9	251.2	**(5.2)**	828.7
New members	176.0	149.9	213.0	238.3	**231.4**	1,008.6
Pay increases	(52.6)	(64.4)	(275.0)	(214.3)	**162.0**	(444.3)
Investment (income) loss	(579.1)	(418.0)	236.3	(175.5)	**580.4**	(355.9)
Other	(52.0)	(35.7)	68.2	61.2	**511.0**[1]	552.7
Experience (gain) loss during year	(32.2)	27.8	689.6	374.2	**1,788.4**	2,847.8
Non-recurring items						
Change in plan assumptions and methods	(636.9)	—	3,947.3[2]	—	**—**	3,310.4
Change in plan provisions	—	—	—	(4,832.3)[3]	**(5.6)**	(4,837.9)
Non-recurring items	(636.9)	—	3,947.3	(4,832.3)	**(5.6)**	(1,527.5)
Contribution deficiency	55.3	380.9	249.6	195.2	**450.0**	1,331.0[4]
Expected change in UAAL	690.4	541.6	530.4	798.2	**(10.6)**	2,550.0[5]
Total (gain)/loss for year	**76.6**	**950.3**	**5,416.9**	**(3,464.7)**	**2,222.2**	**5,201.3**
UAAL end of year	**$25,874.6**	**$26,824.9**	**$32,241.8**	**$28,777.1**	**$30,999.3**	**$30,999.3**

The previous schedule shows where gains and losses occurred over the five-year period compared to what was expected or assumed. These include the following significant gains and losses:

1 $0.5 billion loss in 2018, primarily due to the change in actuarial service provider and actuarial valuation software. Although the total present value of benefits matched closely as determined by the prior and current actuarial service provider, the loss shown represents the different methods of attribution applied to allocate costs between future normal costs and AAL for earned service.

2 $3.9 billion loss, in 2016, primarily due to the reduction of the long-term expected investment rate of return assumption from 7.50 percent to 7.25 percent and the adoption of revised mortality tables to recognize extended member longevity.

3 $4.8 billion gain, in 2017, primarily due to the changes in pension plan provisions enacted pursuant to SB 18-200.

4 $1.3 billion cumulative loss resulting from contribution deficiencies; occurring when actual contributions flowing into the plans are less than the determined ADC.

5 $2.6 billion cumulative loss indicating the five-year difference between each prior year's UAAL and the expected current year UAAL considering the normal cost earned, less the required employer contributions all of which is adjusted for interest.

DIVISION TRUST FUNDS—PENSION

Actuarial Valuation Results

Contribution rates for the year ending December 31, 2020, are derived from the results of the December 31, 2018, annual actuarial valuation and are determined in advance for purposes of budgeting, completing the required assessments related to the automatic adjustment provision (AAP) and consideration of any necessary legislative action.

SCHEDULE OF COMPUTED EMPLOYER CONTRIBUTION AND DIRECT DISTRIBUTION RATES FOR THE 2020 FISCAL YEAR

	Expressed as a percentage of Covered Payroll				
	State Division	School Division	Local Government Division	Judicial Division	DPS Division
Contributions					
Service retirement benefits	6.96%	8.04%	6.53%	14.39%	8.20%
Disability retirement benefits	0.36%	0.23%	0.27%	0.60%	0.30%
Survivor benefits	0.17%	0.15%	0.17%	0.49%	0.15%
Termination withdrawals	2.93%	3.10%	2.87%	1.11%	2.78%
Refunds	1.29%	1.03%	1.29%	0.09%[1]	0.44%
Administrative expense load	0.40%	0.40%	0.40%	0.40%	0.40%
Total normal cost	12.11%	12.95%	11.53%	17.08%	12.27%
Less member contributions	(9.18%)[2,3]	(9.13%)[2]	(8.00%)	(9.13%)[2]	(9.13%)[2]
Employer normal cost	**2.93%**	**3.82%**	**3.53%**	**7.96%**	**3.14%**
Percentage available to amortize unfunded actuarial accrued liabilities	15.96%	15.06%	8.55%	12.12%	2.75%
Amortization period[4]	35 Years	37 Years	37 Years	23 Years	Infinite
Total employer contribution rate for actuarially funded benefits[5]	10.48%[3]	10.40%	10.00%	13.91%	10.40%
Amortization Equalization Disbursement	5.00%	4.50%	2.20%	3.80%	4.50%
Supplemental Amortization Equalization Disbursement	5.00%	5.50%	1.50%	3.80%	5.50%
Less Health Care Trust Fund	(1.02%)	(1.02%)	(1.02%)	(1.02%)	(1.02%)
Less Annual Increase Reserve	(0.57%)	(0.50%)	(0.60%)	(0.41%)	(0.66%)
Less PCOP credit	N/A	N/A	N/A	N/A	(12.83%)[6]
Employer contribution rate for defined benefit plan	**18.89%**	**18.88%**	**12.08%**	**20.08%**	**5.89%**
Direct distribution[7]	**2.53%**	**2.47%**	**—%**	**2.56%**	**2.41%**

1 Assumes no judge will elect a refund of contributions made for the 17th through the 20th year of service.

2 Includes 100 percent of the phased-in amount of 0.75 percent additional member contribution effective July 1, 2019, and 50 percent of the phased-in amount of 0.75 percent additional member contribution effective July 1, 2020.

3 Weighted average of more than one statutory rate.

4 For the State, School, Judicial, and DPS Divisions, the amortization period shown considers the $225 million direct distribution from the State.

5 For the State, School, Judicial, and DPS Divisions, the rate shown includes 0.25 percent additional employer contribution effective July 1, 2019.

6 An offset to the DPS Division rate is provided for under C.R.S. § 24-51-412. See Note 4 of the Notes to the Financial Statements in the Financial Section.

7 Rates for the direct distribution have been estimated and are shown as a percentage of 2020 projected covered payroll.

Note: The underlying calculations involve more precision than what is presented in the schedule above and the rounded numbers shown may not add as a result.

DIVISION TRUST FUNDS—PENSION

The AED and SAED are set to increase in future years for the Judicial Division, as shown below. With the passage of SB 10-001, the AED and the SAED can be adjusted based on the year-end funded status within a particular Division Trust Fund. If a particular Division Trust Fund reaches a funded status of 103 percent, a decrease in the AED and SAED is mandated and if it subsequently falls below a funded status of 90 percent, an increase is mandated. For the Local Government and Judicial Divisions, if the funded ratio reaches 90 percent and subsequently falls below 90 percent, an increase in the AED and SAED is mandated. Increases cannot exceed the maximum allowable limitations shown below:

FUTURE AED AND SAED RATES

	2019 Rates		Future Annual Increases in Rates Prescribed by Colorado Revised Statutes		Maximum Allowable Limitations	
Trust Fund	AED	SAED	AED	SAED	AED	SAED
State Division	5.00%	5.00%	N/A	N/A	5.00%	5.00%
School Division	4.50%	5.50%	N/A	N/A	4.50%	5.50%
Local Government Division	2.20%	1.50%	N/A	N/A	5.00%	5.00%
Judicial Division	3.40%	3.40%	Yes[1]	Yes[2]	5.00%	5.00%
DPS Division[3]	4.50%	5.50%	N/A	N/A	4.50%	5.50%

[1] For the calendar year beginning in 2019, C.R.S. § 24-51-411(4.5) increased the AED payment to 3.40 percent of PERA-includable salary and requires the AED payment to increase by 0.40 percent at the start of each of the following four calendar years through 2023 at which time the AED payment will be 5.00 percent of PERA-includable salary.

[2] For the calendar year beginning in 2019, C.R.S. § 24-51-411(7.5) increased the SAED payment to 3.40 percent of PERA-includable salary and requires the SAED payment to increase by 0.40 percent at the start of each of the following four calendar years through 2023 at which time the SAED payment will be 5.00 percent of PERA-includable salary.

[3] DPS Division employers are permitted to reduce the AED and SAED by the PCOP offset, as specified in C.R.S. § 24-51-412 *et seq*.

Note: A history of contributions by Division Trust Fund, the ADC compared to the actual contributions paid, including the deficiency (or excess), for each of the last ten years, is shown in the Schedule of Employer and Nonemployer Contributions, found on pages 117-119, in the RSI in the Financial Section.

DIVISION TRUST FUNDS—PENSION

Annual Actuarial Valuation Statistics

As of December 31, 2018, the Funded Ratio, the UAAL, the ADC for 2020 as a percentage of covered payroll, and the amortization period considering current funding and future increases prescribed by Colorado statute, for each Division Trust Fund, are shown in the following table. The results in this table are based on the actuarial valuation for funding purposes, which does not consider the impact of reduced benefits for those hired in the future as provided for in Colorado law.

ACTUARIAL STATISTICS
(Dollars in Thousands)

Trust Fund	Funded Ratio	UAAL	ADC[1]	Amortization Period Considering Future AED and SAED Increases
State Division	56.1%	$11,206,126	23.69%	35 Years
School Division	57.9%	17,503,958	23.37%	37 Years
Local Government Division	77.7%	1,170,206	13.01%	37 Years
Judicial Division	70.6%	131,787	22.05%	23 Years
DPS Division	76.8%	987,264	10.42%	Infinite
All Division Trust Funds[2]		**$30,999,341**		

1 Determined considering the 30-year target amortization period defined in the pension funding policy for purposes of funding benchmarks and RSI reporting as shown in the Financial Section.

2 The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Pursuant to the pension funding policy, for reporting purposes, alternative ADCs also are determined by applying the layered amortization methodology as previously described. Under the target and alternative calculations, the legacy UAAL as of December 31, 2017, was amortized using a 30-year period, but the alternative ADCs use 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 any "new" UAAL recognized on and after January 1, 2018. The 2020 target and alternative ADCs, by division, are displayed below:

	Target ADC	Alternative ADCs		
Trust Fund	30-Year[1]	25-Year[2]	20-Year[2]	15-Year[2]
State Division	23.69%	23.77%	23.90%	24.12%
School Division	23.37%	23.46%	23.60%	23.84%
Local Government Division	13.01%	13.11%	13.26%	13.51%
Judicial Division	22.05%	22.14%	22.28%	22.52%
DPS Division	10.42%	10.50%	10.62%	10.82%

1 Refers to the amortization period used to amortize the legacy UAAL as of December 31, 2017, and any "new" UAAL recognized on and after January 1, 2018.

2 Refers to the amortization period used to amortize any "new" UAAL recognized on and after January 1, 2018.

DIVISION TRUST FUNDS—PENSION

Automatic Adjustment Provision

The primary intent of the AAP is to gauge the adequacy of the contributions coming into the pension trust fund against the amount required, and if determined necessary, to initiate automatic changes to member and employer contribution rates, the AI cap, and, under certain circumstances, the direct distribution from the State of Colorado, to better insure achievement of the targeted 30-year funding goal, as delineated in SB 18-200. Pursuant to C.R.S. § 24-51-413, this assessment commenced with the December 31, 2018, actuarial valuation and is performed annually, thereafter.

The AAP assessment compares two blended rates, weighted across all five division trust funds, defined as: the "Blended Total Contribution Amount" (employer contribution rate + member contribution rate + direct distribution as a rate of pay) divided by the "Blended Total Required Contribution" (ADC Rate + member contribution rate), determining a resulting ratio. If the resulting ratio falls within an acceptable corridor (98 percent to 119 percent), no adjustments are made. If the resulting ratio does not achieve a minimum benchmark (is less than 98 percent) or exceeds a maximum benchmark (is 120 percent or greater), adjustments are applied in an equitable manner of impact. The following table shows the results of the AAP assessment which was conducted to determine if adjustments are necessary as of July 1, 2020.

Elements of Test Ratio (Shown as a percentage of pay)	2020 Input Percentages	Resulting Ratio	Adjustments, if Necessary, Determined by the Board's Actuary (Effective July 1, 2020)	Revised Resulting Ratio
2020 Blended Total Contribution Amount[1,2] *(Divided By):* 2020 Blended Total Required Contribution[1,2]	29.59% *(Divided by):* 31.78%	(Equals) 93.11%	(1) 0.50% increase to member contribution rate (2) 0.50% increase to employer contribution rate (3) 0.25% decrease to AI cap[3] (4) No change to direct distribution	(Equals) 97.8%

[1] The blended rate is weighted based on the UAAL of each Division Trust Fund and is not appropriate for any other use.

[2] Determined from rates shown on page 190-192.

[3] Administrative actuarial factors applying the 1.25 percent AI cap will become effective as of July 1, 2019.

Below is a summary of the AAP guidelines. An automatic adjustment will occur under the following conditions:

- If the resulting ratio is less than 98 percent, there will be adjustments of equitable impact, increasing the employer contribution rate, increasing the member contribution rate, decreasing the AI cap, and increasing the direct distribution (if permitted).
- If the resulting ratio is greater than or equal to 120 percent, there will be adjustments of equitable impact, decreasing the employer contribution rate, decreasing the member contribution rate, increasing the AI cap, and decreasing the direct distribution.

The AAP defines the limited amounts of total adjustment available in each category, and also the increments of adjustments that can occur in any one year. Multiple steps over multiple years are allowed for a required adjustment as is necessary, but cannot exceed the ultimate limits as set forth in statute, as detailed below:

- First adjustment cannot occur prior to July 1, 2020.
- Adjustment (increase or decrease) to each of the employer contribution rates and the member contribution rates cannot exceed 0.50 percent in any one year, and
  - Cannot exceed 2.00 percent above the contribution rates reflecting SB 18-200 statutory reforms.
  - Cannot fall below the contribution rates in effect immediately prior to the passage of SB 18–200.
- Adjustment (increase or decrease) to the AI rate cannot exceed 0.25 percent in any one year, and
  - Cannot exceed a 2.00 percent AI cap maximum.
  - Cannot fall below a 0.50 percent AI cap minimum.
- Adjustment to the direct distribution cannot exceed $20 million in any one year, and
  - Cannot exceed the initial $225 million amount.
  - Can be reduced to $0.

DIVISION TRUST FUNDS—PENSION

- Adjustments that are required because funding is below the 98 percent threshold will be made to an extent that will bring the revised ratio to 103 percent following the corrective efforts but in no event can the adjustments in one year be greater than the limit described above.
- Adjustments that are required because funding has reached the 120 percent threshold must not cause the ratio to fall below 103 percent.

Additional information on the AAP can be found in C.R.S. § 24-51-413.

Funded Ratio

(Dollars in Thousands)

The funded ratio for the plan is determined by dividing the actuarial value of assets by the AAL. The actuarial value of assets is not the current market value but a market-related value, which recognizes the differences between actual and expected investment experience for each year in equal amounts over a four-year period. The actuarial value of the assets as of December 31, 2018, was $46,046,155 compared to a market value of assets of $44,539,737, and to the AAL of $77,045,496. The funded ratio for each of the funds, based on the actuarial value of assets, at December 31 for each of the last five years is shown below:

Trust Fund	2014	2015	2016	2017	2018
State Division	57.8%	57.6%	54.6%	57.5%	**56.1%**
School Division	60.9%	60.7%	56.3%	59.4%	**57.9%**
Local Government Division	78.7%	79.0%	74.4%	79.5%	**77.7%**
Judicial Division	73.0%	71.4%	66.6%	72.4%	**70.6%**
DPS Division	82.6%	82.1%	75.9%	79.7%	**76.8%**
All Division Trust Funds[1]	**62.3%**	**62.1%**	**58.1%**	**61.3%**	**59.8%**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

The Board's pension funding policy states that the targeted actuarial funded ratio is greater than or equal to 110 percent on a combined Division Trust Fund basis. The funded ratios listed above give an indication of progress made toward achieving the stated objective. A larger funded ratio indicates that a plan is better funded. As an example, for every $1.00 of the actuarially determined benefits earned for the School Division Trust Fund as of December 31, 2018, approximately $0.58 of assets are available for payment based on the actuarial value of assets. These benefits earned will be payable over the life span of members after their retirement and therefore, it is not imperative that the AAL equal the actuarial value of assets at any given moment in time.

DIVISION TRUST FUNDS—PENSION

At December 31, 2018, and December 31, 2017, PERA had the following funded status for all of its Division Trust Funds:

FUNDED STATUS FOR THE DIVISION TRUST FUNDS

(Dollars in Thousands)

	Market Value of Assets[1]		Actuarial Value of Assets[2]	
	12/31/2017	12/31/2018	12/31/2017	12/31/2018
State Division Trust Fund				
Actuarial accrued liability[3]	$24,782,085	**$25,509,852**	$24,782,085	**$25,509,852**
Assets held to pay those liabilities	15,105,378	**13,837,863**	14,256,410	**14,303,726**
Unfunded actuarial accrued liability	**$9,676,707**	**$11,671,989**	**$10,525,675**	**$11,206,126**
Funded ratio	61.0%	**54.2%**	57.5%	**56.1%**
School Division Trust Fund				
Actuarial accrued liability[3]	$40,046,215	**$41,598,400**	$40,046,215	**$41,598,400**
Assets held to pay those liabilities	25,204,920	**23,304,911**	23,780,045	**24,094,442**
Unfunded actuarial accrued liability	**$14,841,295**	**$18,293,489**	**$16,266,170**	**$17,503,958**
Funded ratio	62.9%	**56.0%**	59.4%	**57.9%**
Local Government Division Trust Fund				
Actuarial accrued liability[3]	$5,045,932	**$5,240,885**	$5,045,932	**$5,240,885**
Assets held to pay those liabilities	4,249,852	**3,935,921**	4,009,413	**4,070,679**
Unfunded actuarial accrued liability	**$796,080**	**$1,304,964**	**$1,036,519**	**$1,170,206**
Funded ratio	84.2%	**75.1%**	79.5%	**77.7%**
Judicial Division Trust Fund				
Actuarial accrued liability[3]	$428,108	**$447,757**	$428,108	**$447,757**
Assets held to pay those liabilities	328,459	**305,304**	310,085	**315,970**
Unfunded actuarial accrued liability	**$99,649**	**$142,453**	**$118,023**	**$131,787**
Funded ratio	76.7%	**68.2%**	72.4%	**70.6%**
DPS Division Trust Fund				
Actuarial accrued liability[3]	$4,088,526	**$4,248,602**	$4,088,526	**$4,248,602**
Assets held to pay those liabilities	3,452,667	**3,155,738**	3,257,770	**3,261,338**
Unfunded actuarial accrued liability	**$635,859**	**$1,092,864**	**$830,756**	**$987,264**
Funded ratio	84.4%	**74.3%**	79.7%	**76.8%**
All Division Trust Funds[4]				
Actuarial accrued liability[3]	$74,390,866	**$77,045,496**	$74,390,866	**$77,045,496**
Assets held to pay those liabilities[5]	48,341,276	**44,539,737**	45,613,723	**46,046,155**
Unfunded actuarial accrued liability	**$26,049,590**	**$32,505,759**	**$28,777,143**	**$30,999,341**
Funded ratio	65.0%	**57.8%**	61.3%	**59.8%**

1 The market value of assets is the fair value of the investments.

2 The actuarial value of assets is calculated by spreading any market gains or losses above or below the assumed rate of return over four years.

3 Based upon an assumed rate of return on investments of 7.25 percent and an assumed rate of 7.25 percent to discount the liabilities to be paid in the future to a value as of December 31, 2017, and December 31, 2018.

4 The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

5 In aggregate, the market value of the assets as of December 31, 2018, is $1,506,418 less than the actuarial value of assets calculated by the actuaries, as they are recognizing the gains and losses in value over four years, rather than only in the year they occurred. The remaining gains and (losses) to be smoothed for 2016 are ($24,160), for 2017 are $2,276,856, and for 2018 are ($3,759,114).

DIVISION TRUST FUNDS—PENSION

Sensitivity of Actuarial Valuation to Changes in Assumed Investment Rate of Return and Discount Rate

The most important long-term driver of a pension plan is investment income. The investment return assumption and the discount rate for liabilities should be based on an estimated long-term investment yield for the plan, considering the nature and mix of current and expected plan investments and the basis used to determine the actuarial value of assets.

To understand the importance of the investment rate of return, which is used to discount the actuarial liabilities of PERA, a one percent fluctuation in the investment rate of return and discount rate would change the funded ratio, UAAL, and ADC (for contributions for the fiscal year ended December 31, 2020) as shown on the tables below:

INVESTMENT RETURN ASSUMPTION (DISCOUNT RATE) EQUAL TO 6.25 PERCENT

(Dollars in Thousands)

	Actuarial Value of Assets			Market Value of Assets
Trust Fund	Funded Ratio	UAAL	ADC	UAAL
State Division	50.6%	$13,981,517	29.04%	$14,447,380
School Division	51.9%	22,351,244	29.49%	23,140,775
Local Government Division	69.6%	1,778,190	19.25%	1,912,948
Judicial Division	63.9%	178,161	28.60%	188,828
DPS Division	68.8%	1,482,204	16.08%	1,587,803
All Division Trust Funds[1]		**$39,771,316**		**$41,277,734**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

CURRENT INVESTMENT RETURN ASSUMPTION (DISCOUNT RATE) EQUAL TO 7.25 PERCENT

(Dollars in Thousands)

	Actuarial Value of Assets			Market Value of Assets
Trust Fund	Funded Ratio	UAAL	ADC	UAAL
State Division	**56.1%**	**$11,206,126**	**23.69%**	**$11,671,989**
School Division	**57.9%**	**17,503,958**	**23.37%**	**18,293,489**
Local Government Division	**77.7%**	**1,170,206**	**13.01%**	**1,304,964**
Judicial Division	**70.6%**	**131,787**	**22.05%**	**142,453**
DPS Division	**76.8%**	**987,264**	**10.42%**	**1,092,864**
All Division Trust Funds[1]		**$30,999,341**		**$32,505,759**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

INVESTMENT RETURN ASSUMPTION (DISCOUNT RATE) EQUAL TO 8.25 PERCENT

(Dollars in Thousands)

	Actuarial Value of Assets			Market Value of Assets
Trust Fund	Funded Ratio	UAAL	ADC	UAAL
State Division	61.8%	$8,853,759	18.93%	$9,319,622
School Division	64.2%	13,429,731	17.98%	14,219,262
Local Government Division	86.1%	658,430	7.30%	793,188
Judicial Division	77.5%	91,878	15.99%	102,545
DPS Division	85.0%	574,092	5.44%	679,691
All Division Trust Funds[1]		**$23,607,890**		**$25,114,308**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Note: The time-weighted, net-of-fees annualized rate of return for the pooled investment assets was 5.6 percent for the past five years and 8.8 percent for the past 10 years. The 30-year annualized gross-of-fees rate of return for the pooled investment assets was 8.5 percent.

DIVISION TRUST FUNDS—PENSION

Plan Data

SCHEDULE OF RETIREES, BENEFICIARIES, AND SURVIVORS ADDED TO AND REMOVED FROM THE BENEFIT PAYROLL

(In Actual Dollars)

	Added to Payroll		Removed from Payroll		Payroll—End of Year			
Valuation Date	No.[1]	Annual Benefits	No.[1]	Annual Benefits	No.[1]	Annual Benefits	Average Annual Benefits	Increase in Average Benefits
State Division[2]								
12/31/2009					31,330	$1,095,394,056	$34,963	—
12/31/2010	1,705	$63,012,492	668	$15,870,416	32,367	1,142,735,232	35,306	1.0%
12/31/2011	1,477	52,575,840	767	18,206,208	33,077	1,198,047,252	36,220	2.6%
12/31/2012	1,753	60,313,800	835	17,053,956	33,995	1,259,715,132	37,056	2.3%
12/31/2013	1,472	49,314,648	621	15,343,872	34,846	1,316,530,332	37,781	2.0%
12/31/2014	1,688	70,625,718	728	17,912,280	35,806	1,369,243,770	38,241	1.2%
12/31/2015	1,862	92,808,306	803	20,891,508	36,865	1,441,160,568	39,093	2.2%
12/31/2016	1,953	90,963,480	805	22,828,296	38,013	1,509,295,752	39,705	1.6%
12/31/2017	2,029	96,524,376	810	23,794,584	39,232	1,582,025,544	40,325	1.6%
12/31/2018	**1,948**	**64,439,160**	**865**	**29,030,196**	**40,315**	**1,617,434,508**	**40,120**	**(0.5%)**
School Division[2]								
12/31/2009					47,459	$1,599,048,372	$33,693	—
12/31/2010	3,002	$94,587,504	717	$15,977,299	49,744	1,677,950,928	33,732	0.1%
12/31/2011	2,783	83,582,412	809	17,059,212	51,718	1,776,539,052	34,350	1.8%
12/31/2012	3,044	87,700,656	985	18,719,640	53,777	1,876,340,508	34,891	1.6%
12/31/2013	2,744	79,704,816	713	17,081,472	55,808	1,974,615,348	35,382	1.4%
12/31/2014	3,016	111,392,724	843	19,419,540	57,981	2,066,588,532	35,643	0.7%
12/31/2015	2,990	130,162,524	1,027	23,409,984	59,944	2,173,341,072	36,256	1.7%
12/31/2016	3,023	123,292,224	1,027	25,461,636	61,940	2,271,171,660	36,667	1.1%
12/31/2017	3,249	130,564,260	1,026	26,635,332	64,163	2,375,100,588	37,017	1.0%
12/31/2018	**3,319**	**90,191,556**	**1,106**	**32,160,792**	**66,376**	**2,433,131,352**	**36,657**	**(1.0%)**
Local Government Division[2]								
12/31/2009					4,671	$154,915,224	$33,165	—
12/31/2010	463	$18,211,380	82	$1,560,317	5,052	171,596,184	33,966	2.4%
12/31/2011	332	11,254,980	88	1,645,992	5,296	184,500,768	34,838	2.6%
12/31/2012	687	23,576,376	105	1,892,688	5,878	209,260,764	35,601	2.2%
12/31/2013	345	10,330,380	76	1,456,248	6,147	221,838,300	36,089	1.4%
12/31/2014	392	13,412,585	93	2,018,928	6,446	233,231,957	36,182	0.3%
12/31/2015	408	18,760,927	97	2,215,488	6,757	249,777,396	36,966	2.2%
12/31/2016	388	15,843,636	100	2,491,764	7,045	263,129,268	37,350	1.0%
12/31/2017	420	18,329,400	114	2,916,156	7,351	278,542,512	37,892	1.5%
12/31/2018	**421**	**14,336,628**	**128**	**3,227,280**	**7,644**	**289,651,860**	**37,893**	**0.0%**

Please see page 198 for footnote references.

DIVISION TRUST FUNDS—PENSION

SCHEDULE OF RETIREES, BENEFICIARIES, AND SURVIVORS ADDED TO AND REMOVED FROM THE BENEFIT PAYROLL (CONTINUED)

(In Actual Dollars)

	Added to Payroll		Removed from Payroll		Payroll—End of Year			
Valuation Date	No.[1]	Annual Benefits	No.[1]	Annual Benefits	No.[1]	Annual Benefits	Average Annual Benefits	Increase in Average Benefits
Judicial Division[2]								
12/31/2009					291	$15,290,100	$52,543	—
12/31/2010	10	$876,804	8	$234,040	293	15,935,640	54,388	3.5%
12/31/2011	21	1,224,480	3	103,752	311	17,320,980	55,694	2.4%
12/31/2012	19	1,089,288	11	337,308	319	18,331,992	57,467	3.2%
12/31/2013	9	740,508	6	156,468	322	19,219,128	59,687	3.9%
12/31/2014	16	1,068,823	8	368,520	330	19,919,431	60,362	1.1%
12/31/2015	20	2,111,405	6	323,940	344	21,706,896	63,101	4.5%
12/31/2016	28	2,406,072	12	287,580	360	23,825,388	66,182	4.9%
12/31/2017	24	2,554,728	9	398,184	375	25,981,932	69,285	4.7%
12/31/2018	**8**	**696,864**	**3**	**129,084**	**380**	**26,549,712**	**69,868**	**0.8%**
DPS Division[2,3]								
12/31/2010	**6,199**	$216,886,500	—	$—	6,199	$216,886,500	$34,987	—
12/31/2011	**252**	7,977,360	155	4,143,396	6,296	224,954,832	35,730	2.1%
12/31/2012	**274**	8,333,292	168	3,949,860	6,402	232,858,044	36,373	1.8%
12/31/2013	**284**	9,255,936	135	3,704,628	6,551	242,733,072	37,053	1.9%
12/31/2014	**306**	12,537,532	171	5,065,860	6,686	250,204,744	37,422	1.0%
12/31/2015	**295**	14,799,992	178	5,884,980	6,803	259,119,756	38,089	1.8%
12/31/2016	**322**	14,412,348	190	5,854,992	6,935	267,677,112	38,598	1.3%
12/31/2017	**283**	13,847,400	181	6,388,008	7,037	275,136,504	39,099	1.3%
12/31/2018	**297**	**9,717,816**	**184**	**6,345,060**	**7,150**	**278,509,260**	**38,952**	**(0.4%)**
All Division Trust Funds[2,4]								
12/31/2009					83,751	$2,864,647,752	$34,204	—
12/31/2010	11,379[5]	$393,574,680	1,475	$33,642,072	93,655[5]	3,225,104,484	34,436	0.7%
12/31/2011	4,865	156,615,072	1,822	41,158,560	96,698	3,401,362,884	35,175	2.1%
12/31/2012	5,777	181,013,412	2,104	41,953,452	100,371	3,596,506,440	35,832	1.9%
12/31/2013	4,854	149,346,288	1,551	37,742,688	103,674	3,774,936,180	36,412	1.6%
12/31/2014	5,418	209,037,382	1,843	44,785,128	107,249	3,939,188,434	36,729	0.9%
12/31/2015	5,575	258,643,154	2,111	52,725,900	110,713	4,145,105,688	37,440	1.9%
12/31/2016	5,714	246,917,760	2,134	56,924,268	114,293	4,335,099,180	37,930	1.3%
12/31/2017	6,005	261,820,164	2,140	60,132,264	118,158	4,536,787,080	38,396	1.2%
12/31/2018	**5,993**	**179,382,024**	**2,286**	**70,892,412**	**121,865**	**4,645,276,692**	**38,118**	**(0.7%)**

1 The number does not include deferred survivors.

2 Amounts derived on an accrual basis.

3 The DPS Division Trust Fund was established on January 1, 2010, and received the net assets of the DPSRS.

4 Data prior to December 31, 2010, does not include the DPS Division.

5 Includes the addition of 6,199 beneficiaries due to the DPSRS merger.

DIVISION TRUST FUNDS—PENSION

The number of persons receiving monthly retirement benefits has grown steadily in relation to membership. This trend will likely continue for many years into the future. The retirement benefit disbursements shown in the right-hand column include cost-of-living increases paid in years since 1970. Prior to 1981, figures are for years ended June 30.

MEMBER-RETIREE COMPARISON–ALL DIVISION TRUST FUNDS[1]

(In Actual Dollars)

Year	Number of Retiree Accounts on 12/31	Number of Member Accounts on 12/31[2]	Retiree Accounts as % of Members on 12/31	Total Benefits Paid–Year Ended 12/31
1940	93	3,715	2.5%	$72,588
1945	171	5,585	3.1%	137,442
1950	280	11,853	2.4%	237,866
1955	747	21,185	3.5%	745,679
1960	1,775	33,068	5.4%	2,055,139
1965	3,631	49,701	7.3%	5,486,225
1970	6,308	65,586	9.6%	13,115,234
1975	11,650	84,781	13.7%	32,820,433
1980	17,301	96,473	17.9%	71,289,456
1985	24,842	101,409	24.5%	192,456,029
1990	32,955	115,350	28.6%	350,398,094
1995	41,909	203,102	20.6%	639,501,796
2000	53,015	248,104	21.4%	1,093,779,068
2005	69,416	306,139	22.7%	1,973,240,491
2010	91,412	378,264	24.2%	3,161,773,781
2015	108,426	436,465	24.8%	4,073,789,897
2016	111,975	451,760	24.8%	4,260,156,437
2017	115,801	465,590	24.9%	4,458,990,801
2018	**119,435**	**481,991**	**24.8%**	**4,611,125,071**

1 Amounts derived on a cash basis. Data prior to 2010 does not include the DPS Division.

2 Includes inactive member accounts.

DIVISION TRUST FUNDS—PENSION

SCHEDULE OF MEMBERS IN ACTUARIAL VALUATION

By Attained Age and Years of Service as of December 31, 2018

(In Actual Dollars)

State Division

For State Division members (excluding State Troopers) the average age was 45.4 years, the average service was 8.7 years, and the average expected remaining service life was 9.0 years. For State Troopers the average age was 41.6 years, the average service was 12.1 years, and the average expected remaining service life was 11.0 years.

	Years of Service to Valuation Date							Total	
Attained Age	0–4	5–9	10–14	15–19	20–24	25–29	30+	No.	Annual Valuation Payroll
Up to 20	257	—	—	—	—	—	—	257	$2,921,849
20 - 24	1,874	8	—	—	—	—	—	1,882	54,771,951
25 - 29	4,351	447	10	—	—	—	—	4,808	190,772,541
30 - 34	4,055	1,716	412	5	—	—	—	6,188	287,521,586
35 - 39	3,299	1,794	1,327	295	17	—	—	6,732	347,744,265
40 - 44	2,429	1,412	1,300	941	270	11	—	6,363	356,930,568
45 - 49	3,493	1,591	1,363	1,030	901	319	20	8,717	488,206,326
50 - 54	1,767	1,127	1,207	922	835	630	186	6,674	404,069,337
55 - 59	1,473	1,010	1,223	988	776	512	294	6,276	360,867,210
60	270	201	230	185	128	85	63	1,162	65,785,661
61	232	175	229	181	108	83	60	1,068	60,292,101
62	204	171	178	137	104	79	51	924	52,469,751
63	172	152	196	138	79	69	57	863	49,217,782
64	138	160	159	139	71	66	43	776	42,449,765
65	135	111	135	111	64	46	37	639	34,048,346
66	121	106	96	68	47	30	26	494	23,988,409
67	95	59	75	56	34	22	26	367	18,662,381
68	90	54	62	42	26	24	23	321	15,596,412
69	60	41	51	44	24	11	14	245	12,628,471
70 +	230	134	120	99	52	48	72	755	29,882,559
Total	**24,745**	**10,469**	**8,373**	**5,381**	**3,536**	**2,035**	**972**	**55,511**	**$2,898,827,271**

DIVISION TRUST FUNDS—PENSION

SCHEDULE OF MEMBERS IN ACTUARIAL VALUATION (CONTINUED)

By Attained Age and Years of Service as of December 31, 2018

(In Actual Dollars)

School Division

For School Division members the average age was 44.6 years, the average service was 8.4 years, and the average expected remaining service life was 9.2 years.

	Years of Service to Valuation Date							Total	
Attained Age	0–4	5–9	10–14	15–19	20–24	25–29	30+	No.	Annual Valuation Payroll
Up to 20	1,127	—	—	—	—	—	—	1,127	$11,494,116
20 - 24	5,285	71	—	—	—	—	—	5,356	114,521,888
25 - 29	9,858	1,634	49	—	—	—	—	11,541	369,992,791
30 - 34	7,456	4,292	1,122	32	—	—	—	12,902	465,939,999
35 - 39	7,105	3,392	3,875	884	21	—	—	15,277	597,035,627
40 - 44	6,703	3,065	3,077	3,254	561	16	—	16,676	700,573,962
45 - 49	8,463	3,077	3,020	2,687	2,300	555	27	20,129	829,332,353
50 - 54	4,279	2,426	2,814	2,463	1,778	1,471	223	15,454	685,872,207
55 - 59	3,504	1,988	2,457	2,580	1,684	995	522	13,730	557,781,070
60	574	315	418	439	268	165	76	2,255	87,014,969
61	564	274	362	391	233	132	62	2,018	74,734,928
62	499	246	299	312	210	113	70	1,749	64,190,273
63	419	248	242	259	171	120	54	1,513	54,651,253
64	376	184	178	238	151	90	46	1,263	43,067,241
65	328	178	185	146	106	65	40	1,048	34,408,841
66	300	119	115	97	67	45	21	764	21,536,259
67	279	112	89	80	59	35	27	681	18,895,183
68	261	82	64	67	36	21	19	550	14,400,624
69	221	76	70	51	27	23	13	481	11,590,474
70 +	924	353	257	127	71	40	47	1,819	32,469,393
Total	**58,525**	**22,132**	**18,693**	**14,107**	**7,743**	**3,886**	**1,247**	**126,333**	**$4,789,503,451**

DIVISION TRUST FUNDS—PENSION

SCHEDULE OF MEMBERS IN ACTUARIAL VALUATION (CONTINUED)

By Attained Age and Years of Service as of December 31, 2018

(In Actual Dollars)

Local Government Division

For Local Government Division members the average age was 44.1 years, the average service was 7.3 years, and the average expected remaining service life was 8.2 years.

	Years of Service to Valuation Date							Total	
Attained Age	0–4	5–9	10–14	15–19	20–24	25–29	30+	No.	Annual Valuation Payroll
Up to 20	598	—	—	—	—	—	—	598	$4,760,793
20 - 24	717	13	—	—	—	—	—	730	15,329,908
25 - 29	1,030	100	9	—	—	—	—	1,139	43,168,027
30 - 34	987	281	87	11	—	—	—	1,366	66,467,669
35 - 39	787	304	231	77	6	—	—	1,405	77,297,505
40 - 44	808	294	281	148	62	2	—	1,595	87,186,367
45 - 49	567	248	365	213	135	54	5	1,587	100,259,550
50 - 54	511	255	281	176	147	83	27	1,480	90,636,603
55 - 59	451	226	298	232	162	86	68	1,523	90,797,225
60	71	31	58	30	28	19	9	246	15,447,744
61	68	31	58	29	24	13	12	235	14,255,357
62	61	41	33	20	19	16	8	198	10,789,888
63	70	21	44	26	21	9	7	198	10,390,983
64	55	22	33	24	6	12	6	158	8,113,846
65	65	24	21	19	7	4	5	145	6,083,340
66	58	23	22	13	9	5	3	133	5,969,402
67	41	17	18	7	3	5	5	96	4,009,988
68	39	10	13	5	1	3	1	72	2,081,721
69	30	10	12	6	2	3	—	63	2,316,163
70 +	188	42	34	17	6	2	4	293	5,636,048
Total	**7,202**	**1,993**	**1,898**	**1,053**	**638**	**316**	**160**	**13,260**	**$660,998,127**

DIVISION TRUST FUNDS—PENSION

SCHEDULE OF MEMBERS IN ACTUARIAL VALUATION (CONTINUED)

By Attained Age and Years of Service as of December 31, 2018

(In Actual Dollars)

Judicial Division

For Judicial Division members the average age was 56.1 years, the average service was 13.7 years, and the average expected remaining service life was 10.5 years.

	Years of Service to Valuation Date							Total	
Attained Age	0–4	5–9	10–14	15–19	20–24	25–29	30+	No.	Annual Valuation Payroll
Up to 20	—	—	—	—	—	—	—	—	$—
20 - 24	—	—	—	—	—	—	—	—	—
25 - 29	—	—	—	—	—	—	—	—	—
30 - 34	—	1	—	—	—	—	—	1	64,966
35 - 39	5	4	1	—	—	—	—	10	1,137,414
40 - 44	17	7	2	1	1	—	—	28	3,873,306
45 - 49	12	9	9	6	1	1	—	38	5,959,766
50 - 54	12	16	22	11	5	3	—	69	10,586,152
55 - 59	10	13	12	9	9	11	6	70	11,176,041
60	—	1	4	4	2	2	1	14	2,113,718
61	2	1	2	3	2	3	—	13	2,150,674
62	3	1	2	2	3	—	1	12	1,880,739
63	1	2	2	2	—	—	—	7	957,605
64	—	1	2	2	2	2	2	11	1,728,630
65	—	2	2	5	—	2	—	11	1,703,844
66	—	—	5	3	2	3	2	15	2,284,660
67	—	—	2	1	2	—	—	5	804,099
68	1	2	3	1	—	1	1	9	1,330,727
69	—	1	1	1	—	1	—	4	619,093
70 +	1	1	2	5	1	3	2	15	2,134,422
Total	**64**	**62**	**73**	**56**	**30**	**32**	**15**	**332**	**$50,505,856**

DIVISION TRUST FUNDS—PENSION

SCHEDULE OF MEMBERS IN ACTUARIAL VALUATION (CONTINUED)

By Attained Age and Years of Service as of December 31, 2018

(In Actual Dollars)

DPS Division

For DPS Division members the average age was 40.4 years, the average service was 6.2 years, and the average expected remaining service life was 10.1 years.

	Years of Service to Valuation Date							Total	
Attained Age	0–4	5–9	10–14	15–19	20–24	25–29	30+	No.	Annual Valuation Payroll
Up to 20	115	—	—	—	—	—	—	115	$1,465,734
20 - 24	941	7	—	—	—	—	—	948	23,444,546
25 - 29	2,131	314	—	—	—	—	—	2,445	92,834,913
30 - 34	1,717	941	119	2	—	—	—	2,779	126,575,104
35 - 39	1,585	833	382	32	2	—	—	2,834	132,966,033
40 - 44	705	488	314	199	27	—	—	1,733	88,276,906
45 - 49	571	440	249	234	107	21	2	1,624	84,048,493
50 - 54	367	340	192	174	118	68	8	1,267	65,674,716
55 - 59	306	288	152	147	97	54	27	1,071	52,684,305
60	63	66	20	28	18	6	6	207	8,841,651
61	42	61	22	21	10	11	5	172	7,490,196
62	40	61	23	16	15	5	7	167	7,438,831
63	34	43	14	23	13	6	3	136	6,418,593
64	27	49	17	23	9	2	5	132	5,992,316
65	35	23	11	13	10	5	4	101	4,084,627
66	28	20	6	5	6	3	1	69	2,773,213
67	19	22	5	6	5	3	1	61	2,363,872
68	21	18	4	4	1	2	—	50	1,781,345
69	17	17	6	4	3	—	1	48	2,016,545
70 +	75	78	13	5	3	7	8	189	4,868,134
Total	**8,839**	**4,109**	**1,549**	**936**	**444**	**193**	**78**	**16,148**	**$722,040,073**

DIVISION TRUST FUNDS—PENSION

SCHEDULE OF ACTIVE MEMBER ACTUARIAL VALUATION DATA

As of December 31

(In Actual Dollars)

Year	Number of Participating Employers[1]	Number of Active Members	Annual Payroll for Active Members	Average Annual Pay for Active Members	% Increase (Decrease) in Average Annual Pay
State Division					
2009	70	54,333	$2,384,136,844	$43,880	—
2010	70	54,977	2,392,080,128	43,511	(0.84%)
2011	70	54,956	2,393,791,402	43,558	0.11%
2012	70	54,804	2,384,933,961	43,518	(0.09%)
2013	70	55,354	2,474,965,482	44,712	2.74%
2014	32	55,300	2,564,669,718	46,377	3.72%
2015	32	55,291	2,641,866,650	47,781	3.03%
2016	32	55,725	2,710,650,565	48,643	1.80%
2017	32	55,686	2,774,207,203	49,819	2.42%
2018	**32**	**55,511**	**2,898,827,271**	**52,221**	**4.82%**
School Division					
2009	196	119,390	$3,922,175,230	$32,852	—
2010	271[2]	116,486	3,900,661,576	33,486	1.93%
2011	275[2]	114,820	3,821,603,410	33,283	(0.61%)
2012	281[2]	115,294	3,819,065,598	33,125	(0.47%)
2013	294[2]	117,727	3,938,649,818	33,456	1.00%
2014	224	119,618	4,063,235,757	33,968	1.53%
2015	227	120,239	4,235,290,282	35,224	3.70%
2016	229	121,945	4,349,319,783	35,666	1.25%
2017	234	122,990	4,471,356,847	36,355	1.93%
2018	**234**	**126,333**	**4,789,503,451**	**37,912**	**4.28%**
Local Government Division					
2009	139	16,166	$705,097,035	$43,616	—
2010	142	16,144	705,265,331	43,686	0.16%
2011	145	16,065	718,169,015	44,704	2.33%
2012	143	12,097	523,668,446	43,289	(3.17%)
2013	146	11,954	529,003,436	44,253	2.23%
2014	141	12,084	540,468,037	44,726	1.07%
2015	140	12,176	561,518,205	46,117	3.11%
2016	141	12,736	608,222,609	47,756	3.55%
2017	140	12,770	632,768,337	49,551	3.76%
2018	**141**	**13,260**	**660,998,127**	**49,849**	**0.60%**
Judicial Division					
2009	6	317	$37,582,661	$118,557	—
2010	6	317	37,412,139	118,019	(0.45%)
2011	6	329	39,033,369	118,642	0.53%
2012	6	329	39,045,008	118,678	0.03%
2013	6	332	39,941,730	120,306	1.37%
2014	2	334	42,976,979	128,674	6.96%
2015	2	334	46,869,730	140,329	9.06%
2016	2	335	48,699,531	145,372	3.59%
2017	2	332	48,947,607	147,433	1.42%
2018	**2**	**332**	**50,505,856**	**152,126**	**3.18%**

Please see page 206 for footnote references.

DIVISION TRUST FUNDS—PENSION

SCHEDULE OF ACTIVE MEMBER ACTUARIAL VALUATION DATA (CONTINUED)

As of December 31
(In Actual Dollars)

Year	Number of Participating Employers[1]	Number of Active Members	Annual Payroll for Active Members	Average Annual Pay for Active Members	% Increase (Decrease) in Average Annual Pay
DPS Division[3]					
2010	28[2]	13,171[4]	$470,773,746	$35,743	—
2011	27[2]	13,571	491,646,251	36,228	1.36%
2012	29[2]	13,911	510,872,366	36,724	1.37%
2013	31[2]	14,816	547,659,912	36,964	0.65%
2014	1	15,414	584,319,269	37,908	2.55%
2015	1	15,929	621,114,573	38,993	2.86%
2016	1	15,950	642,177,158	40,262	3.25%
2017	1	15,991	658,198,306	41,161	2.23%
2018	**1**	**16,148**	**722,040,073**	**44,714**	**8.63%**
All Division Trust Funds[5]					
2009	411	190,206	$7,048,991,770	$37,060	—
2010	517[2]	201,095[4]	7,506,192,920	37,327	0.72%
2011	523[2]	199,741	7,464,243,447	37,370	0.12%
2012	529[2]	196,435	7,277,585,379	37,048	(0.86%)
2013	547[2]	200,183	7,530,220,378	37,617	1.54%
2014	400	202,750	7,795,669,760	38,450	2.21%
2015	402	203,969	8,106,659,440	39,745	3.37%
2016	405	206,691	8,359,069,646	40,442	1.75%
2017	409	207,769	8,585,478,300	41,322	2.18%
2018	**410**	**211,584**	**9,121,874,778**	**43,112**	**4.33%**

1 Prior to 2014, employer counts were based on separate units of government. Effective in 2014, GASB 67 classifies a primary government and its component units as one employer. Employer counts for the years 2014 and beyond are presented for purposes of complying with GASB 67 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

2 Includes charter schools operating within the School and DPS Divisions.

3 The DPS Division Trust Fund was established on January 1, 2010, and received the net assets of the DPSRS.

4 Includes the addition of approximately 4,000 hourly employees who were previously ineligible for benefits under the DPSRS.

5 Data prior to 2010 does not include the DPS Division.

HEALTH CARE TRUST FUNDS—OPEB

Introduction

Implementation of GASB Statement No. 74 results in the preparation of two actuarial valuations—one for funding purposes and one for accounting and financial reporting purposes. Unless otherwise noted, this Health Care Trust Funds subsection reports on the actuarial valuation performed for funding purposes, but also includes information on specific differences between the two actuarial valuations. This subsection includes information on PERA's two defined benefit Other Postemployment Benefit (OPEB) plans. The Health Care Trust Fund (HCTF) is a cost-sharing multiple-employer plan and the Denver Public Schools Health Care Trust Fund (DPS HCTF) is a single-employer plan.

The HCTF and the DPS HCTF provide a subsidy for PERACare, PERA's health benefits program. Participation in the HCTF and the DPS HCTF is voluntary pursuant to C.R.S. § 24-51-1201. Contributions and investment earnings on the assets of the plans pay for the costs.

The HCTF and the DPS HCTF provide a health care premium subsidy based upon the benefit structure under which a member retires and the member's years of service credit. There is an allocation of the premium subsidy between the trust funds for members who retire with service credit in the DPS Division and one or more of the other divisions, as set forth in C.R.S. § 24-51-1206.5. The basis for the allocation of the premium subsidy is the percentage of the member contribution balance from each division as it relates to the total member contribution account balance.

The Board is responsible for maintaining a funding policy applicable to PERA's OPEB funds. The OPEB funding policy was last revised and adopted by the Board on January 19, 2018, effective for the December 31, 2017, funding actuarial valuation. The OPEB funding policy requires the calculation of an ADC for each of the two Health Care Trust Funds for the purpose of assessing the adequacy of the statutory contribution rate of each HCTF. The ADC is determined in accordance with the OPEB plan provisions, as described in Note 9 of the Notes to the Financial Statements in the Financial Section.

As stated by Segal in their actuarial valuation report:

> "Segal strongly recommends an actuarial funding method that targets 100% funding of the actuarial accrued liability. Generally, this implies payments that are ultimately at least enough to cover normal cost, interest on the unfunded actuarial accrued liability and a portion of the principal balance. The OPEB funding policy adopted by PERA meets this standard."

The Board has the authority to contract, self-insure, and authorize disbursements necessary in order to carry out the purposes of the PERACare program including the administration of the health care subsidies.

Actuarial Methods and Assumptions

Actuarial Methods

The Board is responsible for the actuarial methods and assumptions used in the OPEB actuarial valuations in accordance with C.R.S. § 24-51-204(5). The Board retains an external actuary, and effective November 1, 2018, Segal was engaged to perform annual actuarial valuations and sustainability projections as well as periodic experience studies to review the actuarial assumptions versus actual plan experience.

Through formal action, the Board updates, replaces, or adopts new actuarial methods and assumptions as deemed necessary.

In general, the AAL of the HCTF and the DPS HCTF consists of the following two types of benefits:

- A service-based, monthly premium subsidy.
- A subsidy for members not eligible for premium-free Medicare Part A coverage.

The plan's actuary determines the costs relating to the subsidies provided by the HCTF and the DPS HCTF. Currently, all participating employers are statutorily required to contribute 1.02 percent of covered payroll to fund these benefits.

The actuary followed ASOP No. 6, *Measuring Retiree Group Benefit Obligations,* for purposes of recommending appropriate OPEB-specific assumptions. Although many of the economic and demographic assumptions used to determine pension liabilities apply in the determination of OPEB liabilities, additional assumptions typically are required. All actuarial methods and assumptions necessary to assess OPEB liabilities, in addition to those already provided on previous pages, are described and/or listed below.

Entry Age Normal Cost Method

The EAN cost method used for the determination of the pension liabilities also applies to the calculation of the OPEB liabilities. Consistent with the determination of normal cost of the pension plans, the calculation of the normal cost of the OPEB plans is based upon compensation.

Amortization Method

Under the OPEB funding policy, an ADC is determined by adding the normal cost and the cost to amortize, over defined, closed periods, any existing UAAL or new UAAL, including the impact of any experience actuarial gains and losses, actuarial assumption changes, and changes in plan provisions. Implementing a layered amortization approach requires each amortized item to be tracked over the closed period defined for that category.

The legacy UAAL as of December 31, 2017, will be recognized over a closed 30-year period from that date. All gains, losses, and changes in actuarial methods and assumptions on and after January 1, 2018, will be recognized each year and amortized separately over closed 30-year periods. The impact of any changes in plan provisions will be recognized over a closed period relating to the demographics of the group affected and/or the duration of the enhancement provided, not to exceed 25 years. If any future actuarial valuation indicates a fund 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 percent. At that time, the ADC shall be equal to the normal cost less an amount equal to the 15-year amortization of the portion of the negative UAAL above the 120 percent funded ratio.

Once determined, the ADC is then expressed as a level percentage of assumed future covered payroll and compared, as a benchmark, against the current statutory employer contribution rate.

Asset Valuation Method

The Board adopted a method for valuing assets that determines a smoothed market value of assets. The smoothed value of assets recognizes the differences between actual and expected investment experience for each year in equal amounts over a four–year period. Note, the term "market value" is used in the Board's OPEB funding policy regarding the description of the determination of the asset valuation method used for funding purposes. The term "market value" is used consistently throughout the Actuarial Section and has the identical meaning of the term "fair value" as is used in other sections of this *CAFR.*

Actuarial Assumptions

The determination of the AAL includes recognition of a number of economic and non-economic assumptions in addition to the applied actuarial methods described above. Unless otherwise noted, it can be assumed that the economic and demographic actuarial assumptions applied to the actuarial valuation for funding purposes also were applied to the actuarial valuation for accounting and financial reporting purposes.

Economic Assumptions

The economic assumptions for price inflation, investment rate of return, and wage inflation used in the determination of the pension liabilities also apply to the OPEB plans. In addition to these economic assumptions, initial per capita health care costs, morbidity rates, and health care cost trend rates are needed to project the future costs associated with providing benefits to those PERACare enrollees under the PERA benefit structure who are not eligible for premium-free Medicare Part A.

Exhibit J contains the assumptions used in determining the additional liability for PERACare enrollees under the PERA benefit structure who are age 65 or older and who are not eligible for premium-free Medicare Part A. Shown are the monthly costs/premiums assumed for 2019, which are subject to the morbidity rates and health care cost trend rates. The morbidity rates were first adopted for use for the December 31, 2015, actuarial valuation, and the health care cost trend rates are reviewed and updated annually. All cost/premiums and morbidity and trend assumptions are displayed in the adjacent tables.

Exhibit K contains the dollar subsidy amounts used in determining the additional liability for PERACare enrollees under the DPS benefit structure who are age 65 or older and who are not eligible for premium-free Medicare Part A.

As the service-based premium subsidy does not increase over time, PERACare enrollees are required to pay the entire increase in annual health care costs each year, resulting in monthly contributions that increase more rapidly over time than the total cost of coverage.

Non-Economic Assumptions

The non-economic decremental assumptions such as rates of withdrawal, retirement and disability used in the determination of the pension liabilities also apply to the OPEB plans. Listed below are the additional actuarial assumptions, specific to the determination of OPEB liabilities, which also are considered for the December 31, 2018, actuarial valuation.

Current PERACare participants are assumed to maintain their current health care benefit elections in perpetuity. For active members retiring directly from covered employment, Exhibit L provides the assumed participation rates. 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 Exhibit L. The health care participation rates were updated and became effective for the December 31, 2016, actuarial valuation based on the results of the 2016 experience analysis. These assumptions are reviewed annually and adjusted as necessary.

Survivors of retirees under the PERA benefit structure electing health care coverage are eligible to receive the subsidy. To anticipate future liabilities driven by these survivors, it is assumed that 70 percent of the current members assumed to elect PERACare coverage will choose a joint and survivor optional payment and thus, their survivors will qualify for the subsidy. This assumption was determined from actual census data and current plan elections of current benefit recipients. This assumption was supported by the results of the 2016 experience analysis and remains in effect as of the current actuarial valuation. The assumed average number of years a covered male spouse is older than a covered female spouse is three years for a male retiree and one year for a female retiree. These assumptions were determined from actual census data and were revised from the previous non-gender specific assumptions used in prior actuarial valuations. The age difference assumptions were based on the results of the 2016 experience analysis and became effective for the December 31, 2016, actuarial valuation.

HEALTH CARE TRUST FUNDS—OPEB

For eligible inactive members, the current assumption that 25 percent are assumed to elect health care coverage upon commencement of their monthly benefit was supported by the 2016 experience analysis. For spousal participation, actual census data and current plan elections of current benefit recipients were used. Based on the results of the 2016 experience analysis, the assumed percentage of eligible inactive members and future retirees electing coverage for their spouses was reduced from 25 percent to 20 percent for all divisions except the DPS Division, which remains at 15 percent, effective for the December 31, 2016, actuarial valuation.

For eligible inactive members, an average age at which health benefits are to begin must be assumed. Here, the assumed age of initial benefit receipt is determined using the same approach used for terminating active members who are assumed to leave their contributions in the plan in order to be eligible for a pension benefit at their retirement date. This assumption varies from age 50 to age 65 depending on benefit structure and years of service. This approach became effective for the December 31, 2015, actuarial valuation and was supported by the results of the 2016 experience analysis.

Exhibit M shows the assumed plan elections for current and future Medicare-eligible retirees who are not eligible for premium-free Medicare Part A. The assumptions became effective for the December 31, 2015, actuarial valuation and were supported by the results of the 2016 experience analysis. However, these assumptions are reviewed annually and most recently were adjusted effective for the December 31, 2018, actuarial valuation to align with the recently revised plan choices.

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, estimated to have been 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, Exhibit N lists the percentage, by estimated age at hire, of PERACare enrollees assumed to not qualify for premium-free Medicare Part A benefits, thus qualifying for the applicable ″No Part A″ subsidy. These assumptions are reviewed annually and adjusted as necessary. The current assumptions were last revised and effective for the December 31, 2015, actuarial valuation and were supported by the results of the 2016 experience analysis with one exception. Effective for the December 31, 2016, actuarial valuation, the percentage of disability retirees enrolled in PERACare assumed to qualify for the "No Part A" subsidy was increased from 5 percent to 10 percent. Regarding spousal coverage, of the PERACare enrollees assumed to receive the ″No Part A" subsidy from the PERA benefit structure, 10 percent are assumed to cover a spouse. This assumption was supported by the 2016 experience analysis and remains in effect as of the current actuarial valuation.

The revised pre- and post-retirement and disability retirement mortality assumptions described in the Division Trust Funds subsection of this Actuarial Section appropriately reflect PERA's recent and anticipated plan experience and are used to estimate the value of expected future subsidy payments. Exhibits A, B, C, D, and E in the Division Trust Funds subsection of this Actuarial Section, list the healthy pre-retirement mortality rates at sample ages and Exhibit I lists the healthy post-retirement mortality rates and values at sample ages.

Annual Increase Assumptions

As the service-based premium subsidy does not increase over time, there is no need for an assumption regarding increasing benefit amounts.

Actuarial Studies

All actuarial studies described in the Division Trust Funds subsection of this Actuarial Section titled, Actuarial Studies, incorporated a review and analysis of actuarial methods and assumptions pertaining to the HCTF and the DPS HCTF.

Changes Since Last Actuarial Valuation

Changes in Actuarial Methods

There are no changes in actuarial methods reflected in the December 31, 2018, actuarial valuation since the last actuarial valuation as of December 31, 2017.

Changes in Actuarial Assumptions

In addition to the ″Changes in Actuarial Assumptions″ noted in the Division Trust Funds subsection of this Actuarial Section, listed below are the actuarial assumption changes incorporated into the December 31, 2018, actuarial valuation specific to the HCTF and the DPS HCTF:

- Initial per capita health care costs for those PERACare enrollees under the PERA benefit structure who are expected to attain age 65 and older ages and are not eligible for premium-free Medicare Part A benefits have been updated to reflect the change in costs for the 2019 plan year.
- The morbidity assumptions have been updated to reflect Segal's standard aging factors.
- The health care cost trend rates for Medicare Part A premiums have been revised to reflect the current expectation of future increases in rates of inflation applicable to Medicare Part A premiums.

Changes in Plan Provisions

There are no changes in plan provisions reflected in the December 31, 2018, actuarial valuation since the last actuarial valuation as of December 31, 2017.

HEALTH CARE TRUST FUNDS—OPEB

Significant Events

There were no significant events during 2018.

Differences in Actuarial Valuation Methods and Assumptions

- The actuarial valuation for funding purposes was performed as of December 31, 2018. The actuarial valuation for accounting and financial reporting purposes was performed as of December 31, 2017, and the total OPEB liability was rolled forward to the measurement date as of December 31, 2018.
- Census data used for the actuarial valuation for funding purposes reflects membership data as of December 31, 2018, and the census data used for the actuarial valuation for accounting and financial reporting purposes reflects membership data as of December 31, 2017. Therefore, all summaries and schedules, regarding actuarial valuation results for funding purposes, shown in the Actuarial Section, reflect census data as of December 31, 2018.
- The actuarial valuation for funding purposes applies an asset valuation method that recognizes a four-year smoothed market value of assets for purposes of determining the UAAL. The actuarial valuation for accounting and financial reporting purposes applies the fair value of assets to determine the net OPEB liability.
- The actuarial valuation for funding purposes reflects updated initial per capita health care costs and health care trend rates to 2019. The actuarial valuation for accounting and financial reporting purposes reflects initial per capita health care costs and health care trend rates to 2018.

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Actuarial Assumptions: Exhibits J–N

The following exhibits (Exhibits J through N) show the actuarial assumptions employed to determine the actuarial valuation results. The basic economic and demographic actuarial assumptions as detailed in Exhibits A through I, in the Division Trust Funds subsection of the Actuarial Section, also were applied, as applicable, for purposes of determining OPEB liabilities.

Exhibit J: Initial Health Care Costs, Age-Related Morbidity, and Trend Rate Assumptions—PERA Benefit Structure

INITIAL HEALTH CARE COSTS

(In Actual Dollars)

	Initial Costs for 2019 Members Without Medicare Part A		
Plan	Monthly Cost	Monthly Premium	Monthly Cost Adjusted to Age 65
Medicare Advantage / Self-Funded Rx	$601	$240	$562
Kaiser Permanente Medicare Advantage HMO	605	237	571
	2019 Medicare Part A Premium — $437		

AGE-RELATED MORBIDITY ASSUMPTIONS

Participant Age	Annual Increase (Male)	Annual Increase (Female)
65-69	3.0%	1.5%
70	2.9%	1.6%
71	1.6%	1.4%
72	1.4%	1.5%
73	1.5%	1.6%
74	1.5%	1.5%
75	1.5%	1.4%
76-77	1.5%	1.5%
78	1.5%	1.6%
79	1.5%	1.5%
80	1.4%	1.5%
81+	0.0%	0.0%

HEALTH CARE COST TREND RATE ASSUMPTIONS[1]

Year	PERACare Medicare Plans	Medicare Part A Premiums
2019	5.60%	3.50%
2020	8.60%	3.50%
2021	7.30%	3.50%
2022	6.00%	3.75%
2023	5.70%	3.75%
2024	5.50%	3.75%
2025	5.30%	4.00%
2026	5.10%	4.00%
2027	4.90%	4.25%
2028	4.70%	4.25%
2029+	4.50%	4.50%

[1] Applies only to PERACare enrollees who are age 65 or older and who are not eligible for premium-free Medicare Part A.

HEALTH CARE TRUST FUNDS—OPEB

Exhibit K: Additional Premium Subsidy Assumptions—DPS Benefit Structure[1]

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

[1] Health care assumptions for future PERACare enrollees who are age 65 or older and who are assumed to not be eligible for premium-free Medicare Part A.

Exhibit L: Health Care Participation Rate Assumptions

	Percent Electing Health Care Coverage			Percent Electing Health Care Coverage	
Attained Age(s)	Other Divisions	DPS Division	Attained Age(s)	Other Divisions	DPS Division
15 – 48	20%	20%	61	50%	60%
49	25%	25%	62	55%	60%
50	25%	25%	63	55%	60%
51	35%	35%	64	55%	60%
52	35%	35%	65	55%	60%
53	40%	40%	66	55%	60%
54	40%	50%	67	55%	60%
55	40%	50%	68	55%	60%
56	45%	50%	69	55%	60%
57	45%	50%	70	55%	60%
58	50%	55%	71	55%	60%
59	50%	55%	72+	60%	65%
60	50%	55%			

HEALTH CARE TRUST FUNDS—OPEB

Exhibit M: Medicare Health Care Plan Election Rate Assumptions

	Percent Electing Medicare Plan	
Medicare Plan	Other Divisions	DPS Division
Medicare Advantage / Self-Funded Rx[1]	60%	40%
Kaiser Permanente Medicare Advantage HMO	40%	60%

[1] Eighty (80) percent of those PERACare enrollees participating in the self-funded plans are assumed to elect MS #1, 17 percent MS #2, and 3 percent MS #3.

	Percent Electing Medicare Plan	
Medicare Plan	Pre-Medicare Anthem Plans	Pre-Medicare Kaiser Plans
Medicare Advantage / Self-Funded Rx[1]	88%	2%
Kaiser Permanente Medicare Advantage HMO	12%	98%

[1] Eighty (80) percent of those PERACare enrollees participating in the self-funded plans are assumed to elect MS #1, 17 percent MS #2, and 3 percent MS #3.

Exhibit N: Percent Qualifying for “No Part A” Subsidy Assumptions

	Percent Qualifying for “No Part A” Subsidy	
Hire Age	HCTF[1,2]	DPS HCTF[2]
15 – 24	17%	17%
25 – 29	11%	11%
30+	4%	4%

[1] Ten (10) percent of the PERACare enrollees assumed to qualify for the “No Part A” subsidy from the PERA benefit structure are assumed to cover a spouse.

[2] Ten (10) percent of the PERACare enrollees receiving health care benefits as a result of disability retirement are assumed to qualify for the “No Part A” subsidy. One-hundred (100) percent of eligible inactive (or deferred vested) 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.

HEALTH CARE TRUST FUNDS—OPEB

Summary of Funding Progress

The PERA funding objective is to pay long-term benefit promises through contributions that remain approximately level from year to year as a percent of covered payroll earned by PERA members. The following information in this section provides an overview of funding progress:

- The solvency test shows the degree to which existing liabilities are funded, including prior history.
- A schedule of funding progress shows the UAAL as a percentage of annual covered payroll, including prior history.
- A schedule detailing actuarial gains and losses, by source, for the current year.
- The scheduled contribution requirements based on the December 31, 2018, actuarial valuation for the period ending December 31, 2020.

Consideration of the plans' current funded ratio, the unfunded liabilities in relation to annual covered payroll, historic trends, including significant gains and losses, and the schedule of future contributions should provide sufficient information to appropriately measure funding progress.

Solvency Test

The solvency test is one means of checking funding progress. In this test, the plan's actuarial value of assets typically are compared with: (A) member contributions (with interest) on deposit, (B) the liabilities for future benefits to persons who have retired, died or become disabled, and to those who have terminated service with the right to a future benefit, and (C) the liabilities for service already rendered by active members. Since the HCTF and the DPS HCTF are funded only through employer contributions, there are no member contribution accounts (liability A). Each table below and on the next page shows the funded level of the liabilities for future benefits to current retirees (liability B) and the unfunded liabilities associated with service already rendered by active members (liability C).

SOLVENCY TEST

(Dollars in Thousands)

	Aggregate Accrued Liabilities				Portion of Actuarial Accrued Liabilities Covered by Valuation Assets		
Valuation Date	Active Member Contributions (A)	Retirees, Beneficiaries, and Inactive Members (B)	Employer-Financed Portion of Active Members (C)	Actuarial Value of Plan Assets	Liability (A)	Liability (B)	Liability (C)
HCTF							
12/31/2009	N/A	$1,241,349	$521,892	$260,341	N/A	21.0%	0.0%
12/31/2010	N/A	1,179,809	463,184	288,193	N/A	24.4%	0.0%
12/31/2011	N/A	1,251,579	459,211	282,228	N/A	22.5%	0.0%
12/31/2012	N/A	1,259,557	463,938	285,097	N/A	22.6%	0.0%
12/31/2013	N/A	1,092,438	464,968	293,556	N/A	26.9%	0.0%
12/31/2014	N/A	1,085,995	448,466	297,377	N/A	27.4%	0.0%
12/31/2015	N/A	1,099,045	457,224	285,588	N/A	26.0%	0.0%
12/31/2016	N/A	1,153,015	403,747	270,150	N/A	23.4%	0.0%
12/31/2017	N/A	1,178,160	403,062	260,282	N/A	22.1%	0.0%
12/31/2018	**N/A**	**1,084,313**	**393,801**	**288,323**	**N/A**	**26.6%**	**0.0%**
DPS HCTF[1]							
12/31/2010	N/A	$58,432	$20,081	$14,086	N/A	24.1%	0.0%
12/31/2011	N/A	57,093	20,382	14,448	N/A	25.3%	0.0%
12/31/2012	N/A	54,727	22,942	14,443	N/A	26.4%	0.0%
12/31/2013	N/A	52,106	24,530	15,482	N/A	29.7%	0.0%
12/31/2014	N/A	50,998	25,028	16,502	N/A	32.4%	0.0%
12/31/2015	N/A	49,891	25,006	17,557	N/A	35.2%	0.0%
12/31/2016	N/A	51,357	21,488	18,945	N/A	36.9%	0.0%
12/31/2017	N/A	50,796	19,496	21,117	N/A	41.6%	0.0%
12/31/2018	**N/A**	**48,268**	**21,184**	**25,018**	**N/A**	**51.8%**	**0.0%**

Please see page 215 for footnote references.

HEALTH CARE TRUST FUNDS—OPEB

SOLVENCY TEST (CONTINUED)

(Dollars in Thousands)

	Aggregate Accrued Liabilities				Portion of Actuarial Accrued Liabilities Covered by Valuation Assets		
Valuation Date	Active Member Contributions (A)	Retirees, Beneficiaries, and Inactive Members (B)	Employer-Financed Portion of Active Members (C)	Actuarial Value of Plan Assets	Liability (A)	Liability (B)	Liability (C)
Total of Health Care Trust Funds[2,3]							
12/31/2009	N/A	$1,241,349	$521,892	$260,341	N/A	21.0%	0.0%
12/31/2010	N/A	1,238,241	483,265	302,279	N/A	24.4%	0.0%
12/31/2011	N/A	1,308,672	479,593	296,676	N/A	22.7%	0.0%
12/31/2012	N/A	1,314,284	486,880	299,540	N/A	22.8%	0.0%
12/31/2013	N/A	1,144,544	489,498	309,038	N/A	27.0%	0.0%
12/31/2014	N/A	1,136,993	473,494	313,879	N/A	27.6%	0.0%
12/31/2015	N/A	1,148,936	482,230	303,145	N/A	26.4%	0.0%
12/31/2016	N/A	1,204,372	425,235	289,095	N/A	24.0%	0.0%
12/31/2017	N/A	1,228,956	422,558	281,399	N/A	22.9%	0.0%
12/31/2018	**N/A**	**1,132,581**	**414,985**	**313,341**	**N/A**	**27.7%**	**0.0%**

1 The DPS HCTF was established on January 1, 2010, and received the balance of the Denver Public Schools Retiree Health Benefit Trust.

2 Results prior to December 31, 2010, do not include the DPS HCTF.

3 The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Unfunded Actuarial Accrued Liability

UAAL is the difference between actuarially calculated liability for service already rendered and the valuation assets of the fund.

The following factors resulted in lower liabilities (or gains) during 2018:

- Fewer members retired at earlier ages than expected.
- Fewer service and disability retirements were experienced than expected.
- More members terminated PERA-covered employment and withdrew their accounts than expected.
- Higher investment return than assumed in 2017.
- Retirees experienced shorter lifespans than expected.
- Favorable benefit utilization and claims experience.
- Actual payroll contributions were greater than the determined ADC for the DPS HCTF.

The following factors resulted in higher liabilities (or losses) during 2018:

- Lower investment returns than assumed in 2015, 2016, and 2018.
- New PERA members had some service resulting in accrued liabilities.
- Higher than expected administrative expenses.

HEALTH CARE TRUST FUNDS—OPEB

SCHEDULE OF FUNDING PROGRESS

(Dollars in Thousands)

(A) Valuation Date	(B) Actuarial Value of Plan Assets	(C) Actuarial Accrued Liabilities	(D) Unfunded Actuarial Accrued Liabilities (UAAL) (C)–(B)	(E) Funded Ratio (B)/(C)	(F) Annual Covered Payroll	(G) UAAL As a % of Covered Payroll (D)/(F)
HCTF						
12/31/2009	$260,341	$1,763,241	$1,502,900	14.8%	$7,048,992	21.3%
12/31/2010	288,193	1,642,993	1,354,800	17.5%	7,035,419	19.3%
12/31/2011	282,228	1,710,790	1,428,562	16.5%	6,972,596	20.5%
12/31/2012	285,097	1,723,495	1,438,398	16.5%	6,766,713	21.3%
12/31/2013	293,556	1,557,406	1,263,850	18.8%	6,982,560	18.1%
12/31/2014	297,377	1,534,461	1,237,084	19.4%	7,211,351	17.2%
12/31/2015	285,588	1,556,269	1,270,681	18.4%	7,485,545	17.0%
12/31/2016	270,150	1,556,762	1,286,612	17.4%	7,716,894	16.7%
12/31/2017	260,282	1,581,222	1,320,940	16.5%	7,927,280	16.7%
12/31/2018	**288,323**	**1,478,114**	**1,189,791**	**19.5%**	**8,399,835**	**14.2%**
DPS HCTF[1]						
12/31/2010	$14,086	$78,513	$64,427	17.9%	$470,774	13.7%
12/31/2011	14,448	77,475	63,027	18.6%	491,646	12.8%
12/31/2012	14,443	77,669	63,226	18.6%	510,872	12.4%
12/31/2013	15,482	76,636	61,154	20.2%	547,660	11.2%
12/31/2014	16,502	76,026	59,524	21.7%	584,319	10.2%
12/31/2015	17,557	74,897	57,340	23.4%	621,115	9.2%
12/31/2016	18,945	72,845	53,900	26.0%	642,177	8.4%
12/31/2017	21,117	70,292	49,175	30.0%	658,198	7.5%
12/31/2018	**25,018**	**69,452**	**44,434**	**36.0%**	**722,040**	**6.2%**
Total of Health Care Trust Funds[2,3]						
12/31/2009	$260,341	$1,763,241	$1,502,900	14.8%	$7,048,992	21.3%
12/31/2010	302,279	1,721,506	1,419,227	17.6%	7,506,193	18.9%
12/31/2011	296,676	1,788,265	1,491,589	16.6%	7,464,242	20.0%
12/31/2012	299,540	1,801,164	1,501,624	16.6%	7,277,585	20.6%
12/31/2013	309,038	1,634,042	1,325,004	18.9%	7,530,220	17.6%
12/31/2014	313,879	1,610,487	1,296,608	19.5%	7,795,670	16.6%
12/31/2015	303,145	1,631,166	1,328,021	18.6%	8,106,660	16.4%
12/31/2016	289,095	1,629,607	1,340,512	17.7%	8,359,071	16.0%
12/31/2017	281,399	1,651,514	1,370,115	17.0%	8,585,478	16.0%
12/31/2018	**313,341**	**1,547,566**	**1,234,225**	**20.2%**	**9,121,875**	**13.5%**

1 The DPS HCTF was established on January 1, 2010, and received the balance of the Denver Public Schools Retiree Health Benefit Trust.

2 Results prior to December 31, 2010, do not include the DPS HCTF.

3 The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Note: A history of contributions by Health Care Trust Fund, the ADC compared to the actual contributions paid, including the deficiency (or excess), for each of the last ten years, is shown in the Schedule of Contributions from Employers and Other Contributing Entities, found on pages 128-129 in the RSI in the Financial Section.

HEALTH CARE TRUST FUNDS—OPEB

Actuarial Gains and Losses

ANALYSIS OF FINANCIAL EXPERIENCE

(Dollars in Millions)

	HCTF	DPS HCTF
Amounts		
From differences between assumed and actual experience on liabilities		
Age and service retirements[1]	($8.3)	($0.4)
Disability retirements[2]	(0.6)	—
Deaths[3]	(15.6)	(0.1)
Withdrawals[4]	0.1	(0.6)
New members[5]	1.7	0.2
Administrative expenses and other[6]	(19.1)	(1.3)
Subtotal	(41.8)	(2.2)
From differences between assumed and actual experience on assets	3.9	0.3
From change in plan assumptions	(111.4)	—
From change in actuarial methods	—	—
From change in plan provisions	—	—
Total actuarial (gains)/losses on 2018 activities	**($149.3)**	**($1.9)**
Total actuarial (gains)/losses on 2017 activities	**$14.7**	**($2.9)**

1 *Age and service retirements*: If members retire at older ages than assumed, there is a gain. If members retire at younger ages than assumed, there is a loss.

2 *Disability retirements*: If disability claims are lower than assumed, there is a gain. If disability claims are higher than assumed, there is a loss.

3 *Deaths*: If survivor claims are lower than assumed, there is a gain. If survivor claims are higher than assumed, there is a loss. If retirees die sooner than assumed, there is a gain. If retirees live longer than assumed, there is a loss.

4 *Withdrawal from employment*: If more members terminate and more liabilities are released by withdrawals than assumed, there is a gain. If fewer liabilities are released by terminations than assumed, there is a loss.

5 *New members*: If new members entering the plan have prior service, there is a loss.

6 *Administrative expenses and other:* Also includes miscellaneous gains and losses resulting from purchased service transfers, claims experience, benefit utilization, a change in actuarial service provider and valuation software, data adjustments, timing of financial transactions, etc.

Actuarial Valuation Results

Contribution rates for the year ending December 31, 2020, are derived from the results of the December 31, 2018, annual actuarial valuation and are determined in advance for purposes of budgeting and consideration of any necessary legislative action.

SCHEDULE OF COMPUTED EMPLOYER CONTRIBUTION RATES FOR THE 2020 FISCAL YEAR

	Expressed as a Percentage of Member Payroll	
	HCTF	DPS HCTF
Contributions		
Service retirement benefits	0.18%	0.16%
Disability retirement benefits	0.00%	0.00%
Survivor benefits	0.00%	0.00%
Separation benefits	0.03%	0.02%
Total normal cost	0.21%	0.18%
Less member contributions	(0.00%)	(0.00%)
Employer normal cost	**0.21%**	**0.18%**
Percentage available to amortize unfunded actuarial accrued liabilities	0.81%	0.84%
Amortization period	25 Years	8 Years
Total employer contribution rate for actuarially funded benefits	**0.97%**	**0.51%**

HEALTH CARE TRUST FUNDS—OPEB

Annual Actuarial Valuation Statistics

As of December 31, 2018, the Funded Ratio, the UAAL, the ADC for 2020 as a percentage of covered payroll, and the amortization period are shown in the following table. The results in this table are based on the actuarial valuation for funding purposes.

ACTUARIAL STATISTICS

(Dollars in Thousands)

Trust Fund	Funded Ratio	UAAL	ADC[1]	Amortization Period
HCTF	19.5%	$1,189,791	0.97%	25 Years
DPS HCTF	36.0%	44,434	0.51%	8 Years
Total of Health Care Trust Funds[2]		**$1,234,225**		

[1] Determined considering the 30-year target amortization period defined in the OPEB funding policy for purposes of funding benchmarks and RSI reporting as shown in the Financial Section.

[2] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Pursuant to the OPEB funding policy, for reporting purposes, alternative ADCs also are determined by applying the layered amortization methodology as previously described. Under the target and alternative calculations, the legacy UAAL as of December 31, 2017, was amortized using a 30-year period, but the alternative ADCs use 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 any "new" UAAL recognized on and after January 1, 2018. The 2020 target and alternative ADCs, by division, are displayed below:

	Target ADC	Alternative ADCs		
Trust Fund	30-Year[1]	25-Year[2]	20-Year[2]	15-Year[2]
HCTF	0.97%	0.96%	0.94%	0.92%
DPS HCTF	0.51%	0.51%	0.50%	0.49%

[1] Refers to the amortization period used to amortize the legacy UAAL as of December 31, 2017, and any "new" UAAL recognized on and after January 1, 2018.

[2] Refers to the amortization period used to amortize any "new" UAAL recognized on and after January 1, 2018.

Funded Ratio

(Dollars in Thousands)

The funded ratio for the plan is determined by dividing the actuarial value of assets by the AAL. The actuarial value of assets is not the current market value but a market-related value, which recognizes the differences between actual and expected investment experience for each year in equal amounts over a four-year period. The actuarial value of the assets as of December 31, 2018, was $313,341 compared to a market value of assets of $303,221, and to the AAL of $1,547,566. The funded ratio for each of the funds, based on the actuarial value of assets, at December 31 for each of the last five years is shown below:

Trust Fund	2014	2015	2016	2017	2018
HCTF	19.4%	18.4%	17.4%	16.5%	**19.5%**
DPS HCTF	21.7%	23.4%	26.0%	30.0%	**36.0%**
Total of Health Care Trust Funds[1]	**19.5%**	**18.6%**	**17.7%**	**17.0%**	**20.2%**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

The Board's OPEB funding policy states that the targeted actuarial funded ratio is greater than or equal to 110 percent on a combined trust fund basis. The funded ratios listed above give an indication of progress made toward achieving the stated objective. A larger funded ratio indicates that a plan is better funded. As an example, for every $1.00 of the actuarially determined benefits earned for the HCTF as of December 31, 2018, approximately $0.20 of assets are available for payment based on the actuarial value of assets. These benefits earned will be payable over a period dependent upon factors, such as, the life span of members after their retirement and participation in PERACare. Therefore, it is not imperative that the AAL equal the actuarial value of assets at any given moment in time.

HEALTH CARE TRUST FUNDS—OPEB

At December 31, 2018, and December 31, 2017, PERA had the following funded status for Health Care Trust Funds as shown below:

FUNDED STATUS FOR THE HEALTH CARE TRUST FUNDS

(Dollars in Thousands)

	Market Value of Assets[1]		Actuarial Value of Assets[2]	
	12/31/2017	12/31/2018	12/31/2017	12/31/2018
Health Care Trust Fund				
Actuarial accrued liability[3]	$1,581,222	**$1,478,114**	$1,581,222	**$1,478,114**
Assets held to pay those liabilities	276,222	**279,192**	260,282	**288,323**
Unfunded actuarial accrued liability	**$1,305,000**	**$1,198,922**	**$1,320,940**	**$1,189,791**
Funded ratio	17.5%	**18.9%**	16.5%	**19.5%**
DPS Health Care Trust Fund				
Actuarial accrued liability[3]	$70,292	**$69,452**	$70,292	**$69,452**
Assets held to pay those liabilities	22,308	**24,029**	21,117	**25,018**
Unfunded actuarial accrued liability	**$47,984**	**$45,423**	**$49,175**	**$44,434**
Funded ratio	31.7%	**34.6%**	30.0%	**36.0%**
Total of Health Care Trust Funds[4]				
Actuarial accrued liability[3]	$1,651,514	**$1,547,566**	$1,651,514	**$1,547,566**
Assets held to pay those liabilities[5]	298,530	**303,221**	281,399	**313,341**
Unfunded actuarial accrued liability	**$1,352,984**	**$1,244,345**	**$1,370,115**	**$1,234,225**
Funded ratio	18.1%	**19.6%**	17.0%	**20.2%**

[1] The market value of assets is the fair value of the investments.

[2] The actuarial value of assets is calculated by spreading any market gains or losses above or below the assumed rate of return over four years.

[3] Based upon an assumed rate of return on investments of 7.25 percent and an assumed rate of 7.25 percent to discount the liabilities to be paid in the future to a value as of December 31, 2017, and December 31, 2018.

[4] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

[5] In aggregate, the market value of the assets as of December 31, 2018, is $10,120 less than the actuarial value of assets calculated by the actuaries, as they are recognizing the gains and losses in value over four years, rather than only in the year they occurred. The remaining gains and (losses) to be smoothed for 2016 are ($108), for 2017 are $14,565, and for 2018 are ($24,577).

HEALTH CARE TRUST FUNDS—OPEB

Sensitivity of Actuarial Valuation to Changes in Assumed Investment Rate of Return and Discount Rate

The most important long-term driver of an OPEB plan is investment income. The investment return assumption and the discount rate for liabilities should be based on an estimated long-term investment yield for the plan, considering the nature and mix of current and expected plan investments and the basis used to determine the actuarial value of assets.

To understand the importance of the investment rate of return, which is used to discount the actuarial liabilities, a one percent fluctuation in the investment rate of return and discount rate would change the funded ratio, UAAL, and ADC (for contributions for the fiscal year ended December 31, 2020) as shown on the tables below:

INVESTMENT RETURN ASSUMPTION (DISCOUNT RATE) EQUAL TO 6.25 PERCENT

(Dollars in Thousands)

	Actuarial Value of Assets			Market Value of Assets
Trust Fund	Funded Ratio	UAAL	ADC	UAAL
HCTF	17.7%	$1,337,454	1.02%	$1,346,585
DPS HCTF	32.9%	51,074	0.55%	52,063
Total of Health Care Trust Funds[1]		**$1,388,528**		**$1,398,648**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

CURRENT INVESTMENT RETURN ASSUMPTION (DISCOUNT RATE) EQUAL TO 7.25 PERCENT

(Dollars in Thousands)

	Actuarial Value of Assets			Market Value of Assets
Trust Fund	Funded Ratio	UAAL	ADC	UAAL
HCTF	**19.5%**	**$1,189,791**	**0.97%**	**$1,198,922**
DPS HCTF	**36.0%**	**44,434**	**0.51%**	**45,423**
Total of Health Care Trust Funds[1]		**$1,234,225**		**$1,244,345**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

INVESTMENT RETURN ASSUMPTION (DISCOUNT RATE) EQUAL TO 8.25 PERCENT

(Dollars in Thousands)

	Actuarial Value of Assets			Market Value of Assets
Trust Fund	Funded Ratio	UAAL	ADC	UAAL
HCTF	21.3%	$1,063,736	0.93%	$1,072,867
DPS HCTF	39.2%	38,768	0.46%	39,757
Total of Health Care Trust Funds[1]		**$1,102,504**		**$1,112,624**

[1] The data in this table is aggregated for informational purposes. The assets of each trust fund are for the sole purpose of its members and cannot be used by another fund.

Note: The time-weighted, net-of-fees annualized rate of return for the pooled investment assets was 5.6 percent for the past five years and 8.8 percent for the past 10 years. The 30-year annualized gross-of-fees rate of return for the pooled investment assets was 8.5 percent.

HEALTH CARE TRUST FUNDS—OPEB

Plan Data

Benefit recipients and members of PERA consisted of the following as of December 31, 2018:

MEMBERSHIP—HEALTH CARE TRUST FUNDS

	HCTF	DPS HCTF	2018
Retirees and beneficiaries	115,033	7,156	**122,189**
Terminated employees eligible but not yet receiving benefits	26,783	1,780	**28,563**
Inactive members not eligible for benefits	229,558	12,286	**241,844**
Active members	195,436	16,148	**211,584**
Total	**566,810**	**37,370**	**604,180**

PARTICIPATION IN THE HEALTH CARE PLANS FOR RETIREES AND SURVIVORS CURRENTLY RECEIVING RETIREMENT BENEFITS

	HCTF	DPS HCTF	Total
Enrolled in PERACare			
Under age 65	11,919	514	12,433
Age 65 and older	44,723	3,111	47,834
	56,642	3,625	60,267
Not enrolled in PERACare			
Under age 65	14,453	595	15,048
Age 65 and older	43,938	2,936	46,874
	58,391	3,531	61,922
Total retirees and survivors currently receiving benefits	**115,033**	**7,156**	**122,189**

HEALTH CARE TRUST FUNDS—OPEB

SCHEDULE OF RETIREES, BENEFICIARIES, AND SURVIVORS ADDED TO AND REMOVED FROM THE BENEFIT PAYROLL

(In Actual Dollars)

	Added to Payroll		Removed from Payroll		Payroll—End of Year			
Valuation Date	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	Average Annual Benefits	Increase in Average Benefits
HCTF[1]								
12/31/2009					46,738	$81,765,552	$1,749	—
12/31/2010	3,633	$8,290,281	1,653	$2,623,104	48,718	85,247,016	1,750	0.1%
12/31/2011	3,399	7,638,162	1,900	2,999,430	50,217	86,755,011	1,728	(1.3%)
12/31/2012	3,489	7,844,610	2,040	3,548,532	51,666	90,123,660	1,744	0.9%
12/31/2013	3,256	7,098,720	1,881	3,383,139	53,041	91,009,965	1,716	(1.6%)
12/31/2014	3,231	6,954,234	2,196	3,945,282	54,076	91,222,002	1,687	(1.7%)
12/31/2015	3,271	6,998,325	2,255	3,920,028	55,092	91,545,543	1,662	(1.5%)
12/31/2016	3,217	6,921,114	2,520	4,463,334	55,789	91,567,554	1,641	(1.3%)
12/31/2017	3,352	7,255,971	2,667	7,153,713	56,474	91,669,812	1,623	(1.1%)
12/31/2018	**3,337**	**7,068,843**	**3,169**	**5,498,610**	**56,642**	**89,984,901**	**1,589**	**(2.1%)**
DPS HCTF[1,2]								
12/31/2010	3,944	$6,446,394	—	$—	3,944	$6,446,394	$1,634	—
12/31/2011	203	411,792	189	292,905	3,958	6,296,871	1,591	(2.6%)
12/31/2012	168	340,929	165	258,957	3,961	6,086,352	1,537	(3.4%)
12/31/2013	198	428,532	164	241,845	3,995	6,098,082	1,526	(0.7%)
12/31/2014	184	368,943	217	346,587	3,962	5,961,324	1,505	(1.4%)
12/31/2015	174	360,111	206	330,648	3,930	5,829,741	1,483	(1.5%)
12/31/2016	156	322,230	201	302,220	3,885	5,703,954	1,468	(1.0%)
12/31/2017	149	325,128	218	445,188	3,816	5,583,894	1,463	(0.3%)
12/31/2018	**160**	**346,794**	**351**	**550,827**	**3,625**	**5,905,296**	**1,629**	**11.3%**
Total of Health Care Trust Funds[1,3]								
12/31/2009					46,738	$81,765,552	$1,749	—
12/31/2010	7,577[4]	$14,736,675	1,653	$2,623,104	52,662[4]	91,693,410	1,741	(0.5%)
12/31/2011	3,602	8,049,954	2,089	3,292,335	54,175	93,051,882	1,718	(1.3%)
12/31/2012	3,657	8,185,539	2,205	3,807,489	55,627	96,210,012	1,730	0.7%
12/31/2013	3,454	7,527,252	2,045	3,624,984	57,036	97,108,047	1,703	(1.6%)
12/31/2014	3,415	7,323,177	2,413	4,291,869	58,038	97,183,326	1,674	(1.7%)
12/31/2015	3,445	7,358,436	2,461	4,250,676	59,022	97,375,284	1,650	(1.4%)
12/31/2016	3,373	7,243,344	2,721	4,765,554	59,674	97,271,508	1,630	(1.2%)
12/31/2017	3,501	7,581,099	2,885	7,598,901	60,290	97,253,706	1,613	(1.0%)
12/31/2018	**3,497**	**7,415,637**	**3,520**	**6,049,437**	**60,267**	**95,890,197**	**1,591**	**(1.4%)**

1 The annual benefit is based upon creditable service and varies by attained age. Results do not include benefits valued for “No Part A” benefits or RDS subsidies prior to December 31, 2013.

2 The DPS HCTF was established on January 1, 2010, and received the balance of the Denver Public Schools Retiree Health Benefit Trust.

3 Data prior to 2010 does not include the DPS HCTF.

4 Includes the addition of 3,944 beneficiaries due to the DPSRS merger.

HEALTH CARE TRUST FUNDS—OPEB

SCHEDULE OF ACTIVE MEMBER ACTUARIAL VALUATION DATA

As of December 31

(In Actual Dollars)

Year	Number of Participating Employers[1]	Total Number of Active Members	Medicare Eligible Active Members[2]	Annual Payroll for Active Members	Average Annual Pay for Active Members	% Increase (Decrease) in Average Annual Pay
HCTF						
2009	411	190,206		$7,048,991,770	$37,060	—
2010	489[3]	187,924		7,035,419,174	37,438	1.02%
2011	496[3]	186,170		6,972,597,196	37,453	0.04%
2012	500[3]	182,524		6,766,713,013	37,073	(1.01%)
2013	516[3]	185,367		6,982,560,466	37,669	1.61%
2014	531[3]	187,336		7,211,350,491	38,494	2.19%
2015	534[3]	188,040		7,485,544,867	39,808	3.41%
2016	542[3]	190,741		7,716,892,488	40,457	1.63%
2017	408	191,778	8,284	7,927,279,994	41,336	2.17%
2018	**409**	**195,436**	**8,826**	**8,399,834,705**	**42,980**	**3.98%**
DPS HCTF[4]						
2010	28[3]	13,171		$470,773,746	$35,743	—
2011	27[3]	13,571		491,646,251	36,228	1.36%
2012	29[3]	13,911		510,872,366	36,724	1.37%
2013	31[3]	14,816		547,659,912	36,964	0.65%
2014	34[3]	15,414		584,319,269	37,908	2.55%
2015	38[3]	15,929		621,114,573	38,993	2.86%
2016	42[3]	15,950		642,177,158	40,262	3.25%
2017	1	15,991	498	658,198,306	41,161	2.23%
2018	**1**	**16,148**	**510**	**722,040,073**	**44,714**	**8.63%**
Total of Health Care Trust Funds[5]						
2009	411	190,206		$7,048,991,770	$37,060	—
2010	517[3]	201,095		7,506,192,920	37,327	0.72%
2011	523[3]	199,741		7,464,243,447	37,370	0.12%
2012	529[3]	196,435		7,277,585,379	37,048	(0.86%)
2013	547[3]	200,183		7,530,220,378	37,617	1.54%
2014	565[3]	202,750		7,795,669,760	38,450	2.21%
2015	572[3]	203,969		8,106,659,440	39,745	3.37%
2016	584[3]	206,691		8,359,069,646	40,442	1.75%
2017	409	207,769	8,782	8,585,478,300	41,322	2.18%
2018	**410**	**211,584**	**9,336**	**9,121,874,778**	**43,112**	**4.33%**

1 Prior to 2017, employer counts were based on separate units of government. Beginning in 2017, new guidance under GASB 74 classifies a primary government and its component units as one employer. The 2017 employer count is presented for purposes of complying with GASB 74 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

2 Information prior to 2017 was not required.

3 Includes charter schools operating within the School and DPS Divisions.

4 The DPS HCTF was established on January 1, 2010, and received the balance of the Denver Public Schools Retiree Health Benefit Trust.

5 Data prior to 2010 does not include the DPS HCTF.

COLORADO PERA

STATISTICAL SECTION

The Statistical Section presents detailed information that assists users in utilizing the basic financial statements, notes to basic financial statements, and required supplementary information to assess the economic condition of PERA.

Overview

Financial Trends

The following schedules show trend information about the changes and growth in PERA's fiduciary net position over the past 10 years:

- ***Changes in Fiduciary Net Position***
- ***Benefits and Refund Deductions From Fiduciary Net Position by Type***

Operating Information

The following schedules contain information related to the services that PERA provides and the activities it performs:

- ***Member and Benefit Recipient Statistics***[1]
- ***Breakdown of Membership by Percentage***[1]
- ***Schedule of Average Retirement Benefits Payable—All Division Trust Funds***[1]
- ***Schedule of Average Retirement Benefits Payable***[1]
- ***Colorado PERA Benefit Payments—All Division Trust Funds***[1]
- ***Schedule of Retirees and Survivors by Types of Benefits***[1]
- ***Schedule of Average Benefit Payments***[1]
- ***Schedule of Contribution Rate History***
- ***Principal Participating Employers***
- ***Schedule of Affiliated Employers***

Note: Schedules and information are derived from PERA internal sources unless otherwise noted.

[1] Schedules and data are provided by the consulting actuary, Segal Consulting.

CHANGES IN FIDUCIARY NET POSITION

For the Years Ended December 31

(Dollars in Thousands)

State Division Trust Fund

	2009	2010	2011	2012	2013
Additions					
Employer contributions[1]	$297,240	$287,624	$283,222	$335,073	$401,658
Member contributions[1]	194,168	223,240	258,678	227,058	202,799
Purchased service	8,830	12,496	11,277	16,358	22,241
Investment income	1,742,571	1,553,142	232,669	1,511,244	1,931,658
Other	3	1	331	150	4,869
Total additions	2,242,812	2,076,503	786,177	2,089,883	2,563,225
Deductions					
Benefit payments	1,071,725	1,122,435	1,174,707	1,231,922	1,295,780
Refunds	58,416	68,844	70,090	69,221	68,735
Disability insurance premiums	2,004	1,661	1,685	1,570	2,229
Administrative expenses	8,729	8,942	8,685	8,568	9,780
Other	(1,519)	(726)	(4,546)	3,911	3,593
Total deductions	1,139,355	1,201,156	1,250,621	1,315,192	1,380,117
Change in fiduciary net position	1,103,457	875,347	(464,444)	774,691	1,183,108
Fiduciary net position held at beginning of year	10,508,301	11,611,758	12,487,105	12,022,661	12,797,352
Fiduciary net position held at end of year	**$11,611,758**	**$12,487,105**	**$12,022,661**	**$12,797,352**	**$13,980,460**

	2014	2015	2016	2017	2018
Additions					
Employer contributions[1]	$444,372	$484,005	$521,804	$563,977	**$583,164**
Nonemployer contributions[1]	—	—	—	—	**78,489**
Member contributions[1]	211,610	217,980	223,005	228,978	**236,313**
Purchased service	22,446	26,946	24,528	27,442	**25,227**
Investment income (loss)	780,762	210,337	947,981	2,391,683	**(497,562)**
Other	3,289	5,023	8,708	15,860	**7,888**
Total additions	1,462,479	944,291	1,726,026	3,227,940	**433,519**
Deductions					
Benefit payments	1,352,293	1,417,862	1,483,828	1,554,290	**1,608,534**
Refunds	61,152	63,567	60,137	58,696	**65,253**
Disability insurance premiums	2,309	2,088	2,106	2,035	**2,093**
Administrative expenses	10,067	10,779	11,271	11,745	**11,903**
Other	3,171	3,406	3,040	3,652	**3,017**
Total deductions	1,428,992	1,497,702	1,560,382	1,630,418	**1,690,800**
Change in fiduciary net position	33,487	(553,411)	165,644	1,597,522	**(1,257,281)**
Fiduciary net position held at beginning of year	13,980,460	14,013,947	13,460,536	13,626,180	**15,223,702**
Fiduciary net position held at end of year	**$14,013,947**	**$13,460,536**	**$13,626,180**	**$15,223,702**	**$13,966,421**

[1] Employer, nonemployer, and member contribution rate history is shown on pages 263-268.

CHANGES IN FIDUCIARY NET POSITION

For the Years Ended December 31

(Dollars in Thousands)

School Division Trust Fund

	2009	2010	2011	2012	2013
Additions					
Employer contributions[1]	$480,239	$519,044	$541,962	$573,586	$624,784
Member contributions[1]	314,571	316,446	315,958	313,923	322,217
Purchased service	10,152	13,096	14,465	17,406	19,285
Investment income	2,741,797	2,469,517	370,045	2,434,176	3,136,269
Other	12	25	544	246	139
Total additions	3,546,771	3,318,128	1,242,974	3,339,337	4,102,694
Deductions					
Benefit payments	1,563,315	1,642,350	1,731,348	1,832,643	1,932,756
Refunds	70,910	79,012	78,543	77,154	76,980
Disability insurance premiums	3,186	2,802	2,619	2,522	3,655
Administrative expenses	13,226	17,104	16,322	16,086	18,523
Other	9,121	9,396	9,839	9,157	7,132
Total deductions	1,659,758	1,750,664	1,838,671	1,937,562	2,039,046
Change in fiduciary net position	1,887,013	1,567,464	(595,697)	1,401,775	2,063,648
Fiduciary net position held at beginning of year	16,415,800	18,302,813	19,870,277	19,274,580	20,676,355
Fiduciary net position held at end of year	**$18,302,813**	**$19,870,277**	**$19,274,580**	**$20,676,355**	**$22,740,003**

	2014	2015	2016	2017	2018
Additions					
Employer contributions[1]	$686,323	$754,182	$812,740	$857,740	**$923,910**
Nonemployer contributions[1]	—	—	—	—	**126,505**
Member contributions[1]	334,585	348,537	359,059	368,740	**386,811**
Purchased service	21,935	23,841	27,422	30,313	**27,525**
Investment income (loss)	1,274,862	344,000	1,569,026	3,982,275	**(838,899)**
Other	112	96	109	106	**7,957**
Total additions	2,317,817	1,470,656	2,768,356	5,239,174	**633,809**
Deductions					
Benefit payments	2,032,628	2,134,754	2,231,475	2,334,003	**2,413,387**
Refunds	77,171	70,298	65,715	74,637	**76,035**
Disability insurance premiums	3,748	3,400	3,454	3,347	**3,506**
Administrative expenses	19,290	20,865	21,991	23,019	**23,560**
Other	4,376	9,178	17,443	22,484	**2,501**
Total deductions	2,137,213	2,238,495	2,340,078	2,457,490	**2,518,989**
Change in fiduciary net position	180,604	(767,839)	428,278	2,781,684	**(1,885,180)**
Fiduciary net position held at beginning of year	22,740,003	22,920,607	22,152,768	22,581,046	**25,362,730**
Fiduciary net position held at end of year	**$22,920,607**	**$22,152,768**	**$22,581,046**	**$25,362,730**	**$23,477,550**

[1] Employer, nonemployer, and member contribution rate history is shown on pages 263-268.

CHANGES IN FIDUCIARY NET POSITION

For the Years Ended December 31

(Dollars in Thousands)

Local Government Division Trust Fund

	2009	2010	2011	2012	2013
Additions					
Employer contributions[1]	$84,456	$89,515	$91,780	$86,113	$67,197
Member contributions[1]	57,598	56,728	58,590	54,827	42,627
Purchased service	4,460	3,671	3,902	13,927	7,363
Investment income	381,350	355,964	53,130	368,492	482,297
Other	2	9	78	2,663	14
Total additions	527,866	505,887	207,480	526,022	599,498
Deductions					
Benefit payments	150,036	165,770	179,449	195,945	217,875
Refunds	19,648	22,942	22,686	42,941	32,480
Disability insurance premiums	591	496	442	410	479
Administrative expenses	2,160	2,215	2,157	2,035	2,021
Other	2,737	5,235	2,737	2,072	4,463
Total deductions	175,172	196,658	207,471	243,403	257,318
Change in fiduciary net position	352,694	309,229	9	282,619	342,180
Fiduciary net position held at beginning of year	2,221,581	2,574,275	2,883,504	2,883,513	3,166,132
Fiduciary net position held at end of year	**$2,574,275**	**$2,883,504**	**$2,883,513**	**$3,166,132**	**$3,508,312**

	2014	2015	2016	2017	2018
Additions					
Employer contributions[1]	$68,719	$70,415	$75,132	$78,291	**$81,358**
Member contributions[1]	43,792	45,400	48,470	50,472	**52,421**
Purchased service	5,498	6,586	3,981	6,325	**5,642**
Employer disaffiliation	186,006	—	—	1,063	**—**
Investment income (loss)	200,394	56,328	261,276	669,011	**(142,476)**
Other	14	15	17	14	**840**
Total additions	504,423	178,744	388,876	805,176	**(2,215)**
Deductions					
Benefit payments	232,055	244,948	258,967	274,258	**286,745**
Refunds	24,436	20,410	12,938	14,530	**15,716**
Disability insurance premiums	481	431	439	430	**442**
Administrative expenses	2,091	2,253	2,395	2,541	**2,621**
Other	2,204	1,661	1,140	3,837	**3,958**
Total deductions	261,267	269,703	275,879	295,596	**309,482**
Change in fiduciary net position	243,156	(90,959)	112,997	509,580	**(311,697)**
Fiduciary net position held at beginning of year	3,508,312	3,751,468	3,660,509	3,773,506	**4,283,086**
Fiduciary net position held at end of year	**$3,751,468**	**$3,660,509**	**$3,773,506**	**$4,283,086**	**$3,971,389**

[1] Employer and member contribution rate history is shown on pages 263-268.

CHANGES IN FIDUCIARY NET POSITION

For the Years Ended December 31

(Dollars in Thousands)

Judicial Division Trust Fund

	2009	2010	2011	2012	2013
Additions					
Employer contributions[1]	$5,793	$5,654	$5,430	$5,922	$6,587
Member contributions[1]	3,001	3,465	4,120	3,628	3,224
Purchased service	(3)	109	5	180	240
Investment income	29,977	27,400	4,105	28,063	37,096
Other	—	—	6	2,556	1,451
Total additions	38,768	36,628	13,666	40,349	48,598
Deductions					
Benefit payments	15,011	15,394	16,809	17,606	18,616
Refunds	30	104	513	605	385
Disability insurance premiums	31	26	26	27	40
Administrative expenses	22	61	61	61	69
Other	(1,778)	(2,491)	(1,043)	22	52
Total deductions	13,316	13,094	16,366	18,321	19,162
Change in fiduciary net position	25,452	23,534	(2,700)	22,028	29,436
Fiduciary net position held at beginning of year	174,903	200,355	223,889	221,189	243,217
Fiduciary net position held at end of year	**$200,355**	**$223,889**	**$221,189**	**$243,217**	**$272,653**

	2014	2015	2016	2017	2018
Additions					
Employer contributions[1]	$7,070	$7,702	$8,024	$8,080	**$8,299**
Nonemployer contributions[1]	—	—	—	—	**1,385**
Member contributions[1]	3,461	3,772	3,928	3,955	**4,064**
Purchased service	835	425	109	908	**636**
Investment income (loss)	15,299	4,149	19,783	51,173	**(11,006)**
Other	256	3,247	2,800	2,379	**225**
Total additions	26,921	19,295	34,644	66,495	**3,603**
Deductions					
Benefit payments	19,800	21,158	22,734	25,250	**26,236**
Refunds	60	—	109	7	**186**
Disability insurance premiums	43	42	45	41	**41**
Administrative expenses	72	77	81	86	**86**
Other	100	166	122	153	**70**
Total deductions	20,075	21,443	23,091	25,537	**26,619**
Change in fiduciary net position	6,846	(2,148)	11,553	40,958	**(23,016)**
Fiduciary net position held at beginning of year	272,653	279,499	277,351	288,904	**329,862**
Fiduciary net position held at end of year	**$279,499**	**$277,351**	**$288,904**	**$329,862**	**$306,846**

[1] Employer, nonemployer, and member contribution rate history is shown on pages 263-268.

CHANGES IN FIDUCIARY NET POSITION

For the Years Ended December 31

(Dollars in Thousands)

DPS Division Trust Fund[1]

	2010	2011	2012	2013	2014
Additions					
Employer contributions[2]	$6,493	$12,859	$14,703	$25,157	$18,478
Member contributions[2]	36,824	39,422	41,124	43,564	47,083
Plan transfer	2,750,566	—	—	—	—
Purchased service	2,056	1,792	1,924	1,834	2,326
Investment income	367,145	55,081	354,867	452,919	182,823
Other	5	77	146	269	13
Total additions	3,163,089	109,231	412,764	523,743	250,723
Deductions					
Benefit payments	215,825	221,113	228,742	237,921	247,005
Refunds	3,029	4,412	5,821	6,733	8,063
Disability insurance premiums	311	238	220	338	366
Administrative expenses	2,944	1,914	1,919	2,240	2,377
Other	54	2,409	55	150	1,560
Total deductions	222,163	230,086	236,757	247,382	259,371
Change in fiduciary net position	2,940,926	(120,855)	176,007	276,361	(8,648)
Fiduciary net position held at beginning of year	—	2,940,926	2,820,071	2,996,078	3,272,439
Fiduciary net position held at end of year	**$2,940,926**	**$2,820,071**	**$2,996,078**	**$3,272,439**	**$3,263,791**

	2015	2016	2017	2018
Additions				
Employer contributions[2]	$8,494	$17,071	$27,578	**$35,994**
Nonemployer contributions[2]	—	—	—	**18,621**
Member contributions[2]	49,973	52,740	54,354	**58,172**
Purchased service	3,585	2,112	2,466	**2,926**
Investment income (loss)	49,172	218,415	548,585	**(114,070)**
Other	11	3,264	3,870	**770**
Total additions	111,235	293,602	636,853	**2,413**
Deductions				
Benefit payments	255,068	263,152	271,189	**276,223**
Refunds	7,897	8,521	10,277	**11,197**
Disability insurance premiums	358	398	378	**405**
Administrative expenses	2,599	2,754	2,857	**2,919**
Other	1,775	129	89	**5,267**
Total deductions	267,697	274,954	284,790	**296,011**
Change in fiduciary net position	(156,462)	18,648	352,063	**(293,598)**
Fiduciary net position held at beginning of year	3,263,791	3,107,329	3,125,977	**3,478,040**
Fiduciary net position held at end of year	**$3,107,329**	**$3,125,977**	**$3,478,040**	**$3,184,442**

1 The Denver Public Schools (DPS) Division Trust Fund was established on January 1, 2010, and received the net assets of the Denver Public Schools Retirement System (DPSRS).

2 Employer, nonemployer, and member contribution rate history is shown on pages 263-268.

CHANGES IN FIDUCIARY NET POSITION

For the Years Ended December 31

(Dollars in Thousands)

Voluntary Investment Program

	2009	2010	2011	2012	2013
Additions					
Employer contributions	$3,383	$3,827	$3,610	$3,697	$3,679
Member contributions	134,645	132,674	126,331	119,013	120,203
Plan transfer	18,358	—	—	—	—
Investment income (loss)	291,029	194,500	(5,752)	236,775	423,877
Other	3,654	3,697	3,298	2,075	2,141
Total additions	451,069	334,698	127,487	361,560	549,900
Deductions					
Refunds	75,351	102,056	133,719	144,171	142,064
Administrative expenses	4,664	5,178	4,717	2,827	3,137
Other	—	—	29	234	624
Total deductions	80,015	107,234	138,465	147,232	145,825
Change in fiduciary net position	371,054	227,464	(10,978)	214,328	404,075
Fiduciary net position held at beginning of year	1,303,807	1,674,861	1,902,325	1,891,347	2,105,675
Fiduciary net position held at end of year	**$1,674,861**	**$1,902,325**	**$1,891,347**	**$2,105,675**	**$2,509,750**

	2014	2015	2016	2017	2018
Additions					
Employer contributions	$3,866	$3,889	$4,740	$5,072	**$5,409**
Member contributions	126,112	129,990	129,909	135,303	**132,189**
Investment income (loss)	188,199	(11,773)	206,933	469,233	**(165,371)**
Other	2,291	2,237	2,170	2,207	**2,322**
Total additions	320,468	124,343	343,752	611,815	**(25,451)**
Deductions					
Refunds	144,329	158,215	154,202	162,019	**202,684**
Administrative expenses	3,050	3,010	2,814	2,877	**3,310**
Other	839	1,019	1,172	1,411	**1,598**
Total deductions	148,218	162,244	158,188	166,307	**207,592**
Change in fiduciary net position	172,250	(37,901)	185,564	445,508	**(233,043)**
Fiduciary net position held at beginning of year	2,509,750	2,682,000	2,644,099	2,829,663	**3,275,171**
Fiduciary net position held at end of year	**$2,682,000**	**$2,644,099**	**$2,829,663**	**$3,275,171**	**$3,042,128**

CHANGES IN FIDUCIARY NET POSITION

For the Years Ended December 31

(Dollars in Thousands)

Defined Contribution Retirement Plan

	2009	2010	2011	2012	2013
Additions					
Employer contributions	$5,899	$6,428	$7,034	$7,997	$11,090
Member contributions	4,652	6,896	9,732	8,364	8,828
Plan transfer	18,374	11	—	—	—
Investment income (loss)	5,060	5,519	(1,130)	9,046	17,416
Other	14	35	40	2	6
Total additions	33,999	18,889	15,676	25,409	37,340
Deductions					
Refunds	1,377	2,886	5,176	4,869	6,314
Administrative expenses	143	94	282	848	744
Other	—	—	5	22	49
Total deductions	1,520	2,980	5,463	5,739	7,107
Change in fiduciary net position	32,479	15,909	10,213	19,670	30,233
Fiduciary net position held at beginning of year	4,996	37,475	53,384	63,597	83,267
Fiduciary net position held at end of year	**$37,475**	**$53,384**	**$63,597**	**$83,267**	**$113,500**

	2014	2015	2016	2017	2018
Additions					
Employer contributions	$11,531	$12,428	$13,060	$14,309	**$13,201**
Member contributions	9,179	9,830	10,382	11,411	**10,573**
Investment income (loss)	6,745	(2,466)	12,601	29,372	**(15,381)**
Other	8	9	92	39	**11**
Total additions	27,463	19,801	36,135	55,131	**8,404**
Deductions					
Refunds	8,690	9,419	8,932	10,593	**12,722**
Administrative expenses	738	774	726	739	**819**
Other	69	48	97	116	**166**
Total deductions	9,497	10,241	9,755	11,448	**13,707**
Change in fiduciary net position	17,966	9,560	26,380	43,683	**(5,303)**
Fiduciary net position held at beginning of year	113,500	131,466	141,026	167,406	**211,089**
Fiduciary net position held at end of year	**$131,466**	**$141,026**	**$167,406**	**$211,089**	**$205,786**

CHANGES IN FIDUCIARY NET POSITION

For the Years Ended December 31

(Dollars in Thousands)

Deferred Compensation Plan[1]

	2009	2010	2011	2012	2013
Additions					
Employer contributions	$12	$12	$51	$14	$20
Member contributions	23,875	44,203	42,253	39,851	44,449
Plan transfer	336,504	24	4	—	—
Investment income	40,443	42,232	10,335	49,344	88,565
Other	1,820	917	984	354	428
Total additions	402,654	87,388	53,627	89,563	133,462
Deductions					
Refunds	8,745	20,869	27,524	27,627	32,854
Administrative expenses	507	822	834	1,105	1,094
Other	50	168	185	278	430
Total deductions	9,302	21,859	28,543	29,010	34,378
Change in fiduciary net position	393,352	65,529	25,084	60,553	99,084
Fiduciary net position held at beginning of year	—	393,352	458,881	483,965	544,518
Fiduciary net position held at end of year	**$393,352**	**$458,881**	**$483,965**	**$544,518**	**$643,602**

	2014	2015	2016	2017	2018
Additions					
Employer contributions	$43	$27	$26	$50	**$29**
Member contributions	50,370	49,719	51,601	57,088	**57,981**
Investment income (loss)	32,133	(6,427)	51,372	105,027	**(47,542)**
Other	478	484	496	510	**574**
Total additions	83,024	43,803	103,495	162,675	**11,042**
Deductions					
Refunds	35,584	39,945	41,922	47,067	**56,568**
Administrative expenses	1,074	1,071	963	993	**1,094**
Other	517	562	604	698	**756**
Total deductions	37,175	41,578	43,489	48,758	**58,418**
Change in fiduciary net position	45,849	2,225	60,006	113,917	**(47,376)**
Fiduciary net position held at beginning of year	643,602	689,451	691,676	751,682	**865,599**
Fiduciary net position held at end of year	**$689,451**	**$691,676**	**$751,682**	**$865,599**	**$818,223**

[1] On July 1, 2009, the State of Colorado's Deferred Compensation Plan assets transferred to PERA, which became the administrator of that plan under the provisions of SB 09-66.

CHANGES IN FIDUCIARY NET POSITION

For the Years Ended December 31

(Dollars in Thousands)

Health Care Trust Fund

	2009	2010	2011	2012	2013
Additions					
Employer contributions[1]	$74,073	$74,047	$73,449	$72,553	$72,784
Retiree health care premiums	106,903	110,158	108,689	107,104	114,364
Federal health care subsidies	13,633	25,751	14,151	14,198	15,731
Investment income	35,483	34,676	5,153	36,710	46,097
Other	12,721	16,035	10,574	11,668	10,522
Total additions	242,813	260,667	212,016	242,233	259,498
Deductions					
Benefit payments	192,656	192,044	203,419	218,768	222,860
Administrative expenses	12,170	11,131	12,481	13,514	13,766
Total deductions	204,826	203,175	215,900	232,282	236,626
Change in fiduciary net position	37,987	57,492	(3,884)	9,951	22,872
Fiduciary net position held at beginning of year	190,191	228,178	285,670	281,786	291,737
Fiduciary net position held at end of year	**$228,178**	**$285,670**	**$281,786**	**$291,737**	**$314,609**

	2014	2015	2016	2017	2018
Additions					
Employer contributions[1]	$75,631	$78,463	$80,825	$83,077	**$86,559**
Retiree health care premiums	105,459	127,873	138,021	—	**—**
Employer disaffiliation	3,994	—	—	96	**—**
Investment income (loss)	18,203	4,807	19,021	44,990	**(9,678)**
Other	9,813	9,993	9,175	9,760	**8,373**
Total additions	213,100	221,136	247,042	137,923	**85,254**
Deductions					
Benefit payments	200,627	234,414	243,662	102,665	**61,777**
Administrative expenses	16,612	19,261	19,166	19,162	**20,401**
Other	832	594	491	102	**106**
Total deductions	218,071	254,269	263,319	121,929	**82,284**
Change in fiduciary net position	(4,971)	(33,133)	(16,277)	15,994	**2,970**
Fiduciary net position held at beginning of year	314,609	309,638	276,505	260,228	**276,222**
Fiduciary net position held at end of year	**$309,638**	**$276,505**	**$260,228**	**$276,222**	**$279,192**

[1] Employer contribution rate history is shown on page 269.

CHANGES IN FIDUCIARY NET POSITION

For the Years Ended December 31

(Dollars in Thousands)

DPS Health Care Trust Fund[1]

	2010	2011	2012	2013	2014
Additions					
Employer contributions[2]	$4,762	$5,029	$5,243	$5,558	$6,003
Plan transfer	13,510	—	—	—	—
Retiree health care premiums	4,747	4,529	4,295	4,719	4,442
Federal health care subsidies	1,252	499	488	563	—
Investment income	1,992	424	1,800	2,277	938
Other	109	374	216	312	281
Total additions	26,372	10,855	12,042	13,429	11,664
Deductions					
Benefit payments	11,012	10,770	11,027	11,222	10,432
Administrative expenses	569	501	547	561	668
Other	—	—	—	—	32
Total deductions	11,581	11,271	11,574	11,783	11,132
Change in fiduciary net position	14,791	(416)	468	1,646	532
Fiduciary net position held at beginning of year	—	14,791	14,375	14,843	16,489
Fiduciary net position held at end of year	**$14,791**	**$14,375**	**$14,843**	**$16,489**	**$17,021**

	2015	2016	2017	2018
Additions				
Employer contributions[2]	$6,371	$6,723	$6,930	**$7,417**
Retiree health care premiums	6,275	6,738	—	**—**
Investment income (loss)	254	1,235	3,305	**(894)**
Other	301	289	242	**205**
Total additions	13,201	14,985	10,477	**6,728**
Deductions				
Benefit payments	12,442	12,748	5,694	**4,158**
Administrative expenses	822	818	808	**845**
Other	22	18	4	**4**
Total deductions	13,286	13,584	6,506	**5,007**
Change in fiduciary net position	(85)	1,401	3,971	**1,721**
Fiduciary net position held at beginning of year	17,021	16,936	18,337	**22,308**
Fiduciary net position held at end of year	**$16,936**	**$18,337**	**$22,308**	**$24,029**

1 The Denver Public Schools Health Care Trust Fund (DPS HCTF) was established on January 1, 2010, and received the balance of the Denver Public Schools Retiree Health Benefit Trust.

2 Employer contribution rate history is shown on page 269.

CHANGES IN FIDUCIARY NET POSITION

For the Years Ended December 31

(Dollars in Thousands)

Life Insurance Reserve

	2009	2010	2011	2012	2013
Additions					
Investment income	$2,496	$2,280	$503	$2,020	$2,630
Total additions	2,496	2,280	503	2,020	2,630
Deductions					
Life insurance premiums and claims	575	545	547	62	131
Administrative expenses	576	575	573	510	871
Total deductions	1,151	1,120	1,120	572	1,002
Change in fiduciary net position	1,345	1,160	(617)	1,448	1,628
Fiduciary net position held at beginning of year	12,528	13,873	15,033	14,416	15,864
Fiduciary net position held at end of year	**$13,873**	**$15,033**	**$14,416**	**$15,864**	**$17,492**

	2014	2015	2016	2017	2018
Additions					
Investment income (loss)	$1,068	$302	$1,289	$3,241	**($684)**
Other	—	—	—	—	**4**
Total additions	1,068	302	1,289	3,241	**(680)**
Deductions					
Life insurance premiums	196	250	306	373	**433**
Administrative expenses	871	805	1,032	493	**111**
Total deductions	1,067	1,055	1,338	866	**544**
Change in fiduciary net position	1	(753)	(49)	2,375	**(1,224)**
Fiduciary net position held at beginning of year	17,492	17,493	16,740	16,691	**19,066**
Fiduciary net position held at end of year	**$17,493**	**$16,740**	**$16,691**	**$19,066**	**$17,842**

BENEFITS AND REFUND DEDUCTIONS FROM FIDUCIARY NET POSITION BY TYPE

For the Years Ended December 31

(Dollars in Thousands)

State Division Trust Fund

	2009	2010	2011	2012	2013
Type of Benefit					
Age and service benefits:					
Retirees	$979,419	$1,031,628	$1,083,722	$1,140,055	$1,202,238
Disability	78,799	77,830	77,715	78,689	79,854
Survivors	13,507	12,977	13,270	13,178	13,688
Total benefits	**$1,071,725**	**$1,122,435**	**$1,174,707**	**$1,231,922**	**$1,295,780**
Type of Refund					
Separation	$53,668	$59,330	$65,525	$65,627	$64,072
Death	3,760	9,047	3,986	3,503	4,411
Purchased service	988	467	579	91	252
Total refunds	**$58,416**	**$68,844**	**$70,090**	**$69,221**	**$68,735**

	2014	2015	2016	2017	2018
Type of Benefit					
Age and service benefits:					
Retirees	$1,257,767	$1,322,592	$1,387,374	$1,456,159	**$1,510,747**
Disability	80,753	81,310	82,221	83,280	**82,947**
Survivors	13,773	13,960	14,233	14,851	**14,840**
Total benefits	**$1,352,293**	**$1,417,862**	**$1,483,828**	**$1,554,290**	**$1,608,534**
Type of Refund					
Separation	$57,895	$58,274	$54,606	$52,079	**$59,508**
Death	3,058	5,213	5,464	6,561	**5,728**
Purchased service	199	80	67	56	**17**
Total refunds	**$61,152**	**$63,567**	**$60,137**	**$58,696**	**$65,253**

BENEFITS AND REFUND DEDUCTIONS FROM FIDUCIARY NET POSITION BY TYPE

For the Years Ended December 31

(Dollars in Thousands)

School Division Trust Fund

	2009	2010	2011	2012	2013
Type of Benefit					
Age and service benefits:					
Retirees	$1,490,293	$1,568,637	$1,657,071	$1,757,279	$1,855,195
Disability	60,532	60,920	61,150	62,140	63,741
Survivors	12,490	12,793	13,127	13,224	13,820
Total benefits	**$1,563,315**	**$1,642,350**	**$1,731,348**	**$1,832,643**	**$1,932,756**
Type of Refund					
Separation	$67,330	$74,423	$74,446	$73,075	$73,215
Death	2,725	4,206	3,676	3,815	3,282
Purchased service	855	383	421	264	483
Total refunds	**$70,910**	**$79,012**	**$78,543**	**$77,154**	**$76,980**

	2014	2015	2016	2017	2018
Type of Benefit					
Age and service benefits:					
Retirees	$1,952,989	$2,053,108	$2,149,415	$2,249,855	**$2,329,157**
Disability	65,780	67,203	67,416	68,537	**68,774**
Survivors	13,859	14,443	14,644	15,611	**15,456**
Total benefits	**$2,032,628**	**$2,134,754**	**$2,231,475**	**$2,334,003**	**$2,413,387**
Type of Refund					
Separation	$73,522	$66,494	$60,873	$68,265	**$70,227**
Death	3,521	3,621	4,756	6,313	**5,678**
Purchased service	128	183	86	59	**130**
Total refunds	**$77,171**	**$70,298**	**$65,715**	**$74,637**	**$76,035**

BENEFITS AND REFUND DEDUCTIONS FROM FIDUCIARY NET POSITION BY TYPE

For the Years Ended December 31

(Dollars in Thousands)

Local Government Division Trust Fund

	2009	2010	2011	2012	2013
Type of Benefit					
Age and service benefits:					
Retirees	$133,732	$149,260	$162,681	$178,845	$199,821
Disability	14,407	14,572	14,727	15,096	16,022
Survivors	1,897	1,938	2,041	2,004	2,032
Total benefits	**$150,036**	**$165,770**	**$179,449**	**$195,945**	**$217,875**
Type of Refund					
Separation	$18,703	$21,999	$21,316	$41,696	$31,268
Death	574	750	1,283	1,154	1,201
Purchased service	371	193	87	91	11
Total refunds	**$19,648**	**$22,942**	**$22,686**	**$42,941**	**$32,480**

	2014	2015	2016	2017	2018
Type of Benefit					
Age and service benefits:					
Retirees	$213,962	$226,400	$240,432	$255,105	**$267,669**
Disability	16,045	16,327	16,274	16,775	**16,582**
Survivors	2,048	2,221	2,261	2,378	**2,494**
Total benefits	**$232,055**	**$244,948**	**$258,967**	**$274,258**	**$286,745**
Type of Refund					
Separation	$23,034	$18,062	$12,017	$13,095	**$14,587**
Death	1,401	2,317	921	1,434	**1,128**
Purchased service	1	31	—	1	**1**
Total refunds	**$24,436**	**$20,410**	**$12,938**	**$14,530**	**$15,716**

BENEFITS AND REFUND DEDUCTIONS FROM FIDUCIARY NET POSITION BY TYPE

For the Years Ended December 31

(Dollars in Thousands)

Judicial Division Trust Fund

	2009	2010	2011	2012	2013
Type of Benefit					
Age and service benefits:					
Retirees	$13,734	$14,126	$15,563	$16,333	$17,362
Disability	913	917	889	897	908
Survivors	364	351	357	376	346
Total benefits	**$15,011**	**$15,394**	**$16,809**	**$17,606**	**$18,616**
Type of Refund					
Separation	$30	$104	$513	$250	$385
Death	—	—	—	355	—
Total refunds	**$30**	**$104**	**$513**	**$605**	**$385**

	2014	2015	2016	2017	2018
Type of Benefit					
Age and service benefits:					
Retirees	$18,573	$19,901	$21,485	$23,993	**$24,982**
Disability	917	938	939	933	**926**
Survivors	310	319	310	324	**328**
Total benefits	**$19,800**	**$21,158**	**$22,734**	**$25,250**	**$26,236**
Type of Refund					
Separation	$60	$—	$109	$7	**$50**
Death	—	—	—	—	**136**
Total refunds	**$60**	**$—**	**$109**	**$7**	**$186**

BENEFITS AND REFUND DEDUCTIONS FROM FIDUCIARY NET POSITION BY TYPE

For the Years Ended December 31

(Dollars in Thousands)

DPS Division Trust Fund[1]

	2010	2011	2012	2013	2014
Type of Benefit					
Age and service benefits:					
Retirees	$207,398	$212,524	$220,106	$228,692	$237,955
Disability	6,886	7,078	7,070	7,592	7,482
Survivors	1,541	1,511	1,566	1,637	1,568
Total benefits	**$215,825**	**$221,113**	**$228,742**	**$237,921**	**$247,005**
Type of Refund					
Separation	$2,947	$4,322	$5,602	$6,558	$7,424
Death	82	82	217	160	631
Purchased service	—	8	2	15	8
Total refunds	**$3,029**	**$4,412**	**$5,821**	**$6,733**	**$8,063**

	2015	2016	2017	2018
Type of Benefit				
Age and service benefits:				
Retirees	$245,683	$253,641	$261,361	**$266,260**
Disability	7,804	7,929	8,221	**8,278**
Survivors	1,581	1,582	1,607	**1,685**
Total benefits	**$255,068**	**$263,152**	**$271,189**	**$276,223**
Type of Refund				
Separation	$7,685	$7,894	$9,873	**$10,652**
Death	207	616	349	**545**
Purchased service	5	11	55	**—**
Total refunds	**$7,897**	**$8,521**	**$10,277**	**$11,197**

[1] The DPS Division Trust Fund was established on January 1, 2010, and received the net assets of the DPSRS.

MEMBER AND BENEFIT RECIPIENT STATISTICS[1]

(In Actual Dollars)

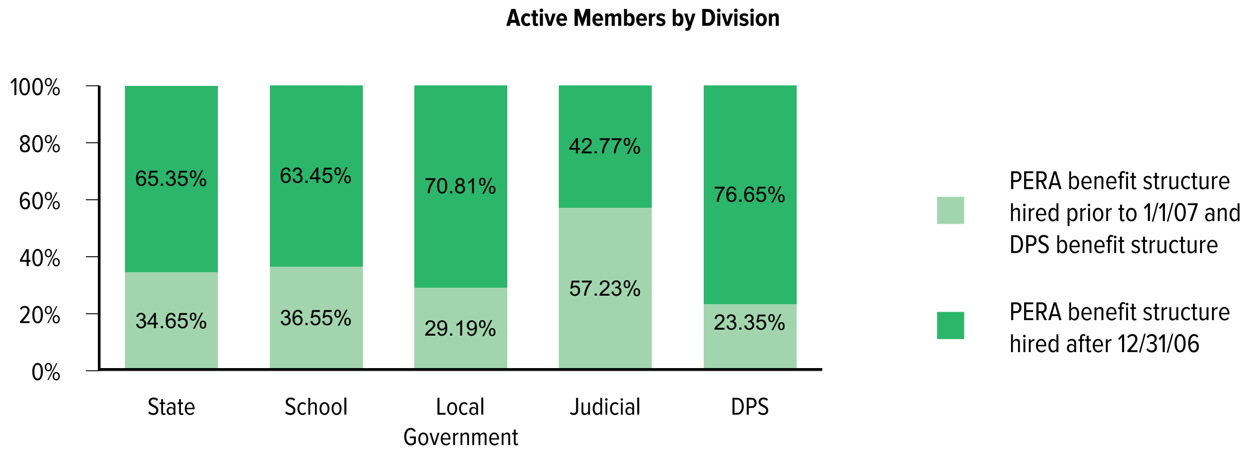
	State Division	School Division	Local Government Division	Judicial Division	DPS Division	Total
Active Members						
Active members as of 12/31/2018	**55,511**	**126,333**	**13,260**	**332**	**16,148**	**211,584**
Retirements during 2018						
Disability retirements	64	74	12	—	12	**162**
Service retirements	1,814	3,144	404	7	274	**5,643**
Total	**1,878**	**3,218**	**416**	**7**	**286**	**5,805**
Retirement benefits						
Total receiving disability and service retirement benefits on 12/31/2017	38,309	63,035	7,186	364	6,907	**115,801**
Data adjustment	3	4	—	—	(7)	**—**
Total retiring during 2018	1,878	3,218	416	7	286	**5,805**
Cobeneficiaries continuing after retiree's death	279	291	55	8	52	**685**
Returning to retirement rolls from suspension	7	11	—	—	2	**20**
Total	40,476	66,559	7,657	379	7,240	**122,311**
Retirees and cobeneficiaries deceased during year	1,108	1,353	181	11	223	**2,876**
Retirees suspending benefits to return to work	—	—	—	—	—	**—**
Total receiving retirement benefits	**39,368**	**65,206**	**7,476**	**368**	**7,017**	**119,435[2]**
Annual retirement benefits for retirees as of 12/31/2018	$1,596,415,464	$2,413,638,204	$285,912,288	$26,120,748	$275,988,300	$4,598,075,004
Average monthly benefit on 12/31/2018	$3,379	$3,085	$3,187	$5,915	$3,278	$3,208
Average monthly benefit for all members who retired during 2018	$2,795	$2,291	$2,853	$7,556	$2,749	$2,523
Survivor benefits						
Survivor benefit accounts						
Total survivors being paid on 12/31/2018	947	1,170	168	12	133	2,430[2]
Annual benefits payable to survivors as of 12/31/2018	$21,019,044	$19,493,148	$3,739,572	$428,964	$2,520,960	$47,201,688
Future benefits						
Future retirements to age 62 or 65	7,074	17,001	2,696	12	1,780	28,563
Total annual future benefits	$74,768,886	$131,941,098	$35,511,500	$380,409	$18,472,630	$261,074,523
Future survivor beneficiaries of inactive members	131	167	18	2	6	324[2]
Total annual future benefits	$1,788,816	$2,039,664	$234,660	$47,988	$45,852	$4,156,980

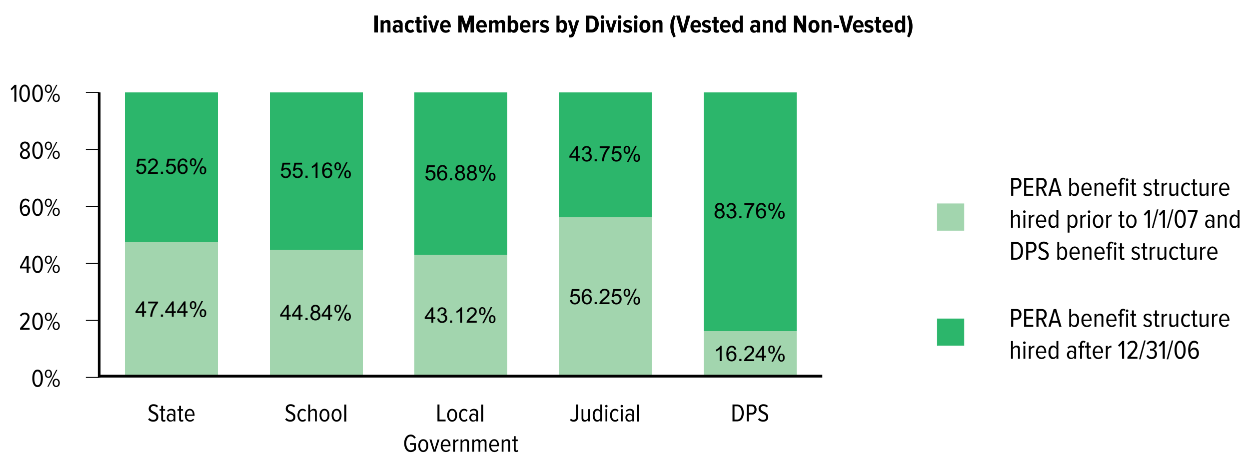
[1] In addition, as of December 31, 2018, there was a total of 241,844 non-vested terminated members due a refund of their contributions as follows: State Division—78,576; School Division—125,944; Local Government Division—25,034; Judicial Division—4; DPS Division—12,286.

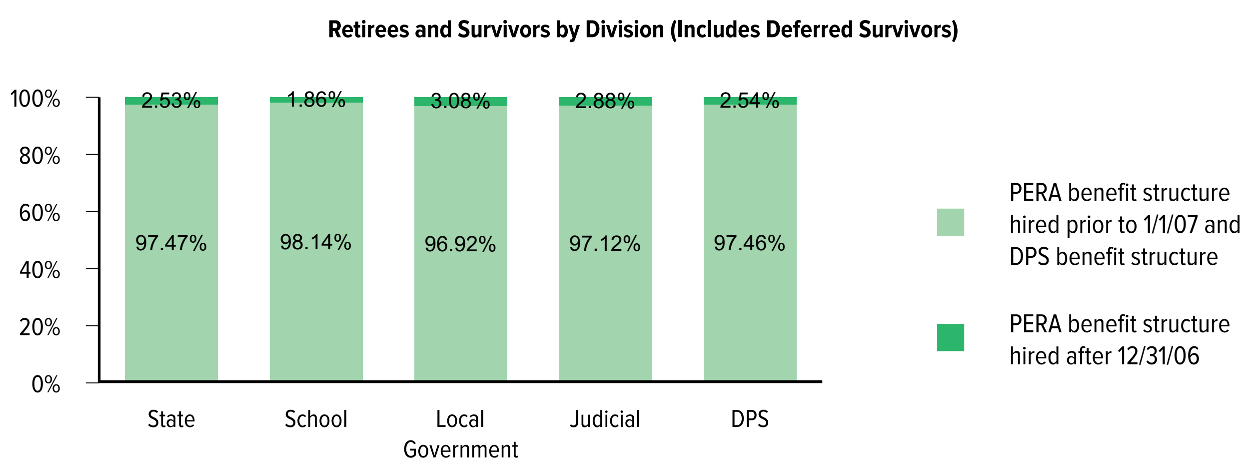
[2] These line items make up the total for retirees and beneficiaries reported on page 71 in Note 1 of the Notes to the Financial Statements in the Financial Section.

BREAKDOWN OF MEMBERSHIP BY PERCENTAGE

As of December 31, 2018







SCHEDULE OF AVERAGE RETIREMENT BENEFITS PAYABLE—ALL DIVISION TRUST FUNDS[1,2]

(In Actual Dollars)

Year Ended	Average Monthly Benefit	Average Age at Retirement	Average Current Age of Retirees	Average Years of Service at Retirement	Average Age at Death
12/31/2009	$2,885	58.0	69.3	23.3	N/A
12/31/2010	2,905	58.1	69.7	23.6	N/A
12/31/2011	2,966	58.1	69.9	23.6	N/A
12/31/2012	3,020	58.2	70.0	23.5	N/A
12/31/2013	3,068	58.2	70.4	23.5	82.0[3]
12/31/2014	3,112	58.3	70.7	23.4	82.8
12/31/2015	3,153	58.4	70.9	23.3	82.2
12/31/2016	3,193	58.5	71.2	23.2	82.5
12/31/2017	3,232	58.6	71.5	23.1	82.5
12/31/2018	**3,208**	**58.8**	**71.7**	**23.0**	**82.5**

1 Includes disability retirements, but not survivor benefits.

2 Data prior to December 31, 2010, does not include the DPS Division.

3 Information not available prior to December 31, 2013.

SCHEDULE OF AVERAGE RETIREMENT BENEFITS PAYABLE[1]

(In Actual Dollars)

	State Division	School Division	Local Government Division	Judicial Division	DPS Division
For All Retirees Year Ended 12/31/2018					
Average monthly benefit	**$3,379**	**$3,085**	**$3,187**	**$5,915**	**$3,278**
Average age at retirement	**58.6**	**58.8**	**58.6**	**62.0**	**59.4**
Average age	**71.9**	**71.6**	**69.7**	**75.0**	**74.3**
Average years of service at retirement	**22.8**	**23.2**	**21.4**	**23.3**	**24.2**
Average age at death	**82.7**	**82.4**	**79.8**	**83.2**	**84.6**
For Members Who Retired During 2018					
Average monthly benefit	**$2,795**	**$2,291**	**$2,853**	**$7,556**	**$2,749**
Average age	**63.2**	**62.8**	**62.8**	**67.5**	**63.3**
Average years of service	**20.1**	**20.3**	**18.8**	**25.1**	**20.1**
For All Retirees Year Ended 12/31/2017					
Average monthly benefit	$3,397	$3,115	$3,188	$5,864	$3,290
Average age at retirement	58.4	58.7	58.4	61.8	59.3
Average age	71.7	71.3	69.3	74.3	74.2
Average years of service at retirement	22.9	23.3	21.5	23.2	24.4
Average age at death	82.1	82.8	78.2	82.9	85.2
For Members Who Retired During 2017					
Average monthly benefit	$2,866	$2,304	$2,669	$7,747	$2,608
Average age	61.7	61.7	61.9	66.1	62.0
Average years of service	20.6	20.4	18.7	25.6	19.3

Please see page 248 for footnote references.

SCHEDULE OF AVERAGE RETIREMENT BENEFITS PAYABLE[1] (CONTINUED)

(In Actual Dollars)

	State Division	School Division	Local Government Division	Judicial Division	DPS Division
For All Retirees Year Ended 12/31/2016					
Average monthly benefit	$3,345	$3,086	$3,145	$5,624	$3,248
Average age at retirement	58.3	58.6	58.2	61.6	59.2
Average age	71.4	71.0	69.0	74.2	74.0
Average years of service at retirement	22.9	23.4	21.7	23.0	24.7
Average age at death	82.4	82.7	80.1	84.2	83.3
For Members Who Retired During 2016					
Average monthly benefit	$2,812	$2,303	$2,467	$6,192	$2,520
Average age	61.6	61.4	61.2	65.6	62.6
Average years of service	20.7	20.7	18.1	21.4	19.2
For All Retirees Year Ended 12/31/2015					
Average monthly benefit	$3,294	$3,052	$3,114	$5,379	$3,206
Average age at retirement	58.2	58.5	58.1	61.4	59.1
Average age	71.2	70.7	68.6	74.5	73.9
Average years of service at retirement	23.0	23.5	21.8	22.9	25.0
Average age at death	81.7	82.2	79.6	78.9	85.3
For Members Who Retired During 2015					
Average monthly benefit	$2,828	$2,293	$2,750	$7,030	$2,493
Average age	61.4	61.3	61.1	65.1	62.9
Average years of service	21.0	20.7	19.7	25.7	18.7
For All Retirees Year Ended 12/31/2014					
Average monthly benefit	$3,241	$3,019	$3,067	$5,158	$3,169
Average age at retirement	58.1	58.4	58.0	61.4	59.0
Average age	71.0	70.4	68.3	74.5	73.7
Average years of service at retirement	23.0	23.6	21.9	22.7	25.3
Average age at death	82.2	83.1	78.8	81.1	85.2
For Members Who Retired During 2014					
Average monthly benefit	$2,760	$2,405	$2,352	$4,969	$2,593
Average age	61.3	60.9	61.3	66.2	63.2
Average years of service	20.8	21.0	18.4	20.0	19.6
For All Retirees Year Ended 12/31/2013					
Average monthly benefit	$3,185	$2,980	$3,044	$5,077	$3,121
Average age at retirement	58.0	58.3	57.8	61.3	58.8
Average age	70.8	70.0	67.9	74.2	73.5
Average years of service at retirement	23.0	23.6	22.1	22.8	25.5
Average age at death[2]	82.5	81.4	78.6	88.2	84.8
For Members Who Retired During 2013					
Average monthly benefit	$2,837	$2,455	$2,509	$6,857	$2,776
Average age	60.7	60.8	60.1	64.9	61.7
Average years of service	21.2	21.3	18.9	26.2	19.6

Please see page 248 for footnote references.

SCHEDULE OF AVERAGE RETIREMENT BENEFITS PAYABLE[1] (CONTINUED)

(In Actual Dollars)

	State Division	School Division	Local Government Division	Judicial Division	DPS Division
For All Retirees Year Ended 12/31/2012					
Average monthly benefit	$3,124	$2,939	$3,007	$4,889	$3,064
Average age at retirement	58.0	58.2	57.7	61.2	58.8
Average age	70.4	69.7	67.5	73.7	73.3
Average years of service at retirement	23.0	23.7	22.2	22.6	25.8
For Members Who Retired During 2012					
Average monthly benefit	$2,890	$2,425	$2,876	$4,841	$2,540
Average age	60.2	60.3	59.8	63.9	62.5
Average years of service	21.8	21.3	20.9	22.7	19.7
For All Retirees Year Ended 12/31/2011					
Average monthly benefit	$3,056	$2,895	$2,948	$4,739	$3,009
Average age at retirement	58.0	58.2	57.5	61.0	58.7
Average age	70.3	69.5	67.8	73.7	73.2
Average years of service at retirement	23.0	23.8	22.3	22.4	26.0
For Members Who Retired During 2011					
Average monthly benefit	$3,010	$2,527	$2,896	$5,130	$2,665
Average age	60.2	60.3	59.3	63.4	62.0
Average years of service	22.3	22.1	21.2	23.4	20.5

[1] Includes disability retirements, but not survivor benefits.

[2] Information not available prior to December 31, 2013.

COLORADO PERA BENEFIT PAYMENTS—ALL DIVISION TRUST FUNDS

As of December 31, 2018

(In Actual Dollars)

PERA Benefit Payments[1,2]

At the end of 2018, PERA was paying benefits to more than 121,000 retired public employees and their beneficiaries who received an average benefit of $3,180 per month. For benefit recipients, this may be the primary source of retirement income as most PERA benefit recipients do not qualify for Social Security payments.

The PERA service retirement formula for calculating benefits, specified in State law as of December 31, 2018, is 2.5 percent multiplied by years of service multiplied by Highest Average Salary (HAS). As of December 31, 2018, HAS[3] is defined in State law as one-twelfth of the average of the highest annual salaries on which contributions were paid that are associated with three periods of 12 consecutive months of service credit. The three 12-month periods do not have to be consecutive, nor do they have to be the last three years of employment.

These three periods are tied to a fourth 12-month period which becomes the base year for the year-to-year salary increase limitation for HAS calculation purposes. The year-to-year limit for members who were eligible to retire on January 1, 2011, and hired before January 1, 2007, is 15 percent. All other members are subject to an 8 percent year-to-year limit in their HAS calculation. This annual limit applied to salaries in the HAS years is designed to moderate salary "spiking."

Approximately 68.8 percent (83,851) of recipients receive less than $50,000 a year in PERA benefits, as the graph below demonstrates. Slightly less than 1.7 percent (2,070) of PERA benefit recipients receive an annual benefit payment of $100,000 or more. Generally, these benefit recipients had high salaries and a significant number of years of service credit.

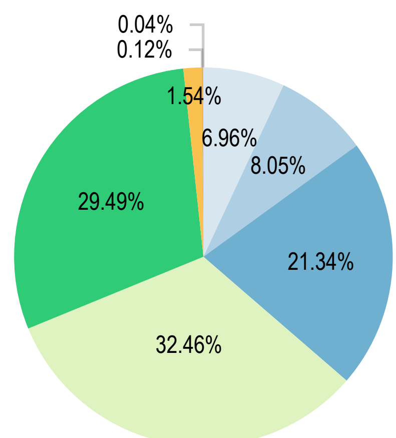
[1] Includes amounts paid under replacement benefit arrangements.

[2] Does not include deferred survivors and benefits that ended or were suspended in 2018.

[3] Some members of the DPS benefit structure, members in the Judicial Division, and members who do not have five years of service credit on December 31, 2019, have different HAS calculations.

PERA BENEFIT PAYMENTS BY DOLLAR AMOUNT OF ANNUAL BENEFIT AND NUMBER OF BENEFIT RECIPIENTS

Benefit Range[1]	Number of Benefit Recipients[2]
$0 - $4,999	8,479
$5,000 - $9,999	9,807
$10,000 - $24,999	26,010
$25,000 - $49,999	39,555
$50,000 - $99,999	35,944
$100,000 - $149,999	1,878
$150,000 - $199,999	143
$200,000+	49
Total Benefit Recipients	**121,865**



[1] Includes amounts paid under replacement benefit arrangements.

[2] Does not include 324 survivors.

COLORADO PERA BENEFIT PAYMENTS—ALL DIVISION TRUST FUNDS

As of December 31, 2018

(In Actual Dollars)

Benefit Payments by Decile

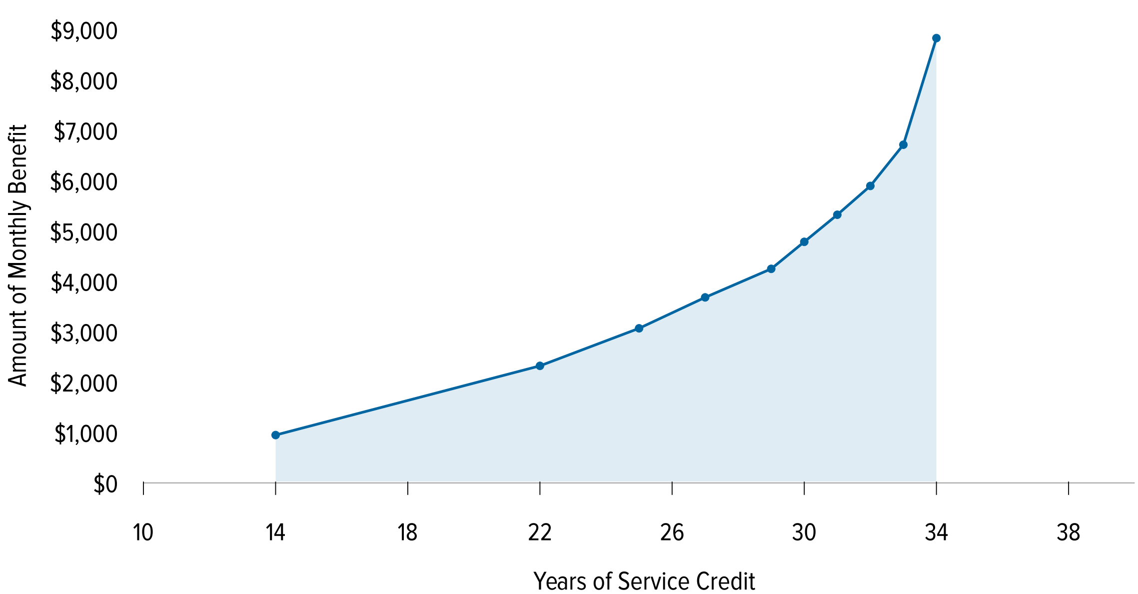
Another way to examine the data is to group benefit recipients and the benefits they receive into benefit payment ranges as a percentage of the total. The table below shows that, for the one-third of PERA benefit recipients (40,803) in the lowest decile, the average benefit is $11,400 a year. This group retired at an average age of 61 with just under 14 years of service credit. For the top decile, on the other end of the scale, the average benefit is $105,972 a year. However, this group, on average, had over 33 years of service credit, which is more than twice the length of the average service credit of those in the lowest decile. For the 5,805 new retirees in 2018, the average monthly benefit is $2,527. These members retired at an average age of 62 with 20.09 years of service credit.

Decile	Number of Benefit Recipients[1]	Percent of Benefit Recipients	Average Monthly Benefit[2]	Average Age at Retirement	Average Service Credit
1%–10%	40,803	33.49%	$950	61	13.78
11%–20%	16,679	13.69%	2,324	58	21.51
21%–30%	12,627	10.36%	3,069	58	24.68
31%–40%	10,523	8.63%	3,683	58	26.94
41%–50%	9,121	7.48%	4,250	57	28.57
51%–60%	8,098	6.65%	4,786	57	29.77
61%–70%	7,279	5.97%	5,324	57	30.68
71%–80%	6,574	5.39%	5,896	57	31.36
81%–90%	5,772	4.74%	6,714	57	32.19
91%–100%	4,389	3.60%	8,831	58	33.25
Total	**121,865**	**100.00%**	**3,180**	**58**	**22.81**

1 Does not include 324 survivors.

2 Includes amounts paid under replacement benefit arrangements.

Average Monthly Benefit Payment by Years of Service Credit



SCHEDULE OF RETIREES AND SURVIVORS BY TYPES OF BENEFITS

As of December 31, 2018

Types of Benefits

1—Age and service retirement.

2—Disability retirement.

3—Survivor payment—Option 3.

4—Survivor payment—children, spouse, or dependent parent.

5—Surviving spouse with future benefit.

6—Former member with future benefit.

Option Selected

Retirees select one of the following options at retirement:

1—Single-life benefit.

2—Joint benefit with 1/2 to surviving cobeneficiary.

3—Joint and survivor benefit.

4—Joint benefit with 1/2 to either survivor. (No longer offered to members retiring.)

Surviving Cobeneficiary

Retiree has predeceased the cobeneficiary.

Surviving Retiree

Cobeneficiary has predeceased the retiree.

State Division

Amount of Monthly Benefit *(In Actual Dollars)*	Total (Columns 1–5)	Types of Benefits 1	2	3	4	5	6
$1-$1,000	5,680	5,051	263	24	273	69	4,965
$1,001-$2,000	7,069	5,308	1,376	46	290	49	1,576
$2,001-$3,000	7,626	6,225	1,242	27	123	9	378
$3,001-$4,000	6,652	6,253	307	30	59	3	99
$4,001-$5,000	4,932	4,810	87	16	18	1	32
$5,001+	8,487	8,416	30	31	10	—	24
Total	**40,446**	**36,063**	**3,305**	**174**	**773**	**131**	**7,074**

Amount of Monthly Benefit[1] *(In Actual Dollars)*	Option Selected 1	2	3	4	Surviving Cobeneficiary	Surviving Retiree
$1-$1,000	3,539	340	858	2	551	24
$1,001-$2,000	3,818	749	1,085	2	975	55
$2,001-$3,000	4,168	1,014	1,384	4	830	67
$3,001-$4,000	3,474	1,143	1,392	1	507	43
$4,001-$5,000	2,481	957	1,142	2	292	23
$5,001+	4,026	1,844	2,191	5	354	26
Total	**21,506**	**6,047**	**8,052**	**16**	**3,509**	**238**

[1] For Types of Benefits 1 and 2 above.

SCHEDULE OF RETIREES AND SURVIVORS BY TYPES OF BENEFITS

As of December 31, 2018

Types of Benefits

1—Age and service retirement.

2—Disability retirement.

3—Survivor payment—Option 3.

4—Survivor payment—children, spouse, or dependent parent.

5—Surviving spouse with future benefit.

6—Former member with future benefit.

Option Selected

Retirees select one of the following options at retirement:

1—Single-life benefit.

2—Joint benefit with 1/2 to surviving cobeneficiary.

3—Joint and survivor benefit.

4—Joint benefit with 1/2 to either survivor. (No longer offered to members retiring.)

Surviving Cobeneficiary

Retiree has predeceased the cobeneficiary.

Surviving Retiree

Cobeneficiary has predeceased the retiree.

School Division

Types of Benefits

Amount of Monthly Benefit *(In Actual Dollars)*	Total (Columns 1–5)	1	2	3	4	5	6
$1-$1,000	14,249	12,826	753	46	519	105	13,966
$1,001-$2,000	10,804	9,313	1,119	41	290	41	2,451
$2,001-$3,000	9,769	8,916	688	19	132	14	414
$3,001-$4,000	9,397	8,989	332	18	52	6	115
$4,001-$5,000	8,902	8,752	118	12	20	—	41
$5,001+	13,422	13,358	42	14	7	1	14
Total	**66,543**	**62,154**	**3,052**	**150**	**1,020**	**167**	**17,001**

Option Selected

Amount of Monthly Benefit[1] *(In Actual Dollars)*	1	2	3	4	Surviving Cobeneficiary	Surviving Retiree
$1-$1,000	9,651	957	2,011	3	901	56
$1,001-$2,000	6,647	1,293	1,559	4	866	63
$2,001-$3,000	5,695	1,576	1,550	2	714	67
$3,001-$4,000	5,701	1,797	1,430	3	356	34
$4,001-$5,000	5,114	1,957	1,517	3	260	19
$5,001+	8,414	2,833	1,869	6	260	18
Total	**41,222**	**10,413**	**9,936**	**21**	**3,357**	**257**

[1] For Types of Benefits 1 and 2 above.

SCHEDULE OF RETIREES AND SURVIVORS BY TYPES OF BENEFITS

As of December 31, 2018

Types of Benefits

1—Age and service retirement.

2—Disability retirement.

3—Survivor payment—Option 3.

4—Survivor payment—children, spouse, or dependent parent.

5—Surviving spouse with future benefit.

6—Former member with future benefit.

Option Selected

Retirees select one of the following options at retirement:

1—Single-life benefit.

2—Joint benefit with 1/2 to surviving cobeneficiary.

3—Joint and survivor benefit.

4—Joint benefit with 1/2 to either survivor. (No longer offered to members retiring.)

Surviving Cobeneficiary

Retiree has predeceased the cobeneficiary.

Surviving Retiree

Cobeneficiary has predeceased the retiree.

Local Government Division

Amount of Monthly Benefit (In Actual Dollars)	Total (Columns 1–5)	Types of Benefits 1	2	3	4	5	6
$1-$1,000	1,365	1,254	55	6	41	9	1,637
$1,001-$2,000	1,511	1,160	283	8	53	7	684
$2,001-$3,000	1,340	1,067	237	10	25	1	251
$3,001-$4,000	1,101	1,018	68	5	9	1	79
$4,001-$5,000	855	836	13	5	1	—	32
$5,001+	1,490	1,478	7	4	1	—	13
Total	**7,662**	**6,813**	**663**	**38**	**130**	**18**	**2,696**

Amount of Monthly Benefit[1] (In Actual Dollars)	Option Selected 1	2	3	4	Surviving Cobeneficiary	Surviving Retiree
$1-$1,000	877	94	215	—	120	3
$1,001-$2,000	828	166	283	2	153	11
$2,001-$3,000	686	220	280	—	109	9
$3,001-$4,000	575	221	225	—	61	4
$4,001-$5,000	415	180	222	—	32	—
$5,001+	643	361	429	—	52	—
Total	**4,024**	**1,242**	**1,654**	**2**	**527**	**27**

[1] For Types of Benefits 1 and 2 above.

SCHEDULE OF RETIREES AND SURVIVORS BY TYPES OF BENEFITS

As of December 31, 2018

Types of Benefits

1—Age and service retirement.

2—Disability retirement.

3—Survivor payment—Option 3.

4—Survivor payment—children, spouse, or dependent parent.

5—Surviving spouse with future benefit.

6—Former member with future benefit.

Option Selected

Retirees select one of the following options at retirement:

1—Single-life benefit.

2—Joint benefit with 1/2 to surviving cobeneficiary.

3—Joint and survivor benefit.

4—Joint benefit with 1/2 to either survivor. (No longer offered to members retiring.)

Surviving Cobeneficiary

Retiree has predeceased the cobeneficiary.

Surviving Retiree

Cobeneficiary has predeceased the retiree.

Judicial Division

Types of Benefits

Amount of Monthly Benefit *(In Actual Dollars)*	Total (Columns 1–5)	1	2	3	4	5	6
$1-$1,000	17	15	1	—	—	1	2
$1,001-$2,000	27	23	1	—	3	—	1
$2,001-$3,000	35	30	2	—	3	—	4
$3,001-$4,000	33	26	3	—	3	1	4
$4,001-$5,000	35	30	4	—	1	—	1
$5,001+	235	225	8	1	1	—	—
Total	**382**	**349**	**19**	**1**	**11**	**2**	**12**

Option Selected

Amount of Monthly Benefit[1] *(In Actual Dollars)*	1	2	3	4	Surviving Cobeneficiary	Surviving Retiree
$1-$1,000	6	—	3	—	7	—
$1,001-$2,000	10	1	4	—	9	—
$2,001-$3,000	5	6	9	—	12	—
$3,001-$4,000	8	4	9	—	8	—
$4,001-$5,000	10	3	11	—	10	—
$5,001+	72	54	85	—	21	1
Total	**111**	**68**	**121**	**—**	**67**	**1**

[1] For Types of Benefits 1 and 2 above.

SCHEDULE OF RETIREES AND SURVIVORS BY TYPES OF BENEFITS

As of December 31, 2018

Types of Benefits

1—Age and service retirement.

2—Disability retirement.

3—Survivor payment—Option 3.

4—Survivor payment—children, spouse, or dependent parent.

5—Surviving spouse with future benefit.

6—Former member with future benefit.

Option Selected

Retirees select one of the following options at retirement:

1—Single-life benefit.

2—Joint benefit with 1/2 to surviving cobeneficiary.

3—Joint and survivor benefit.

4—Joint benefit with 1/2 to either survivor. (No longer offered to members retiring.)

Surviving Cobeneficiary

Retiree has predeceased the cobeneficiary.

Surviving Retiree

Cobeneficiary has predeceased the retiree.

DPS Division

Types of Benefits

Amount of Monthly Benefit (In Actual Dollars)	Total (Columns 1–5)	1	2	3	4	5	6
$1-$1,000	897	753	82	1	56	5	1,242
$1,001-$2,000	1,193	1,043	122	1	26	1	433
$2,001-$3,000	1,172	1,052	85	14	21	—	79
$3,001-$4,000	1,335	1,280	45	7	3	—	20
$4,001-$5,000	1,346	1,323	20	2	1	—	4
$5,001+	1,213	1,208	4	1	—	—	2
Total	**7,156**	**6,659**	**358**	**26**	**107**	**6**	**1,780**

Option Selected[1]

Amount of Monthly Benefit[2] (In Actual Dollars)	1	2	3	4	Surviving Cobeneficiary	Surviving Retiree	Cobeneficiaries Both Deceased
$1-$1,000	573	27	116	—	85	33	1
$1,001-$2,000	714	82	202	—	112	52	3
$2,001-$3,000	614	94	250	—	105	73	1
$3,001-$4,000	657	119	332	—	139	77	1
$4,001-$5,000	633	121	379	—	116	93	1
$5,001+	612	120	344	—	89	47	—
Total	**3,803**	**563**	**1,623**	**—**	**646**	**375**	**7**

[1] Below are the equivalent DPS benefit structure options:
PERA Option 1 = Options A, B, and D (D is discontinued)
PERA Option 2 = Options P2 and E (E is discontinued)
PERA Option 3 = Options P3 and C (C is discontinued)

[2] For Types of Benefits 1 and 2 above.

SCHEDULE OF AVERAGE BENEFIT PAYMENTS

(In Actual Dollars)

State Division

	Years of Service Credit						
Year Retired	**0–5**	**5–10**	**10–15**	**15–20**	**20–25**	**25–30**	**30+**
Period 1/1/2018 to 12/31/2018							
Average monthly benefit	**$153**	**$596**	**$1,250**	**$1,997**	**$2,880**	**$3,981**	**$5,571**
Average highest average salary	**$2,721**	**$3,531**	**$4,332**	**$4,838**	**$5,559**	**$6,179**	**$7,111**
Number of service retirees	**83**	**281**	**228**	**234**	**306**	**303**	**379**
Period 1/1/2017 to 12/31/2017							
Average monthly benefit	$233	$704	$1,287	$2,102	$3,025	$4,355	$5,618
Average highest average salary	$3,134	$3,869	$4,312	$4,860	$5,532	$6,465	$7,162
Number of service retirees	102	238	253	271	338	357	322
Period 1/1/2016 to 12/31/2016							
Average monthly benefit	$240	$641	$1,285	$2,050	$2,983	$4,128	$5,593
Average highest average salary	$3,010	$3,477	$4,394	$4,790	$5,397	$6,130	$6,957
Number of service retirees	103	244	233	238	319	357	319
Period 1/1/2015 to 12/31/2015							
Average monthly benefit	$241	$770	$1,339	$2,111	$2,934	$4,121	$5,232
Average highest average salary	$2,851	$4,043	$4,506	$4,766	$5,260	$6,074	$6,490
Number of service retirees	82	246	214	222	293	348	324
Period 1/1/2014 to 12/31/2014							
Average monthly benefit	$228	$626	$1,239	$1,996	$2,930	$4,002	$5,438
Average highest average salary	$2,960	$3,421	$4,046	$4,609	$5,351	$5,904	$6,642
Number of service retirees	64	204	218	212	278	327	261
Period 1/1/2013 to 12/31/2013							
Average monthly benefit	$269	$628	$1,288	$1,997	$2,853	$4,165	$5,285
Average highest average salary	$2,836	$3,508	$4,030	$4,527	$5,150	$6,196	$6,617
Number of service retirees	64	173	151	167	236	296	252
Period 1/1/2012 to 12/31/2012							
Average monthly benefit	$236	$634	$1,259	$2,121	$2,855	$4,126	$5,035
Average highest average salary	$2,487	$3,355	$4,141	$4,661	$5,248	$5,969	$6,268
Number of service retirees	60	182	196	206	284	351	343
Period 1/1/2011 to 12/31/2011							
Average monthly benefit	$160	$690	$1,214	$1,956	$2,863	$4,096	$5,307
Average highest average salary	$2,254	$3,425	$4,027	$4,413	$5,181	$6,002	$6,661
Number of service retirees	53	184	130	143	237	331	305
Period 1/1/2010 to 12/31/2010							
Average monthly benefit	$266	$617	$1,089	$2,200	$2,816	$4,011	$5,156
Average highest average salary	$2,569	$3,212	$3,504	$4,923	$5,102	$5,983	$6,394
Number of service retirees	34	171	127	164	305	430	362
Period 1/1/2009 to 12/31/2009							
Average monthly benefit	$181	$530	$1,160	$1,952	$2,848	$3,974	$5,087
Average highest average salary	$2,223	$2,903	$3,750	$4,397	$5,159	$5,790	$6,426
Number of service retirees	25	131	129	143	241	406	361

Note: HAS is defined as one-twelfth of the average of the highest annual salaries associated with three periods of 12 consecutive months of service credit. These three periods are tied to a fourth 12-month period which becomes the base year for the year-to-year increase limitation, which is designed to moderate “spiking.” Some members of the DPS benefit structure, members in the Judicial Division, and members who do not have five years of service credit on December 31, 2019, have different HAS calculations.

SCHEDULE OF AVERAGE BENEFIT PAYMENTS

(In Actual Dollars)

School Division

	Years of Service Credit						
Year Retired	0–5	5–10	10–15	15–20	20–25	25–30	30+
Period 1/1/2018 to 12/31/2018							
Average monthly benefit	**$124**	**$436**	**$805**	**$1,440**	**$2,254**	**$3,580**	**$4,833**
Average highest average salary	**$1,951**	**$2,574**	**$2,917**	**$3,535**	**$4,296**	**$5,435**	**$6,175**
Number of service retirees	**122**	**365**	**451**	**474**	**640**	**551**	**541**
Period 1/1/2017 to 12/31/2017							
Average monthly benefit	$185	$433	$925	$1,582	$2,418	$3,794	$4,891
Average highest average salary	$1,980	$2,351	$3,118	$3,615	$4,393	$5,547	$6,067
Number of service retirees	159	370	463	485	611	590	428
Period 1/1/2016 to 12/31/2016							
Average monthly benefit	$127	$430	$879	$1,684	$2,304	$3,727	$4,695
Average highest average salary	$1,796	$2,325	$2,924	$3,799	$4,156	$5,388	$5,851
Number of service retirees	118	384	388	408	565	589	422
Period 1/1/2015 to 12/31/2015							
Average monthly benefit	$221	$436	$899	$1,565	$2,400	$3,682	$4,621
Average highest average salary	$2,015	$2,317	$3,058	$3,538	$4,322	$5,347	$5,741
Number of service retirees	110	372	398	397	544	618	395
Period 1/1/2014 to 12/31/2014							
Average monthly benefit	$194	$467	$939	$1,661	$2,407	$3,726	$4,778
Average highest average salary	$2,108	$2,580	$3,189	$3,706	$4,372	$5,422	$5,908
Number of service retirees	106	362	401	392	531	597	465
Period 1/1/2013 to 12/31/2013							
Average monthly benefit	$201	$474	$976	$1,687	$2,448	$3,685	$4,739
Average highest average salary	$1,791	$2,726	$3,197	$3,721	$4,357	$5,318	$5,886
Number of service retirees	79	350	339	311	492	571	441
Period 1/1/2012 to 12/31/2012							
Average monthly benefit	$216	$473	$815	$1,632	$2,411	$3,682	$4,592
Average highest average salary	$1,696	$2,575	$2,800	$3,546	$4,368	$5,370	$5,791
Number of service retirees	96	365	349	380	534	634	509
Period 1/1/2011 to 12/31/2011							
Average monthly benefit	$214	$462	$806	$1,625	$2,430	$3,617	$4,632
Average highest average salary	$1,980	$2,563	$2,683	$3,526	$4,344	$5,235	$5,804
Number of service retirees	71	336	273	334	506	651	497
Period 1/1/2010 to 12/31/2010							
Average monthly benefit	$212	$464	$780	$1,543	$2,393	$3,603	$4,602
Average highest average salary	$2,193	$2,572	$2,500	$3,336	$4,243	$5,207	$5,722
Number of service retirees	56	297	252	305	585	755	601
Period 1/1/2009 to 12/31/2009							
Average monthly benefit	$165	$440	$825	$1,671	$2,384	$3,508	$4,515
Average highest average salary	$1,928	$2,311	$2,663	$3,512	$4,246	$5,047	$5,632
Number of service retirees	33	268	191	232	459	618	495

Note: HAS is defined as one-twelfth of the average of the highest annual salaries associated with three periods of 12 consecutive months of service credit. These three periods are tied to a fourth 12-month period which becomes the base year for the year-to-year increase limitation, which is designed to moderate “spiking.” Some members of the DPS benefit structure, members in the Judicial Division, and members who do not have five years of service credit on December 31, 2019, have different HAS calculations.

SCHEDULE OF AVERAGE BENEFIT PAYMENTS

(In Actual Dollars)

Local Government Division

	Years of Service Credit						
Year Retired	**0–5**	**5–10**	**10–15**	**15–20**	**20–25**	**25–30**	**30+**
Period 1/1/2018 to 12/31/2018							
Average monthly benefit	**$224**	**$600**	**$1,496**	**$2,232**	**$3,054**	**$4,745**	**$6,276**
Average highest average salary	**$3,698**	**$3,820**	**$5,655**	**$5,428**	**$5,865**	**$7,485**	**$8,237**
Number of service retirees	**19**	**63**	**82**	**43**	**76**	**60**	**61**
Period 1/1/2017 to 12/31/2017							
Average monthly benefit	$240	$621	$1,282	$2,202	$3,241	$4,687	$5,720
Average highest average salary	$4,224	$3,889	$4,675	$5,056	$6,165	$6,969	$7,260
Number of service retirees	29	60	72	52	78	54	55
Period 1/1/2016 to 12/31/2016							
Average monthly benefit	$323	$686	$1,401	$2,195	$2,761	$4,569	$5,378
Average highest average salary	$4,580	$4,031	$5,104	$5,506	$5,255	$6,796	$6,648
Number of service retirees	15	73	77	49	55	52	46
Period 1/1/2015 to 12/31/2015							
Average monthly benefit	$252	$663	$1,202	$2,255	$3,152	$3,970	$5,814
Average highest average salary	$3,727	$4,141	$4,581	$5,481	$5,960	$5,896	$7,317
Number of service retirees	16	64	62	36	76	70	60
Period 1/1/2014 to 12/31/2014							
Average monthly benefit	$241	$680	$1,185	$2,190	$3,110	$4,068	$4,796
Average highest average salary	$4,005	$3,912	$4,206	$5,106	$5,805	$6,299	$6,037
Number of service retirees	15	87	63	42	61	59	48
Period 1/1/2013 to 12/31/2013							
Average monthly benefit	$211	$650	$1,259	$2,156	$2,733	$4,020	$5,692
Average highest average salary	$3,013	$3,743	$4,467	$5,107	$5,311	$6,024	$7,353
Number of service retirees	16	58	47	36	49	73	34
Period 1/1/2012 to 12/31/2012							
Average monthly benefit	$536	$839	$1,264	$2,524	$3,095	$4,323	$4,943
Average highest average salary	$4,726	$4,538	$4,213	$5,649	$5,626	$6,465	$6,275
Number of service retirees	27	96	77	83	138	138	99
Period 1/1/2011 to 12/31/2011							
Average monthly benefit	$338	$665	$1,011	$1,985	$2,908	$4,093	$5,337
Average highest average salary	$5,959	$3,988	$3,469	$4,616	$5,333	$6,070	$6,712
Number of service retirees	13	48	33	32	42	78	60
Period 1/1/2010 to 12/31/2010							
Average monthly benefit	$401	$725	$1,053	$1,955	$2,776	$4,540	$5,024
Average highest average salary	$3,879	$4,141	$3,516	$4,482	$5,184	$6,476	$6,414
Number of service retirees	8	46	32	41	73	116	124
Period 1/1/2009 to 12/31/2009							
Average monthly benefit	$327	$579	$1,496	$1,991	$2,869	$3,712	$4,755
Average highest average salary	$2,981	$3,088	$4,420	$4,380	$5,249	$5,634	$5,970
Number of service retirees	9	43	37	35	49	83	90

Note: HAS is defined as one-twelfth of the average of the highest annual salaries associated with three periods of 12 consecutive months of service credit. These three periods are tied to a fourth 12-month period which becomes the base year for the year-to-year increase limitation, which is designed to moderate “spiking.” Some members of the DPS benefit structure, members in the Judicial Division, and members who do not have five years of service credit on December 31, 2019, have different HAS calculations.

SCHEDULE OF AVERAGE BENEFIT PAYMENTS

(In Actual Dollars)

Judicial Division

	Years of Service Credit						
Year Retired	**0–5**	**5–10**	**10–15**	**15–20**	**20–25**	**25–30**	**30+**
Period 1/1/2018 to 12/31/2018							
Average monthly benefit	**$—**	**$2,763**	**$—**	**$5,841**	**$6,403**	**$8,926**	**$11,277**
Average highest average salary	**$—**	**$13,617**	**$—**	**$13,351**	**$13,378**	**$13,548**	**$15,287**
Number of service retirees	**—**	**1**	**—**	**1**	**2**	**1**	**2**
Period 1/1/2017 to 12/31/2017							
Average monthly benefit	$—	$1,929	$3,419	$6,000	$—	$8,369	$11,366
Average highest average salary	$—	$13,295	$9,786	$12,308	$—	$12,825	$13,840
Number of service retirees	—	3	3	2	—	8	8
Period 1/1/2016 to 12/31/2016							
Average monthly benefit	$679	$1,868	$3,471	$5,044	$5,641	$8,291	$10,086
Average highest average salary	$6,905	$12,839	$12,526	$12,043	$11,450	$13,030	$13,340
Number of service retirees	2	2	1	6	3	7	5
Period 1/1/2015 to 12/31/2015							
Average monthly benefit	$—	$—	$4,012	$4,158	$5,913	$7,635	$9,227
Average highest average salary	$—	$—	$13,045	$11,602	$11,664	$12,097	$12,331
Number of service retirees	—	—	2	1	6	4	6
Period 1/1/2014 to 12/31/2014							
Average monthly benefit	$—	$1,505	$2,767	$4,432	$6,197	$7,806	$7,287
Average highest average salary	$—	$9,209	$10,444	$10,910	$11,182	$12,370	$9,350
Number of service retirees	—	3	3	1	4	2	3
Period 1/1/2013 to 12/31/2013							
Average monthly benefit	$—	$—	$3,596	$—	$—	$9,561	$9,427
Average highest average salary	$—	$—	$9,119	$—	$—	$11,271	$10,871
Number of service retirees	—	—	3	—	—	1	4
Period 1/1/2012 to 12/31/2012							
Average monthly benefit	$—	$713	$3,376	$4,438	$7,013	$6,927	$2,582
Average highest average salary	$—	$4,363	$10,256	$8,787	$12,913	$10,988	$3,077
Number of service retirees	—	4	1	2	2	8	1
Period 1/1/2011 to 12/31/2011							
Average monthly benefit	$—	$962	$2,332	$3,156	$5,642	$4,768	$7,974
Average highest average salary	$—	$8,192	$10,487	$8,704	$10,430	$7,818	$9,925
Number of service retirees	—	1	2	3	5	3	5
Period 1/1/2010 to 12/31/2010							
Average monthly benefit	$—	$—	$2,246	$—	$5,734	$7,313	$8,959
Average highest average salary	$—	$—	$7,685	$—	$10,717	$10,602	$10,999
Number of service retirees	—	—	1	—	1	4	4
Period 1/1/2009 to 12/31/2009							
Average monthly benefit	$—	$1,006	$2,549	$4,238	$5,555	$7,012	$8,330
Average highest average salary	$—	$3,171	$7,858	$10,304	$10,302	$10,449	$10,297
Number of service retirees	—	1	2	1	5	3	6

Note: HAS is defined as one-twelfth of the average of the highest annual salaries associated with three periods of 12 consecutive months of service credit. These three periods are tied to a fourth 12-month period which becomes the base year for the year-to-year increase limitation, which is designed to moderate "spiking." Some members of the DPS benefit structure, members in the Judicial Division, and members who do not have five years of service credit on December 31, 2019, have different HAS calculations.

SCHEDULE OF AVERAGE BENEFIT PAYMENTS

(In Actual Dollars)

DPS Division[1]

	Years of Service Credit						
Year Retired	0–5	5–10	10–15	15–20	20–25	25–30	30+
Period 1/1/2018 to 12/31/2018							
Average monthly benefit	**$77**	**$475**	**$1,369**	**$1,748**	**$2,727**	**$4,334**	**$5,337**
Average highest average salary	**$1,890**	**$2,972**	**$4,821**	**$4,714**	**$5,464**	**$6,788**	**$6,831**
Number of service retirees	**5**	**65**	**23**	**34**	**35**	**51**	**61**
Period 1/1/2017 to 12/31/2017							
Average monthly benefit	$176	$555	$1,305	$2,089	$3,242	$4,544	$5,416
Average highest average salary	$2,466	$2,926	$4,325	$5,263	$5,682	$6,625	$6,835
Number of service retirees	8	59	21	38	52	58	20
Period 1/1/2016 to 12/31/2016							
Average monthly benefit	$163	$611	$1,462	$1,989	$3,415	$4,133	$5,342
Average highest average salary	$1,938	$3,536	$4,816	$4,955	$6,055	$5,876	$6,785
Number of service retirees	4	59	40	60	59	56	24
Period 1/1/2015 to 12/31/2015							
Average monthly benefit	$230	$702	$1,588	$1,994	$3,147	$4,159	$5,254
Average highest average salary	$1,908	$4,275	$5,022	$4,808	$5,523	$7,318	$6,391
Number of service retirees	12	55	36	37	60	56	19
Period 1/1/2014 to 12/31/2014							
Average monthly benefit	$472	$810	$1,379	$2,233	$3,091	$4,243	$4,862
Average highest average salary	$3,399	$4,593	$4,489	$5,569	$5,607	$6,250	$5,891
Number of service retirees	15	39	44	49	72	44	32
Period 1/1/2013 to 12/31/2013							
Average monthly benefit	$276	$890	$1,365	$1,847	$3,214	$4,350	$5,049
Average highest average salary	$2,532	$5,835	$4,861	$4,618	$5,754	$6,611	$6,097
Number of service retirees	15	30	31	32	69	57	27
Period 1/1/2012 to 12/31/2012							
Average monthly benefit	$274	$840	$1,507	$2,099	$3,032	$3,589	$4,568
Average highest average salary	$2,645	$4,483	$4,919	$5,238	$5,454	$5,478	$5,682
Number of service retirees	8	38	31	42	70	38	33
Period 1/1/2011 to 12/31/2011							
Average monthly benefit	$1,297	$996	$1,479	$2,060	$3,373	$4,188	$4,290
Average highest average salary	$2,751	$4,789	$4,956	$4,948	$5,910	$6,046	$5,198
Number of service retirees	8	30	35	38	57	38	26
Period 1/1/2010 to 12/31/2010							
Average monthly benefit	$1,203	$867	$1,386	$1,943	$2,870	$3,971	$4,710
Average highest average salary	$3,568	$4,608	$4,335	$5,151	$5,312	$5,893	$5,944
Number of service retirees	5	17	20	25	42	33	30

[1] The DPS Division Trust Fund was established on January 1, 2010, and received the net assets of the DPSRS.

Note: HAS is defined as one-twelfth of the average of the highest annual salaries associated with three periods of 12 consecutive months of service credit. These three periods are tied to a fourth 12-month period which becomes the base year for the year-to-year increase limitation, which is designed to moderate "spiking." Some members of the DPS benefit structure, members in the Judicial Division, and members who do not have five years of service credit on December 31, 2019, have different HAS calculations.

SCHEDULE OF AVERAGE BENEFIT PAYMENTS

(In Actual Dollars)

All Division Trust Funds[1,2]

	Years of Service Credit						
Year Retired	**0–5**	**5–10**	**10–15**	**15–20**	**20–25**	**25–30**	**30+**
Period 1/1/2018 to 12/31/2018							
Average monthly benefit	**$142**	**$514**	**$1,023**	**$1,668**	**$2,516**	**$3,824**	**$5,227**
Average highest average salary	**$2,373**	**$3,070**	**$3,671**	**$4,090**	**$4,829**	**$5,876**	**$6,691**
Number of service retirees	**229**	**775**	**784**	**786**	**1,059**	**966**	**1,044**
Period 1/1/2017 to 12/31/2017							
Average monthly benefit	$207	$553	$1,088	$1,819	$2,707	$4,102	$5,302
Average highest average salary	$2,606	$3,064	$3,684	$4,196	$4,940	$6,039	$6,662
Number of service retirees	298	730	812	848	1,079	1,067	833
Period 1/1/2016 to 12/31/2016							
Average monthly benefit	$192	$540	$1,096	$1,882	$2,621	$3,955	$5,137
Average highest average salary	$2,530	$2,979	$3,730	$4,375	$4,746	$5,783	$6,402
Number of service retirees	242	762	739	761	1,001	1,061	816
Period 1/1/2015 to 12/31/2015							
Average monthly benefit	$231	$587	$1,101	$1,802	$2,686	$3,879	$5,006
Average highest average salary	$2,445	$3,198	$3,753	$4,112	$4,848	$5,738	$6,225
Number of service retirees	220	737	712	693	979	1,096	804
Period 1/1/2014 to 12/31/2014							
Average monthly benefit	$229	$564	$1,084	$1,839	$2,674	$3,863	$5,005
Average highest average salary	$2,620	$3,135	$3,641	$4,207	$4,875	$5,674	$6,165
Number of service retirees	200	695	729	696	946	1,029	809
Period 1/1/2013 to 12/31/2013							
Average monthly benefit	$233	$555	$1,117	$1,822	$2,640	$3,896	$4,999
Average highest average salary	$2,352	$3,196	$3,644	$4,111	$4,747	$5,710	$6,229
Number of service retirees	174	611	571	546	846	998	758
Period 1/1/2012 to 12/31/2012							
Average monthly benefit	$270	$589	$1,038	$1,913	$2,677	$3,910	$4,779
Average highest average salary	$2,413	$3,174	$3,480	$4,227	$4,870	$5,721	$5,999
Number of service retirees	191	685	654	713	1,028	1,169	985
Period 1/1/2011 to 12/31/2011							
Average monthly benefit	$265	$576	$989	$1,770	$2,657	$3,817	$4,919
Average highest average salary	$2,480	$3,063	$2,941	$3,605	$4,371	$5,351	$6,012
Number of service retirees	145	599	473	550	847	1,101	893
Period 1/1/2010 to 12/31/2010							
Average monthly benefit	$292	$549	$922	$1,795	$2,572	$3,836	$4,846
Average highest average salary	$2,515	$2,979	$2,767	$3,754	$4,401	$5,454	$5,881
Number of service retirees	103	531	432	535	1,006	1,338	1,121
Period 1/1/2009 to 12/31/2009							
Average monthly benefit	$193	$482	$1,024	$1,802	$2,585	$3,703	$4,779
Average highest average salary	$2,180	$2,564	$3,263	$3,911	$4,643	$5,377	$5,995
Number of service retirees	67	443	359	411	754	1,110	952

1 Data prior to December 31, 2010, does not include the DPS Division.

2 The DPS Division Trust Fund was established on January 1, 2010, and received the net assets of the DPSRS.

Note: HAS is defined as one-twelfth of the average of the highest annual salaries associated with three periods of 12 consecutive months of service credit. These three periods are tied to a fourth 12-month period which becomes the base year for the year-to-year increase limitation, which is designed to moderate “spiking.” Some members of the DPS benefit structure, members in the Judicial Division, and members who do not have five years of service credit on December 31, 2019, have different HAS calculations.

SCHEDULE OF AVERAGE BENEFIT PAYMENTS

(In Actual Dollars)

Health Care Trust Fund[1]

	Years of Service Credit						
Year Retired	**0–5**	**5–10**	**10–15**	**15–20**	**20–25**	**25–30**	**30+**
Period 1/1/2018 to 12/31/2018							
Average monthly benefit	**$20**	**$62**	**$110**	**$154**	**$201**	**$201**	**$209**
Number of service retirees[2]	**7**	**56**	**131**	**177**	**394**	**365**	**482**

[1] In future reports, additional years will be added until 10 years of historical data are presented.

[2] Only includes those service retirees participating in PERACare.

DPS Health Care Trust Fund[1]

	Years of Service Credit						
Year Retired	**0–5**	**5–10**	**10–15**	**15–20**	**20–25**	**25–30**	**30+**
Period 1/1/2018 to 12/31/2018							
Average monthly benefit	**$—**	**$65**	**$67**	**$170**	**$203**	**$208**	**$208**
Number of service retirees[2]	**—**	**8**	**3**	**6**	**13**	**21**	**36**

[1] In future reports, additional years will be added until 10 years of historical data are presented.

[2] Only includes those service retirees participating in PERACare.

All Health Care Trust Funds[1]

	Years of Service Credit						
Year Retired	**0–5**	**5–10**	**10–15**	**15–20**	**20–25**	**25–30**	**30+**
Period 1/1/2018 to 12/31/2018							
Average monthly benefit	**$20**	**$62**	**$109**	**$154**	**$201**	**$201**	**$209**
Number of service retirees[2]	**7**	**64**	**134**	**183**	**407**	**386**	**518**

[1] In future reports, additional years will be added until 10 years of historical data are presented.

[2] Only includes those service retirees participating in PERACare.

SCHEDULE OF CONTRIBUTION RATE HISTORY

State Division (Members Other Than State Troopers)[1]

			Percent of Covered Payroll					
Years			Member Contribution Rate	Employer Contribution Rate[2]	Amortization Equalization Disbursement	Supplemental Amortization Equalization Disbursement	Nonemployer Contribution Rate	Total Contribution Rate
8/1/1931	to	6/30/1938	3.50%	—	—	—	—	3.50%
7/1/1938	to	6/30/1949	3.50%	3.50%	—	—	—	7.00%
7/1/1949	to	6/30/1958	5.00%	5.00%	—	—	—	10.00%
7/1/1958	to	6/30/1969	6.00%	6.00%	—	—	—	12.00%
7/1/1969	to	6/30/1970	7.00%	7.00%	—	—	—	14.00%
7/1/1970	to	6/30/1971	7.00%	8.00%	—	—	—	15.00%
7/1/1971	to	6/30/1973	7.00%	8.50%	—	—	—	15.50%
7/1/1973	to	6/30/1974	7.75%	9.50%	—	—	—	17.25%
7/1/1974	to	6/30/1975	7.75%	10.50%	—	—	—	18.25%
7/1/1975	to	8/31/1980	7.75%	10.64%	—	—	—	18.39%
9/1/1980	to	12/31/1981	7.75%	12.20%	—	—	—	19.95%
1/1/1982	to	6/30/1987	8.00%	12.20%	—	—	—	20.20%
7/1/1987	to	6/30/1988	8.00%	10.20%	—	—	—	18.20%
7/1/1988	to	6/30/1991	8.00%	12.20%	—	—	—	20.20%
7/1/1991	to	4/30/1992	8.00%	11.60%	—	—	—	19.60%
5/1/1992	to	6/30/1992	8.00%	5.60%[3]	—	—	—	13.60%
7/1/1992	to	6/30/1993	8.00%	10.60%	—	—	—	18.60%
7/1/1993	to	6/30/1997	8.00%	11.60%	—	—	—	19.60%
1/1/2006	to	12/31/2006	8.00%	10.15%	0.50%	—	—	18.65%
1/1/2007	to	12/31/2007	8.00%	10.15%	1.00%	—	—	19.15%
1/1/2008	to	12/31/2008	8.00%	10.15%	1.40%	0.50%	—	20.05%
1/1/2009	to	12/31/2009	8.00%	10.15%	1.80%	1.00%	—	20.95%
1/1/2010	to	6/30/2010	8.00%	10.15%	2.20%	1.50%	—	21.85%
7/1/2010	to	12/31/2010	10.50%[4]	7.65%[4]	2.20%	1.50%	—	21.85%
1/1/2011	to	12/31/2011	10.50%[4]	7.65%[4]	2.60%	2.00%	—	22.75%
1/1/2012	to	6/30/2012	10.50%[4]	7.65%[4]	3.00%	2.50%	—	23.65%
7/1/2012	to	12/31/2012	8.00%	10.15%	3.00%	2.50%	—	23.65%
1/1/2013	to	12/31/2013	8.00%	10.15%	3.40%	3.00%	—	24.55%
1/1/2014	to	12/31/2014	8.00%	10.15%	3.80%	3.50%	—	25.45%
1/1/2015	to	12/31/2015	8.00%	10.15%	4.20%	4.00%	—	26.35%
1/1/2016	to	12/31/2016	8.00%	10.15%	4.60%	4.50%	—	27.25%
1/1/2017	to	12/31/2017	8.00%	10.15%	5.00%	5.00%	—	28.15%
1/1/2018	**to**	**12/31/2018**	**8.00%**	**10.15%**	**5.00%**	**5.00%**	**2.71%**[5]	**30.86%**

1 State and School Divisions merged July 1, 1997, and separated on January 1, 2006.

2 All employer contribution rates shown since July 1, 1985, include the Health Care Trust Fund (HCTF) allocation.

3 Legislation created an annual reduction equal to 1.0 percent of salary retroactive to July 1, 1991, to be taken during May and June of 1992.

4 Senate Bills 10-146 and 11-076 required member contributions to increase by 2.50 percent and employer contributions to decrease by 2.50 percent.

5 Contributions from a nonemployer contributing entity are required by C.R.S. § 24-51-414 *et seq*. The amount allocated to the State Division has been expressed as a percentage of covered payroll for purposes of this schedule.

SCHEDULE OF CONTRIBUTION RATE HISTORY

State Troopers[1]

Years			Member Contribution Rate	Employer Contribution Rate[2]	Amortization Equalization Disbursement	Supplemental Amortization Equalization Disbursement	Nonemployer Contribution Rate	Total Contribution Rate
			Percent of Covered Payroll					
7/1/1945	to	6/30/1969	7.00%	7.00%	—	—	—	14.00%
7/1/1969	to	6/30/1970	8.00%	8.00%	—	—	—	16.00%
7/1/1970	to	6/30/1971	8.00%	9.00%	—	—	—	17.00%
7/1/1971	to	6/30/1973	8.00%	9.50%	—	—	—	17.50%
7/1/1973	to	6/30/1974	8.75%	10.50%	—	—	—	19.25%
7/1/1974	to	6/30/1975	8.75%	11.50%	—	—	—	20.25%
7/1/1975	to	8/31/1980	8.75%	11.64%	—	—	—	20.39%
9/1/1980	to	12/31/1981	8.75%	13.20%	—	—	—	21.95%
1/1/1982	to	6/30/1987	9.00%	13.20%	—	—	—	22.20%
7/1/1987	to	6/30/1988	9.00%	11.20%	—	—	—	20.20%
7/1/1988	to	6/30/1989	9.00%	13.20%	—	—	—	22.20%
7/1/1989	to	4/30/1992	12.30%	13.20%	—	—	—	25.50%
5/1/1992	to	6/30/1992	12.30%	7.20%[3]	—	—	—	19.50%
7/1/1992	to	6/30/1993	11.50%	12.20%	—	—	—	23.70%
7/1/1993	to	6/30/1997	11.50%	13.20%	—	—	—	24.70%
7/1/1997	to	6/30/1999	11.50%	13.10%	—	—	—	24.60%
7/1/1999	to	6/30/2001	10.00%	13.10%	—	—	—	23.10%
7/1/2001	to	6/30/2002	10.00%	12.60%	—	—	—	22.60%
7/1/2002	to	6/30/2003	10.00%	12.74%	—	—	—	22.74%
7/1/2003	to	12/31/2005	10.00%	12.85%	—	—	—	22.85%
1/1/2006	to	12/31/2006	10.00%	12.85%	0.50%	—	—	23.35%
1/1/2007	to	12/31/2007	10.00%	12.85%	1.00%	—	—	23.85%
1/1/2008	to	12/31/2008	10.00%	12.85%	1.40%	0.50%	—	24.75%
1/1/2009	to	12/31/2009	10.00%	12.85%	1.80%	1.00%	—	25.65%
1/1/2010	to	6/30/2010	10.00%	12.85%	2.20%	1.50%	—	26.55%
7/1/2010	to	12/31/2010	12.50%[4]	10.35%[4]	2.20%	1.50%	—	26.55%
1/1/2011	to	12/31/2011	12.50%[4]	10.35%[4]	2.60%	2.00%	—	27.45%
1/1/2012	to	6/30/2012	12.50%[4]	10.35%[4]	3.00%	2.50%	—	28.35%
7/1/2012	to	12/31/2012	10.00%	12.85%	3.00%	2.50%	—	28.35%
1/1/2013	to	12/31/2013	10.00%	12.85%	3.40%	3.00%	—	29.25%
1/1/2014	to	12/31/2014	10.00%	12.85%	3.80%	3.50%	—	30.15%
1/1/2015	to	12/31/2015	10.00%	12.85%	4.20%	4.00%	—	31.05%
1/1/2016	to	12/31/2016	10.00%	12.85%	4.60%	4.50%	—	31.95%
1/1/2017	to	12/31/2017	10.00%	12.85%	5.00%	5.00%	—	32.85%
1/1/2018	**to**	**12/31/2018**	**10.00%**	**12.85%**	**5.00%**	**5.00%**	**2.71%**[5]	**35.56%**

1 State and School Divisions merged July 1, 1997, and separated on January 1, 2006.

2 All employer contribution rates shown since July 1, 1985, include the HCTF allocation.

3 Legislation created an annual reduction equal to 1.0 percent of salary retroactive to July 1, 1991, to be taken during May and June of 1992.

4 Senate Bills 10-146 and 11-076 required member contributions to increase by 2.50 percent and employer contributions to decrease by 2.50 percent.

5 Contributions from a nonemployer contributing entity are required by C.R.S. § 24-51-414 *et seq*. The amount allocated to the State Division has been expressed as a percentage of covered payroll for purposes of this schedule.

SCHEDULE OF CONTRIBUTION RATE HISTORY

School Division[1]

Years			Member Contribution Rate	Employer Contribution Rate[2]	Amortization Equalization Disbursement	Supplemental Amortization Equalization Disbursement	Nonemployer Contribution Rate	Total Contribution Rate
			Percent of Covered Payroll					
1/1/1944	to	12/31/1949	3.50%	3.50%	—	—	—	7.00%
1/1/1950	to	6/30/1958	5.00%	5.00%	—	—	—	10.00%
7/1/1958	to	6/30/1969	6.00%	6.00%	—	—	—	12.00%
7/1/1969	to	12/31/1969	7.00%	6.00%	—	—	—	13.00%
1/1/1970	to	12/31/1970	7.00%	7.50%	—	—	—	14.50%
1/1/1971	to	12/31/1971	7.00%	8.50%	—	—	—	15.50%
1/1/1972	to	6/30/1973	7.00%	9.25%	—	—	—	16.25%
7/1/1973	to	12/31/1973	7.75%	9.25%	—	—	—	17.00%
1/1/1974	to	12/31/1974	7.75%	10.25%	—	—	—	18.00%
1/1/1975	to	12/31/1975	7.75%	11.25%	—	—	—	19.00%
1/1/1976	to	12/31/1980	7.75%	12.10%	—	—	—	19.85%
1/1/1981	to	12/31/1981	7.75%	12.50%	—	—	—	20.25%
1/1/1982	to	6/30/1987	8.00%	12.50%	—	—	—	20.50%
7/1/1987	to	6/30/1988	8.00%	11.50%	—	—	—	19.50%
7/1/1988	to	6/30/1991	8.00%	12.50%	—	—	—	20.50%
7/1/1991	to	6/30/1992	8.00%	12.20%	—	—	—	20.20%
7/1/1992	to	6/30/1997	8.00%	11.60%	—	—	—	19.60%
1/1/2006	to	12/31/2006	8.00%	10.15%	0.50%	—	—	18.65%
1/1/2007	to	12/31/2007	8.00%	10.15%	1.00%	—	—	19.15%
1/1/2008	to	12/31/2008	8.00%	10.15%	1.40%	0.50%	—	20.05%
1/1/2009	to	12/31/2009	8.00%	10.15%	1.80%	1.00%	—	20.95%
1/1/2010	to	12/31/2010	8.00%	10.15%	2.20%	1.50%	—	21.85%
1/1/2011	to	12/31/2011	8.00%	10.15%	2.60%	2.00%	—	22.75%
1/1/2012	to	12/31/2012	8.00%	10.15%	3.00%	2.50%	—	23.65%
1/1/2013	to	12/31/2013	8.00%	10.15%	3.40%	3.00%	—	24.55%
1/1/2014	to	12/31/2014	8.00%	10.15%	3.80%	3.50%	—	25.45%
1/1/2015	to	12/31/2015	8.00%	10.15%	4.20%	4.00%	—	26.35%
1/1/2016	to	12/31/2016	8.00%	10.15%	4.50%	4.50%	—	27.15%
1/1/2017	to	12/31/2017	8.00%	10.15%	4.50%	5.00%	—	27.65%
1/1/2018	**to**	**12/31/2018**	**8.00%**	**10.15%**	**4.50%**	**5.50%**	**2.64%[3]**	**30.79%**

1 State and School Divisions merged July 1, 1997, and separated on January 1, 2006.

2 All employer contribution rates shown since July 1, 1985, include the HCTF allocation.

3 Contributions from a nonemployer contributing entity are required by C.R.S. § 24-51-414 *et seq*. The amount allocated to the School Division has been expressed as a percentage of covered payroll for purposes of this schedule.

SCHEDULE OF CONTRIBUTION RATE HISTORY

State and School Division[1]

Years			Percent of Covered Payroll	
			Member Contribution Rate	Employer Contribution Rate[2]
7/1/1997	to	6/30/1998	8.00%	11.50%
7/1/1998	to	6/30/2000	8.00%	11.40%
7/1/2000	to	6/30/2001	8.00%	10.40%
7/1/2001	to	6/30/2002	8.00%	9.90%
7/1/2002	to	6/30/2003	8.00%	10.04%
7/1/2003	to	12/31/2005	8.00%	10.15%

[1] State and School Divisions merged July 1, 1997, and separated on January 1, 2006.

[2] The employer contribution rates shown include the HCTF allocation.

Local Government Division[1]

Years			Percent of Covered Payroll				
			Member Contribution Rate	Employer Contribution Rate[2]	Amortization Equalization Disbursement	Supplemental Amortization Equalization Disbursement	Total Contribution Rate
1/1/1944	to	12/31/1949	3.50%	3.50%	—	—	7.00%
1/1/1950	to	6/30/1958	5.00%	5.00%	—	—	10.00%
7/1/1958	to	6/30/1969	6.00%	6.00%	—	—	12.00%
7/1/1969	to	12/31/1969	7.00%	6.00%	—	—	13.00%
1/1/1970	to	12/31/1970	7.00%	7.00%	—	—	14.00%
1/1/1971	to	6/30/1973	7.00%	7.50%	—	—	14.50%
7/1/1973	to	12/31/1973	7.75%	7.50%	—	—	15.25%
1/1/1974	to	12/31/1974	7.75%	8.50%	—	—	16.25%
1/1/1975	to	12/31/1975	7.75%	9.50%	—	—	17.25%
1/1/1976	to	12/31/1980	7.75%	9.86%	—	—	17.61%
1/1/1981	to	12/31/1981	7.75%	10.20%	—	—	17.95%
1/1/1982	to	6/30/1991	8.00%	10.20%	—	—	18.20%
7/1/1991	to	12/31/2000	8.00%	10.00%	—	—	18.00%
1/1/2001	to	12/31/2001	8.00%	9.43%	—	—	17.43%
1/1/2002	to	12/31/2002	8.00%	9.19%	—	—	17.19%
1/1/2003	to	12/31/2003	8.00%	9.60%	—	—	17.60%
1/1/2004	to	12/31/2005	8.00%	10.00%	—	—	18.00%
1/1/2006	to	12/31/2006	8.00%	10.00%	0.50%	—	18.50%
1/1/2007	to	12/31/2007	8.00%	10.00%	1.00%	—	19.00%
1/1/2008	to	12/31/2008	8.00%	10.00%	1.40%	0.50%	19.90%
1/1/2009	to	12/31/2009	8.00%	10.00%	1.80%	1.00%	20.80%
1/1/2010	to	**12/31/2018**	**8.00%**	**10.00%**	**2.20%**	**1.50%**	**21.70%**

[1] The Local Government Division Trust Fund was the Municipal Division Trust Fund prior to January 1, 2006.

[2] All employer contribution rates shown since July 1, 1985, include the HCTF allocation.

SCHEDULE OF CONTRIBUTION RATE HISTORY

Judicial Division

Years			Member Contribution Rate	Employer Contribution Rate[1]	Amortization Equalization Disbursement	Supplemental Amortization Equalization Disbursement	Nonemployer Contribution Rate	Total Contribution Rate
			Percent of Covered Payroll					
7/1/1949	to	6/30/1957	5.00%	5.00%	—	—	—	10.00%
7/1/1957	to	6/30/1973	6.00%	12.00%	—	—	—	18.00%
7/1/1973	to	6/30/1980	7.00%	12.00%	—	—	—	19.00%
7/1/1980	to	8/30/1980	7.00%	13.00%	—	—	—	20.00%
9/1/1980	to	12/31/1981	7.00%	15.00%	—	—	—	22.00%
1/1/1982	to	6/30/1987	8.00%	15.00%	—	—	—	23.00%
7/1/1987	to	6/30/1988	8.00%	13.00%	—	—	—	21.00%
7/1/1988	to	6/30/2000	8.00%	15.00%	—	—	—	23.00%
7/1/2000	to	6/30/2001	8.00%	14.00%	—	—	—	22.00%
7/1/2001	to	6/30/2003	8.00%	11.82%	—	—	—	19.82%
7/1/2003	to	6/30/2004	8.00%	12.66%	—	—	—	20.66%
7/1/2004	to	12/31/2005	8.00%	13.66%	—	—	—	21.66%
1/1/2006	to	12/31/2006	8.00%	13.66%	0.50%	—	—	22.16%
1/1/2007	to	12/31/2007	8.00%	13.66%	1.00%	—	—	22.66%
1/1/2008	to	12/31/2008	8.00%	13.66%	1.40%	0.50%	—	23.56%
1/1/2009	to	12/31/2009	8.00%	13.66%	1.80%	1.00%	—	24.46%
1/1/2010	to	6/30/2010	8.00%	13.66%	2.20%	1.50%	—	25.36%
7/1/2010	to	6/30/2012	10.50%[2]	11.16%[2]	2.20%	1.50%	—	25.36%
7/1/2012	to	12/31/2017	8.00%	13.66%	2.20%	1.50%	—	25.36%
1/1/2018	**to**	**12/31/2018**	**8.00%**	**13.66%**	**2.20%**	**1.50%**	**2.74%[3]**	**28.10%**

[1] All employer contribution rates shown since July 1, 1985, include the HCTF allocation.

[2] Senate Bills 10-146 and 11-076 required member contributions to increase by 2.50 percent and employer contributions to decrease by 2.50 percent.

[3] Contributions from a nonemployer contributing entity are required by C.R.S. § 24-51-414 *et seq*. The amount allocated to the Judicial Division has been expressed as a percentage of covered payroll for purposes of this schedule.

SCHEDULE OF CONTRIBUTION RATE HISTORY

DPS Division[1]

Years			Member Contribution Rate	Employer Contribution Rate[2]	Amortization Equalization Disbursement	Supplemental Amortization Equalization Disbursement	Employer Contribution PCOP Offset[3]	Nonemployer Contribution Rate	Total Contribution Rate
			Percent of Covered Payroll						
1/1/2010	to	12/31/2010	8.00%	13.75%	2.20%	1.50%	(15.04%)	—	10.41%
1/1/2011	to	12/31/2011	8.00%	13.75%	2.60%	2.00%	(14.72%)	—	11.63%
1/1/2012	to	12/31/2012	8.00%	13.75%	3.00%	2.50%	(15.37%)	—	11.88%
1/1/2013	to	12/31/2013	8.00%	13.75%	3.40%	3.00%	(14.51%)	—	13.64%
1/1/2014	to	12/31/2014	8.00%	13.75%	3.80%	3.50%	(16.89%)	—	12.16%
1/1/2015	to	12/31/2015	8.00%	10.15%[4]	4.20%	4.00%	(15.97%)	—	10.38%
1/1/2016	to	12/31/2016	8.00%	10.15%	4.50%	4.50%	(15.54%)	—	11.61%
1/1/2017	to	12/31/2017	8.00%	10.15%	4.50%	5.00%	(14.56%)	—	13.09%
1/1/2018	**to**	**12/31/2018**	**8.00%**	**10.15%**	**4.50%**	**5.50%**	**(14.18%)**	**2.58%**[5]	**16.55%**

1 The DPS Division Trust Fund was established on January 1, 2010, and received the net assets of the DPSRS.

2 All employer contribution rates shown include the DPS HCTF allocation.

3 An offset to the DPS Division rate is provided for under C.R.S. § 24-51-412. See Note 4 of the Notes to the Financial Statements in the Financial Section.

4 On June 3, 2015, House Bill 15-1391 reduced the employer contribution rate with a retroactive effective date of January 1, 2015.

5 Contributions from a nonemployer contributing entity are required by C.R.S. § 24-51-414 *et seq*. The amount allocated to the DPS Division has been expressed as a percentage of covered payroll for purposes of this schedule.

SCHEDULE OF CONTRIBUTION RATE HISTORY

Employer Contributions to Health Care Trust Funds

Division/Years			Percent of Covered Payroll Allocated from Employer Contribution to Health Care Trust Funds
State Division[1]			
7/1/1985	to	6/30/1997	0.80%
1/1/2006	to	**12/31/2018**	**1.02%**
School Division[1]			
7/1/1985	to	6/30/1997	0.80%
1/1/2006	to	**12/31/2018**	**1.02%**
State and School Division[1]			
7/1/1997	to	6/30/1999	0.80%
7/1/1999	to	12/31/2000	1.10%
1/1/2001	to	12/31/2001	1.42%
1/1/2002	to	12/31/2002	1.64%
1/1/2003	to	6/30/2004	1.10%
7/1/2004	to	12/31/2005	1.02%
Local Government Division[2]			
7/1/1985	to	6/30/1999	0.80%
7/1/1999	to	12/31/2000	1.10%
1/1/2001	to	12/31/2001	1.96%
1/1/2002	to	12/31/2002	2.31%
1/1/2003	to	12/31/2003	1.69%
1/1/2004	to	6/30/2004	1.10%
7/1/2004	to	**12/31/2018**	**1.02%**
Judicial Division			
7/1/1985	to	6/30/1999	0.80%
7/1/1999	to	12/31/2000	1.10%
1/1/2001	to	12/31/2002	4.37%
1/1/2003	to	12/31/2003	3.11%
1/1/2004	to	6/30/2004	1.10%
7/1/2004	to	**12/31/2018**	**1.02%**
DPS Division[3]			
1/1/2010	to	**12/31/2018**	**1.02%**

[1] State and School Divisions merged July 1, 1997, and separated on January 1, 2006.

[2] The Local Government Division Trust Fund was the Municipal Division Trust Fund prior to January 1, 2006.

[3] The DPS HCTF was established on January 1, 2010, and received the balance of the Denver Public Schools Retiree Health Benefit Trust.

SCHEDULE OF CONTRIBUTION RATE HISTORY

Employer Contributions to MatchMaker[1]

Division/Years			Percent of Covered Payroll Available from Employer Contribution for MatchMaker (Maximum Match)
State and School Division[2]			
1/1/2001	to	12/31/2002	3.00%
1/1/2003	to	12/31/2003	2.00%
1/1/2004	to	5/31/2004	1.00%
Local Government Division[3]			
1/1/2001	to	12/31/2001	2.00%
1/1/2002	to	12/31/2002	3.00%
1/1/2003	to	12/31/2003	2.00%
1/1/2004	to	5/31/2004	1.00%
Judicial Division			
1/1/2001	to	12/31/2002	7.00%
1/1/2003	to	12/31/2003	6.00%
1/1/2004	to	5/31/2004	5.00%

1 Legislation enacted in 2004 ended MatchMaker contributions by June 1, 2004.

2 State and School Divisions merged July 1, 1997, and separated on January 1, 2006.

3 The Local Government Division Trust Fund was the Municipal Division Trust Fund prior to January 1, 2006.

PRINCIPAL PARTICIPATING EMPLOYERS

State Division Trust Fund[1,2]

Employer	2018 Covered Active Members December 31	2018 Rank	2018 Percentage of Total System	2014 Covered Active Members December 31	2014 Rank	2014 Percentage of Total System
State of Colorado	**51,113**	**1**	**92.08%**	50,508	1	91.33%

[1] Guidance under GASB 67 classifies a primary government and its component units as one employer. Due to this change, data for the number of members by employer for years prior to 2014 is not available.

[2] This employer count is presented for purposes of complying with GASB 67 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

School Division Trust Fund[1,2]

Employer	2018 Covered Active Members December 31	2018 Rank	2018 Percentage of Total System	2014 Covered Active Members December 31	2014 Rank	2014 Percentage of Total System
Jefferson County School District R-1	**12,297**	**1**	**9.73%**	12,184	1	10.19%
Douglas County School District Re 1	**9,003**	**2**	**7.13%**	8,345	2	6.98%
Cherry Creek School District 5	**8,184**	**3**	**6.48%**	7,670	3	6.41%
Adams-Arapahoe School District 28J	**5,374**	**4**	**4.25%**	5,453	4	4.56%
Adams 12 Five Star Schools	**5,242**	**5**	**4.15%**	5,261	5	4.40%
Boulder Valley School District RE2	**4,763**	**6**	**3.77%**	4,678	6	3.91%
Poudre School District R-1	**4,611**	**7**	**3.65%**	4,425	7	3.70%
St. Vrain Valley School District RE1J	**4,532**	**8**	**3.59%**	4,189	9	3.50%
Colorado Springs School District 11	**4,477**	**9**	**3.54%**	4,292	8	3.59%
Academy School District #20	**3,937**	**10**	**3.12%**	3,660	10	3.06%

[1] Guidance under GASB 67 classifies a primary government and its component units as one employer. Due to this change, data for the number of members by employer for years prior to 2014 is not available.

[2] This employer count is presented for purposes of complying with GASB 67 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

Local Government Division Trust Fund[1,2]

Employer	2018 Covered Active Members December 31	2018 Rank	2018 Percentage of Total System	2014 Covered Active Members December 31	2014 Rank	2014 Percentage of Total System
City of Colorado Springs	**3,355**	**1**	**25.30%**	3,054	1	25.27%
Boulder County	**2,143**	**2**	**16.16%**	2,067	2	17.11%
City of Boulder	**1,548**	**3**	**11.67%**	1,413	3	11.69%

[1] Guidance under GASB 67 classifies a primary government and its component units as one employer. Due to this change, data for the number of members by employer for years prior to 2014 is not available.

[2] This employer count is presented for purposes of complying with GASB 67 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

PRINCIPAL PARTICIPATING EMPLOYERS

Judicial Division Trust Fund[1,2]

	2018			2014		
Employer	Covered Active Members December 31	Rank	Percentage of Total System	Covered Active Members December 31	Rank	Percentage of Total System
Judicial Department	**316**	**1**	**95.18%**	318	1	95.21%

1 Guidance under GASB 67 classifies a primary government and its component units as one employer. Due to this change, data for the number of members by employer for years prior to 2014 is not available.

2 This employer count is presented for purposes of complying with GASB 67 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

DPS Division Trust Fund[1,2]

	2018			2014		
Employer	Covered Active Members December 31	Rank	Percentage of Total System	Covered Active Members December 31	Rank	Percentage of Total System
Denver Public School District No. 1	**16,148**	**1**	**100.00%**	15,414	1	100.00%

1 Guidance under GASB 67 classifies a primary government and its component units as one employer. Due to this change, data for the number of members by employer for years prior to 2014 is not available.

2 This employer count is presented for purposes of complying with GASB 67 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

PRINCIPAL PARTICIPATING EMPLOYERS

Health Care Trust Fund[1,2]

	2018			2017		
Employer	Covered Active Members December 31	Rank	Percentage of Total System	Covered Active Members December 31	Rank	Percentage of Total System
State of Colorado	**51,113**	**1**	**26.15%**	51,022	1	26.60%
Jefferson County School District R-1	**12,297**	**2**	**6.29%**	12,295	2	6.41%
Douglas County School District Re 1	**9,003**	**3**	**4.61%**	9,100	3	4.75%
Cherry Creek School District 5	**8,184**	**4**	**4.19%**	7,929	4	4.13%
Adams-Arapahoe School District 28J	**5,374**	**5**	**2.75%**	5,271	5	2.75%
Adams 12 Five Star Schools	**5,242**	**6**	**2.68%**	5,075	6	2.65%
Boulder Valley School District RE2	**4,763**	**7**	**2.44%**	4,763	7	2.48%
Poudre School District R-1	**4,611**	**8**	**2.36%**			
Colorado Springs School District 11				4,448	8	2.32%

1 Guidance under GASB Statement No. 74 classifies a primary government and its component units as one employer. Due to this change, data for the number of members by employer for years prior to 2017 is not available.

2 This employer count is presented for purposes of complying with GASB 74 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

DPS Health Care Trust Fund[1,2]

	2018			2017		
Employer	Covered Active Members December 31	Rank	Percentage of Total System	Covered Active Members December 31	Rank	Percentage of Total System
Denver Public School District No. 1	**16,148**	**1**	**100.00%**	15,991	1	100.00%

1 Guidance under GASB Statement No. 74 classifies a primary government and its component units as one employer. Due to this change, data for the number of members by employer for years prior to 2017 is not available.

2 This employer count is presented for purposes of complying with GASB 74 only. For all other purposes, the definition of an employer is governed by Title 24, Article 51 of the C.R.S., PERA's Rules, 8 CCR 1502-1, and, if applicable, the employer's affiliation agreement with PERA.

SCHEDULE OF AFFILIATED EMPLOYERS

State Division

Agencies and Instrumentalities

CollegeInvest
College Assist
Colorado Association of School Boards
Colorado Association of School Executives
Colorado Community College System
Colorado High School Activities Association
Colorado House of Representatives
Colorado Senate
Colorado Water Resources & Power Development Authority
Department of Agriculture
Department of Corrections
Department of Education
Department of Health Care Policy and Financing
Department of Human Services
Department of Labor and Employment
Department of Law
Department of Local Affairs
Department of Military and Veterans Affairs
Department of Natural Resources
Department of Personnel and Administration
Department of Public Health and Environment
Department of Public Safety
Department of Regulatory Agencies
Department of Revenue
Department of State
Department of the Treasury
Department of Transportation
Fire and Police Pension Association
Joint Budget Committee
Judicial Department
Legislative Council
Office of the District Attorneys
Office of Economic Development and International Trade
Office of the Governor
Office of Information Technology
Office of Legislative Legal Services
Office of the Lieutenant Governor
Office of the State Auditor
Pinnacol Assurance
Public Employees' Retirement Association of Colorado
School for the Deaf and the Blind
Special District Association of Colorado
State Historical Society

Institutions of Higher Education

Adams State University
Aims Community College
Arapahoe Community College
Auraria Higher Education Center
Aurora Community College
Colorado Mesa University
Colorado Mountain College
Colorado Northwestern Community College
Colorado School of Mines
Colorado State University
Colorado State University at Pueblo
Commission on Higher Education
Denver Community College
Fort Lewis College
Front Range Community College
Lamar Community College
Metropolitan State University of Denver
Morgan Community College
Northeastern Junior College
Otero Junior College
Pikes Peak Community College
Pueblo Vocational Community College
Red Rocks Community College
State Board for Community Colleges and Occupational Education
Trinidad State Junior College
University of Colorado
University of Northern Colorado
Western State Colorado University

SCHEDULE OF AFFILIATED EMPLOYERS

School Division[1]

Adams County

Adams 12 Five Star Schools
Adams County School District 14
Bennett School District 29J
Brighton School District 27J
Mapleton School District 1
Strasburg School District 31J
Westminster Public Schools

Alamosa County

Alamosa County School District Re-11J
Sangre de Cristo School District Re-22J

Arapahoe County

Adams-Arapahoe School District 28J
Byers School District 32J
Cherry Creek School District 5
Deer Trail School District 26J
Englewood School District 1
Littleton School District 6
Sheridan School District 2

Archuleta County

Archuleta County School District 50 Jt

Baca County

Campo School District RE-6
Pritchett School District RE-3
Springfield School District RE-4
Vilas School District RE-5
Walsh School District RE-1

Bent County

Las Animas School District RE-1
McClave School District RE-2

Boulder County

Boulder Valley School District RE2
St. Vrain Valley School District RE1J

Chaffee County

Buena Vista School District R-31
Salida School District R-32(J)

Cheyenne County

Cheyenne County School District Re-5
Kit Carson School District R-1

Clear Creek County

Clear Creek School District RE-1

Conejos County

North Conejos School District RE1J
Sanford School District 6J
South Conejos School District RE 10

Costilla County

Centennial School District R-1
Sierra Grande School District R-30

Crowley County

Crowley County School District RE-1

Custer County

Custer County Consolidated School District C-1

Delta County

Delta County School District 50(J)

Dolores County

Dolores County School District Re No. 2

Douglas County

Douglas County School District Re 1

Eagle County

Eagle County School District Re 50

Elbert County

Agate School District 300
Big Sandy School District 100J
Elbert School District 200
Elizabeth School District C-1
Kiowa School District C-2

El Paso County

Academy School District #20
Calhan School District RJ1
Cheyenne Mountain School District 12
Colorado Springs School District 11
Edison School District 54 Jt
Ellicott School District 22
Falcon School District 49
Fountain School District 8
Hanover School District 28
Harrison School District 2
Lewis-Palmer School District 38
Manitou Springs School District 14
Miami/Yoder School District 60 Jt
Peyton School District 23 Jt
Widefield School District 3

[1] The list of employers in the School Division does not include charter schools operating within the respective public school districts and under the Colorado Charter School Institute.

SCHEDULE OF AFFILIATED EMPLOYERS

School Division[1] (continued)

Fremont County
Canon City School District Re-1
Cotopaxi School District Re-3
Florence School District Re-2

Garfield County
Garfield School District 16
Garfield School District Re-2
Roaring Fork School District Re-1

Gilpin County
Gilpin County School District Re-1

Grand County
East Grand School District 2
West Grand School District 1

Gunnison County
Gunnison Watershed School District Re1J

Hinsdale County
Hinsdale County School District Re-1

Huerfano County
Huerfano School District Re-1
La Veta School District Re-2

Jackson County
North Park School District R-1

Jefferson County
Jefferson County School District R-1

Kiowa County
Kiowa County School District RE-1
Plainview School District Re-2

Kit Carson County
Arriba-Flagler Consolidated School District No. 20
Bethune School District R-5
Burlington School District Re-6J
Hi-Plains School District R-23
Stratton School District R-4

Lake County
Lake County School District R-1

La Plata County
Bayfield School District 10Jt-R
Durango School District 9-R
Ignacio School District 11 Jt

Larimer County
Estes Park School District
Poudre School District R-1
Thompson School District R-2J

Las Animas County
Aguilar Reorganized School District 6
Branson Reorganized School District 82
Hoehne Reorganized School District 3
Kim Reorganized School District 88
Primero Reorganized School District 2
Trinidad School District 1

Lincoln County
Genoa/Hugo School District C-113
Karval School District Re 23
Limon School District Re 4J

Logan County
Buffalo School District Re-4
Frenchman School District Re-3
Plateau School District Re-5
Valley School District Re-1

Mesa County
De Beque School District 49 Jt
Mesa County Valley School District 51
Plateau Valley School District 50

Mineral County
Creede Consolidated School District 1

Moffat County
Hayden School District Re 1
Moffat County School District Re No. 1

Montezuma County
Dolores School District RE 4A
Mancos School District Re-6
Montezuma-Cortez School District Re 1

Montrose County
Montrose County School District Re-1J
West End School District Re-2

[1] The list of employers in the School Division does not include charter schools operating within the respective public school districts and under the Colorado Charter School Institute.

SCHEDULE OF AFFILIATED EMPLOYERS

School Division[1] (continued)

Morgan County

Brush School District Re-2 (J)
Fort Morgan School District Re-3
Weldon Valley School District Re-20 (J)
Wiggins School District Re-50 (J)

Otero County

Cheraw School District 31
East Otero School District R1
Fowler School District R4J
Manzanola School District 3J
Rocky Ford School District R2
Swink School District 33

Ouray County

Ouray School District R-1
Ridgway School District R-2

Park County

Park County School District Re-2
Platte Canyon School District 1

Phillips County

Haxtun School District Re-2J
Holyoke School District Re-1J

Pitkin County

Aspen School District 1

Prowers County

Granada School District Re-1
Holly School District Re-3
Lamar School District Re-2
Wiley School District Re-13 Jt

Pueblo County

Pueblo City School District 60
Pueblo County Rural School District 70

Rio Blanco County

Meeker School District RE1
Rangely School District RE4

Rio Grande County

Del Norte School District C-7
Monte Vista School District C-8
Sargent School District Re-33J

Routt County

South Routt School District Re 3
Steamboat Springs School District Re 2

Saguache County

Center Consolidated School District 26 Jt
Moffat School District 2
Mountain Valley School District Re 1

San Juan County

Silverton School District 1

San Miguel County

Norwood School District R-2J
Telluride School District R-1

Sedgwick County

Julesburg School District Re 1
Revere School District

Summit County

Summit School District Re 1

Teller County

Cripple Creek-Victor School District Re-1
Woodland Park School District RE-2

Washington County

Akron School District R-1
Arickaree School District R-2
Lone Star School District 101
Otis School District R-3
Woodlin School District R-104

Weld County

Ault-Highland School District Re-9
Briggsdale School District Re-10
Eaton School District Re-2
Greeley School District 6
Johnstown-Milliken School District Re-5J
Keenesburg School District Re-3
Pawnee School District Re-12
Platte Valley School District Re-7
Prairie School District Re-11
Weld County School District RE-1
Weld School District Re-8
Windsor School District Re-4

[1] The list of employers in the School Division does not include charter schools operating within the respective public school districts and under the Colorado Charter School Institute.

SCHEDULE OF AFFILIATED EMPLOYERS

School Division[1] (continued)

Yuma County

Idalia School District RJ-3
Liberty School District J-4
Wray School District RD-2
Yuma School District 1

Boards of Cooperative Educational Services (BOCES)

Adams County BOCES
Centennial BOCES
Colorado Digital BOCES
Colorado River BOCES
East Central BOCES
Expeditionary Learning School BOCES
Grand Valley BOCES
Mt. Evans BOCES
Mountain BOCES
Northeast BOCES
Northwest Colorado BOCES
Pikes Peak BOCES
Rio Blanco BOCES
San Juan BOCES
San Luis Valley BOCES
Santa Fe Trail BOCES
South Central BOCES
Southeastern BOCES
Uncompahgre BOCES
Ute Pass BOCES

Vocational Schools

Technical College of the Rockies

Other

Colorado Consortium for Earth and Space Science Education

[1] The list of employers in the School Division does not include charter schools operating within the respective public school districts and under the Colorado Charter School Institute.

SCHEDULE OF AFFILIATED EMPLOYERS

Local Government Division

Adams and Jefferson County Hazardous Response Authority
Alamosa Housing Authority
Arapahoe Park and Recreation District
Aurora Housing Authority
Baca Grande Water & Sanitation District
Beulah Water Works District
Black Hawk-Central City Sanitation District
Blanca-Fort Garland Metropolitan District
Boulder County
Boulder County Public Trustee's Office
Boxelder Sanitation District
Brush Housing Authority
Carbon Valley Park & Recreation District
Castle Pines Metropolitan District
Castle Pines North Metropolitan District
Center Housing Authority
Central Colorado Water Conservancy District
Cheyenne Wells Housing Authority
City of Alamosa
City of Boulder
City of Castle Pines
City of Colorado Springs
City of Fort Morgan
City of Las Animas
City of Lone Tree
City of Manitou Springs
City of Pueblo
City of Wray
City of Yuma
Clearview Library District
Collbran Conservancy District
Colorado District Attorneys' Council
Colorado First Conservation District
Colorado Health Facilities Authority
Colorado Housing and Finance Authority
Colorado Library Consortium
Colorado River Fire Protection District
Colorado School District Self Insurance Pool
Colorado Springs Utilities
Columbine Knolls-Grove Metropolitan Recreation District
Costilla Housing Authority
County Technical Services, Inc.
Cucharas Sanitation & Water District
Douglas County Housing Partnership
Douglas County Libraries
Durango Fire Protection District
East Cheyenne Groundwater Management District
East Larimer County Water District
Eastern Rio Blanco Metropolitan Recreation & Park District
Eaton Housing Authority
Elbert County Library District
Elizabeth Park and Recreation District
El Paso-Teller County Emergency Telephone Service Authority
Estes Park Housing Authority
Estes Park Local Marketing District
Estes Valley Fire Protection District
Estes Valley Public Library District
Forest Lakes Metropolitan District
Fremont Conservation District
Fremont Sanitation District
Garfield County Housing Authority
Grand Junction Regional Airport Authority
Grand Valley Fire Protection District
Green Mountain Water and Sanitation District
GVR Metropolitan District
Housing Authority of the City of Boulder
Housing Authority of the City of Colorado Springs
Housing Authority of the County of Adams
Housing Authority of the Town of Limon
Lamar Housing Authority
Lamar Utilities Board
Left Hand Water District
Longmont Housing Authority
Longs Peak Water District
Louisville Fire Protection District
Meeker Cemetery District
Meeker Regional Library District
Meeker Sanitation District
Montrose Fire Protection District
Montrose Recreation District
Monument Sanitation District
Morgan Conservation District
Morgan County Quality Water District
Mountain View Fire Protection District
Mountain Water and Sanitation District
Niwot Sanitation District
North Carter Lake Water District
North Chaffee County Regional Library
North Front Range Water Quality Planning Association
Northeast Colorado Health Department
Northeastern Colorado Association of Local Governments
Park Center Water District
Pikes Peak Regional Building Department
Pine Drive Water District
Plum Creek Water Reclamation Authority
Pueblo City-County Health Department
Pueblo Library District
Pueblo Transit Authority
Pueblo Urban Renewal Authority
Rampart Regional Library District
Rangely Regional Library District
Red Feather Mountain Library District
Red, White & Blue Fire Protection District
Republican River Water Conservation District
Rio Blanco Fire Protection District
Rio Blanco Water Conservancy District
Routt County Conservation District
Sable-Altura Fire Protection District
San Luis Valley Development Resources Group
San Luis Valley Water Conservancy District
San Miguel County Public Library

SCHEDULE OF AFFILIATED EMPLOYERS

Local Government Division (continued)

San Miguel Regional and Telluride Housing Authority
Scientific and Cultural Facilities District
Sheridan Sanitation District #1
Soldier Canyon Water Treatment Authority
Statewide Internet Portal Authority
Steamboat II Water and Sanitation District
Strasburg Metropolitan Parks & Recreation District
St. Vrain Sanitation District
Tabernash Meadows Water and Sanitation District
Town of Alma
Town of Bayfield
Town of Crawford
Town of Dinosaur
Town of Eckley
Town of Estes Park
Town of Firestone
Town of Lake City
Town of Lochbuie
Town of Mountain Village
Town of Platteville
Town of Rico
Town of Rye
Town of Seibert
Town of Silver Plume
Town of Timnath
Tri-County Health Department
Tri-Lakes Wastewater Treatment Facility
Unison Housing Partners
Upper Colorado Environmental Plant Center
Upper Thompson Sanitation District
Washington-Yuma Counties Combined Communications Center
Weld County Department of Public Health and Environment
West Greeley Conservation District
Western Rio Blanco Metropolitan Recreation and Park District
White River Conservation District
Wray Housing Authority
Yuma Housing Authority

SCHEDULE OF AFFILIATED EMPLOYERS

Judicial Division

1st-22nd District Court
Adams County Court
Alamosa County Court
Arapahoe County Court
Archuleta County Court
Baca County Court
Bent County Court
Boulder County Court
Broomfield County Court
Chaffee County Court
Cheyenne County Court
Clear Creek County Court
Conejos County Court
Costilla County Court
Court of Appeals
Crowley County Court
Custer County Court
Delta County Court
Denver County Court
Denver Juvenile Court
Denver Probate Court
Dolores County Court
Douglas County Court
Eagle County Court
Elbert County Court
El Paso County Court
Fremont County Court
Garfield County Court
Gilpin County Court
Grand County Court
Gunnison County Court
Hinsdale County Court
Huerfano County Court
Jackson County Court
Jefferson County Court
Kiowa County Court
Kit Carson County Court
Lake County Court
La Plata County Court
Larimer County Court
Las Animas County Court
Lincoln County Court
Logan County Court
Mesa County Court
Mineral County Court
Moffat County Court
Montezuma County Court
Montrose County Court
Morgan County Court
Otero County Court
Ouray County Court
Park County Court
Phillips County Court
Pitkin County Court
Prowers County Court
Pueblo County Court
Rio Blanco County Court
Rio Grande County Court
Routt County Court
Saguache County Court
San Juan County Court
San Miguel County Court
Sedgwick County Court
Summit County Court
Supreme Court
Teller County Court
Washington County Court
Weld County Court
Yuma County Court

DPS Division[1]

Denver Public School District No. 1

1 The list of employers in the DPS Division does not include charter schools operating within the Denver Public Schools school district.

COLORADO PERA®

COMMONLY USED ACRONYMS

AAL	Actuarial Accrued Liability
AAP	Automatic Adjustment Provision
ADC	Actuarially Determined Contribution
AED	Amortization Equalization Disbursement
AI	Annual Increase
AIR	Annual Increase Reserve
ARC	Annual Required Contribution
ASOPs	Actuarial Standards of Practice
CBI	Colorado Bureau of Investigation
CMBS	Commercial Mortgage-Backed Securities
CMC	Cavanaugh Macdonald Consulting, LLC
CMS	Centers for Medicare & Medicaid Services
CPI-W	Consumer Price Index for Urban Wage Earners and Clerical Workers
C.R.S.	Colorado Revised Statutes
DB	Defined Benefit
DC	Defined Contribution
DC Plan	Defined Contribution Retirement Plan
DPS	Denver Public Schools
DPS HCTF	Denver Public Schools Health Care Trust Fund
DPSRS	Denver Public Schools Retirement System
EAN	Entry Age Normal
EGWP	Employer Group Waiver Plan
FNP	Fiduciary Net Position
GASB	Governmental Accounting Standards Board
HAS	Highest Average Salary
HB	House Bill
HCTF	Health Care Trust Fund
IRC	Internal Revenue Code
MBS	Mortgage-Backed Securities
MD&A	Management's Discussion and Analysis
NAV	Net Asset Value
NOL	Net OPEB Liability
NPL	Net Pension Liability
OPEB	Other Postemployment Benefit
PCOP	Pension Certificates of Participation
RDS	Retiree Drug Subsidy
REITs	Real Estate Investment Trusts
RSI	Required Supplementary Information
SAED	Supplemental Amortization Equalization Disbursement
SB	Senate Bill
SEIR	Single Equivalent Interest Rate
SRI	Socially Responsible Investment
TIPS	Treasury Inflation Protected Securities
TOL	Total OPEB Liability
TPL	Total Pension Liability
UAAL	Unfunded Actuarial Accrued Liability

Public Employees' Retirement Association of Colorado
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Denver, Colorado 80203
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5/20 (REV 6-19)