Public Employees' Retirement Association of Colorado

Actuarial Audit of December 31, 2021 Actuarial Valuations

November 18, 2022 Board of Trustees Meeting

Mike Ribble, FSA, EA, MAAA, FCA
Kevin Penderghest, ASA, MAAA, FCA
David Driscoll, FSA, EA, MAAA, FCA

Agenda

- Introductions
- Overview of Actuarial Audit
  - Plans Covered
  - Scope of Review
  - Audit Process
- Key Findings
- Key Recommendations
- Key Takeaways

Introductions

Mike Ribble
FSA, EA, MAAA, FCA
Principal, Consulting Actuary,
Wealth

Kevin Penderghest
ASA, MAAA, FCA
Director, Consulting Actuary
Health

David Driscoll
FSA, EA, MAAA, FCA
Principal, Consulting Actuary,
National Public Consulting Leader

Overview of Actuarial Audit

Plans Covered

- State Division Trust Fund
- School Division Trust Fund
- Local Government Division Trust Fund
- Judicial Division Trust Fund
- Denver Public Schools Division Trust Fund
- Health Care Trust Fund
- Denver Public Schools Health Care Trust Fund

Scope of Review

The scope of this actuarial audit includes the following elements from the December 31, 2021, actuarial valuation reports:

- Review of **actuarial assumptions and methods** used, including:
  - Economic and demographic assumptions
  - Actuarial cost, asset valuation and amortization methods
- Review of **census data process** with respect to:
  - Continuity from PERA-provided census data to final edited data used by the Board’s actuary Segal
  - Proper tracking of members from 2020 to 2021
  - Inclusion of sufficient data summaries and statistics

Scope of Review

(Continued)

- Replication of the **actuarial liabilities and valuation results** on a “closed group” basis, including:
  - Present Value of Future Benefits, Actuarial Accrued Liability and Normal Cost Rates
  - Actuarial Value of Assets
  - Actuarially Determined Contribution Rates
  - Effective Amortization Period based on current sources of income
  - Automatic Adjustment Provision (AAP) assessment, pursuant to SB 18-200
- Replication of the most recent funding **actuarial projections** on an “open-group” basis, including new entrant and other additional projection assumptions
- Review of recent **actuarial communications**
  - Including actuarial valuation report and 2020 experience study

Audit Process

- Review actuarial assumptions and methods
  - Are they reasonable?
  - Are they substantiated sufficiently in the 2020 experience studies?
  - Does the assumption make the appropriate adjustments for recent experience?
- Review census data
  - Does Segal data tie to the data provided by PERA?
  - Does Segal make appropriate assumptions for missing/unavailable information?
- Replicate liabilities
  - Are benefits valued consistently with administration and statutes?
- Replicate valuation results
- Replicate projections
- Review actuarial communications

Audit Process

Actuarial Assumptions and Methods

Census Data

Actuarial Liabilities

Actuarial Valuation Results

Actuarial Projections

Actuarial Communications

Key Findings

Key Findings – Division Trust Funds

- Actuarial assumptions and methods are reasonable for the purpose of the measurement
  - Methodology used to assess reasonability of economic and demographic assumptions comply with guidance provided in applicable Actuarial Standards of Practice (ASOPs), although we recommend closer examination of termination and retirement assumptions in the next experience study
  - Based on our analysis, assumed long-term rate of investment return is reasonable, although we recommend continued monitoring given current economic environment
  - Actuarial methods used in the valuation comply with applicable ASOPs
  - Additional assumptions used for open-group projections, including future new member growth, are reasonable
- Final edited census data is reasonable and valid for use in the December 31, 2021, valuations, and consistent with member counts included in the report
- Buck was able to replicate liabilities of the valuation within reasonable tolerance levels
  - Present value of future benefits within 1% for all five divisions
  - Actuarial accrued liabilities within 2% for each division in aggregate and within 3% by member status
  - Total normal cost within 2% for each division

Key Findings – Division Trust Funds

(Continued)

- Buck was able to replicate key valuation results of the valuation within reasonable tolerance levels
  - Market value of assets, actual cash flows and actuarial value of assets matched for each division
  - Actuarially determined contribution rates within 0.7% of pay for each division
  - Effective amortization period based on current sources of income within 2 years for each division
  - Automatic Adjustment Provision (AAP) assessment, pursuant to SB 18-200, within 2%
- Buck was able to replicate 40-year actuarial projections within a reasonable tolerance level
  - Projected years until 100% funded matched for all five divisions
  - Projected trend of funded ratio over time was consistent between projections modeled by Buck and Segal
- In our review of actuarial communications, we found:
  - Actuarial process followed is thorough, complete and complies with applicable ASOPs and U.S. Qualification Standards (USQs) of the American Academy of Actuaries
    - Key assumptions were properly summarized, although we made several recommendations for more accurate and transparent disclosure of certain assumptions
    - We have also made a few recommendations regarding ASOPs and USQs

Key Findings – Health Care Trust Funds

- Overall, we believe the data, methods, and assumptions used in the valuation of the Health Care Trust Funds (HCTF) are reasonable and appropriate, and in compliance with relevant ASOPs
  - The report does not comment on the ASOP No. 6 Practice Note released in March 2021
  - Practice notes are non-binding guidance
- Overall, we believe the Experience Study performed in 2020 was reasonable
  - Disclosure of the exposures included in the observation period for each assumption would assist in assessment of the actuary's recommendations
- Our replication of liabilities was within our tolerance level for the present value of future benefits, the actuarial accrued liability, and normal cost
  - We were not able to match as closely by benefit type as retirements are assumed to occur at the beginning of the year
    - Inconsistent with timing of other assumptions for the HCTF valuations
    - Inconsistent with timing of assumptions used in the pension valuations
- Our replication of key results of the valuation was within reasonable tolerance levels
  - Actuarial value of assets and effective amortization period matched for each division
  - Actuarially determined contribution rates within 0.02% of pay for each division
  - Projected years until 100% funded matched within one year for each division

Key Recommendations

Key Recommendations

Long Story Short…

- Based on our review, Segal has been performing sound actuarial work, without material errors and in compliance with applicable Actuarial Standards of Practice
- Buck's recommendations mainly focus on adding clarity, improving thoroughness, and ensuring that the plan experience is appropriately reflected in the setting and description of plan assumptions
- We have included in this presentation the key recommendations from the audit. Please refer to our actuarial audit report for the full list of our recommendations

- **Actuarial results from the 2021 annual valuations for Colorado PERA are reasonable**
- **Recommendations made in effort to refine calculations and make clarifications in future reports**

Key Recommendations

Actuarial Assumptions: Long-Term Rate of Investment Return

- Segal reviewed historical investment returns of the funds over the past 5, 10, 15, 20, and 30 years
  - Also reviewed composite 20-year return based on target allocation and 20-year Capital Market Assumptions provided in the Horizon Survey of Capital Market Assumptions (2020 edition)
  - Also cited a study of PERA's investments conducted by Aon in September 2019, which determined that the 7.25% investment return assumption was achievable
- Buck used tools from our Financial Risk Management (FRM) practice and the 2021 policy benchmark weight and long-term asset allocation target of the Funds effective January 1, 2020
  - Buck reviewed percentiles generated by the tool based on averages over 20- and 30-year periods
- Buck's analysis indicated the current assumption of 7.25% is near the top of the range we would consider to be reasonable
  - Current economic environment continues to put downward pressure on investment returns
  - We recommend commentary on the continued reasonability of the long-term rate of return assumption be included in future actuarial valuation reports

Recommendation: Continue to monitor the assumed long-term rate of investment return assumption

Key Recommendations

Actuarial Assumptions: Rates of Termination of Employment

- Proposed rates of termination in the 2020 experience study, except for the DPS Division (PERA Benefit Structure), were weighted two-thirds based on current assumption (i.e., previous experience studies) and one-third based on recent experience (i.e., the period under examination for the 2020 experience study)

Recommendation: Consider giving more weight to recent termination of employment experience in future experience studies

- — Especially true for larger divisions with more credibility in number of data observations
- — Assuming more members terminate employment prior to retirement eligibility when actual experience results in a higher number of members reaching retirement eligibility would result in actuarial losses in future valuations

Key Recommendations

Actuarial Assumptions: Rates of Retirement

- Segal analyzed experience for three groups: those eligible for a reduced benefit, those eligible for an unreduced benefit in the first year only, and those eligible for an unreduced benefit in all other years
  - We noted that reduced retirement rates at age 59 are relatively high and are higher than rates shown at the same age for unreduced retirement
  - Age and service rounding issues could incorrectly place a member who left active service in the wrong benefit eligibility category (e.g., reduced retirement vs. unreduced retirement, non-vested termination vs. vested termination)

Recommendation: Review categorizations of reduced and unreduced retirement for accuracy

  - For example, careful review of age rounding methodology may result in more observed unreduced retirements
  - Assuming more members retire with eligibility for a reduced benefit when actual experience results in a higher number of members retiring with eligibility for an unreduced benefit would result in actuarial losses in future valuations
  - The next experience study should also account for the past few years of experience, with adjustments for the “great resignation” as applicable, especially with respect to salary increase, termination of employment and retirement assumptions

Key Recommendations

Actuarial Assumptions: Per Capita Costs

- The current approach of only valuing the PERA/DPS subsidies is reasonable for most participants, as any costs beyond these subsidies to purchase coverage will be paid by retirees.
- For pre-Medicare coverage it is our understanding that premiums are set to include the entire cost of coverage, such that no implicit subsidy exists. There is no documentation in the report providing justification for this methodology.
- For enrollees where a per capita cost assumption is needed, we believe using 2022 premiums as a basis for these costs is appropriate.
- The Actuarial Standard of Practice (ASOP) No. 6 Practice Note released in March 2021 expands benefits that do not need to be age-adjusted to include Medicare Advantage, MA-PD, and stand-alone Medicare prescription drug plans. Currently aging is still reflected for MA-PD benefits, but the report does not include justification for this assumption or any discussion of this Note.

Recommendation: Document the justification for not reflecting age-related implicit subsidy for pre-Medicare coverage, and discuss age morbidity assumption within the context of the ASOP 6 Practice Note

Key Recommendations

Actuarial Assumptions: Health Care Participation

- Participation rates have decreased based on the experience study. Given the subsidy provided is not expected to increase over time, while premiums are expected to increase with healthcare cost trend, this decrease is reasonable and expected to continue over time

Recommendation: Consider implementing a persistency assumption if the experience supports this to reflect expected lower participation over time

- Subsidies for the retiree health plan are based on years of service completed, which indicates participation is correlated to years of service

Recommendation: Consider tying participation assumption to years of service instead of age at retirement

- Medicare Advantage premiums decreased significantly in 2022 in conjunction with the change in plan carrier and cost sharing provisions. This decrease in premiums will likely impact participation in the plans for future retirees as the employer subsidy will now cover a larger percentage of the plan premium

Recommendation: Consider adopting an increased initial participation assumption, and revisit assumption on annual basis if premium renewals are significantly higher or lower than expected

Key Recommendations

Actuarial Methods: Amortization Period

- For the amortization of unfunded actuarial accrued liability (UAAL) used in the Division Trust Fund valuations to calculate the Actuarially Determined Contribution (ADC) Rates, we note the following:
  - Method utilizes 30-year amortization period for most bases and 3% assumed payroll growth assumption, which results in a negative amortization pattern -- i.e., the UAAL continues to grow for the first few years of the amortization period
- Upcoming updates to ASOP 4 effective on or after February 15, 2023
  - Indicates one factor the actuary should consider in selecting a method is the anticipated pattern of the payments, including the length of time until payments exceed interest on the outstanding balance
  - Requires assessment of whether the UAAL is expected to be fully amortized and selection of a method that will fully amortize the UAAL within a reasonable time period (or reduce by a reasonable amount within a sufficiently short period)
  - Requires the actuary to make a statement regarding whether the UAAL is not expected to be fully amortized

Recommendation: Continue to monitor the movement of the unfunded actuarial accrued liability of each division

- Review whether expected amortization payments are expected to fully amortize the UAAL within a reasonable period
- Monitor against policy objectives, reviewing the amount and duration of negative amortization occurring in each division

* Conference of Consulting Actuaries' Public Plans Community (CCA PPC)

Key Recommendations

Census Data

- For the Division Trust Funds, while many survivors are tracked under a retiree record with a separate field identifying that the original retiree is deceased, not all survivors are tracked in this manner
  - All survivors in the valuation data process should be tracked separately as beneficiaries
- Division Trust Funds valuation report should include additional data disclosures, most significantly:
  - Summaries of retirees, beneficiaries, and disabled census data and liability information separately rather than solely in the aggregate
  - More detailed summaries for terminated vested and terminated non-vested members
- For the Health Care Trust Funds, investigate records listed in the source data but also as Defined Contribution participants
  - 75 were excluded as of the last valuation, but it may be appropriate to include these individuals as they may be eligible for benefits from prior employment
- Health Care Trust Funds Valuation report should include additional data disclosures, most significantly:
  - Average age and service for the active population, including an age/service scatter (in 5-year increments)
  - Active counts by division
  - Average age and service for deferred vested participants
  - Inactive counts by age (in 5-year increments)

Recommendation: Expand the tracking and disclosure of membership data and liabilities

Key Recommendations

Actuarial Liabilities

Recommendation: Review valuation of post-termination death benefits for the Division Trust Funds

- Valuation of post-termination death benefits for active and deferred vested members should be reviewed to ensure coding is consistent and in accordance with plan provisions

Recommendation: Review assumptions applied to Local Government Division State Troopers

- Buck calculated an average expected remaining service life of 15.63 years, while Segal's report indicated 8.22 years
- Segal noted assumptions for Local Government Non-Troopers were applied to 29 members of Local Government Troopers group

Recommendation: Review timing of application of decrement assumptions for Health Care Trust Funds

- In the HCTF valuations, all decrements are being applied at mid-year except for the retirement assumption, which is applied at beginning of the year. This is also inconsistent with the pension valuations, in which all decrements are applied at mid-year
- Segal noted mid-year retirement application of the retirement decrement is appropriate for the HCTF valuations

Recommendation: Review Medicare assumptions for disabled participants

- The percentage of disabled participants hired before April 1, 1986, who are assumed to qualify for premium-free Medicare Part A was updated from 90% to 95% based on the 2020 experience study, but the 90% assumption was still being used
- Segal noted that the next valuation will be updated to reflect the 95% assumption

Key Recommendations

Actuarial Communications

We recommend future valuation reports be enhanced as follows:

- Provide demographic summaries of new entrant profiles used in the open-group projections
- Add a description for post-termination death benefits prior to retirement to the plan provisions section of the report
- Review Buck recommendations for more accurate and transparent disclosure of certain assumptions for the Division Trust Funds
- Add a statement that the actuaries who have performed the valuations meet the Qualification Standards “to render the statements of actuarial opinion presented in the report”
- Add a statement that the actuaries are available to answer questions about the information contained in the report
- Add a statement that the analysis of the potential range of future differences in actuarial measurements is beyond the scope of the valuation

Key Takeaways

Key Takeaways

- Based on our review, Segal has been performing sound actuarial work, without material errors and in compliance with applicable Actuarial Standards of Practice
- Actuarial assumptions and methods are reasonable and appropriate for the purpose under each applicable ASOP
- The census data process is replicable and appropriately reflects plan member statuses and data
- Actuarial results including actuarial accrued liabilities, actuarial value of assets, normal cost, effective amortization period, and Automatic Adjustment Provision were closely matched within a reasonable tolerance and without material issues identified.
- Actuarial projections were closely matched and trend to 100% funding over a reasonable period
- It is not anticipated that the recommendations made in our audit report would have a significant impact on the actuarial liabilities and related results.

- **Actuarial results from the 2021 annual valuations for Colorado PERA are reasonable**
- **Recommendations made in effort to refine calculations and make clarifications in future reports**

Questions?

Certification

Future actuarial measurements may differ significantly from current measurements due to plan experience differing from that anticipated by the economic and demographic assumptions, changes expected as part of the natural operation of the methodology used for these measurements, and changes in plan provisions, applicable law, or regulations. An analysis of the potential range of such future differences is beyond the scope of this actuarial audit.

The results in this presentation were developed for the Public Employees' Retirement Association of Colorado by Buck using generally accepted actuarial principles and techniques in accordance with all applicable Actuarial Standards of Practice (ASOPs). The purpose of this presentation is to provide to the board a summary of the actuarial audit results for discussion during the board meeting attended by the actuaries. Use of this presentation for any other purpose may not be appropriate and may result in mistaken conclusions due to failure to understand applicable assumptions, methodologies, or inapplicability of the presentation for that purpose. Because of the risk of misinterpretation of actuarial results, you should ask Buck to review any statement you wish to make based on the results contained in this presentation. Buck will not accept any liability for any such statement made without prior review. Interested parties may refer to the full actuarial audit report for a detailed explanation regarding data, methods, techniques, results and recommendations as well as applicable ASOP disclosures including our use of models per ASOP 56.

David Driscoll and Michael Ribble meet the Qualification Standards of the American Academy of Actuaries in the retirement practice area, and Kevin Penderghest meets the Qualification Standards of the American Academy of Actuaries in the health practice area. Together, we meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained in this presentation. This presentation has been prepared in accordance with all applicable Actuarial Standards of Practice, and we are available to answer questions about it.

David L. Driscoll, FSA, EA, MAAA, FCA

Michael A. Ribble, FSA, EA, MAAA, FCA

Kevin Penderghest, ASA, MAAA, FCA

Appendix

Data and Documents Received from Colorado PERA

- Preliminary census data (“raw data”), as provided by Colorado PERA to Segal for the 2021 actuarial valuation for all five Division Trust Funds and two Health Care Trust Funds
- Correspondence between Segal and Colorado PERA regarding any questions about the 2021 raw data
- December 31, 2020 and December 31, 2021 actuarial valuation reports
- Actuarial experience studies covering the period January 1, 2016, through December 31, 2019, as reported by Segal in October 2020 for the Division Trust Funds and November 2020 for the Health Care Trust Funds (collectively, referred to as the “2020 experience study”)
- Sample benefit calculations for reduced and unreduced retirement, disability and disability recalculation adjustments, and survivor benefits

Data and Documents Received from Colorado PERA

(Continued)

- December 31, 2021 asset information, including a reconciliation of cash flows from the 2020 actuarial valuations
- Documents with respect to rules and regulations:
  - Colorado PERA Law including legislation enacted in 2021
  - Colorado PERA Rules effective January 1, 2022
  - Enacted legislation passed during 2022 that impacted the funds
- Other miscellaneous supporting documents and information as obtained by email or conference calls

Data and Documents Received from Segal

- Final census data (“final edited data”) as used in the 2021 actuarial valuation and 40-year projections for all five Division Trust Funds and two Health Care Trust Funds
- New entrant profiles for all five Division Trust Funds and a description of the methodology used to develop the new entrant profiles for the two Health Care Trust Funds
- Complete decrement tables from Segal, including all assumed rates of retirement, withdrawal, disablement, and salary increase
- Present Value of Future Benefit, Accrued Liability, and Normal Cost by status as well as by decrement
- Individual sample lives as requested, with liabilities by decrement for active participants
- Responses to Buck questions with respect to the actuarial audit obtained by email or conference calls

Overview of Results

Review of Actuarial Liabilities

Process and Results

- In our parallel valuation and review, we compared present values of future benefits, actuarial accrued liabilities, and total normal costs for each Division Trust Fund and Health Care Trust Fund
  - We independently generated these actuarial liabilities for comparison to aggregate results published in the actuarial valuation reports
  - We also compared each of these values by status and by benefit type based on information provided by Segal
- We refined our understanding of the provisions based on statutes, benefit calculations, and summaries of plan provisions contained in Colorado PERA's 2021 Annual Comprehensive Financial Report
- We used sample participant liabilities provided by Segal to continue our refinements
- In matching liability calculations, we generally target producing aggregate results that fall within a 5% tolerance level
  - Although we may initially fall within 5% of the liability calculations in the aggregate, we also compare subtotals by status as well as by benefit type. The reason we review calculations in total as well as by different subtotals is that aggregate valuation results that differ by less than 5% in total may camouflage systematic errors with respect to particular types of participants

Buck replicated present value of future benefits, actuarial accrued liabilities and normal costs as a dollar amount, all well within the tolerance level of 5% for all divisions

Summary of Liabilities by Division

Actuarial Accrued Liability and Present Value of Future Benefits

Summary of Liabilities by Division Trust Fund
$ Millions

	State	School	Local Government	Judicial	Denver Public Schools
Actuarial Accrued Liability					
Segal	$27,159.8	$46,336.8	$5,745.0	$488.0	$4,637.9
Buck	$26,838.9	$45,828.9	$5,683.6	$487.8	$4,560.7
% Difference to Segal	*(1.2%)*	*(1.1%)*	*(1.1%)*	*(0.0%)*	*(1.7%)*
Present Value of Future Benefits					
Segal	$30,096.5	$52,746.8	$6,424.6	$570.3	$5,581.0
Buck	$29,969.9	$52,473.5	$6,419.7	$571.2	$5,546.2
% Difference to Segal	*(0.4%)*	*(0.5%)*	*(0.1%)*	*0.2%*	*(0.6%)*

Summary of Liabilities by Health Care Trust Fund
$ Millions

	HCTF	DPS HCTF
Actuarial Accrued Liability		
Segal	$1,345.5	$62.1
Buck	$1,334.2	$61.4
% Difference to Segal	*(0.8%)*	*(1.1%)*
Present Value of Future Benefits		
Segal	$1,457.7	$70.6
Buck	$1,450.8	$70.1
% Difference to Segal	*(0.5%)*	*(0.7%)*

Buck replicated actuarial accrued liability and present value of future benefits well within the tolerance level of 5% for all divisions

See Schedule A of actuarial audit report for summary of liabilities by division, status and benefit type

Summary of Normal Cost by Division

Normal Cost

Summary of Normal Cost by Division Trust Fund *% of Pay*	State	School	Local Government	Judicial	Denver Public Schools
Total Normal Cost as a % of Pay					
Segal	12.76%	14.57%	12.71%	17.15%	13.32%
Buck	12.88%	14.46%	12.91%	16.84%	13.27%
Difference to Segal	*0.12%*	*(0.11%)*	*0.20%*	*(0.31%)*	*(0.05%)*

Summary of Normal Cost by Health Care Trust Fund *% of Pay*	HCTF	DPS HCTF
Total Normal Cost as a % of Pay		
Segal	0.18%	0.14%
Buck	0.17%	0.13%
Difference to Segal	*(0.01%)*	*(0.01%)*

Buck replicated Normal Cost as a dollar amount well within the 5% tolerance across all divisions

See Schedule B of actuarial audit report for more details, including dollar amounts by division and benefit type

Review of Actuarial Valuation Results

Process and Results

- In our parallel valuation and review, we also replicated key results of the valuation using our calculations of liabilities and reconciled asset information
- Key valuation results we replicated included:
  - Actuarial value of assets
  - Actuarially determined contribution rates
  - Effective amortization period based on current sources of income
  - Automatic Adjustment Provision assessment ratio

- **Buck matched actuarial value of assets for all divisions**
- **Buck replicated actuarial determined contribution rates and effective amortization periods within tolerance for all divisions**
- **Buck replicated Automatic Adjustment Provision assessment calculation within tolerance and Buck's result would arrive at the same conclusion as Segal**

Results by Division – Division Trust Funds

Actuarially Determined Contribution and Effective Amortization Period

Actuarially Determined Contribution by Division Trust Fund
% of Pay

	State	School	Local Government	Judicial	Denver Public Schools
Segal	20.71%	21.13%	9.20%	13.83%	6.77%
Buck	20.25%	20.50%	8.93%	13.49%	6.24%
Difference to Segal	(0.46%)	(0.63%)	(0.27%)	(0.34%)	(0.53%)

Effective Amortization Period by Division Trust Fund

	State	School	Local Government	Judicial	Denver Public Schools
Segal	23 years	26 years	12 years	7 years	9 years
Buck	23 years	24 years	11 years	6 years	9 years
Difference to Segal	0 years	(2) years	(1) year	(1) year	0 years

Buck replicated the actuarially determined contribution rates within 0.7% of pay for each Division Trust Fund

See Schedule C of actuarial audit report for more details on Buck's replication of the actuarially determined contribution rates

Buck also replicated the effective amortization period based on current sources of income within 2 years for each Division Trust Fund

Results by Division – Health Care Trust Funds

Actuarially Determined Contribution and Effective Amortization Period

Actuarially Determined Contribution by Health Care Trust Fund
% of Pay

	HCTF	DPS HCTF
Segal	0.73%	0.24%
Buck	0.71%	0.23%
Difference to Segal	(0.02%)	(0.01%)

Effective Amortization Period by Health Care Trust Fund

	HCTF	DPS HCTF
Segal	13 years	2 years
Buck	13 years	2 years
Difference to Segal	0 years	0 years

Buck replicated the actuarially determined contribution rates within 0.02% of pay for each Health Care Trust Fund

See Schedule C of actuarial audit report for more details on Buck's replication of the actuarially determined contribution rates

Buck also matched the effective amortization period for each Health Care Trust Fund

Automatic Adjustment Provision (AAP) Assessment

Automatic Adjustment Provisions (AAP) Ratio of Blended Total Contribution Rate to Blended Total Required Contribution for 2023 Plan Year	State	School	Local Government	Judicial	Denver Public Schools	Total Weighted Average
Segal						
Unfunded Actuarial Accrued Liability (millions)	9,780.3	16,083.6	654.4	68.8	608.8	27,195.9
Member Contribution Rate	11.08%	11.00%	9.01%	11.00%	11.00%	10.98%
Employer Contribution Rate	19.99%	19.80%	13.06%	23.33%	9.00%	19.47%
Actuarially Determined Employer Contribution Rate	20.71%	21.13%	9.20%	13.83%	6.77%	20.35%
Direct Distribution Rate						0.32%
Blended Total Contribution Rate						30.77%
Blended Total Required Contribution						31.33%
Ratio of Blended Total Contribution Rate to Blended Total Required Contribution						**98.21%**
Buck						
Unfunded Actuarial Accrued Liability (millions)	9,459.4	15,575.7	593.0	68.6	531.6	26,228.4
Member Contribution Rate	11.08%	11.00%	9.01%	11.00%	11.00%	10.98%
Employer Contribution Rate	19.99%	19.80%	13.06%	23.33%	9.00%	19.51%
Actuarially Determined Employer Contribution Rate	20.25%	20.50%	8.93%	13.49%	6.24%	19.84%
Direct Distribution Rate						0.32%
Blended Total Contribution Rate						30.81%
Blended Total Required Contribution						30.82%
Ratio of Blended Total Contribution Rate to Blended Total Required Contribution						**99.97%**
Difference to Segal						*1.76%*

Buck replicated the ratio of the blended total contribution rate and the blended total required contribution

Buck arrived at a ratio of 99.97% compared to 98.21% by Segal

Under Buck's calculation, we would also arrive at the same conclusion as Segal that the AAP assessment performed as of December 31, 2021 does not indicate automatic changes to member and employer contribution rates, annual increase cap, or direct distribution from the State.

Review of Actuarial Projections

Process and Results

- Buck also completed 40-year, "open-group" actuarial projections based on our replicated valuation results and Segal's assumptions with respect to future new members
- Key projection results we replicated for each division included:
  - Projected years until 100% funded
  - Projected funded ratio over 40 years

- **Buck matched projected years until 100% for each Division Trust Fund and DPS HCTF, and within 1 year for HCTF**
- **Buck's projected trend of funded ratios over time was consistent with Segal's projections for all divisions**

Actuarial Projections

Projected Years to 100% Funding

Projected Years Until 100% Funded Based on 40-Year Projection			
Division Trust Fund	Segal	Buck	Difference to Segal
State Division	16 years	16 years	0 years
School Division	16 years	16 years	0 years
Local Government Division	2 years	2 years	0 years
Judicial Division	3 years	3 years	0 years
DPS Division	2 years	2 years	0 years

Projected Years Until 100% Funded Based on 40-Year Projection			
Health Care Trust Fund	Segal	Buck	Difference to Segal
HCTF	12 years	13 years	1 year
DPS HCTF	1 year	1 year	0 years

- Buck replicated 40-year actuarial projections
- Buck matched projected years until 100% funded for each Division Trust Fund and DPS HCTF and within 1 year for HCTF
- In addition, the trend of the funded ratio over time was consistent between the projections modeled by us and Segal
- See Schedule D of actuarial audit report for graphs of Buck's projections of funded ratios and years until 100% funded compared to Segal's results