# Houston Firefighters' Relief and Retirement Fund

## Actuarial Experience Study – Final

October 15, 2024

BUCK
A Gallagher Company

# Agenda

Purpose and scope of the study

Assumptions

- Demographic
- Economic

Impact of Proposed Changes

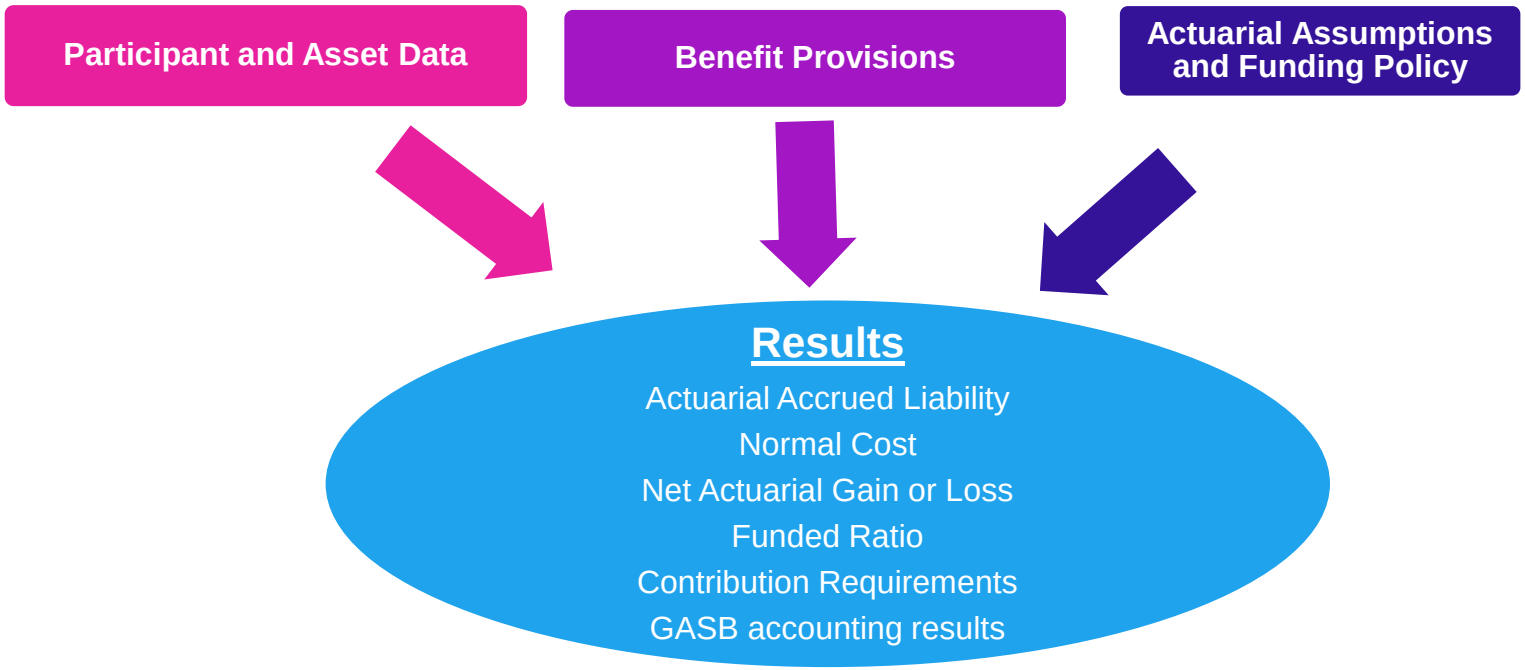
Takeaways and Next Steps

# Purpose and Scope of the Study

# Risk Sharing Valuation Study (RSVS) Process

- Texas statute article 6243e.2(1), Section 13B sets forth requirements for an annual RSVS of the Fund
  - The actuary determines the rate of contributions to be made to the Fund according to prescribed contribution policy
  - The contribution is determined through the RSVS, which is summarized in the annual actuarial RSVS report
  - In addition, the RSVS:
    - Determines the funded ratio
    - Satisfies regulatory and accounting requirements
    - Explores why the results of the current RSVS differ from the results of the RSVS of the previous year

# Risk Sharing Valuation Study Process




- The actuarial assumptions and funding policy are reviewed as part of an experience study process required at least every four years under Section 13D of the statute
- This experience study is conducted to determine the assumptions that will serve as the basis for the RSVS from 2024 – 2027
- The funding policy and certain assumptions are prescribed by statute

# 2017 Senate Bill 2190 (SB2190)

- SB2190 reformed the funding and benefit provisions of the Houston Firefighters' Relief and Retirement Fund (Fund)
- Funding reforms
  - Perform an annual Risk Sharing Valuation Study (RSVS)
  - **Requires an experience study at least once every four years**
- Benefit reforms effective July 1, 2017
  - Pensionable pay for benefit accruals after June 30, 2017 includes base pay
  - Increase member contributions to 10.5% of pay
  - Revised the calculation to determine COLA
  - Members hired prior to July 1, 2017 (legacy members)
    - Changed service retirement benefit accrual formula for service after June 30, 2017
    - Reduced the DROP credits
  - Members hired after June 30, 2017
    - Lower benefit accrual formula than legacy member, maximum 80% of pay
    - Service retirement eligibility at age when the sum of the member's age and service equals 70
    - Not eligible to participate in DROP

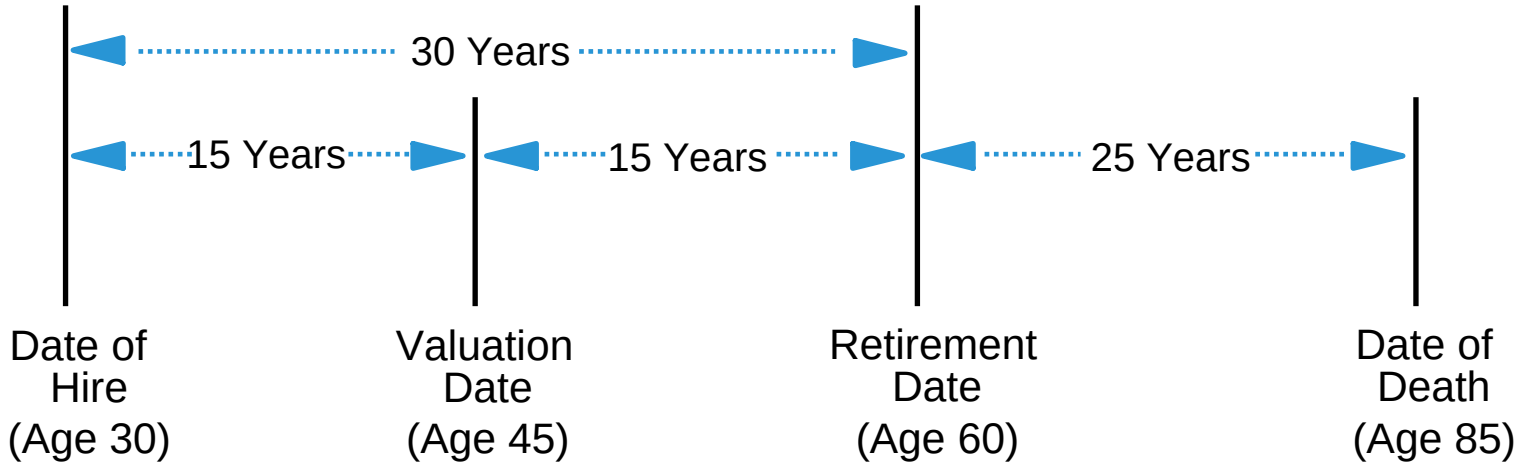
# Experience Study

- Determine how actual experience or frequency of events (such as retirement, terminations, etc.) differs from expectations using current actuarial assumptions
  - This experience study covers the period from Fiscal Year Ending June 30, 2019 through Fiscal Year Ending June 30, 2023 (FYE2019 – FYE2023)
  - The amount of data accumulated applicable to members hired after June 30, 2017, is not enough to examine emerging trends for demographic assumptions
    - While patterns of behavior may be different from legacy membership, we have not proposed an alternative set of demographic assumptions
    - We will review again when the next scheduled study is prepared in 2027 and proposed changes, if warranted, will be recommended at that time
    - The base assumptions, however, are adjusted for differing Fund provisions (e.g., eligibility)
- Develop recommendations for changes in those actuarial assumptions, if necessary
  - When selecting assumptions, it is important to account for a plan sponsor's expectations for future years that may differ from past experience
- Assess impact of changes on the Proposed RSVS as of July 1, 2023
- Goal is to improve accuracy of results and forecasts

# Things That Happen to Members (Illustrative) (Demographics Assumptions)

- **KNOWN at valuation date:**
  1. Age
  2. Gender
  3. Service to date

- **ASSUMED at valuation date:**
  1. Retirement rates
  2. Death rates before and after retirement
  3. Disability rates
  4. Termination rates



## Things That Happen to Members – Salary Increases (Illustrative) (Economic Assumptions)

- KNOWN at valuation date:

| Salary History | |
|---|---|
| Age 43 | $ 48,857 |
| Age 44 | 51,422 |
| Age 45 | 54,019 |
| Total | $154,298 |

**Current 78 pay period average**

$154,298/3 = $51,433

- ASSUMED at valuation date:

| at Retirement | |
|---|---|
| Age 57 | $ 80,138 |
| Age 58 | 82,542 |
| Age 59 | 85,018 |
| Total | $247,698 |

**Projected 78 pay period average**

$247,698/3 = $82,566

# Things That Happen to Money (Economic Assumptions)

- KNOWN at valuation date:

  1. Market value of Fund assets
  2. Composition of Fund assets
     - Stocks
     - Bonds
     - Short term
     - Long term
     - International
     - Real estate
     - Alternative investments

- ASSUMED at valuation date:

  1. Future rates of investment return
  2. Future rates of inflation
  3. No change in composition of Fund assets

# Selection of Actuarial Assumptions

| What Assumption | Who Decides |
|---|---|
| ➢ Economic: | |
| • Investment return | • Agreement between municipality and Board (not to exceed 7%) |
| • Inflation | • Board, with limitations |
| • Payroll growth and projected salary increases | • HFRRF consultation with municipality's finance director with discussion based on Actuary's review |
| ➢ Demographic: | |
| • Termination of Employment, Disability, Retirement, Mortality, other misc. | • Mostly Actuary, with input from HFRRF and Board |
| ➢ Actuarial methods: | |
| • Actuarial cost method<br>• Actuarial asset valuation method<br>• Amortization method<br>• Administration expense load | • Prescribed by statute |

# Actuarial Assumptions - Demographic

- Termination of Employment
  - For members hired prior to July 1, 2017 -
    - Refund of contributions if less than 10 years of service
    - Vested benefit with at least 10 years but less than 20 years of service
  - For members hired after June 30, 2017 – Refund of contributions if terminate prior to date at which the sum of the member's age and service equals 70
  - Form of payment (Immediate Contribution Refund vs. Deferred Pension Benefit)

- Retirement
  - Members hired prior to July 1, 2017: 20 years of service
    - DROP participation rate
    - DROP duration upon participation
    - Payment of DROP balances
  - Members hired after June 30, 2017: Age at which the sum of the member's age and service equals 70

- Marriage
  - Married percentage of retiring members
  - Age difference between member and spouse

# Actuarial Assumptions - Demographic

- Disability
  - Non-Service-Connected
  - Service-Connected
    - Capable of performing any substantial gainful activity
    - Not capable of performing any substantial gainful activity
- Death After Retirement
  - Healthy retired members
  - Disabled retired members
  - Beneficiary in receipt
- Death in Active Service
  - Non-Service-Connected
  - Service-Connected

# Demographic Assumptions

## Setting Demographic Assumptions

- Based on 4-year Experience Review
- Full review covers June 30, 2019 - June 30, 2023
- Compare past experience (“actual”) with assumptions (“expected”)
- Determine trends
- Make judgments about future

# Mortality

# Setting Demographic Assumptions

## ➢ Mortality

- Mortality rates have generally continued to improve over time and are expected to improve in the future
  - ASOP No. 35 states that the actuary should “include an assumption as to expected mortality improvement after the measurement date.”

- Mortality trends among the plan population groups are examined through the relationship of liability that was expected to be released due to deaths versus the actual amount released due to actual deaths.
  - The expected release of liability based on the mortality table being examined (expected)
  - The actual liability released based on the mortality table being examined (actual)
  - If the ratio of actual to expected is 100%, the table has predicted what actually occurred in the aggregate. If the ratio of actual to expected is greater than 100%, then the table has underestimated actual experience. If the ratio is less than 100%, then the table has overestimated actual experience
  - The ideal adjustment to the current mortality related rates is to find a mortality table basis that produces an expected liability released that is close to the liability actually released

## Mortality Table

- In January 2015 the Society of Actuaries (SOA) and the Retirement Plans Experience Committee (RPEC or “the Committee”) initiated a mortality study of public pension plans
  - The primary focus of this study was a comprehensive review of recent mortality experience of public retirement plans in the United States
- In January 2019 the SOA published the Pub-2010 Public Retirement Plans Mortality Tables Report
  - The analysis included several versions of the tables based on job types (Public Safety, Teachers and General Employees) and income levels (above and below median)
  - Pub-2010 base tables adopted by Board in previous experience study
- Recommend continuing to select from the SOA Pub-2010 tables for Public Safety workers unless there is credible experience to support another assumption

## Mortality Improvement Scale

- In general, the rates of mortality observed in America decline over time; each generation lives longer than preceding generations
- Actuarial professional standards of practice recommend projecting these mortality improvements into the future
- Theoretically will not have to update mortality rates (as much) in future experience reviews
- For purposes of our analysis, the base mortality tables are generationally projected from 2010 using the MP-2021 Improvement Scale, the most recent improvement scale published by the SOA

## Experience Credibility

- The decision on what table to use and whether to adjust for actual plan experience is based on the “exposures” and expected number of deaths
  - For our review, the exposures and expected number of deaths are weighted by liability amounts
- Generally, retiree mortality will have more credibility because the plan will have a sufficient amount of experience
- Active and disabled member mortality generally have less credibility due to limited plan experience of active deaths and participants who go on disability
- Credibility factor is a measurement of the reliability of the plan experience as compared to the broader experience reflected in standard tables

# Mortality Rates - Male Service Retirees

| $millions | Actual Liability Released | Expected Liability Released | Ratio of Actual to Expected |
|---|---|---|---|
| Current Assumption: SOA Public Safety Mortality (Below Median) Amount Weighted-Male, 97.2% adjusted, generationally projected with scale MP-2019 | $123.8 | $134.6 | 92.0% |
| SOA Public Safety Mortality (Below Median) Amount Weighted-Male, generationally projected with scale MP-2021 | $123.8 | $137.9 | 89.7% |
| SOA Public Safety Mortality (Below Median) Amount Weighted-Male, 95.9% adjusted, generationally projected with scale MP-2021 | $123.8 | $132.3 | 93.6% |

- We recommend the SOA Public Mortality Safety (Below Median) Amount Weighted Male Table, with a 95.9% adjustment, generationally projected with scale MP-2021

  — The credibility factor is 40.15%. During FYE2019 – FYE2023, there were 218 deaths
  — The 95.9% adjustment = .4015 x .897 + .5985 x 1

# Mortality Rates - Female Beneficiaries

| $millions | Actual Liability Released | Expected Liability Released | Ratio of Actual to Expected |
|---|---|---|---|
| Current Assumption: SOA Public Cont. Surv. Mortality (Below Median) Amount Weighted-Female,106.0% adjusted, generationally projected with scale MP-2019 | $32.1 | $31.3 | 102.5% |
| SOA Public Cont. Surv. Mortality (Below Median) Amount Weighted-Female, generationally projected with scale MP-2021 | $32.1 | $29.3 | 109.6% |
| SOA Public Cont. Surv. Mortality (Below Median) Amount Weighted-Female,106.0% adjusted, generationally projected with scale MP-2021 | $32.1 | $31.0 | 103.4% |

- The current mortality assumption produced assumed experience generally in line with actual experience. We recommend maintain the current base mortality assumption and updating mortality improvement to scale MP-2021.

# Mortality Rates - Groups with No Experience Credibility

- All other groups have no experience credibility, and we recommend the mortality basis below. The only update from the prior assumption for the groups below is to update the mortality improvement to scale MP-2021.

| Group | # Deaths during Study Period | Mortality basis recommendation |
|---|---|---|
| Female Service Retirees | 0 | SOA Public Safety Mortality (Below Median) Amount Weighted Female Table, projected generationally with scale MP-2021 |
| Male Beneficiaries | 1 | SOA Public Contingent Survivor Mortality (Below Median) Amount Weighted Male Table, projected generationally with scale MP-2021 |
| Male Disableds | 34 | SOA Public Safety Disability Mortality Amount Weighted Male Table, projected generationally with scale MP-2021 |
| Female Disableds | 0 | SOA Public Safety Disability Mortality Amount Weighted Female Table, projected generationally with scale MP-2021 |
| Male Actives | 26 | SOA Public Safety Mortality (Below Median) Amount Weighted Male Table, projected generationally with scale MP-2021 |
| Female Actives | 0 | SOA Public Safety Mortality (Below Median) Amount Weighted Female Table, projected generationally with scale MP-2021 |

# Mortality Recommendation

- The SOA 2010 Public Mortality Amount Weighted tables provides the best fit based on the makeup of the plan participants, therefore recommend using these tables:
  - Service retirees
    - Males - Public Safety (Below-Median) Amount Weighted Male Table with a 95.9% adjustment for credibility
    - Females - Public Safety (Below-Median) Amount Weighted Female Table
  - Survivor beneficiaries
    - Males - Contingent Survivor (Below-Median Male) Amount Weighted Male Table
    - Females - Contingent Survivor (Below-Median Female) Amount Weighted Female Table with a 106.0% adjustment
  - Disabled retirees – Sex-distinct Public Safety Disabled Retiree Amount Weighted Tables
  - All others, including actives and vested terminated participants
    - Pre-commencement of benefits: Sex-distinct Public Safety (Below-Median) Amount Weighted Tables
    - Post-commencement of benefits: Use applicable table above
- These base mortality tables will then be generationally projected from 2010 using the Mortality Improvement Scale MP-2021

# Mortality - Percentage of Active Service-Connected Deaths

- The pre-retirement death benefit formula is based on whether the death was service-connected or non-service connected
  - Current assumption varies death type by age
  - Experience

| Group | # Observed | Actual Rate |
|---|---|---|
| Service-Connected Deaths | 13 | 0.50 |
| Non-Service-Connected Deaths | 13 | 0.50 |

  - Assumption modifications as follows

| Age | Current | Proposed (All Ages) |
|---|---|---|
| 25 | 80% | 50% |
| 35 | 80% | 50% |
| 45 | 40% | 50% |
| 55 | 20% | 50% |

# Non-Mortality Demographic Assumptions

# Setting Demographic Assumptions

- Non-Mortality

  - The expected number of separations from service on account of withdrawal, retirement and disability is calculated by multiplying the rates of separation used as a basis for the active service tables by the number of those exposed to risk

  - The actual number of those who had separated from service is then compared with the expected number

  - If the ratio of actual to expected is 100%, the table has predicted what actually occurred in the aggregate. If the ratio of actual to expected is greater than 100%, then the table has underestimated actual experience. If the ratio is less than 100%, then the table has overestimated actual experience

  - The ideal adjustment, taking into account credibility, to the current non-mortality related rates tends to produce an expected number that falls between the current expected number predicted by the assumption and the actual number of separations

# Termination

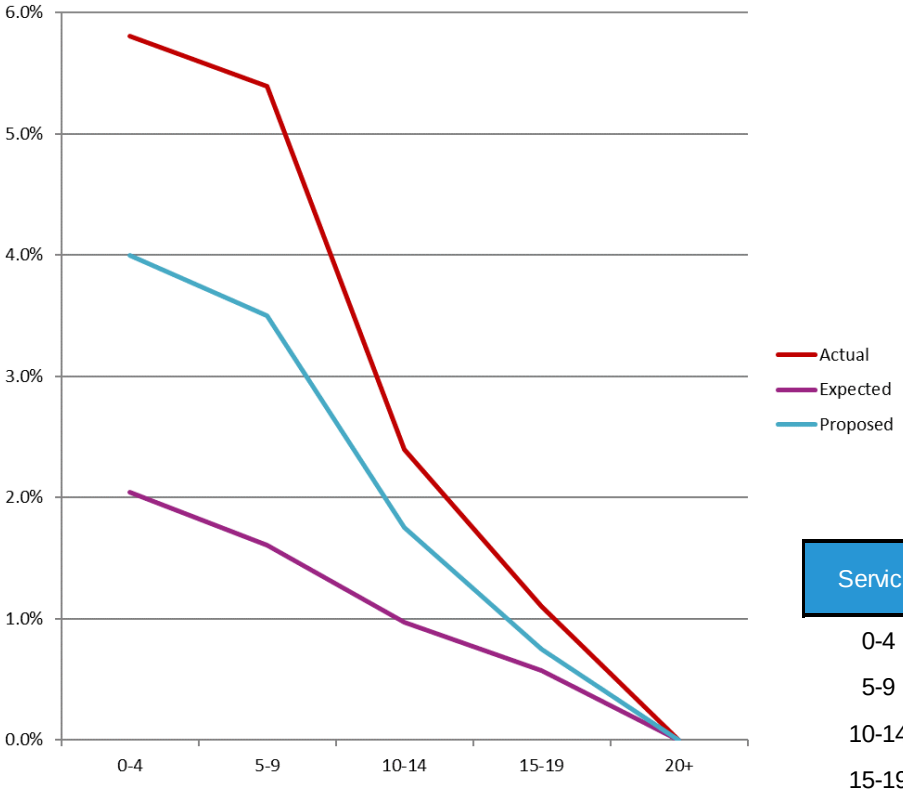
# Termination - Termination Rates Prior to Service Retirement Eligibility

| Service Group | Exposed | Actual | Expected | | Actual/Expected | |
|---|---|---|---|---|---|---|
| | | | Current | Proposed | Current | Proposed |
| 0-4 | 2,032 | 118 | 41.6 | 81.3 | 2.84 | 1.45 |
| 5-9 | 2,653 | 143 | 42.7 | 92.9 | 3.35 | 1.54 |
| 10-14 | 2,381 | 57 | 23.2 | 41.7 | 2.46 | 1.37 |
| 15-19 | 4,082 | 45 | 23.5 | 30.6 | 1.91 | 1.47 |
| 20+ | 0 | 0 | 0.0 | 0.0 | N/A | N/A |
| Total | 11,148 | 363 | 131.0 | 246.5 | 2.77 | 1.47 |

Recommendations:

- Change from age-based to service-based rates since vesting and retirement eligibility is generally based on service
- Increase termination rates since the total incidence of actual terminations is more than expected.
- Note – we reviewed the experience on a liability-weighted basis and the results are generally consistent with the headcount basis shown above

# Termination - Termination Rates Prior to Service Retirement Eligibility




## Active Termination by Service

| Service | Actual | Expected | Proposed | Actual / Expected | Actual / Proposed |
|---|---|---|---|---|---|
| 0-4 | 0.0581 | 0.0205 | 0.0400 | 2.84 | 1.45 |
| 5-9 | 0.0539 | 0.0161 | 0.0350 | 3.35 | 1.54 |
| 10-14 | 0.0239 | 0.0097 | 0.0175 | 2.46 | 1.37 |
| 15-19 | 0.0110 | 0.0058 | 0.0075 | 1.91 | 1.47 |
| 20+ | - | - | - | - | - |
| **Total** | **0.0326** | **0.0118** | **0.0221** | **2.77** | **1.47** |

# Termination – Form of Payment

- Prior to eligibility for service retirement, a vested pension is available to members hired prior to July 1, 2017, who terminate with at least 10 years of service but less than 20 years of service*
  - Current assumption for members hired prior to July 1, 2017: 80% of those eligible for a vested pension will elect an immediate refund of contributions, while 20% will elect a deferred monthly pension benefit payable at age 50
  - Experience and proposed assumption modifications for members hired prior to July 1, 2017, as follows

| Form of Payment | # Exposed | Actual | Expected Rate | Actual Rate | Proposed Rate |
|---|---|---|---|---|---|
| Immediate Contribution Refund | 76 | 64 | 0.80 | 0.84 | 0.80 |
| Deferred Pension Benefit | 76 | 12 | 0.20 | 0.16 | 0.20 |

*All other members are only eligible to receive a refund of contributions without interest if terminating prior to retirement eligiblity

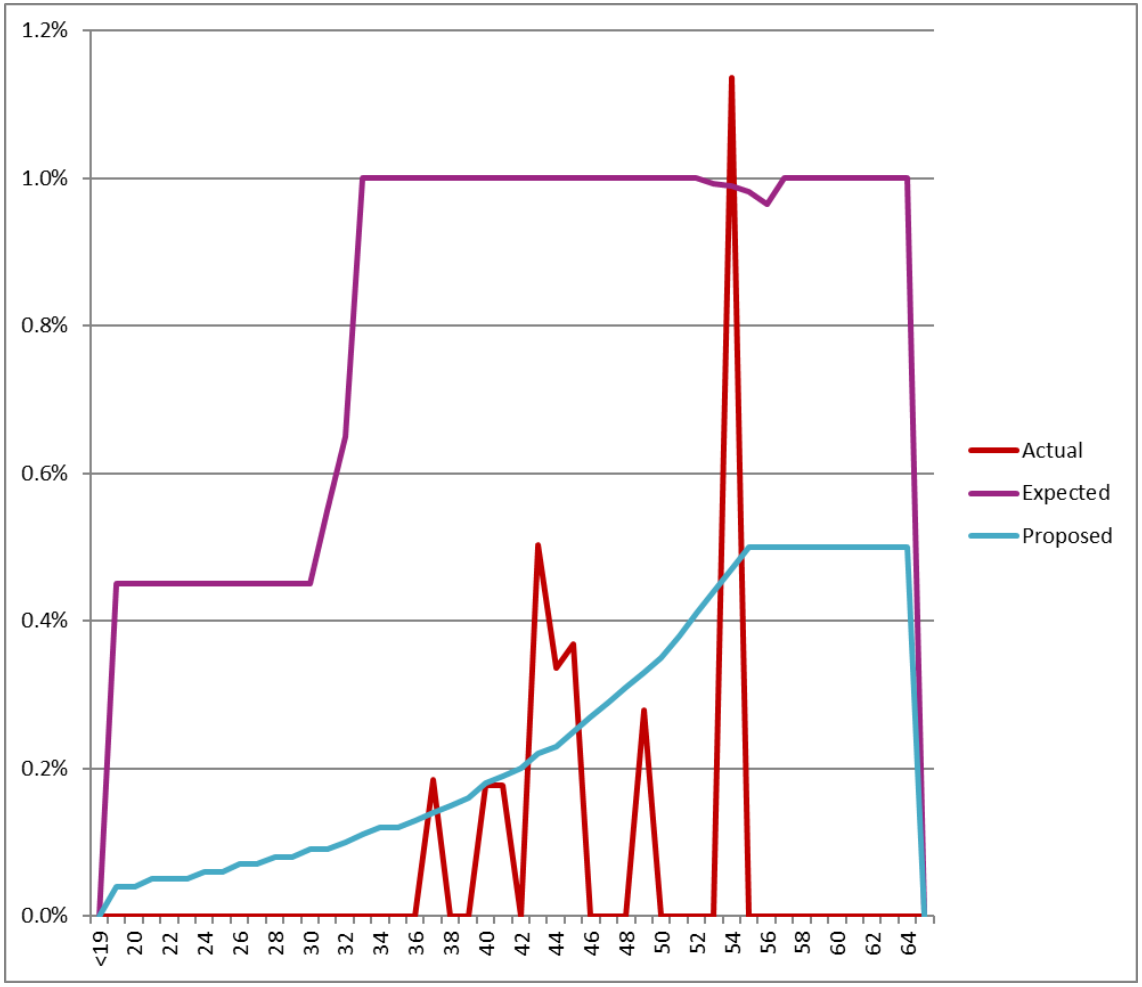
# Disability

# Disability – Combined Rates for Service-Connected and Non-Service-Connected Disability Retirements

| Central Age Group | Exposed | Actual | Expected | | Actual/Expected | |
|---|---|---|---|---|---|---|
| | | | Current | Proposed | Current | Proposed |
| 21 | 101 | 0 | 0.5 | 0.1 | 0.0 | 0.0 |
| 26 | 785 | 0 | 3.5 | 0.6 | 0.0 | 0.0 |
| 31 | 2,056 | 0 | 13.2 | 2.0 | 0.0 | 0.0 |
| 36 | 2,661 | 1 | 26.6 | 3.5 | 0.0 | 0.3 |
| 41 | 2,848 | 5 | 28.5 | 5.4 | 0.2 | 0.9 |
| 46 | 2,447 | 4 | 24.5 | 6.5 | 0.2 | 0.6 |
| 51 | 1,212 | 1 | 12.1 | 4.5 | 0.1 | 0.2 |
| >53 | 190 | 1 | 1.9 | 0.9 | 0.5 | 1.1 |
| Total | 12,300 | 12 | 110.8 | 23.5 | 0.1 | 0.5 |

Recommendation: Decrease the rates since the total incidence of actual disabilities is less than expected.

# Disability – Combined Rates for Service-Connected and Non-Service-Connected Disability Retirements



# Disability – Combined Rates for Service-Connected and Non-Service-Connected Disability Retirements

| Age | Actual Rate | Expected Rate | Proposed Rate |
|---|---|---|---|
| 19 | - | 0.0045 | 0.0004 |
| 20 | - | 0.0045 | 0.0004 |
| 21 | - | 0.0045 | 0.0005 |
| 22 | - | 0.0045 | 0.0005 |
| 23 | - | 0.0045 | 0.0005 |
| 24 | - | 0.0045 | 0.0006 |
| 25 | - | 0.0045 | 0.0006 |
| 26 | - | 0.0045 | 0.0007 |
| 27 | - | 0.0045 | 0.0007 |
| 28 | - | 0.0045 | 0.0008 |
| 29 | - | 0.0045 | 0.0008 |
| 30 | - | 0.0045 | 0.0009 |
| 31 | - | 0.0055 | 0.0009 |
| 32 | - | 0.0065 | 0.0010 |
| 33 | - | 0.0100 | 0.0011 |
| 34 | - | 0.0100 | 0.0012 |
| 35 | - | 0.0100 | 0.0012 |
| 36 | - | 0.0100 | 0.0013 |
| 37 | 0.0018 | 0.0100 | 0.0014 |
| 38 | - | 0.0100 | 0.0015 |
| 39 | - | 0.0100 | 0.0016 |
| 40 | 0.0018 | 0.0100 | 0.0018 |
| 41 | 0.0018 | 0.0100 | 0.0019 |
| 42 | - | 0.0100 | 0.0020 |

| Age | Actual Rate | Expected Rate | Proposed Rate |
|---|---|---|---|
| 43 | 0.0050 | 0.0100 | 0.0022 |
| 44 | 0.0034 | 0.0100 | 0.0023 |
| 45 | 0.0037 | 0.0100 | 0.0025 |
| 46 | - | 0.0100 | 0.0027 |
| 47 | - | 0.0100 | 0.0029 |
| 48 | - | 0.0100 | 0.0031 |
| 49 | 0.0028 | 0.0100 | 0.0033 |
| 50 | - | 0.0100 | 0.0035 |
| 51 | - | 0.0100 | 0.0038 |
| 52 | - | 0.0100 | 0.0041 |
| 53 | - | 0.0100 | 0.0044 |
| 54 | 0.0114 | 0.0100 | 0.0047 |
| 55 | - | 0.0100 | 0.0050 |
| 56 | - | 0.0100 | 0.0050 |
| 57 | - | 0.0100 | 0.0050 |
| 58 | - | 0.0100 | 0.0050 |
| 59 | - | 0.0100 | 0.0050 |
| 60 | - | 0.0100 | 0.0050 |
| 61 | - | 0.0100 | 0.0050 |
| 62 | - | 0.0100 | 0.0050 |
| 63 | - | 0.0100 | 0.0050 |
| 64 | - | 0.0100 | 0.0050 |
| 65+ | - | - | - |

# Disability - Percentage of Service-Connected Disabilities

- The disability benefit formula is based on whether the incident was service-connected or non-service connected. If it is service-connected, the benefit is based on whether the member is capable of performing any substantial gainful activity (SGA)
  - Current assumption provides that 80% of disabilities are assumed to be service-connected and that 50% of service-connected disabilities cannot perform SGA
  - Experience and proposed assumption modifications as follows:

| Disability Type | # Observed | Expected Rate | Actual Rate | Proposed Rate |
|---|---|---|---|---|
| Service-Connected Disabilities | 16 | 0.80 | 0.89 | 0.85 |
| Non-Service-Connected Disabilities | 2 | 0.20 | 0.11 | 0.15 |

| Service-Connected Disabilities | # Observed | Expected Rate | Actual Rate | Proposed Rate |
|---|---|---|---|---|
| Not Able to Perform SGA | 9 | .50 | 0.56 | 0.50 |
| Able to Perform SGA | 7 | .50 | 0.44 | 0.50 |

The proposed rates are uniform rates at all ages for each category

# Retirement

# Retirement Assumption for RSVS Purposes

- Current RSVS retirement assumptions are unnecessarily complex and involve the following:
  - Commencement assumption – varying based on when a participant entered the DROP for current DROP members
  - Multiple assumed DROP durations, given years of service at commencement
    - I.e. for future DROP members, and given a particular commencement age, a portion will have been in DROP for 5 years, a portion will have been in DROP for 8 years, etc.
  - 100% DROP participation except for a small portion of active population who are allowed to bypass DROP based on age at entry
- Recommend simplifying approach to retirement assumption
  - Identify service levels at which members are commencing their benefit or entering the DROP
  - Identify portion of population expected to enter the DROP
  - Identify single average duration that members are in the DROP
  - Translate new retirement assumption from the previous points

# Incidence of Commencement or DROP Entry

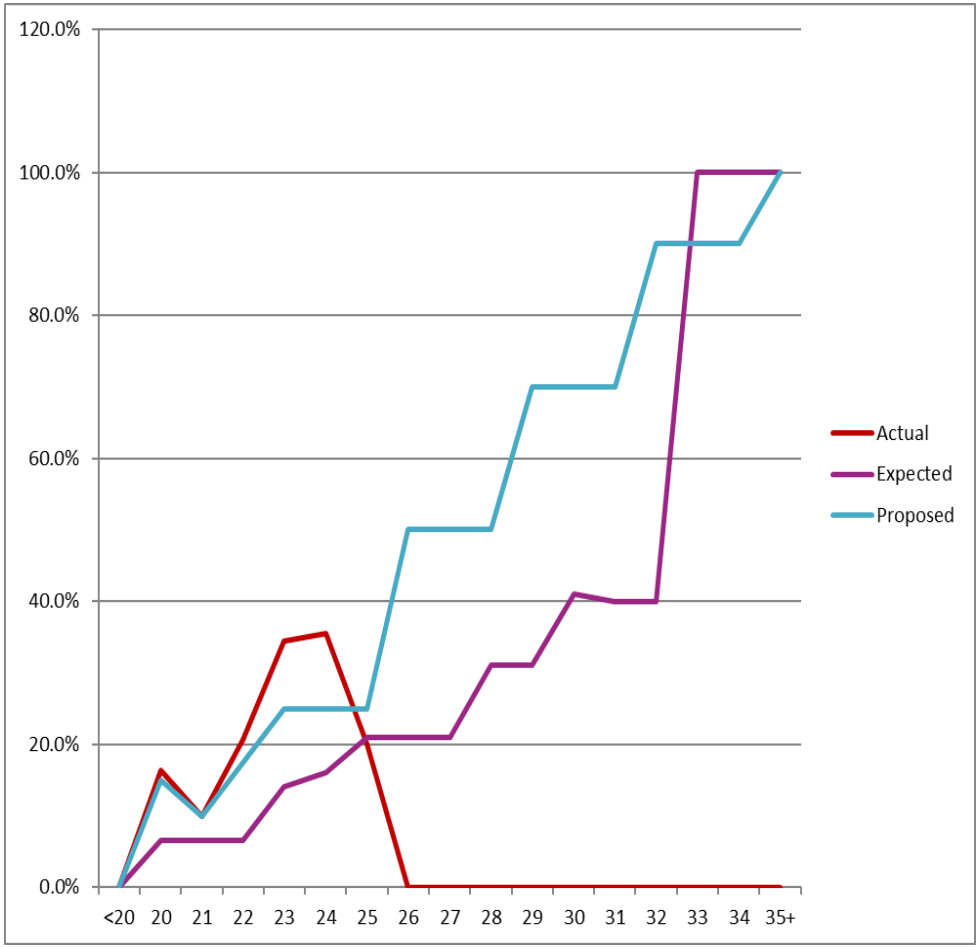
| Years of Service | Exposed | Actual | Expected | | Actual/Expected | |
|---|---|---|---|---|---|---|
| | | | Current* | Proposed | Current | Proposed |
| 20 | 448 | 73 | 29.1 | 67.2 | 2.51 | 1.09 |
| 21 | 312 | 31 | 20.3 | 31.2 | 1.53 | 0.99 |
| 22 | 194 | 40 | 12.6 | 34.0 | 3.17 | 1.18 |
| 23 | 113 | 39 | 15.8 | 28.3 | 2.47 | 1.38 |
| 24 | 62 | 22 | 9.9 | 15.5 | 2.22 | 1.42 |
| 25 | 15 | 3 | 3.2 | 3.8 | 0.94 | 0.79 |
| 26 | 1 | 0 | 0.2 | 0.5 | 0.00 | 0.00 |
| 27 | 1 | 0 | 0.2 | 0.5 | 0.00 | 0.00 |
| 28 | 1 | 0 | 0.3 | 0.5 | 0.00 | 0.00 |
| 29 | 0 | 0 | 0.0 | 0.0 | N/A | N/A |
| 30 | 0 | 0 | 0.0 | 0.0 | N/A | N/A |
| 31 | 0 | 0 | 0.0 | 0.0 | N/A | N/A |
| 32 | 0 | 0 | 0.0 | 0.0 | N/A | N/A |
| 33 | 1 | 0 | 1.0 | 0.9 | 0.00 | 0.00 |
| 34 | 1 | 0 | 1.0 | 0.9 | 0.00 | 0.00 |
| 35+ | 3 | 0 | 3.0 | 3.0 | 0.00 | 0.00 |
| Total | 1,152 | 208 | 96.6 | 186.3 | 2.15 | 1.12 |

* Implied from current commencement assumption and assuming a single 7-year DROP duration

Recommendation: Align assumed incidence of commencement or DROP entry with experience due to change in valuation approach

Note – we reviewed the experience on a liability-weighted basis and the results are generally consistent with the headcount basis shown above

# Incidence of Commencement or DROP Entry




| Years of Service | Actual Rate | Expected Rate | Proposed Rate |
|---|---|---|---|
| 20 | 0.1629 | 0.0650 | 0.1500 |
| 21 | 0.0994 | 0.0650 | 0.1000 |
| 22 | 0.2062 | 0.0650 | 0.1750 |
| 23 | 0.3451 | 0.1400 | 0.2500 |
| 24 | 0.3548 | 0.1600 | 0.2500 |
| 25 | 0.2000 | 0.2100 | 0.2500 |
| 26 | 0.0000 | 0.2100 | 0.5000 |
| 27 | 0.0000 | 0.2100 | 0.5000 |
| 28 | 0.0000 | 0.3100 | 0.5000 |
| 29 | 0.0000 | 0.3100 | 0.7000 |
| 30 | 0.0000 | 0.4100 | 0.7000 |
| 31 | 0.0000 | 0.4000 | 0.7000 |
| 32 | 0.0000 | 0.4000 | 0.9000 |
| 33 | 0.0000 | 1.0000 | 0.9000 |
| 34 | 0.0000 | 1.0000 | 0.9000 |
| 35+ | 0.0000 | 1.0000 | 1.0000 |

# DROP Participation Rate

- Currently, 100% of active participants who are projected to have at least 25 years of service at age 55 and eligible to participate in the DROP are assumed to participate in the DROP
  - Actual experience over study period and proposed rates, are as follows:

| Years of Service | A = Actives who Bypassed DROP and Retired | B = Actives who Entered DROP | C = Exposures = A + B | D = B/C = DROP Take Rate |
|---|---|---|---|---|
| Total | 48 | 191 | 239 | 79.9% |

  - The 79.9% total DROP participation rate indicates that fewer participants are electing to enter the DROP than previously
- Propose decreasing the assumed DROP participation rate to 85% for all DROP-eligible members

# DROP Duration

- As a portion of legacy active members of the Fund are assumed to participate in the DROP, “duration” is the assumption of how long the member remain in DROP until the member retires. We are proposing a change to this assumption to a single assumed DROP duration period.
- The four-year experience suggests an average DROP duration of 7.99 years. We recommend an assumed DROP duration of 8 years for future DROP members and current DROP members.
- Commencement assumption for actives not currently in DROP is shown on the next slide:
  - Assumption implied based on 1) incidences of commencement or DROP entry, 2) assumed DROP duration, and 3) assumed DROP participation rate
  - Assume immediate commencement of benefit for DROP members already in the DROP for 8 years.

* See Appendix for a complete development.

# Commencement Assumption (Actives Not Currently in DROP or Never Eligible for DROP)

| Years of Service | Proposed Rate* | Note |
|---|---|---|
| <=20 | 0.02250 | 15% of corresponding row on slide 40 |
| 21 | 0.01500 | |
| 22 | 0.02625 | |
| 23 | 0.03750 | |
| 24 | 0.03750 | |
| 25 | 0.03750 | |
| 26 | 0.07500 | |
| 27 | 0.07500 | |
| 28 | 0.20250 | 15% of corresponding row on slide 40, plus 85% of row on slide 40 corresponding to years of service minus 8 |
| 29 | 0.19000 | |
| 30 | 0.25375 | |
| 31 | 0.31750 | |
| 32 | 0.34750 | |
| 33 | 0.34750 | |
| 34 | 0.56000 | |
| 35 | 0.57500 | |
| 36 | 0.57500 | |
| 37 | 0.74500 | |
| 38 | 0.74500 | |
| 39 | 0.74500 | |
| 40 | 0.91500 | |
| 41 | 0.91500 | |
| 42 | 0.91500 | |
| 43+ | 1.00000 | 100% commencement |

* For actives never eligible for DROP (hired on or after July 1, 2017), increase rate by 5 percentage points in first year where sum of age and service equals or exceeds 70.

## Payment of DROP Balances – Active members

- Current assumption - DROP balances will be distributed over 15 years from pension commencement date
- Data to analyze the experience during the covered period is not provided for the annual RSVS
  - As discussed with the Fund's staff, payment information provided for the Fund's "415-limit" testing was used
  - Available data estimates - it will take an average of 16.9 years to fully distribute a DROP balance assuming the DROP balance is paid in equal annual payments
- Recommend changing to a 16-year installment of a DROP balance assumption

## Payment of DROP/PROP Balances – Inactive members

- Current assumption - The liability for DROP/PROP balances of members who have left active service is assumed to be equal to the value of a 7.5-year level installment of the Retirement Fund's remaining DROP/PROP balance, applied based on the difference between the assumed investment rate of return and the assumed DROP interest crediting rate (defined to be 65% of the assumed investment rate of return)
- We recommend assuming an 8.0-year level installment of the Retirement Fund's remaining DROP/PROP balance, applied based on the difference between the assumed investment rate of return and the assumed DROP interest crediting rate (defined to be 65% of the assumed investment rate of return)

# Marriage Assumptions

- Currently, 82.0% of male and 85.0% of female retiring active participants are assumed to be married
  - Actual experience over study period and proposed rates, are as follows:

| Retiree Gender | Over study period | Current Assumption | Proposed Assumption |
|---|---|---|---|
| % of Males married at retirement | 83.6% | 82.0% | 83.0% |
| % of Females married at retirement | 43.8% | 85.0% | 75.0% |

- Currently, male participants are assumed to be two years older than wives, and female participants are assumed to be six years younger than husbands
  - Actual experience over study period and proposed age differences, are as follows:

| Retiree Gender | Average over study period | Current Assumption | Proposed Assumption |
|---|---|---|---|
| Males | +1.62 | +2 | +2 |
| Females | -3.12 | -6 | -4 |

# Economic Assumptions

# Setting Economic Assumptions

- Review Past Experience
- Review General Practice
- Develop component parts of each assumption
  - Maintain linkage with investments
  - Maintain internal consistency
- Make Judgment About Future
  - Make use of forward-looking models
- Apply Statutory provisions

# Investment Return & Inflation

# Investment Return

- Current statute requires that the annual RSVS assumed rate of return may not exceed 7.00% per annum (net of investment expenses)
- Current actuarial standards of practice allow for the investment return assumption to be based on the expected returns of the underlying portfolio
- Current target asset allocation:

| Asset Class | Policy Target Weight | Benchmarks |
|---|---|---|
| Cash & Short Term | 2% | BofAML 9-12 Mo. US Treasury Index |
| Public Equity- Domestic | 19% | Russell 3000 Index |
| Public Equity- International | 19% | MSCI All Country World Ex-US Index |
| Aggregate Bonds | 5% | Barclays US Aggregate Index |
| Intermediate Credit | 3% | Barclays US Aggregate Index |
| Intermediate High Yield | 5% | CS LLI 50%/ICE BofAML HY 50% |
| Hedge Funds | 2% | 70% - HFR Risk Parity Vol 10 Institutional Index / 30% - Cash + CPI benchmark |
| Private Equity | 25% | Cambridge Associates US Private Equity 1QA |
| Private Debt | 10% | CS LLI 50%/ICE BofAML HY 50% |
| Real Estate | 10% | NCREIF Property |
| | 100% | |

# Investment Return

- Recent GEMS* Model results (gross benchmark returns)

| Time Horizon | 10 | 20 | 30 |
|---|---|---|---|
| **2023 Capital Market Assumptions** | | | |
| Nominal Returns - Percentile (Geometric) | | | |
| 75th | 11.14% | 10.21% | 9.86% |
| 65th | 10.11% | 9.51% | 9.25% |
| 50th | 8.64% | 8.53% | 8.44% |
| 35th | 7.47% | 7.41% | 7.45% |
| 25th | 6.31% | 6.66% | 6.86% |

| Time Horizon | 10 | 20 | 30 |
|---|---|---|---|
| **2022 Capital Market Assumptions** | | | |
| Nominal Returns - Percentile (Geometric) | | | |
| 75th | 12.02% | 11.08% | 10.95% |
| 65th | 10.99% | 10.28% | 10.10% |
| 50th | 9.34% | 9.10% | 9.17% |
| 35th | 7.67% | 8.00% | 8.20% |
| 25th | 6.40% | 7.07% | 7.42% |

| Time Horizon | 10 | 20 | 30 |
|---|---|---|---|
| **2021 Capital Market Assumptions** | | | |
| Nominal Returns - Percentile (Geometric) | | | |
| 75th | 8.08% | 8.39% | 8.25% |
| 65th | 7.16% | 7.59% | 7.65% |
| 50th | 6.04% | 6.48% | 6.81% |
| 35th | 4.79% | 5.42% | 5.93% |
| 25th | 3.69% | 4.69% | 5.25% |

| Time Horizon | 10 | 20 | 30 |
|---|---|---|---|
| **2020 Capital Market Assumptions** | | | |
| Nominal Returns - Percentile (Geometric) | | | |
| 75th | 8.01% | 8.34% | 8.61% |
| 65th | 6.29% | 7.16% | 7.64% |
| 50th | 5.29% | 6.49% | 7.05% |
| 35th | 4.28% | 5.70% | 6.42% |
| 25th | 2.65% | 4.55% | 5.43% |

- Recent capital market assumptions have increased expected returns for many asset classes

* See Appendix

# Investment Return

- Future considerations
  - 7.00% return assumption continues to be supportable in the short-term
  - Upward movement of capital market assumptions might at some point require us to soften position on assumption: Disclose that expected return “does not significantly conflict with what, in the actuary’s professional judgment, is reasonable for the purpose of the measurement”
  - NASRA survey (published November 2023 based on FY 2022) indicates median rate assumed by 131 large public plans is 7.00%
  - NCPERS 2023 Public Retirement Systems Study indicates average rate assumed by 195 state and local government pension funds is 6.86%

# Inflation

- Current assumption – 2.50% per annum
- As prescribed by statute, the assumption should be based on:
  - *"the most recent headline consumer price index 10-year forecast published in the Federal Reserve Bank of Philadelphia Survey of Professional Forecasters"* or, if not available, another standard agreed to by the Municipality and the Fund's board
  - Further, "*the price inflation assumption as of the most recent actuarial experience study…may be reset by the board by plus or minus 50 basis points based on that actuarial experience study*"
- The published "*headline consumer price index 10-year forecast"* (Long-Term Annual Average for 2024-2033) is currently 2.24% per annum
- Recommend updating inflation assumption to 2.25% per annum

## Future Cost-of-Living Adjustments (COLAs)

- Current assumption – Assumed to be equal to the assumed asset return less 4.75% (current 7% less 4.75% equal 2.25%)
- Assumption continues to be supportable
- Proposed clarification - Assumed to be equal to the assumed asset return less 4.75% (current 7% less 4.75% equal 2.25%) **and applied each October following the valuation date**

# Salary Increase

## Salary Increase

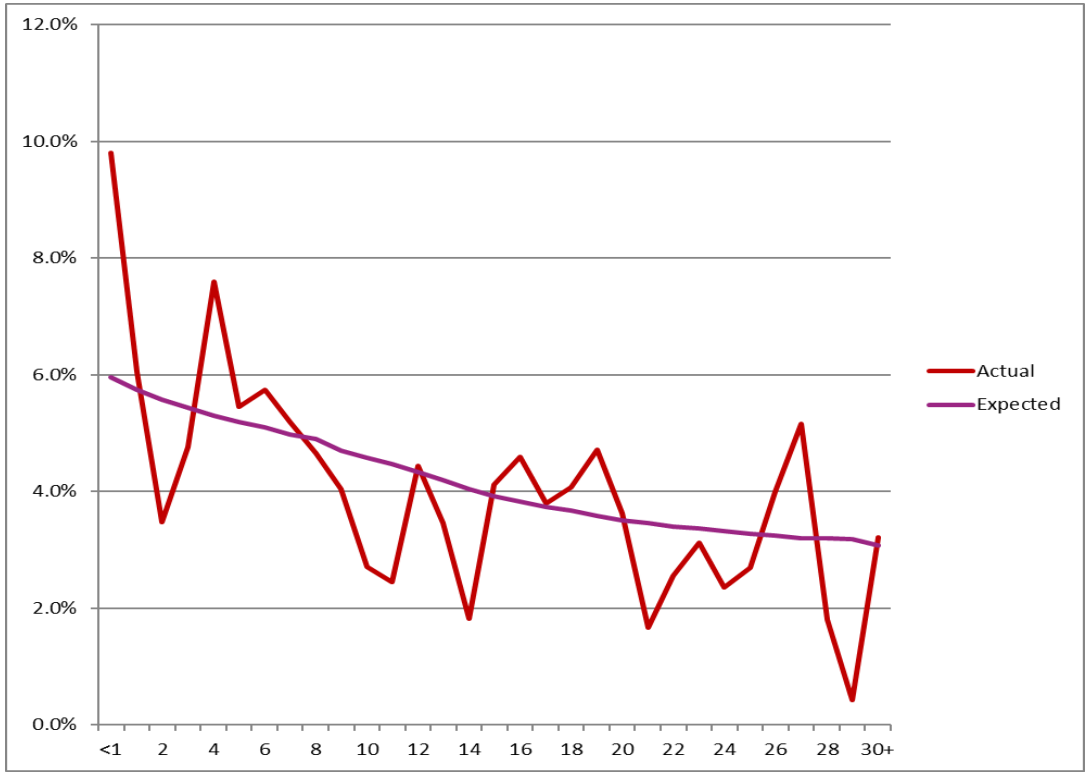
- When selecting assumptions, it is important to account for the Fund sponsor's expectations for future years that may differ from past experience

- Discussions with the Fund's staff: the last five years may not be a good proxy for the future:
  - Lack of contract settlements during the examination period
    - Expectation of new contracts in the near future
- No change is recommended at this time
  - Salary increase assumption will be reviewed when the next scheduled study is prepared as of June 30, 2027 and proposed changes, if warranted, will be recommended at that time.
  - An interim study of this assumption may be prudent upon contract settlement

# Salary Increase

| Central Svc Group | Exposed | Prior Year Salary | Current Year Salary | Expected Salary | Current Year/Expected |
|---|---|---|---|---|---|
| 0-4 | 2,614 | 132,233,000 | 140,666,000 | 139,569,878 | 1.0079 |
| 5-9 | 2,189 | 133,636,000 | 140,459,000 | 140,320,055 | 1.0010 |
| 10-14 | 2,644 | 176,877,000 | 181,969,000 | 184,468,338 | 0.9865 |
| 15-19 | 3,767 | 267,290,000 | 278,591,000 | 277,362,485 | 1.0044 |
| 20-24 | 1,673 | 128,397,000 | 131,868,000 | 132,775,809 | 0.9932 |
| 25-29 | 972 | 75,468,000 | 77,709,000 | 77,904,231 | 0.9975 |
| 30+ | 404 | 33,053,000 | 34,115,000 | 34,067,697 | 1.0014 |
| Total | 14,263 | 946,954,000 | 985,377,000 | 986,468,493 | 0.9989 |

# Salary Increase




| Svc | Actual Rate | Expected Rate |
|---|---|---|
| <1 | 0.0980 | 0.0596 |
| 1 | 0.0605 | 0.0574 |
| 2 | 0.0347 | 0.0557 |
| 3 | 0.0475 | 0.0544 |
| 4 | 0.0760 | 0.0530 |
| 5 | 0.0544 | 0.0519 |
| 6 | 0.0574 | 0.0510 |
| 7 | 0.0520 | 0.0498 |
| 8 | 0.0466 | 0.0490 |
| 9 | 0.0404 | 0.0470 |
| 10 | 0.0271 | 0.0458 |
| 11 | 0.0245 | 0.0447 |
| 12 | 0.0444 | 0.0434 |
| 13 | 0.0346 | 0.0420 |
| 14 | 0.0183 | 0.0404 |
| 15 | 0.0412 | 0.0392 |
| 16 | 0.0460 | 0.0383 |
| 17 | 0.0380 | 0.0374 |
| 18 | 0.0407 | 0.0367 |
| 19 | 0.0472 | 0.0358 |
| 20 | 0.0363 | 0.0351 |
| 21 | 0.0167 | 0.0346 |
| 22 | 0.0256 | 0.0340 |
| 23 | 0.0312 | 0.0336 |
| 24 | 0.0236 | 0.0333 |
| 25 | 0.0269 | 0.0327 |
| 26 | 0.0400 | 0.0324 |
| 27 | 0.0516 | 0.0319 |
| 28 | 0.0180 | 0.0319 |
| 29 | 0.0042 | 0.0318 |
| 30+ | 0.0321 | 0.0307 |

# Payroll Growth

- The amortization of the Fund's unfunded accrued liability uses a level percentage of payroll method which produces a payment stream that is designed to increase based on the expected growth in payroll
- The current assumption is 3% and statute indicates the payroll growth may not exceed 3%
- The last five years may not be a good proxy for payroll expectations in the future

| FYE 6/30 | Covered Payroll ($000) | % Change from Prior Year |
|---|---|---|
| 2019 | 272,498 | |
| 2020 | 259,235 | (4.87) |
| 2021 | 243,045 | (6.25) |
| 2022 | 255,100 | 4.96 |
| 2023 | 269,091 | 5.48 |
| | Avg | (0.17) |

- No change is recommended at this time
  - Payroll growth assumption will be reviewed when the next scheduled study is prepared as of June 30, 2027 and proposed changes, if warranted, will be recommended at that time.
  - An interim study of this assumption may be prudent upon contract settlement

# Impact of Proposed Changes

# Actuarial Impact of Recommended Changes: Based on July 1, 2023 Proposed RSVS, published November 2023

| ($000) | Current Assumptions | Proposed Assumptions | Change |
|---|---|---|---|
| Present Value of Future Benefits | $6,004,258 | $5,955,128 | ($49,130) |
| Actuarial Accrued Liability | $5,277,944 | $5,417,938 | $139,994 |
| Actuarial Value of Assets (AVA) | $5,064,764 | $5,064,764 | $0 |
| Unfunded Accrued Liability | $213,180 | $353,174 | $139,994 |
| AVA - Funded Ratio | 96.0% | 93.5% | (2.5%) |
| City Normal Cost Rate[1] | 14.53% | 10.87% | (3.66%) |
| City Accrued Liability Rate | 11.58% | 14.66% | 3.08% |
| Total City Contribution Rate[2] | 26.11% | 25.53% | (0.58%) |
| Estimated City Contribution for following Fiscal Year | $75,277 | $73,604 | ($1,673) |
| Employee Contribution Rate | 10.50% | 10.50% | 0.00% |

1. Contains an allowance for administrative expenses equal to 1.25% of payroll
2. As a percentage of pensionable compensation

# Takeaways and Next Steps

## Takeaways

- The proposed assumption changes result in a decrease in overall costs of the pension plan
- Setting assumptions closer to expected future experience should reduce gains and losses over time and make long term costs more predictable

## Next Steps

- ✓ Substantially final draft of the study to be provided to the City's actuary, including:
  - All assumptions and methods recommended by the Fund actuary
  - Summaries of the reconciled actuarial data used in creation of the experience study
- ✓ Fund actuary and City actuary confer and cooperate on reconciling and producing a final experience study
- ➢ No Longer Applicable: City actuary to notify in writing any assumptions and methods not reconciled, and City actuary's rationale
- ➢ No Longer Applicable : If applicable, Fund must notify City actuary, in writing, of any changes the Fund does not accept
  - Recommend names of three independent actuaries
  - City actuary must select one of the three names (cost shared 50/50)
  - Independent actuary reviews and sides with either fund actuary or city actuary assumption or method
  - If Fund does not accept a City assumption or method recommended by the independent actuary, City actuary can use the assumption in future RSVS reports
- ➢ **Board cannot adopt any final experience study until 180 days has elapsed**

# Disclosures

The information contained herein is developed for the Board of Trustees and Staff of Houston Firefighters' Relief and Retirement Fund by Buck Global, LLC using generally accepted actuarial principles and techniques in accordance with all applicable Actuarial Standards of Practice (ASOPs). The presentation contains key results of the June 30, 2023 four-year experience study. All recommendations contained in this report are consistent with each other, as appropriate. Interested parties should refer to the July 1, 2023 Proposed Risk Sharing Valuation, which was published November 2023, for a detailed explanation regarding data, assumptions, methods, plan provisions, applicable ASOPs and disclosures.

The purpose of this presentation is to provide information to assist the Board in adopting assumptions to be used in the actuarial valuation of the Fund. Any cost information provided is estimated and should not be used to determine the actual contributions needed for funding purposes.

No third-party recipient of Buck's work product should rely upon Buck's work product absent involvement of Buck or without our approval.

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

I am a Fellow of the Society of Actuaries and a Member of the American Academy of Actuaries. I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. I am available to answer any questions on the material contained herein, or to provide explanations or further details as may be appropriate.

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

Principal, Consulting Actuary

## Questions?

# THANK YOU

# Appendix

# Analysis for Duration Modifications

# Analysis for DROP Duration

- DROP Duration Analysis:

| Years in DROP | Exposed | Count who Exited DROP | Rate of DROP Exit | Probability of Continuing in DROP (a) | Probability of DROP Exit = 1 – (a) | % of DROP Exits |
|---|---|---|---|---|---|---|
| 0 | 74 | 11 | 14.9% | 100.0% | 0.0% | 3.8% |
| 1 | 99 | 5 | 5.1% | 85.1% | 14.9% | 1.7% |
| 2 | 209 | 7 | 3.3% | 80.8% | 19.2% | 2.4% |
| 3 | 321 | 14 | 4.4% | 78.1% | 21.9% | 4.9% |
| 4 | 382 | 19 | 5.0% | 74.7% | 25.3% | 6.6% |
| 5 | 413 | 25 | 6.1% | 71.0% | 29.0% | 8.7% |
| 6 | 319 | 19 | 6.0% | 66.7% | 33.3% | 6.6% |
| 7 | 218 | 21 | 9.6% | 62.7% | 37.3% | 7.3% |
| 8 | 182 | 25 | 13.7% | 56.7% | 43.3% | 8.7% |
| 9 | 140 | 29 | 20.7% | 48.9% | 51.1% | 10.1% |
| 10 | 95 | 24 | 25.3% | 38.8% | 61.2% | 8.4% |
| 11 | 87 | 23 | 26.4% | 29.0% | 71.0% | 8.0% |
| 12 | 68 | 35 | 51.5% | 21.3% | 78.7% | 12.2% |
| 13 | 36 | 22 | 61.1% | 10.3% | 89.7% | 7.7% |
| 14 | 12 | 4 | 33.3% | 4.0% | 96.0% | 1.4% |
| 15 | 7 | 3 | 42.9% | 2.7% | 97.3% | 1.0% |
| 16 | 1 | 0 | 0.0% | 1.5% | 98.5% | 0.0% |
| 17 | 0 | 0 | 0.0% | 1.5% | 98.5% | 0.0% |
| 18 | 0 | 0 | 0.0% | 0.0% | 100.0% | 0.0% |
| 19 | 0 | 0 | 0.0% | 0.0% | 100.0% | 0.0% |
| >19 | 4 | 0 | 0.0% | 0.0% | 100.0% | 0.0% |

- At year 0, 100% are participating in the DROP. Each succeeding year, the probability of continuing in the DROP is the prior year's amount and the prior year's probability of continuing (i.e., 1 minus the rate of retirement)
- Avg. DROP Duration is the sum of the products of Years in DROP and % of DROP Exits = 7.99 years

# GEMS Capital Market Model

# Buck's Capital Market Model

- Buck's capital market assumptions are derived from the General Economy and Market Simulator ("GEMS") developed by Conning & Company.
  - Buck determines a set of capital market assumptions based on the GEMS modeling of the key economic variables and the asset class returns that result from a factor model that forecasts future values for all asset classes in the model
- GEMS Model
  - Incorporates historical data to develop the factor model
  - Calibrates to current economic and market conditions,
  - Models the general economy and capital markets
  - Asset class means, volatilities, and correlations are determined dynamically to reflect the change over time
  - Asset class return distributions will vary depending on the time horizon modeled
- Returns modeled are benchmark returns and results don't include reductions for fees and/or expenses.