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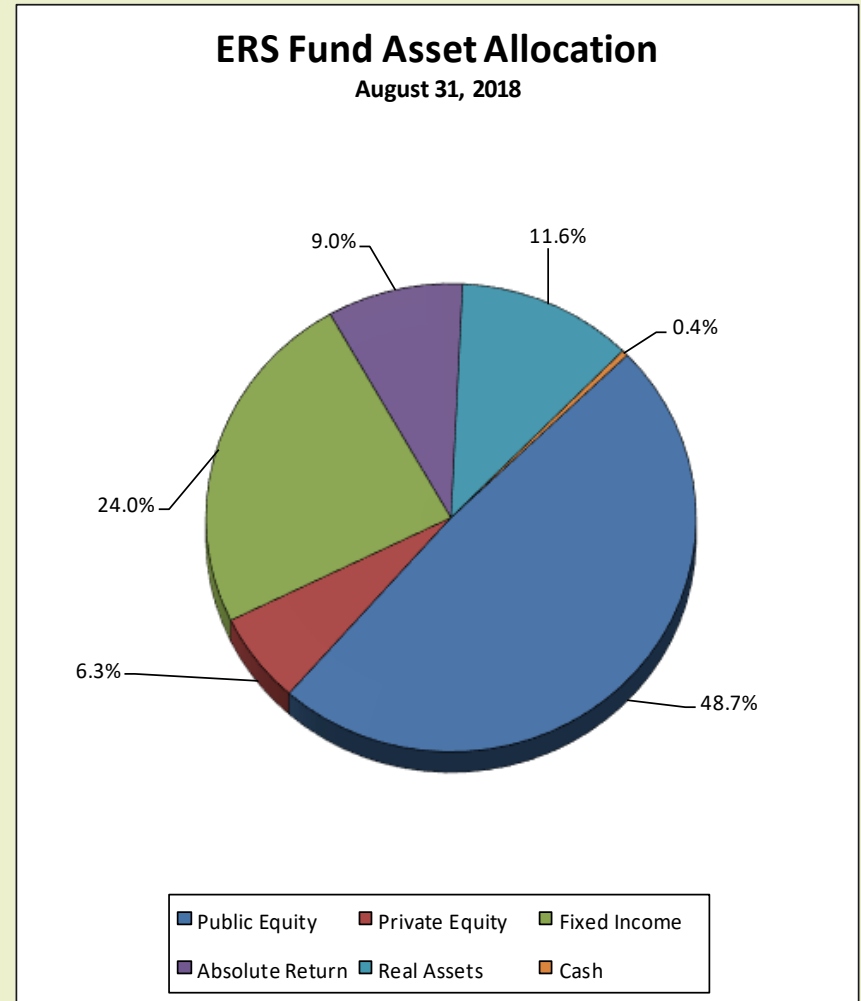
# 2019 Budget Presentation

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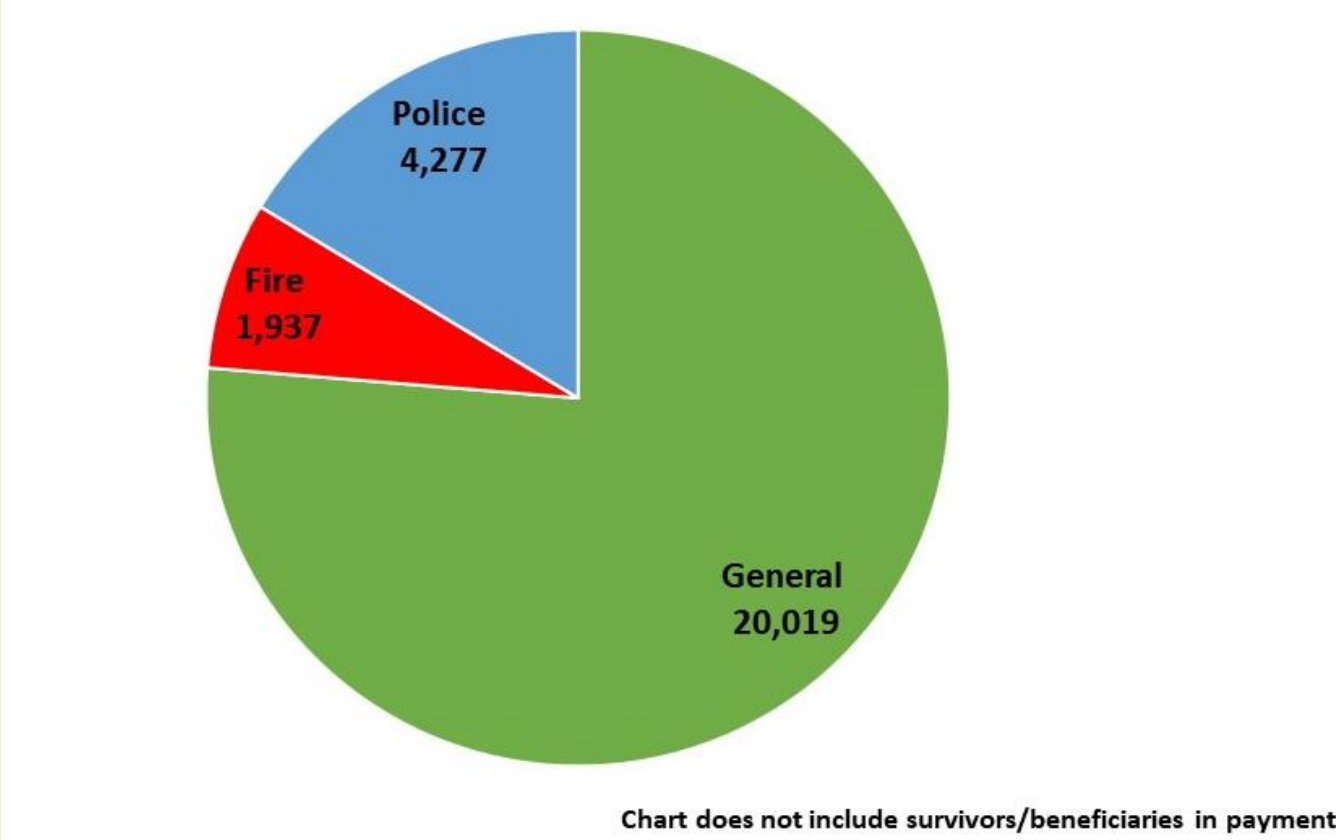
Employes' Retirement System  
October 10, 2018

# General Pension Statistics

- Fund Value: \$5.42 billion (as of August 31, 2018)
- Membership Breakdown (per 2018 valuation):
  - Actives: 10,845
  - Deferred: 3,135
  - Retirees / Beneficiaries: 13,196
- Actuarial Funded Status: 89.9% (per 2018 actuarial valuation; 92.7% based on market value)
- Total Annual Pension Payroll: \$374.0 million (est. for 2018 based on actuals through Aug. 2018)
- Total Annual Pensionable Wages : \$540.8 million (est. for 2018 based on YTD actuals through Aug.)
- Total Annual Member Contributions: \$31.2 million (est. for 2018 based on YTD actuals through Aug.)

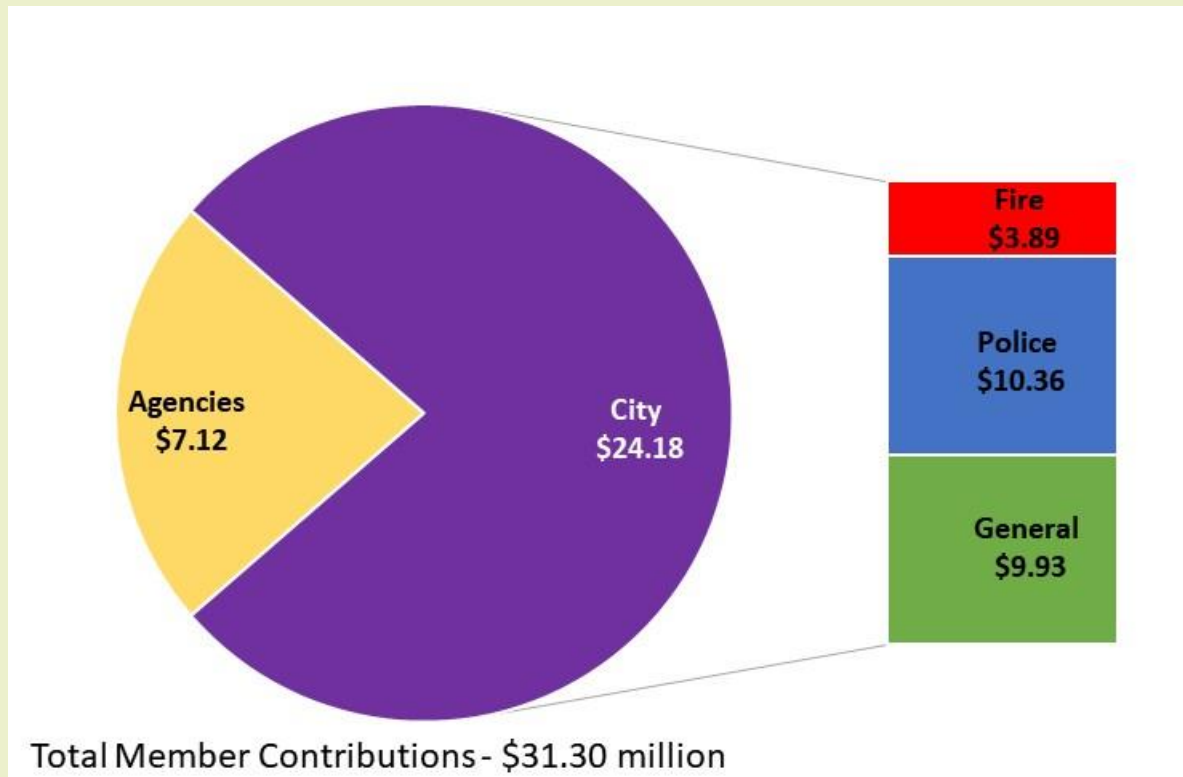


# CMERS Participant Headcount (Active, Deferred and Retired) as of July 31, 2018



# Total Annual Member Contributions

(in millions)  
(projected for 2018)



# Annual Member Contributions

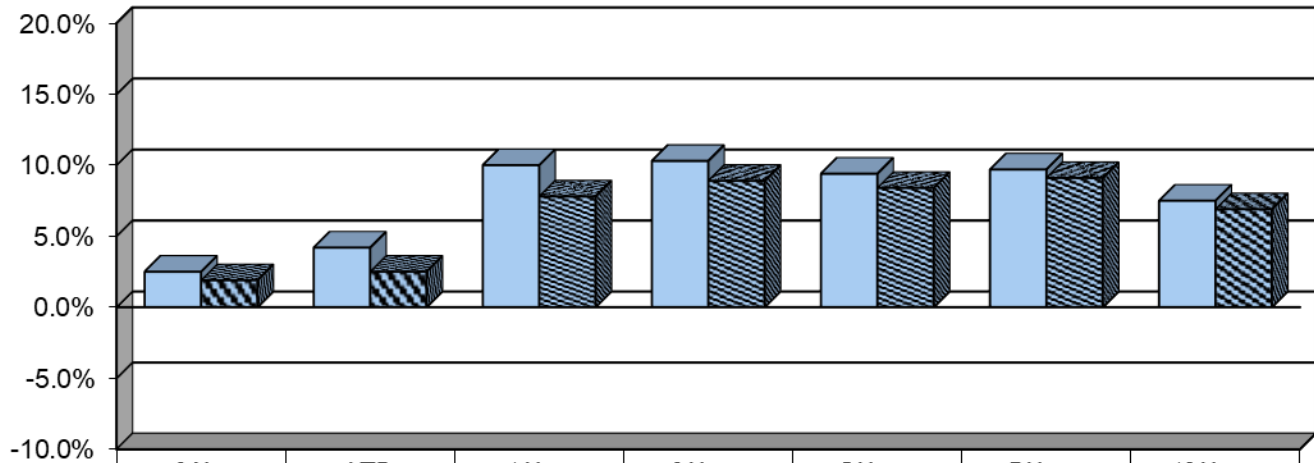
(projected for 2018)

| Unit                | Collected Through PP18-2018* |                  |                      |                      | Straightline Projection for 2018 |                   |                      |                      |
|---------------------|------------------------------|------------------|----------------------|----------------------|----------------------------------|-------------------|----------------------|----------------------|
|                     | Payroll Size                 | Employer Paid    | Employee Paid        | Total                | Payroll Size                     | Employer Paid     | Employee Paid        | Total                |
| City - General      | 134,659,898                  | -                | 6,871,583            | 6,871,583            | 194,508,741                      | -                 | 9,925,620            | 9,925,620            |
| City - Police       | 102,480,670                  | -                | 7,170,431            | 7,170,431            | 148,027,634                      | -                 | 10,357,289           | 10,357,289           |
| City - Fire         | 38,540,657                   | -                | 2,696,274            | 2,696,274            | 55,669,839                       | -                 | 3,894,618            | 3,894,618            |
| <b>City - Total</b> | <b>275,681,225</b>           | <b>-</b>         | <b>16,738,288</b>    | <b>16,738,288</b>    | <b>398,206,214</b>               | <b>-</b>          | <b>24,177,527</b>    | <b>24,177,527</b>    |
| Agencies            | 98,298,547                   | 74,852           | 4,834,340            | 4,909,192            | 142,610,429                      | 114,480           | 7,009,366            | 7,123,847            |
| <b>Total</b>        | <b>\$ 373,979,772</b>        | <b>\$ 74,852</b> | <b>\$ 21,572,628</b> | <b>\$ 21,647,481</b> | <b>\$ 540,816,643</b>            | <b>\$ 114,480</b> | <b>\$ 31,186,893</b> | <b>\$ 31,301,374</b> |

\*For certain agencies, information is only available through PP17-2018

# CMERS Investment Performance History Periods Ending August 31, 2018

August 31, 2018



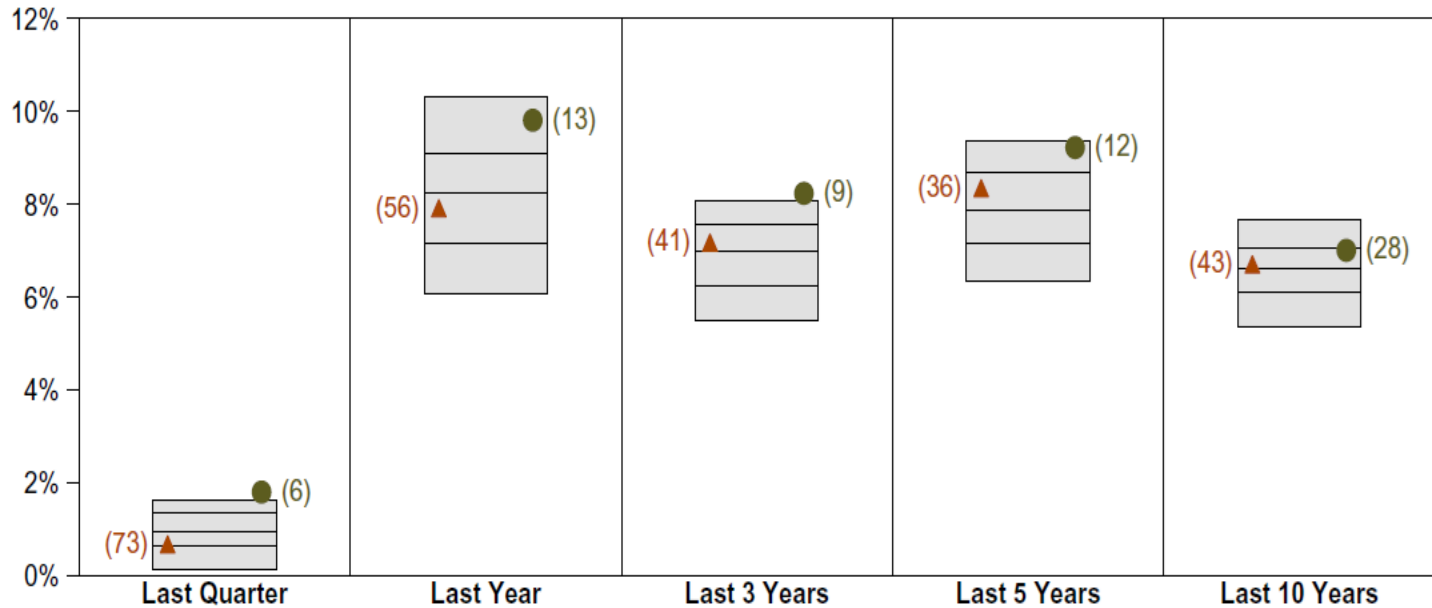
|                        | 3 Mo. | YTD  | 1 Year | 3 Years | 5 Years | 7 Years | 10 Years |
|------------------------|-------|------|--------|---------|---------|---------|----------|
| ■ Total Fund Gross     | 2.5%  | 4.2% | 10.0%  | 10.3%   | 9.4%    | 9.7%    | 7.5%     |
| ▨ Total Fund Benchmark | 1.9%  | 2.5% | 7.8%   | 8.9%    | 8.4%    | 9.1%    | 6.9%     |

Total Fund Gross
  Total Fund Benchmark

# Investment Performance Compared to Public Fund Peers

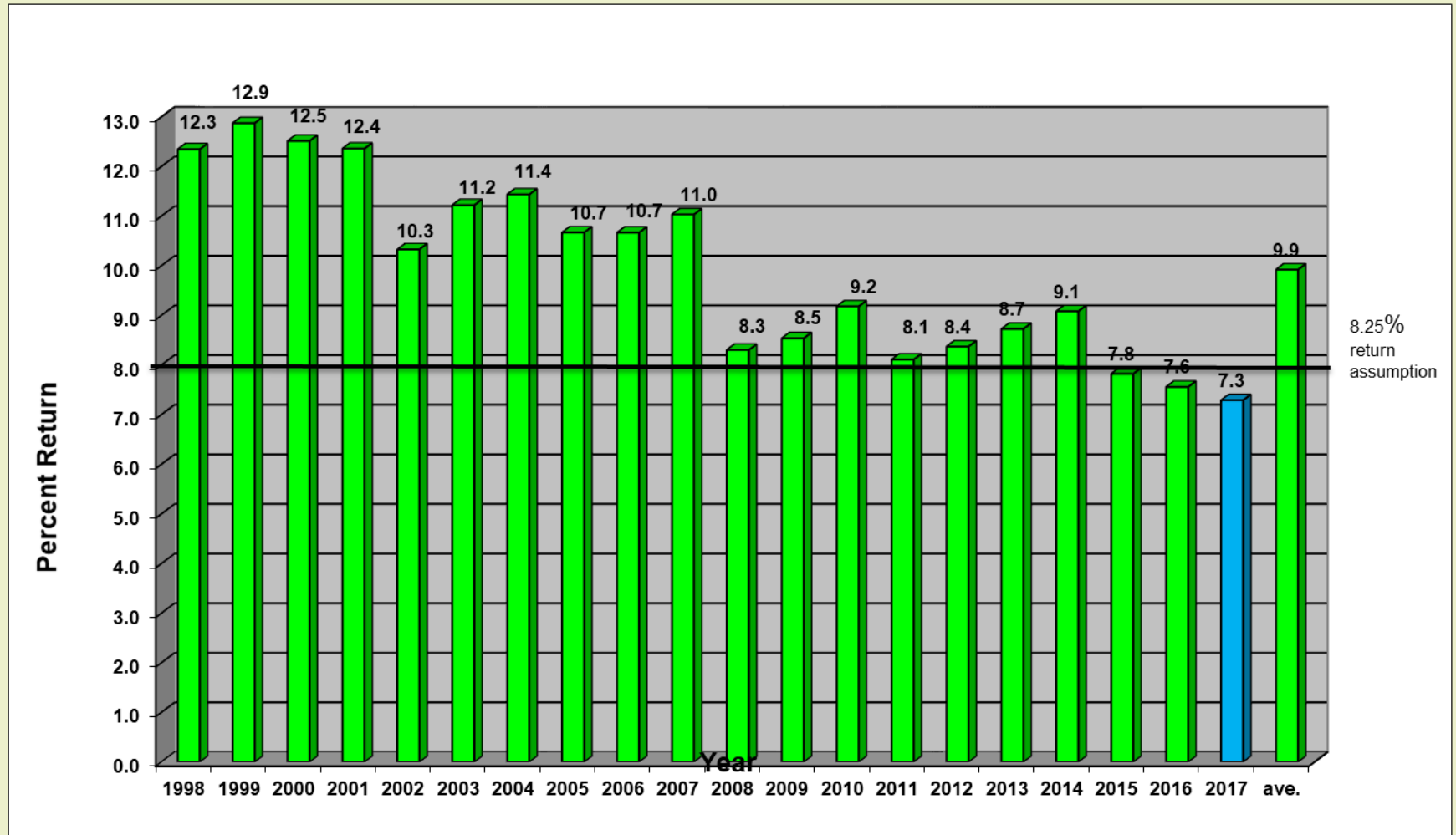
## Periods Ending June 30, 2018

### Performance vs Callan Public Fund Sponsor Database (Gross)



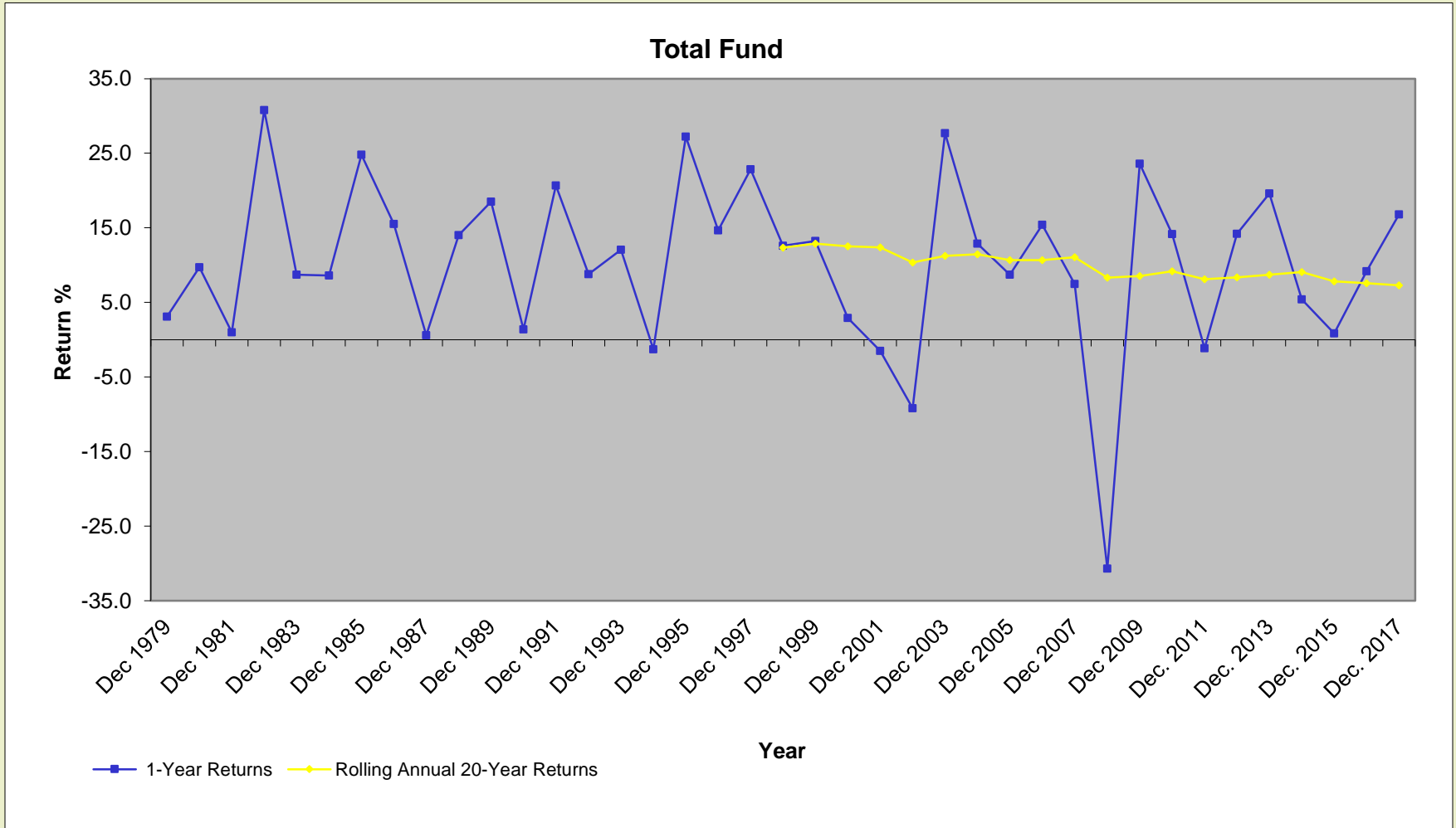
|                                     |      |       |      |      |      |
|-------------------------------------|------|-------|------|------|------|
| 10th Percentile                     | 1.60 | 10.31 | 8.07 | 9.34 | 7.65 |
| 25th Percentile                     | 1.34 | 9.09  | 7.54 | 8.66 | 7.05 |
| Median                              | 0.95 | 8.23  | 6.96 | 7.87 | 6.61 |
| 75th Percentile                     | 0.64 | 7.15  | 6.24 | 7.14 | 6.11 |
| 90th Percentile                     | 0.13 | 6.06  | 5.49 | 6.32 | 5.35 |
| <b>Total Fund</b> ●                 | 1.79 | 9.79  | 8.22 | 9.21 | 6.99 |
| <b>Total Fund Reference Index</b> ▲ | 0.66 | 7.90  | 7.16 | 8.33 | 6.69 |

# ERS 20 Year Rolling Ave. Investment Returns 1978-2017





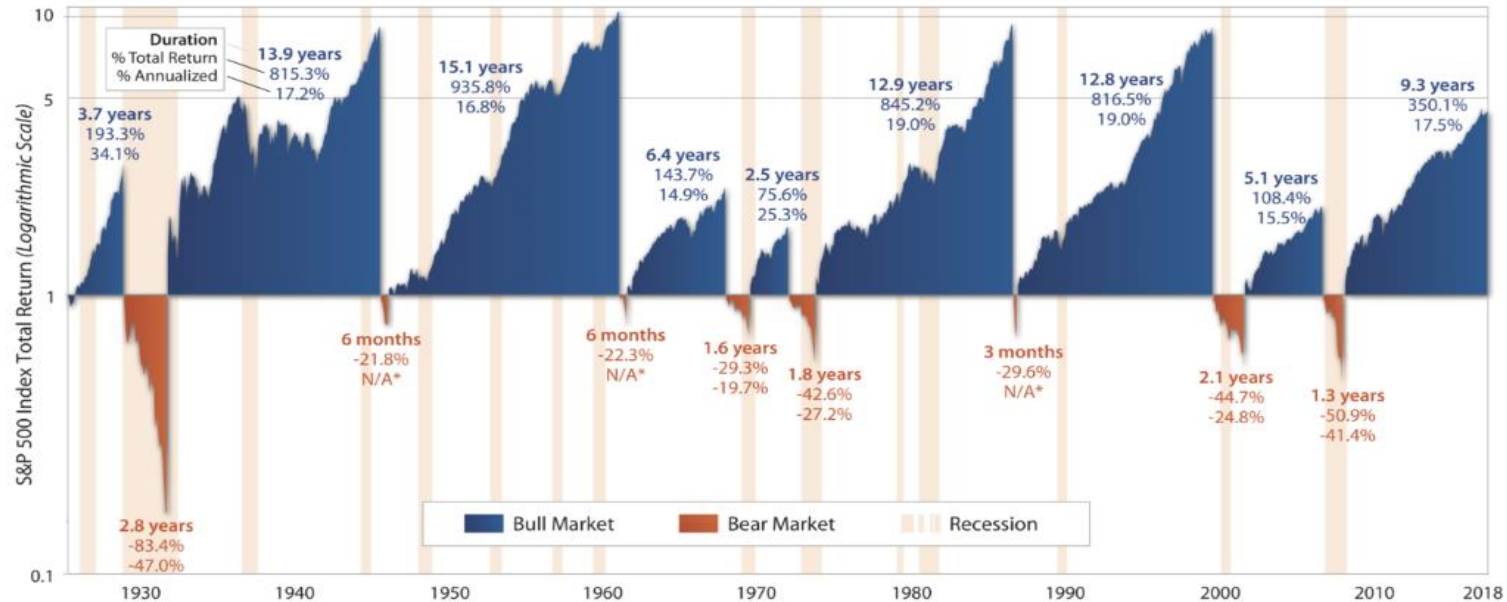
# Rolling Fund Returns 1979 - 2017



# History of U.S. Bear & Bull Markets Since 1926

This chart shows historical performance of the S&P 500 Index throughout the U.S. Bull and Bear Markets from 1926 through June 2018. Although past performance is no guarantee of future results, we believe looking at the history of the market's expansions and recessions helps to gain a fresh perspective on the benefits of investing for the long-term.

- The average **Bull Market** period lasted 9.1 years with an average cumulative total return of 476%.
- The average **Bear Market** period lasted 1.4 years with an average cumulative loss of -41%.



Source: First Trust Advisors L.P., Morningstar. Returns from 1926 - 6/29/18. \*Not applicable since duration is less than one year.

The S&P 500 Index is an unmanaged index of 500 stocks used to measure large-cap U.S. stock market performance. Investors cannot invest directly in an index. Index returns do not reflect any fees, expenses, or sales charges. This chart is for illustrative purposes only and not indicative of any actual investment. These returns were the result of certain market factors and events which may not be repeated in the future. Past performance is no guarantee of future results.

The information presented is not intended to constitute an investment recommendation for, or advice to, any specific person. By providing this information, First Trust is not undertaking to give advice in any fiduciary capacity within the meaning of ERISA and the Internal Revenue Code. First Trust has no knowledge of and has not been provided any information regarding any investor. Financial advisors must determine whether particular investments are appropriate for their clients. First Trust believes the financial advisor is a fiduciary, is capable of evaluating investment risks independently and is responsible for exercising independent judgment with respect to its retirement plan clients.

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First Trust



# Active Management versus Passive Analysis

## 23-Years

### 1/1/95 - 12/31/17

#### MERS' decision to hire some active managers versus hiring only passive managers

|   |                    | Time Weighted Returns       |             |                  | Dollar Weighted Estimates (Net of fees) |         |                          |
|---|--------------------|-----------------------------|-------------|------------------|---|---------|--------------------------|
|   |                    | Annualized MERS Asset Class |             | Annualized Index | Value of a Dollar Invested in           |         | Active Management Impact |
| MERS Asset Class  | Index              | Gross                       | Net of fees | Net of fees      | MERS Asset Class                        | Index   | \$Millions               |
| Domestic Equity   | Russell 3000       | 10.47%                      | 10.20%      | 10.09%           | \$ 9.34                                 | \$ 9.12 | \$ 127.1                 |
| International Equity*   | MSCI EAFE          | 7.70%                       | 7.29%       | 4.89%            | \$ 4.57                                 | \$ 2.81 | \$ 371.5                 |
| Global Equity **  | MSCI World / ACWI  | 9.65%                       | 9.27%       | 9.58%            | \$ 1.99                                 | \$ 2.03 | \$ (2.6)                 |
| Fixed Income  | Barclays Aggregate | 7.03%                       | 6.92%       | 5.67%            | \$ 4.66                                 | \$ 3.55 | \$ 271.0                 |
| Estimate of Fund's benefit from its decision to hire active managers over past 23 years |                    |                             |             |                  |   |         | \$ 767.1                 |

Manager Fees for indices are assumed to be:

\* \$116.3 million calculated as follows:

|   |  |                |
|---|--|----------------|
| Russell 3000 Index - 2 basis points       | MERS Domestic Equity versus Russell 3000   | \$ 127.1       |
| MSCI EAFE Index - 5 basis points          | MERS International Equity versus MSCI EAFE | \$ 371.5       |
| MSCI World / ACWI Index - 5 basis points  | MSCI EAFE versus Russell 3000              | \$ (347.2)     |
| Barclays Aggregate Index - 2 basis points | 1==  | Total \$ 151.4 |

Value estimates are based on monthly ERS asset class balances.

\* Inception Date for International Equity Composite is May 1, 1996

\*\* Inception Date for Global Equity Composite is April 1, 2010

# Stable Employer Contribution Policy

|                                     | General | Police | Fire   |
|-------------------------------------|---------|--------|--------|
| Stable Employer Contribution Policy | 8.48%   | 22.63% | 24.83% |
| Prior Contribution requirement      |         |        |        |
| 2013                                | 10.60%  | 25.87% | 27.18% |
| 2014                                | 8.36%   | 22.60% | 22.86% |
| 2015                                | 6.96%   | 19.93% | 19.98% |
| 2016                                | 6.89%   | 20.81% | 20.80% |
| 2017                                | 6.75%   | 21.35% | 20.87% |
| Average                             | 7.91%   | 22.11% | 22.34% |

When the rates are reset in late 2017, the funded ratio in 2017 will factor heavily in rate setting. The table here shows that for the last four out of five years the contribution rate has been higher under the stable rate than would have been under the previous policy.

# Stable Employer Contribution Policy

- An amendment to the MCC was adopted by the Common Council on April 30, 2013 to establish the Stable Employer Contribution Policy.
- As part of this policy, rates as a percent of payroll as of the beginning of the year were reset in 2018 to be used for calendar years 2018 through 2022:
  - General Employees - 7.48%
  - Policemen – 25.22%
  - Firemen – 26.83%
- The Prior Contribution Requirement funding policy served as the basis for re-setting the contribution rates for the Stable Employer Contribution Policy in 2018. Conduent set the Stable Employer Contribution Rates at a level which is expected to result in the funded ratio in 2023 being at least as good as the Prior Contribution Requirement.
- As part of the Stable Employer Contribution Policy, these rates are scheduled to be reset after the next five year experience study to be performed in 2022 and to be used for calendar years 2023 through 2027.

# Stable Employer Contribution Policy

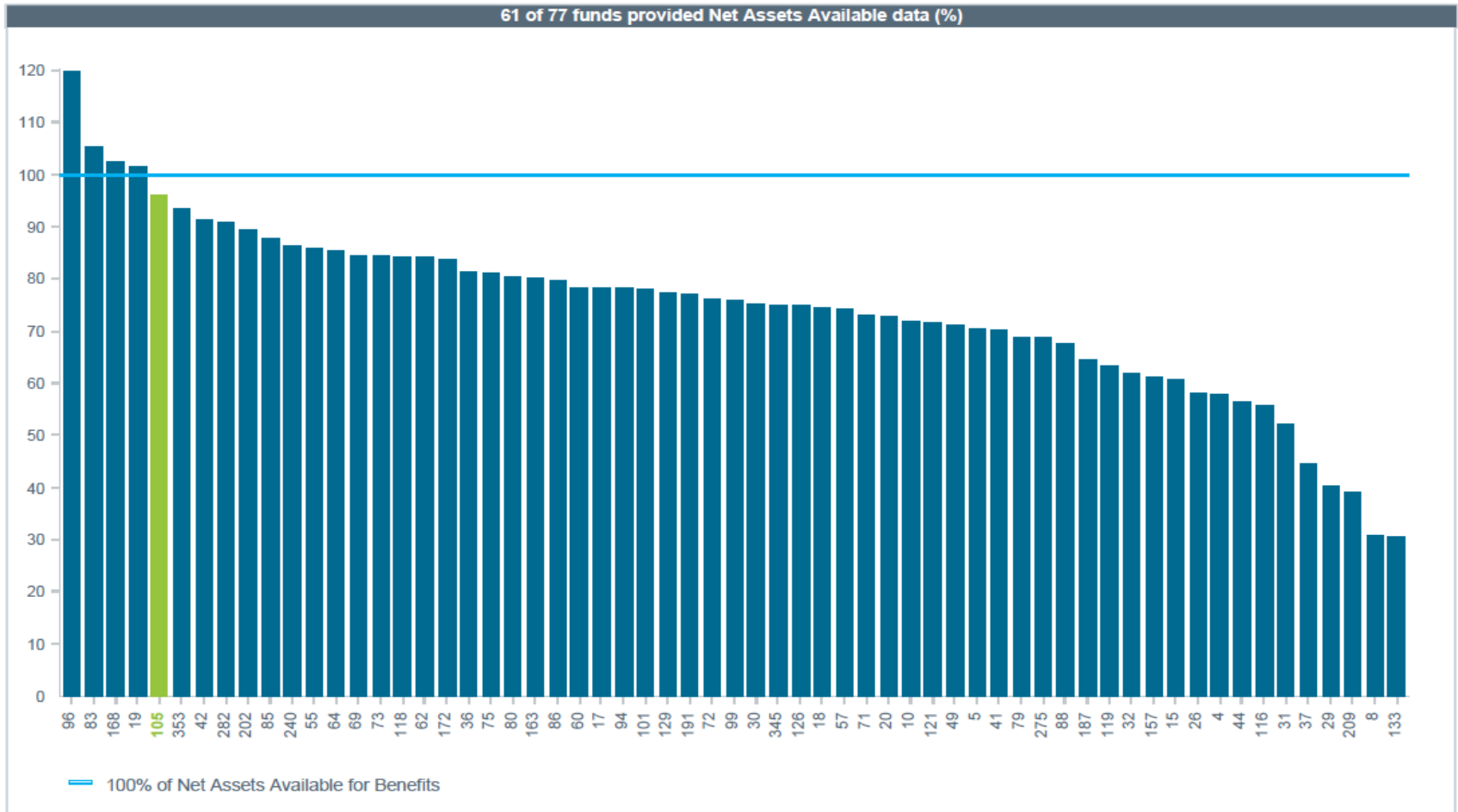
| Group       | Employer Rate based on:             |                                |   |
|-------------|-------------------------------------|--------------------------------|---|
|             | Stable Employer Contribution Policy | Prior Contribution Requirement | Market Based Prior Contribution Requirement |
| General     | 7.48%                               | 7.46%                          | 6.02%                                       |
| Policemen   | 25.22%                              | 25.13%                         | 22.03%                                      |
| Firefighter | 26.83%                              | 26.74%                         | 23.38%                                      |

- The Prior Contribution Requirement would have provided for a smaller contribution this year
- The Stable Employer Contribution Policy rates are in line with the Prior Contribution rates, as this is the first year after the reset of these rates. The above expected market asset return in 2017 will be smoothed in over the next five years.
- The Market Based Prior Contribution Requirement is an indicator of where the contribution rates may trend to when they are reset again. This year may not be a good indicator because of the above expected market asset returns in 2017.
  - The Stable Employer rates are determined using actuarial assets, so account for prior gains and losses.

Fund Number: 105

As of December 31, 2017

Net Assets Available For Benefits  
Expressed as a Percentage of the Pension Benefit Obligation



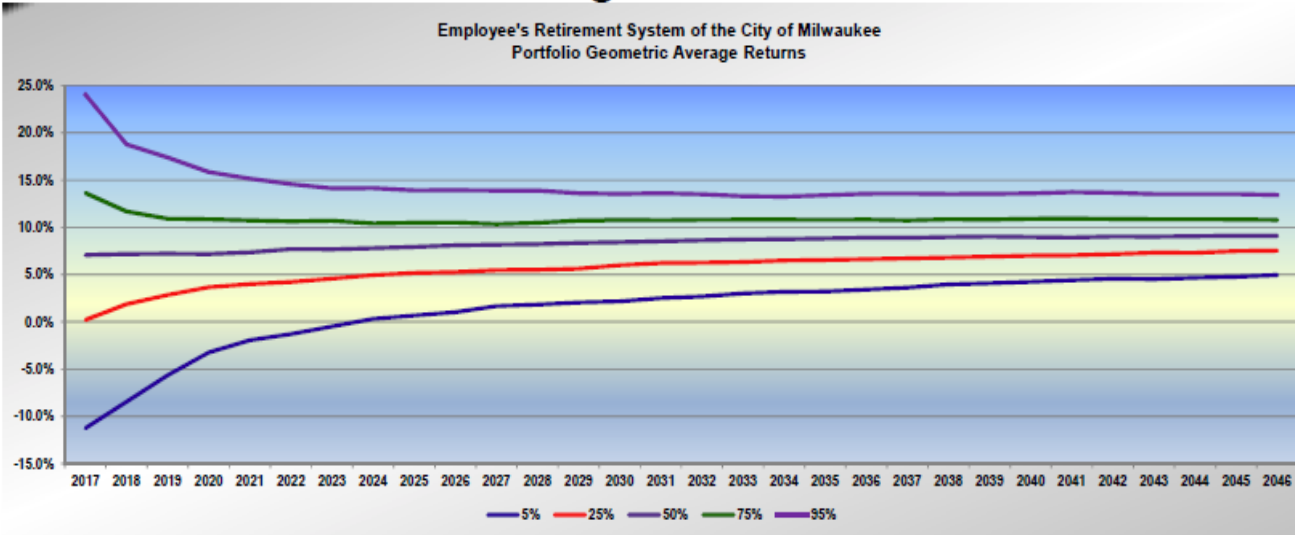
Funds that did not provide data will not appear in the chart.



# Employees' Retirement System of the City of Milwaukee



## Portfolio Geometric Average Return



Recommendation:

Could maintain current **8.5%** assumption.  
Consider lower rate for conservatism – possibly **8.0%**.

Note that these gross rates of return do not reflect investment manager fees.

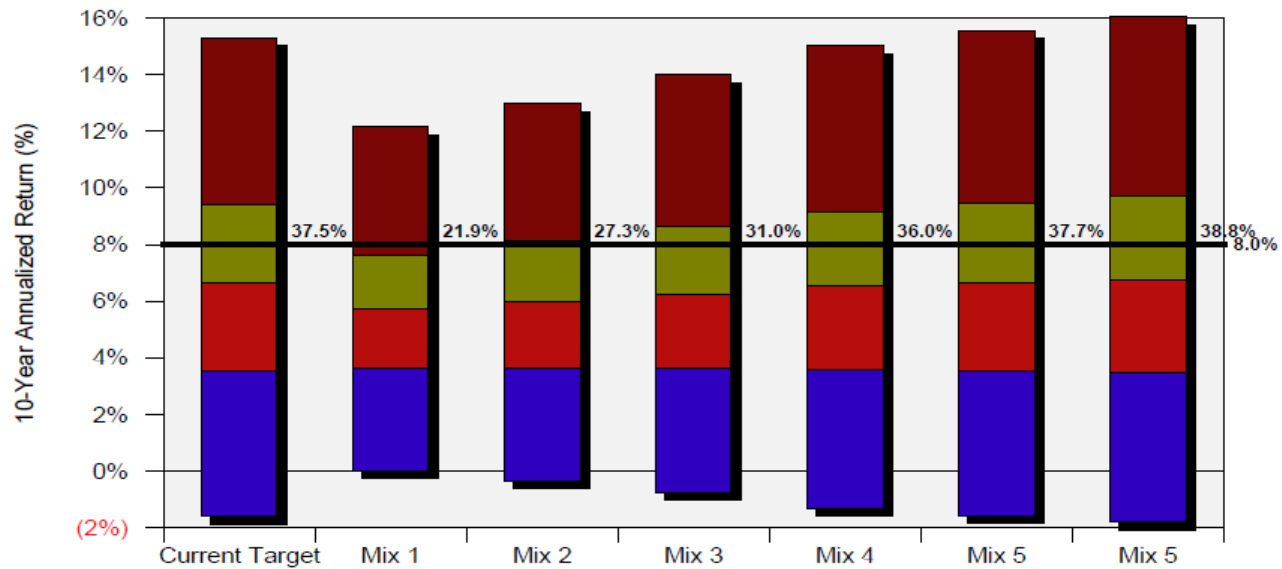
| Portfolio Geometric Average Return |        |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|------------------------------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                    | 2017   | 2018  | 2019  | 2020  | 2021  | 2022  | 2023  | 2024  | 2025  | 2026  | 2027  | 2028  | 2029  | 2030  | 2031  |
| 95th percentile                    | 24.0%  | 18.8% | 17.4% | 15.8% | 15.1% | 14.6% | 14.1% | 14.1% | 13.9% | 13.9% | 13.9% | 13.9% | 13.6% | 13.5% | 13.6% |
| 75th percentile                    | 13.6%  | 11.7% | 10.9% | 10.8% | 10.7% | 10.6% | 10.7% | 10.4% | 10.5% | 10.5% | 10.3% | 10.5% | 10.7% | 10.8% | 10.7% |
| 50th percentile                    | 7.1%   | 7.2%  | 7.2%  | 7.2%  | 7.3%  | 7.7%  | 7.7%  | 7.8%  | 7.9%  | 8.1%  | 8.2%  | 8.2%  | 8.4%  | 8.4%  | 8.5%  |
| 25th percentile                    | 0.2%   | 1.9%  | 2.8%  | 3.7%  | 4.0%  | 4.2%  | 4.6%  | 4.9%  | 5.2%  | 5.3%  | 5.5%  | 5.5%  | 5.6%  | 6.0%  | 6.2%  |
| 5th percentile                     | -11.2% | -8.5% | -5.7% | -3.2% | -1.9% | -1.3% | -0.5% | 0.3%  | 0.7%  | 1.0%  | 1.7%  | 1.8%  | 2.0%  | 2.2%  | 2.5%  |

|                 | 2032  | 2033  | 2034  | 2035  | 2036  | 2037  | 2038  | 2039  | 2040  | 2041  | 2042  | 2043  | 2044  | 2045  | 2046  |
|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 95th percentile | 13.5% | 13.3% | 13.2% | 13.4% | 13.5% | 13.6% | 13.5% | 13.5% | 13.6% | 13.7% | 13.6% | 13.5% | 13.5% | 13.5% | 13.4% |
| 75th percentile | 10.8% | 10.8% | 10.8% | 10.8% | 10.8% | 10.7% | 10.8% | 10.8% | 10.9% | 10.9% | 10.9% | 10.8% | 10.8% | 10.8% | 10.8% |
| 50th percentile | 8.6%  | 8.7%  | 8.7%  | 8.8%  | 8.9%  | 8.9%  | 9.0%  | 9.0%  | 9.0%  | 8.9%  | 9.0%  | 9.0%  | 9.0%  | 9.1%  | 9.1%  |
| 25th percentile | 6.2%  | 6.3%  | 6.5%  | 6.5%  | 6.6%  | 6.7%  | 6.8%  | 6.9%  | 7.0%  | 7.0%  | 7.1%  | 7.3%  | 7.3%  | 7.5%  | 7.5%  |
| 5th percentile  | 2.7%  | 3.0%  | 3.2%  | 3.2%  | 3.4%  | 3.6%  | 4.0%  | 4.1%  | 4.2%  | 4.4%  | 4.5%  | 4.5%  | 4.7%  | 4.8%  | 4.9%  |



# Probability of Achieving An 8.0% Return



|                 |        |       |        |        |        |        |        |
|-----------------|--------|-------|--------|--------|--------|--------|--------|
| 2nd Percentile  | 15.3%  | 12.2% | 13.0%  | 14.0%  | 15.0%  | 15.6%  | 16.0%  |
| 25th Percentile | 9.4%   | 7.6%  | 8.1%   | 8.7%   | 9.2%   | 9.5%   | 9.7%   |
| Median          | 6.6%   | 5.7%  | 6.0%   | 6.2%   | 6.5%   | 6.7%   | 6.8%   |
| 75th Percentile | 3.6%   | 3.6%  | 3.6%   | 3.6%   | 3.6%   | 3.6%   | 3.5%   |
| 97th Percentile | (1.6%) | 0.0%  | (0.3%) | (0.7%) | (1.3%) | (1.6%) | (1.8%) |
| Prob > 8.0%     | 37.5%  | 21.9% | 27.3%  | 31.0%  | 36.0%  | 37.7%  | 38.8%  |

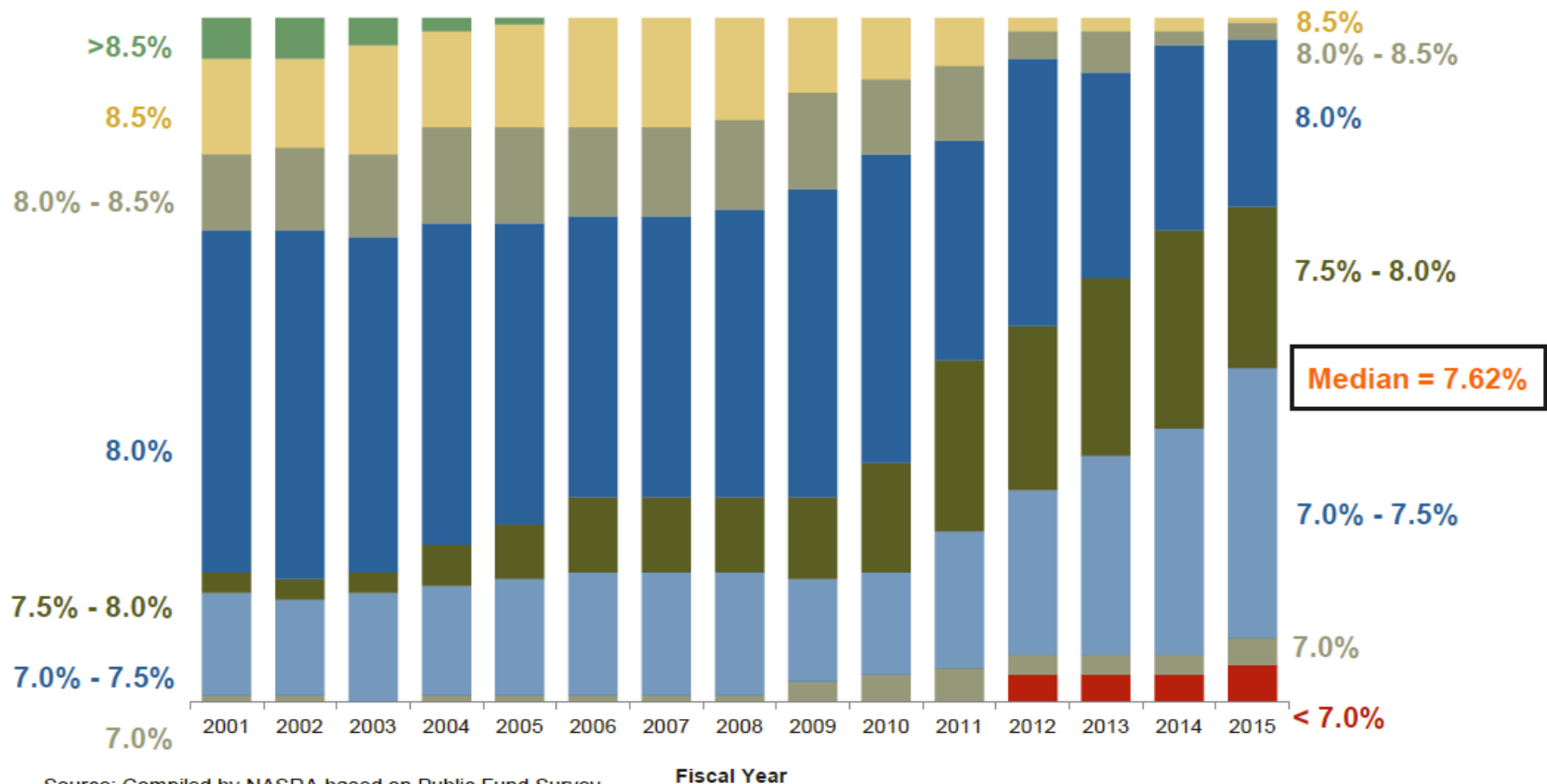
- The above chart illustrates the probability of achieving an 8.0% over the next 10 years in anticipation of lowering the assumed investment return in the Fall, 2017.

## Alternative Mixes: 30-Year Return Expectations

|                         | Current Target | Min | Max  | Mix 1 | Mix 2 | Mix 3 | Mix 4 | Mix 5 | Mix 6 |
|-------------------------|----------------|-----|------|-------|-------|-------|-------|-------|-------|
| Global Equity           | 55%            | 0%  | 52%  | 26%   | 33%   | 39%   | 46%   | 49%   | 52%   |
| Private Equity          | 5%             | 0%  | 8%   | 8%    | 8%    | 8%    | 8%    | 8%    | 8%    |
| Fixed Income            | 22%            | 0%  | 100% | 41%   | 33%   | 26%   | 18%   | 14%   | 10%   |
| Real Assets             | 10%            | 0%  | 100% | 7%    | 8%    | 9%    | 10%   | 11%   | 12%   |
| Absolute Return         | 8%             | 0%  | 18%  | 18%   | 18%   | 18%   | 18%   | 18%   | 18%   |
| Total                   | 100%           |     |      | 100%  | 100%  | 100%  | 100%  | 100%  | 100%  |
| Total Equity            | 60%            |     |      | 34%   | 41%   | 47%   | 54%   | 57%   | 60%   |
| 10-Year Expected Return | 6.4%           |     |      | 5.7%  | 5.9%  | 6.2%  | 6.4%  | 6.5%  | 6.6%  |
| 30-Year Expected Return | 7.4%           |     |      | 6.6%  | 6.9%  | 7.1%  | 7.3%  | 7.5%  | 7.5%  |
| Return Difference       | 1.0%           |     |      | 1.0%  | 1.0%  | 1.0%  | 1.0%  | 1.0%  | 1.0%  |

- Extending capital market projections out to 30 years results in a +1.0% annualized return over the 30-year forecast horizon.
- Callan believes that 10 years is an appropriate planning horizon for many strategic decisions including asset allocation
  - 10 years allows for a complete business cycle
- Shorter periods are more tactical and much longer periods (i.e. 30 years) rely on mean-reversion to elevate projections; we find that 10 years is largely appropriate
  - The focus of strategic planning should be on understanding the short term while positioning the fund for success in the long term

# Public Fund Actuarial Discount Rates



- An industry consensus on low return expectations going forward has led to a steady decline in actuarial discount rates over the last few years.

# 2018 COM Contribution - \$69.164 Million

Table 1c Allocation of Total 2018 Contributions to Employee Groups for Combined Fund

## Employer Contribution based on Stable Employer Contribution Policy

| Group                       | Active Members | Covered Compensation  | Employer Rate** | Dollar Amount Payable*** |                      |                      |                      |                      |                      |                      |                      |                      |                      |  |  |
|-----------------------------|----------------|-----------------------|-----------------|--------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|--|--|
|                             |                |                       |                 | January 1, 2018          | June 1, 2018         | July 1, 2018         | August 1, 2018       | September 1, 2018    | October 1, 2018      | November 1, 2018     | December 1, 2018     | January 31, 2019     |                      |  |  |
| General City *              | 3,289          | \$ 179,888,160        | 7.48%           | \$ 13,455,634            | 13,884,110           | 14,302,586           | 14,721,062           | 15,139,538           | 15,558,014           | 15,976,490           | 16,394,966           | 16,813,442           | 17,231,918           |  |  |
| Water Department            | 314            | 17,616,811            | 7.48%           | 1,317,737                | 1,360,678            | 1,389,433            | 1,378,244            | 1,387,112            | 1,396,036            | 1,405,018            | 1,414,058            | 1,414,058            | 1,432,313            |  |  |
| School Board****            | 4,115          | 124,086,032           | 7.48%           | 9,281,635                | 9,584,094            | 9,645,758            | 9,707,819            | 9,770,280            | 9,833,142            | 9,896,409            | 9,960,083            | 9,960,083            | 10,088,662           |  |  |
| Milwaukee Technical College | -              | -                     | 7.48%           | -                        | -                    | -                    | -                    | -                    | -                    | -                    | -                    | -                    | -                    |  |  |
| Sewerage Commission         | 223            | 18,649,602            | 7.48%           | 1,394,990                | 1,440,448            | 1,449,716            | 1,459,044            | 1,468,431            | 1,477,879            | 1,487,388            | 1,496,958            | 1,496,958            | 1,516,283            |  |  |
| Veolia                      | 32             | 2,625,812             | 7.48%           | 196,411                  | 202,811              | 204,116              | 205,429              | 206,751              | 208,081              | 209,420              | 210,768              | 210,768              | 213,488              |  |  |
| Wisconsin Center District   | 77             | 4,231,336             | 7.48%           | 316,504                  | 326,818              | 328,921              | 331,037              | 333,167              | 335,310              | 337,468              | 339,639              | 339,639              | 344,024              |  |  |
| Housing Authority           | 160            | 9,495,583             | 7.48%           | 710,270                  | 733,415              | 738,134              | 742,883              | 747,663              | 752,473              | 757,315              | 762,187              | 762,187              | 777,837              |  |  |
| Redevelopment Authority     | 8              | 700,682               | 7.48%           | 52,411                   | 54,119               | 54,467               | 54,818               | 55,170               | 55,521               | 55,872               | 56,224               | 56,224               | 56,968               |  |  |
| Policemen                   | 1,854          | 157,759,603           | 25.22%          | 39,786,972               | 41,682,302           | 41,347,834           | 41,613,867           | 41,881,612           | 42,151,080           | 42,422,281           | 42,695,227           | 42,695,227           | 43,246,399           |  |  |
| Firemen                     | 701            | 59,340,058            | 26.83%          | 15,920,938               | 16,439,750           | 16,545,834           | 16,651,978           | 16,758,117           | 16,864,346           | 16,970,568           | 17,076,789           | 17,076,789           | 17,305,243           |  |  |
| <b>TOTAL</b>                | <b>10,773</b>  | <b>\$ 574,393,679</b> |                 | <b>\$ 82,433,502</b>     | <b>\$ 85,119,745</b> | <b>\$ 85,667,408</b> | <b>\$ 86,218,595</b> | <b>\$ 86,773,328</b> | <b>\$ 87,331,629</b> | <b>\$ 87,893,524</b> | <b>\$ 88,459,034</b> | <b>\$ 88,459,034</b> | <b>\$ 89,600,922</b> |  |  |

7.48% of Pay

25.22% of Pay

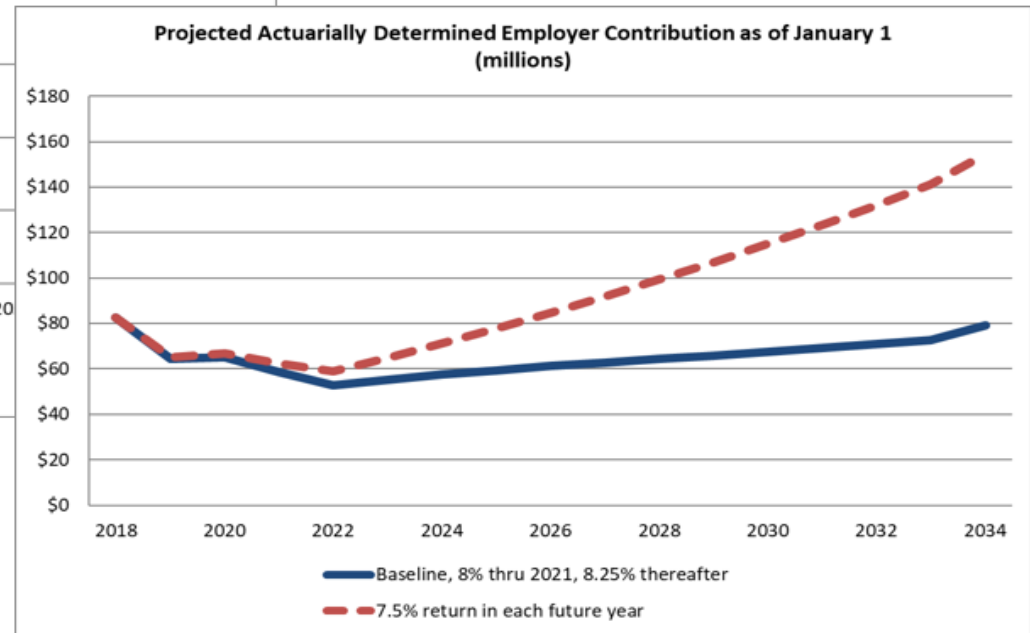
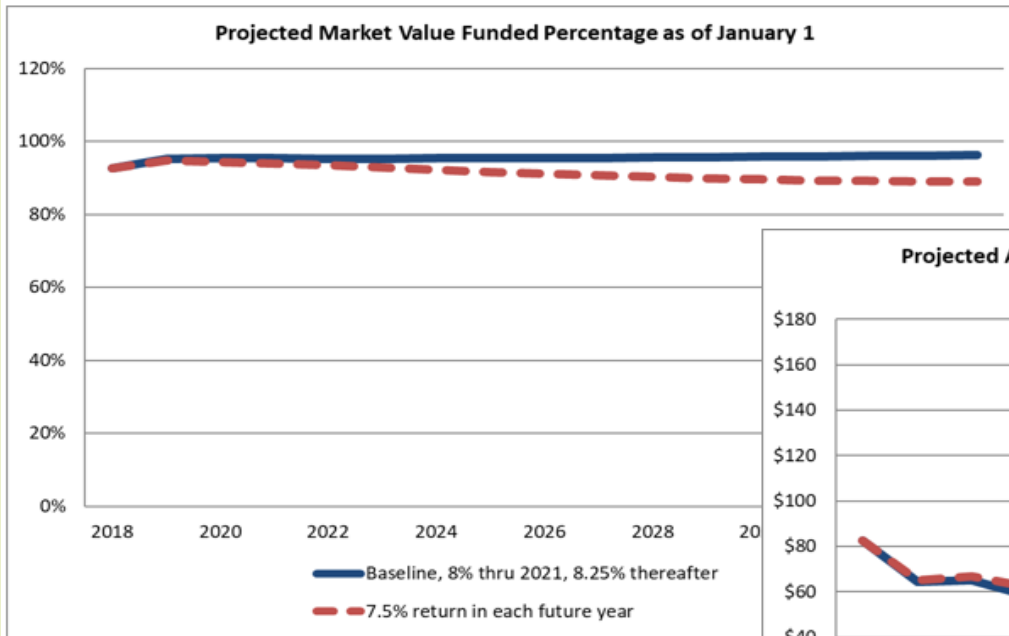
26.83% of Pay

\* Includes Elected Officials  
 \*\* Rates apply to Covered Compensation as of the beginning of the year then credited with interest to payable date  
 \*\*\* Actual contribution requirement will be adjusted for the actual payment date of the contribution.  
 \*\*\*\* Breakdown of contributions for MPS by normal cost and past service portion as follow:



# Deterministic Stress Test

- Scenario: alternative returns in all future years
  - Returns at 7.5% in each future year result in a declining funded ratio



# A Look Ahead Five Years to Future Employer Contributions Beginning in 2022

## 5. NET PENSION LIABILITY OF PARTICIPATING PLANS (cont.)

**Sensitivity of the ERS employer contributions to changes in the discount rate:** The following presents the annual employer contributions as of January 1, 2018 using the discount rate of 8.24 percent, a discount rate that is 1-percentage-point lower (7.24 percent), and a discount rate that is 1-percentage-point higher (9.24 percent) (in thousands):

|                               | <b>1% Decrease</b><br><b>(7.24%)</b> | <b>Current Discount</b><br><b>(8.24%)</b> | <b>1% Increase</b><br><b>(9.24%)</b> |
|-------------------------------|--------------------------------------|---|--------------------------------------|
| Annual employer contributions | \$ 142,403                           | \$ 82,144                                 | \$ 27,069                            |

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# Appendix

# Impact on Employer Contribution to Combined Fund



| Item   | Baseline   | Funding Method Changes - EAN and Amortization Method | EAN and Amortization Method + All Assumption Changes except interest rate | EAN and Amortization Method+All Assumption Changes +Interest rate=8.00% | EAN and Amortization Method+All Assumption Changes +Interest rate=7.50% | EAN and Amortization Method +All Assumption Changes Select & Ultimate – 8.0% for 5 years, then 8.5% | EAN and Amortization Method +All Assumption Changes Select & Ultimate – 8.0% for 5 years, then 8.25% | EAN and Amortization Method +All Assumption Changes Select & Ultimate – 7.75% for 5 years, then 7.98% |
|--|------------|--|---|---|---|---|--|---|
|  | Total      | Total  | Total   | Total   | Total   | Total   | Total  | Total   |
| 1. Active Members  | 11,004     | 11,004   | 11,004  | 11,004  | 11,004  | 11,004  | 11,004   | 11,004  |
| 2. Covered Compensation  | \$ 580,902 | \$ 580,902   | \$ 580,902  | \$ 580,902  | \$ 580,902  | \$ 580,902  | \$ 580,902   | \$ 580,902  |
| 3. Normal Cost   |            |  |   |   |   |   |  |   |
| a. Total   | 88,135     | 77,894   | 78,535  | 86,940  | 97,130  | 80,518  | 82,948   | 86,363  |
| b. Estimated Member Contributions  | 36,274     | 36,274   | 36,274  | 36,274  | 36,274  | 36,274  | 36,274   | 36,274  |
| c. Employer Normal Cost<br>(a) - (b), not less than zero                           | 51,861     | 41,620   | 42,261  | 50,666  | 60,856  | 44,244  | 46,674   | 50,089  |
| 4. Active Actuarial Accrued Liability  | 1,625,630  | 1,748,508  | 1,772,941   | 1,902,909   | 2,047,870   | 1,803,443   | 1,853,982  | 1,930,489   |
| 5. Assets  |            |  |   |   |   |   |  |   |
| a. Actuarial value   | 1,400,097  | 1,400,097  | 1,338,312   | 1,185,786   | 1,011,826   | 1,325,804   | 1,257,427  | 1,170,051   |
| b. Market value<br>(Net of Inactive Liabilities)                                   | 1,231,634  | 1,231,634  | 1,169,849   | 1,017,323   | 843,363   | 1,157,341   | 1,088,964  | 1,001,588   |
| 6. Unfunded Accrued Liability  |            |  |   |   |   |   |  |   |
| a. Actuarial value   | 225,533    | 348,411  | 434,629   | 717,123   | 1,036,044   | 477,639   | 596,555  | 760,438   |
| b. Market value<br>(4) - (5)   | 393,996    | 516,874  | 603,092   | 885,586   | 1,204,507   | 646,102   | 765,018  | 928,901   |
| 7. Amortization of UAL   |            |  |   |   |   |   |  |   |
| a. Actuarial value   | 19,476     | 24,273   | 31,674  | 50,076  | 69,236  | 34,173  | 42,170   | 52,067  |
| b. Market value<br>(Closed Amortization Years)                                     | 34,023     | 36,009   | 43,951  | 61,840  | 80,494  | 46,225  | 54,079   | 63,600  |
| 8. Full Funding Limit*   |            |  |   |   |   |   |  |   |
| a. Actuarial value   | 302,269    | 425,007  | 519,656   | 836,640   | 1,195,264   | 568,683   | 700,911  | 883,211   |
| b. Market value<br>(3) + (6), not less than zero,<br>with interest to 1/31/2018    | 485,840    | 608,577  | 703,225   | 1,020,211   | 1,378,835   | 752,252   | 884,480  | 1,066,781   |
| 9. Annual Contribution Payable January 31, 2018                                    |            |  |   |   |   |   |  |   |
| a. Actuarial value   | \$ 77,734  | \$ 71,802  | \$ 80,566   | \$ 109,777  | \$ 141,757  | \$ 85,448   | \$ 96,811  | \$ 111,317  |
| b. Market value<br>(3) + (7), with interest to 1/31/2018,<br>but not more than (8) | \$ 93,555  | \$ 84,990  | \$ 93,943   | \$ 122,595  | \$ 154,025  | \$ 98,553   | \$ 109,788   | \$ 123,884  |
| 10. Employer rate as of January 1, 2017 based on                                   |            |  |   |   |   |   |  |   |
| a. Stable Employer Contribution Policy   | 14.13%     | 14.13%   | 14.13%  | 14.13%  | 14.13%  | 14.13%  | 14.13%   | 14.13%  |
| b. Prior Contribution Requirement  | 12.28%     | 11.34%   | 12.73%  | 17.34%  | 22.39%  | 13.50%  | 15.29%   | 17.59%  |
| c. Market Based Prior Contribution Requirement                                     | 14.78%     | 13.36%   | 14.84%  | 19.37%  | 24.33%  | 15.57%  | 17.34%   | 19.57%  |

October 23, 2017

Impact shown is as if the assumption changes were effective with the January 1, 2017 valuation

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Fund Number: 105

As of December 31, 2017

## Total Fund Fee Summary in Basis Points

City of Milwaukee ERS vs. Average by Asset Range  
59 of 77 funds provided fee data for this time period

| Administrative Expenses                        | City of Milwaukee ERS | Under \$500 Million | \$500mm - \$1 Billion | \$1 - \$5 Billion | \$5 - \$10 Billion | \$10 - \$20 Billion | Over \$20 Billion |
|--|-----------------------|---------------------|-----------------------|-------------------|--------------------|---------------------|-------------------|
| Internal Inv. Div. Staff                       | 1.02                  | 0.00                | 0.44                  | 0.85              | 0.96               | 0.71                | 1.80              |
| Actuary  | 0.23                  | 2.73                | 1.75                  | 0.46              | 0.33               | 0.10                | 0.12              |
| Legal  | 0.28                  | 0.22                | 1.52                  | 0.53              | 0.25               | 0.21                | 0.24              |
| Consultant                                     | 0.00                  | 0.17                | 0.06                  | 0.52              | 0.38               | 0.16                | 0.27              |
| Audit  | 0.16                  | 0.63                | 0.66                  | 0.24              | 0.10               | 0.07                | 0.06              |
| Other Professional                             | 0.12                  | 0.02                | 4.00                  | 1.32              | 0.48               | 0.79                | 0.67              |
| General Administrative                         | 0.35                  | 3.91                | 9.20                  | 4.90              | 6.29               | 3.28                | 3.37              |
| <b>Total Administrative Expenses</b>           | <b>2.16</b>           | <b>7.68</b>         | <b>17.63</b>          | <b>8.81</b>       | <b>8.79</b>        | <b>5.32</b>         | <b>6.52</b>       |
| Investment Expenses                            | City of Milwaukee ERS | Under \$500 Million | \$500mm - \$1 Billion | \$1 - \$5 Billion | \$5 - \$10 Billion | \$10 - \$20 Billion | Over \$20 Billion |
| Custodial                                      | 0.56                  | 2.55                | 2.11                  | 1.13              | 0.73               | 0.49                | 0.29              |
| Investment Consulting                          | 0.45                  | 1.92                | 2.64                  | 1.98              | 1.06               | 0.60                | 0.36              |
| US Equity                                      | 5.41                  | 8.73                | 5.90                  | 6.44              | 6.67               | 4.15                | 2.67              |
| International Equity                           | 8.24                  | 5.82                | 5.32                  | 7.48              | 6.36               | 6.18                | 4.12              |
| Global Equity                                  | 1.91                  | 5.35                | 2.09                  | 2.27              | 2.56               | 0.35                | 1.09              |
| Fixed Income                                   | 2.40                  | 5.63                | 4.55                  | 5.85              | 3.18               | 2.33                | 3.93              |
| Real Estate                                    | 13.31                 | 10.57               | 6.27                  | 5.87              | 8.99               | 5.42                | 6.54              |
| Other Investment Management                    | 0.07                  | 0.00                | 0.01                  | 1.06              | 4.23               | 3.02                | 1.42              |
| <b>Total Investment Expenses (ex. Alt Inv)</b> | <b>32.36</b>          | <b>40.58</b>        | <b>28.90</b>          | <b>32.09</b>      | <b>33.78</b>       | <b>22.55</b>        | <b>20.43</b>      |
| Alternative Investments                        | 34.32                 | 7.36                | 6.23                  | 14.51             | 26.26              | 12.90               | 20.52             |
| <b>Total Investment Expenses</b>               | <b>66.67</b>          | <b>47.94</b>        | <b>35.13</b>          | <b>46.60</b>      | <b>60.04</b>       | <b>35.45</b>        | <b>40.95</b>      |
| <b>Total Expenses</b>                          | <b>68.84</b>          | <b>55.61</b>        | <b>52.76</b>          | <b>55.41</b>      | <b>68.83</b>       | <b>40.77</b>        | <b>47.47</b>      |

Expressed in basis points on total fund assets. Funds that did not provide fee data will not appear in the table.

