

# City of Grand Rapids General Retirement System

5-Year Experience Study

July 1, 2014 through June 30, 2019





May 5, 2020 (Updated June 8, 2020)

Board of Trustees  
City of Grand Rapids General Retirement System  
Grand Rapids, Michigan

Dear Board Members:

Presented in this report are the results of an **actuarial investigation of experience** of the City of Grand Rapids General Retirement System. The investigation was conducted for the purpose of updating the actuarial assumptions used in computing Retirement System actuarial liabilities and establishing employer contribution rates.

The investigation was based upon the data furnished for the annual actuarial valuations during the period **July 1, 2014 through June 30, 2019**. Results were updated after the initial presentation to the Board to include a new scenario.

We believe that the actuarial assumptions recommended in this experience study report represent, individually and in the aggregate, reasonable estimates of future experience of the City of Grand Rapids General Retirement System.

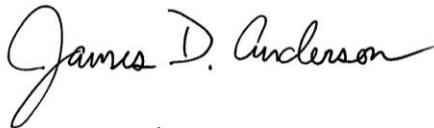
This report should not be relied on for any purpose other than that described above. It was prepared at the request of the Retirement Board and is intended for use by the Board Members and those designated or approved by the Board Members. This report may be provided to parties other than the Board Members only in its entirety and only with the permission of the Board Members. GRS is not responsible for unauthorized use of this report.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. We certify that, to the best of our knowledge, this report is complete and accurate and was made in accordance with standards of practice promulgated by the Actuarial Standards Board.

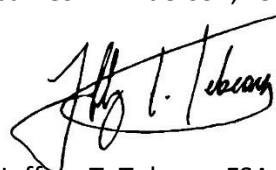
The signing individuals are independent of the plan sponsor.

James D. Anderson and Jeffrey T. Tebeau are independent of the plan sponsor, are Members of the American Academy of Actuaries (MAAA) and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,



James D. Anderson, FSA, EA, FCA, MAAA



Jeffrey T. Tebeau, FSA, EA, MAAA



David L. Hoffman

JDA/JTT/DLH:dj

C0547



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## Executive Summary

The last investigation of actuarial assumptions and methods was prepared for the period from July 1, 2009 through June 30, 2014. In this report, we review the current actuarial assumptions and methods and compare them to the actual experience of the Retirement System for the period from July 1, 2014 through June 30, 2019.

The table below lists each of the primary assumptions and methods that we analyzed, including our recommendations for each item, and the impact of any recommended changes on average liabilities and contributions.

Assumption	Recommendation	Financial Impact
Retirement Rates	No Change	No Change
Turnover Rates	Increase	Decrease
Disability Rates	Increase	Decrease
Pre- and Post-Retirement Mortality Rates	Various	Increase
Pay Increases Due to Seniority	No Change	N/A
Price Inflation	Decrease	N/A
Wage Inflation	Decrease	Decrease*
Interest Rate	Decrease	Increase
<b>Total</b>	<b>Various</b>	<b>Increase</b>

*\*Results in decreased active actuarial liabilities but may have a slight offsetting (increasing) effect on the contribution rate due to lower projected payroll.*

The overall impact of the recommendations on the Retirement System was an increase in the computed contribution of approximately 3% to 11% of payroll (depending on the economic assumption set), as shown on page 21.

# Introduction

Each year, as of June 30<sup>th</sup>, the actuarial liabilities of the City of Grand Rapids General Retirement System are valued. In order to perform the valuations, assumptions must be made regarding the future experience relating to the following risk areas:

- Rates of **retirement** among active members;
- Rates of **termination** of active members;
- Rates of **disability** among active members;
- Rates of **mortality** among active members, inactive members, retirants, and beneficiaries;
- Long-term rates of **investment return** to be generated by the assets of the System; and
- Patterns of **salary increases** to active members.

Assumptions should be carefully chosen and continually monitored. Continued use of outdated assumptions can lead to:

- Understated costs resulting in either an inability to pay benefits when due or sharp increases in required contributions at some point in the future; and
- Overstated costs resulting in either benefit levels that are kept below the level that could be supported by the computed rate or an unnecessarily large burden on the current generation of members, employers, and taxpayers.

A single set of assumptions will not be suitable indefinitely. Things change, and our understanding of things also changes. In recognition of this, assumptions used to value the liabilities of the Retirement System should be reviewed and adjusted periodically to recognize changes in experience trends, a changing economic environment (or changing perceptions of the economic environment), and to maintain consistency within the universe of public employee retirement systems.

A common practice among public employee retirement systems is that the actuary recommends a set of demographic assumptions and suggests a range of reasonable alternate economic assumptions. Following discussion involving the actuary, the plan governing body, and other professionals, the plan governing body makes a final choice from the various alternatives.

## **SECTION A**

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### **DEMOGRAPHIC ASSUMPTIONS**

# Retirement

**Discussion:** Rates of retirement are used to measure the probabilities of an eligible member retiring from City employment during the next year. During the study period, actual rates of retirement were in line with expectations.

**Summary of Experience:** The experience during the study period is summarized below:

<u>Actual</u>	<u>Expected</u>	<u>Actual/Expected</u>
190	180.1	105%

**Proposal:** We recommend no change to the rates.

## Rates of Retirement

<u>Retirement Ages</u>	<u>Current Percent Retiring</u>	<u>Proposed Percent Retiring</u>
50	40	40
51	40	40
52	40	40
53	40	40
54	40	40
55	40	40
56	40	40
57	40	40
58	40	40
59	40	40
60	40	40
61	40	40
62	40	40
63	40	40
64	40	40
65	50	50
66	60	60
67	70	70
68	80	80
69	90	90
70	100	100



# Turnover

**Discussion:** The tables below summarize recent experience and the current and proposed rates of termination.

**Summary of Experience:** The experience during the study period is summarized below:

<u>Actual</u>	<u>Expected</u>	<u>Actual/Expected</u>
76	44.5	171%

**Proposal:** We recommend increasing rates of turnover as shown below. This change will put slight downward pressure on liabilities.

## Turnover Rates

Sample Ages	Years of Service	<u>Current</u>		<u>Proposed</u>	
		<u>% of Active members Separating within Next Year</u>		<u>% of Active members Separating within Next Year</u>	
		Men	Women	Men	Women
ALL	0	15.00	15.00	15.00	15.00
	1	8.00	8.00	8.00	8.00
	2	7.00	7.00	7.00	7.00
	3	6.00	6.00	6.00	6.00
	4	5.00	5.00	5.00	5.00
20	5 & Over	3.53	7.94	6.04	13.57
25		3.44	7.72	5.87	13.21
30		3.29	7.22	5.62	12.35
35		3.05	6.28	5.22	10.73
40		2.72	5.15	4.65	8.81
45		2.30	3.98	3.93	6.80
50	1.61	2.56	2.75	4.38	
55	0.61	0.94	1.04	1.61	
60	0.06	0.09	0.10	0.15	

## Disability

**Discussion:** The actual number of disability retirements was greater than those expected during the study period.

**Summary of Experience:** The experience during the study period is summarized below:

<b>Actual</b>	<b>Expected</b>	<b>Actual/Expected</b>
8	3.0	267%

**Proposal:** We recommend an increase in the disability rates. This will result in a slight decrease in computed liabilities and contributions.

## Rates of Disability

Sample Ages	Current % of Active Members Becoming Disabled Within Next Year	Proposed % of Active Members Becoming Disabled within Next Year
20	0.01 %	0.01 %
25	0.01	0.01
30	0.01	0.01
35	0.04	0.07
40	0.07	0.13
45	0.16	0.29
50	0.31	0.56
55	0.47	0.84
60	0.61	1.09

## Duty/Non-Duty Disability Split

**Discussion:** We recommend no change to the current duty/non-duty disability split. The current assumption is shown below:

	Duty Related	Non-Duty Related
Cause of Disability:	Men	30%
	Women	70%

# Mortality

## ***Mortality Experience***

Post-retirement mortality is an important component in cost calculations and should be updated from time to time to reflect current and expected future longevity improvements. Pre-retirement mortality is a relatively minor component in cost calculations. The frequency of pre-retirement deaths is so low that mortality assumptions based on actual experience can only be produced for very large retirement systems, if at all.

## ***Actuarial Standards of Practice***

Actuarial Standards of Practice (ASOP) No. 35 Disclosure Section 4.1.1 states, “The disclosure of the mortality assumption should contain sufficient detail to permit another qualified actuary to understand the provision made for future mortality improvement. If the actuary assumes zero mortality improvement after the measurement date, the actuary should state that no provision was made for future mortality improvement.” The current mortality rates used in the valuation include a provision for future mortality improvement.

## ***New Mortality Tables and Projection Scale***

Recently, the Society of Actuaries (SOA) published a mortality study specific to public sector retirement systems. This very comprehensive study includes numerous mortality tables created for each classification of employee (General members, Public Safety, Teachers, Survivors, Juvenile, headcount-weighted, benefit-weighted, above median, below median). In addition, the SOA updates mortality projection scales annually – the latest published table is called the MP-2019 Projection Scale – which accounts for future improvements in mortality that are expected to occur. Lastly, the SOA recommends the use of ‘fully generational’ (2-dimensional) projection scales.

***Discussion:*** The mortality assumption used in the annual valuations of the Retirement System measures the probabilities of members dying before retirement and the probability of each benefit payment being made after retirement. While there were more deaths than expected (224 actual vs. 157.6 expected) among retirees over the experience period, the membership in this group is not sufficiently large to set mortality expectations for the future. The mortality tables currently used in the annual valuation of the Retirement System is the RP-2014 mortality tables projected to the year 2019 using projection scale MP-2014. As noted above, newer mortality tables have been released, reflecting declining mortality rates among retired public employees and the Mortality Projection scales have been updated each year through 2019. This is reflected in the most recent published mortality tables released in 2019 by the SOA (Pub-2010 mortality tables, projection scale MP-2019). Lastly, note that the Pub-2010 table is required for State reporting for 2020 under Public Act 202.

We recommend the use of the Pub-2010 amount-weighted General tables, in conjunction with the MP-2019 Projection Scale on a fully generational basis.

## Mortality (Continued)

**Proposal:** We recommend the following mortality tables for use in future valuations of the Retirement System; this change will very slightly decrease measured liabilities:

- **Healthy Pre-Retirement:** The Pub-2010 Amount-Weighted, General, Employee, Male and Female tables, a base year of 2010 and future mortality improvements projected using scale MP-2019.
- **Healthy Post-Retirement:** The Pub-2010 Amount-Weighted, General, Healthy Retiree, Male and Female tables, with a base year of 2010 and future mortality improvements projected using scale MP-2019.
- **Disability Retirement:** The Pub-2010 Amount-Weighted, General, Disabled Retiree, Male and Female, with a base year of 2010 and future mortality improvements projected using scale MP-2019.

## Mortality (Concluded)

### Summary of Life Expectancies Under the Current Tables

Sample Age Now	Pre-Retirement Future Life		Healthy Post-Retirement Future Life		Disabled Retirement Future Life	
	Expectancy (Years)		Expectancy (Years)		Expectancy (Years)	
	Men	Women	Men	Women	Men	Women
50	35.05	39.48	33.25	35.95	23.75	28.16
55	30.36	34.71	28.92	31.44	20.96	24.79
60	25.81	30.01	24.73	27.02	18.26	21.51
65	21.48	25.39	20.70	22.74	15.56	18.23
70	17.41	20.87	16.85	18.67	12.93	15.02
75	13.64	16.54	13.26	14.86	10.41	12.06
80	10.20	12.42	10.01	11.41	8.08	9.45

### Summary of Life Expectancies Under the Proposed Tables

Sample Age Now	Pre-Retirement Future Life		Healthy Post-Retirement Future Life		Disabled Retirement Future Life	
	Expectancy (Years)^		Expectancy (Years)^		Expectancy (Years)^	
	Men	Women	Men	Women	Men	Women
50	39.33	41.54	35.45	38.42	25.86	28.53
55	34.28	36.39	30.55	33.44	22.40	25.11
60	29.34	31.33	25.85	28.58	19.35	21.99
65	24.55	26.35	21.37	23.85	16.52	18.82
70	19.87	21.47	17.11	19.29	13.74	15.48
75	15.28	16.70	13.15	15.02	10.99	12.21
80	10.83	12.11	9.68	11.21	8.44	9.32

^ Using sample ages as of 2019.

## **SECTION B**

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### **ECONOMIC ASSUMPTIONS**

## Summary of Findings - Economic Assumptions

Economic assumptions include **long-term rates of investment return** (net of administrative and investment expenses), **wage inflation** (the across-the-board portion of salary increases), and pay increases due to **merit and seniority**. Unlike demographic activities, economic activities do not lend themselves to analysis solely on the basis of internal historical patterns because both salary increases and investment return are affected more by external forces; namely inflation (both wage and price), general productivity changes, and the local economic environment which defy accurate long-term prediction. Estimates of economic activities are generally selected on the basis of the expectations in an inflation-free environment and then both long-term rates of investment return and wage inflation are increased by some provision for long-term inflation.

If inflation and/or productivity increases are lower than expected, it will probably result in both actual rates of salary increases and investment return below the assumed rates. Salaries increasing at rates less than expected produce lower liabilities. However, actual investment return below the assumed rate of investment return (whether due to manager performance, change in the mix of assets, or general market conditions) results in lower than expected asset amounts.

Sources considered in the analysis of the economic assumptions included:

- Actual System experience over the last five years (i.e., merit and seniority pay increases);
- Future expectations of various investment firms;
- Forward-looking price inflation forecasts from various sources; and
- Historical observations of inflation statistics (both price and wage) and investment returns.

Current economic assumptions for the System are as follows:

Investment Return	7.00%
Wage Inflation	3.25%
Price Inflation	2.50%
Spread Between Investment Return and Wage Inflation	3.75%
Spread Between Investment Return and Price Inflation	4.50%

## Economic Assumptions – ASOP No. 27

Guidance regarding the selection of economic assumptions for measuring pension obligations is provided by Actuarial Standards of Practice (ASOP) No. 27. The standard requires that the selected economic assumptions be consistent with each other. That is, the selection of the investment return assumption should be consistent with the selection of the wage inflation and price inflation assumptions.

The recently adopted revision of ASOP No. 27 (applicable to valuation dates on or after September 30, 2014) defines a reasonable economic assumption as an assumption that has the following characteristics:

- (a) It is appropriate for the purpose of the measurement;
- (b) It reflects the actuary's professional judgment;
- (c) It takes into account historical and current economic data that is relevant as of the valuation date;
- (d) It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and
- (e) It has no significant bias (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included and disclosed under Section 3.5.1, or when alternative assumptions are used for the assessment of risk.

**Public Act 202.** Under Public Act 202 of the State of Michigan, Michigan municipalities will be required to report liabilities under new uniform assumption guidelines. While the current guidelines are currently only for reporting purposes (and not funding), city governments may be encouraged to use these new assumptions for funding. The guidelines include the following (for fiscal year 2020 reporting):

- Investment return no higher than 7.0%;
- Assumed wage inflation no lower than 3.5%\*;
- Mortality assumption that uses a version of the Pub-2010 table\*; and
- Amortization period no longer than 19 years for pension plans.

\* Or based on an actuarial experience study conducted within the last five years.



## Summary of Findings - Economic Assumptions (Continued)

**Price Inflation.** While no specific price inflation assumption is necessary in order to perform the actuarial valuation, price inflation is a key component of the underlying wage inflation and interest rate assumptions. The chart on the next page shows forward looking inflation expectations from various published sources. Over the past 50 years, price inflation has averaged 4.0% -- heavily affected by the high inflationary period of the 1970's and early 1980's. During the past decade, price inflation averaged 1.8%. The 2019 annual report of the Social Security Trustees uses 2.6% as the intermediate assumption. **Based upon the reviewed data, we suggest the Board adopt the price inflation assumption of 2.25%.**

## Summary of Findings - Economic Assumptions (Continued)

Forward-Looking Price Inflation Forecasts <sup>a</sup>	
<b>Congressional Budget Office<sup>b</sup></b>	
5-Year Annual Average	2.46%
10-Year Annual Average	2.38%
<b>Federal Reserve Bank of Philadelphia<sup>c</sup></b>	
5-Year Annual Average	2.20%
10-Year Annual Average	2.20%
<b>Federal Reserve Bank of Cleveland<sup>d</sup></b>	
10-Year Expectation	1.71%
20-Year Expectation	1.93%
30-Year Expectation	2.09%
<b>Federal Reserve Bank of St. Louis<sup>e</sup></b>	
10-Year Breakeven Inflation	1.61%
20-Year Breakeven Inflation	1.81%
30-Year Breakeven Inflation	1.78%
<b>U.S. Department of the Treasury<sup>f</sup></b>	
10-Year Breakeven Inflation	1.65%
20-Year Breakeven Inflation	1.78%
30-Year Breakeven Inflation	1.87%
50-Year Breakeven Inflation	1.95%
100-Year Breakeven Inflation	2.00%
<b>Social Security Trustees<sup>g</sup></b>	
Ultimate Intermediate Assumption	2.60%

<sup>a</sup>Version 2019-12-31 by Gabriel, Roeder, Smith & Company. Revised 2020-02-26.

<sup>b</sup>The Budget and Economic Outlook: 2020 to 2030, Release Date: January 2020, Consumer Price Index (CPI-U), Percentage Change from Fourth Quarter to Fourth Quarter, 5-Year Annual Average (2020 - 2024), 10-Year Annual Average (2020 - 2029).

<sup>c</sup>*Survey of Professional Forecasters*, Fourth Quarter 2019, Release Date: November 15, 2019, Headline CPI, Annualized Percentage Points, 5-Year Annual Average (2019 - 2023), 10-Year Annual Average (2019 - 2028).

<sup>d</sup>Inflation Expectations, Model output date: December 1, 2019.

<sup>e</sup>The breakeven inflation rate represents a measure of expected inflation derived from X-Year Treasury Constant Maturity Securities and X-Year Treasury Inflation-Indexed Constant Maturity Securities. Observation date: December 1, 2020.

<sup>f</sup>*The Treasury Breakeven Inflation (TBI) Curve*, Monthly Average Rates, December 2019.

<sup>g</sup>*The 2019 Annual Report of The Board of Trustees of The Federal Old-Age And Survivors Insurance and Federal Disability Insurance Trust Funds*, April 25, 2019, Long-range (75-year) assumptions, Intermediate, Consumer Price Index (CPI-W), for 2021 and later.

## Summary of Findings - Economic Assumptions (Continued)

**Wage Inflation.** Wage inflation consists of two components: 1) a portion due to pure price inflation (i.e., increases due to changes in the CPI); and 2) increases in average salary levels in excess of pure price inflation (i.e., increases due to changes in productivity levels, supply and demand in the labor market and other macroeconomic factors). The long-term rate of increase in National Average Earnings over the last 50 years is higher than the current assumption, although shorter term averages are lower. It is expected that, in the long run, salary increases in all parts of the country will be close to the national averages. However, few economists are forecasting a repeat of the high inflation rates experienced in the 1970s. Given our suggestion for a 2.25% price inflation assumption, we believe a reasonable range for this assumption is from 2.75% to 3.25% a year. **We suggest adopting a wage inflation assumption of 3.00%.**

Year	Annual Increases in		
	Prices (CPI-U)	Wages (NAE)	Difference
3-Year Avg.	2.0%	2.6%	0.6%
5-Year Avg.	1.5%	2.9%	1.4%
10-Year Avg.	1.8%	2.3%	0.5%
20-Year Avg.	2.2%	3.0%	0.8%
30-Year Avg.	2.5%	3.3%	0.8%
50-Year Avg.	4.0%	4.6%	0.6%

**Pay increases due to merit and seniority.** Since the plan closed to new entrants over a decade ago, the current active population is mature in terms of age and service. The age-related rates of merit and longevity pay increases are relatively low for this closed group, and given the decrease in wage inflation we propose no change to the current assumption.

Sample Ages	Salary Increase Assumptions for an Individual Member		
	Merit & Seniority	Base (Economic)	Increase Next Year
20	4.16%	3.00%	7.16%
25	2.88	3.00	5.88
30	1.98	3.00	4.98
35	1.52	3.00	4.52
40	1.10	3.00	4.10
45	0.66	3.00	3.66
50	0.32	3.00	3.32
55	0.14	3.00	3.14
60	0.00	3.00	3.00
65	--	3.00	3.00

Additional service-based merit and seniority annual increases are:  
 4.00% for members with 1 year of service;  
 3.00% for members with 2 years of service; and  
 1.75% for members with 3 to 5 years of service.



## Summary of Findings - Economic Assumptions (Continued)

**Investment Return.** The investment return assumption is the actuarial assumption that has the largest impact on actuarial valuation results. As more of the actuarial accrued liabilities are related to non-active members, the nominal (as opposed to real) investment return assumption becomes a more prominent factor. Since one of Grand Rapids’ fundamental financial objectives is the receipt of level contributions over time, the discount rate assumption is set equal to the investment return assumption (with perhaps an adjustment for conservatism).

### **Analysis**

The assumed rate of investment return generally depends on factors such as plan’s investment policy and capital market expectations.

Our analysis is based on the GRS Capital Market Assumption Modeler (CMAM). Because GRS is a benefits consulting firm and does not develop or maintain capital market expectations, we request and monitor forward-looking expectations developed by several major forecasting firms. We update our CMAM on an annual basis. The capital market assumptions in the 2019 CMAM are from the following forecaster (in alphabetical order): Aon Hewitt, BlackRock, BNY Mellon, Callan, JPMorgan, Meketa, Marquette Associates, Mercer, NEPC, PCA, RVK, Summit Strategies, Voya and Wilshire. We believe the benefit of performing this analysis using multiple forecasting firms is to recognize the uncertain nature of the items affecting the selection of the investment return assumption.

While there may be differences in asset classes, investment horizons, inflation assumptions, treatment of investment expenses, excess manager performance (i.e., alpha), etc., we have attempted to align the various assumption sets from the different forecasters to be as consistent as possible.

In the following chart, all returns are net of investment expenses and have no assumption for excess manager performance (alpha) in excess of active management fees.

For purposes of this analysis, we have used the following investment allocation for the Retirement System summarized below:

Asset Class	Target Allocation
U.S. Equity	17.75%
Non-U.S. Equity	17.75%
Private Equity	5.00%
Global Low Volatility Equity	10.00%
Private Credit	5.00%
Core Fixed Income	24.50%
U.S. REITs	5.00%
U.S. TIPS	5.00%
MLPs	5.00%
Commodities	5.00%
Total	100%

## Summary of Findings - Economic Assumptions (Continued)

Based upon the approximate target asset allocation, future expectations of various forecasters were analyzed. The next few exhibits show the results of this analysis. Final expected nominal investment return results are based upon a 2.25% price inflation assumption. We used the actuarial assumption for price inflation rather than the consultant assumption, in order to be consistent with the calculation of liabilities. Investment results presented are net of expenses.

The arithmetic expected return developed from this asset allocation is shown in the table below. Note that the arithmetic return is in general higher than the median return due to compounding effect of random returns. In general, the difference between the arithmetic and median return will be larger for larger standard deviation of returns. We have shown the standard deviation of returns as the investment risk in Column 9.

ASOP No. 27 acknowledges that for any given economic assumption, there is a reasonable range of opinions on that assumption. This is evident from the summaries we show from CMAM.

### Investment Return Expectations of Various Forecasters

Investment Consultant	Investment Consultant Expected Nominal Return	Investment Consultant Inflation Assumption	Expected Real Return (2)-(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Plan Incurred Administrative Expenses	Expected Nominal Return Net of Expenses (6)-(7)	Standard Deviation of Expected Return (1-Year)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	4.78%	2.20%	2.58%	2.25%	4.83%	0.14%	4.69%	11.12%
2	6.63%	2.50%	4.13%	2.25%	6.38%	0.14%	6.24%	12.03%
3	6.13%	2.20%	3.93%	2.25%	6.18%	0.14%	6.04%	9.53%
4	6.25%	2.00%	4.25%	2.25%	6.50%	0.14%	6.36%	9.73%
5	6.74%	2.25%	4.49%	2.25%	6.74%	0.14%	6.60%	11.40%
6	6.88%	2.26%	4.62%	2.25%	6.87%	0.14%	6.73%	11.94%
7	6.84%	2.21%	4.63%	2.25%	6.88%	0.14%	6.74%	11.82%
8	7.22%	2.50%	4.72%	2.25%	6.97%	0.14%	6.83%	10.83%
9	6.92%	2.00%	4.92%	2.25%	7.17%	0.14%	7.03%	11.69%
10	7.09%	2.30%	4.79%	2.25%	7.04%	0.14%	6.90%	9.63%
11	7.26%	2.31%	4.96%	2.25%	7.21%	0.14%	7.07%	10.95%
12	7.13%	1.70%	5.43%	2.25%	7.68%	0.14%	7.54%	11.22%
13	7.59%	2.00%	5.59%	2.25%	7.84%	0.14%	7.70%	10.41%
14	7.90%	2.15%	5.76%	2.25%	8.01%	0.14%	7.87%	11.55%
<b>Average</b>	<b>6.81%</b>	<b>2.18%</b>	<b>4.63%</b>	<b>2.25%</b>	<b>6.88%</b>	<b>0.14%</b>	<b>6.74%</b>	<b>10.99%</b>

The average expected nominal return from Column 8 is 6.74%. This is the average arithmetic rate of return. Note that the arithmetic rate of return represents the average future expected return, which is higher than the median future expected. Setting the valuation assumption at the arithmetic expected return means that over time the average accumulated assets are expected to grow at this rate. However, in any given year it is less than 50% likely that this return will be achieved. From the perspective of the Actuarial Standards of Practice, this may be considered a reasonable assumption. Adjusting to the median return (as noted on the following page) is also a reasonable assumption.

## Summary of Findings - Economic Assumptions (Continued)

Next, we compare the probabilities of achieving returns over a 10-year horizon. We compute the 40<sup>th</sup>, 50<sup>th</sup>, and 60<sup>th</sup> percentiles of returns as well as the probability of achieving the current assumption of 7.00% over a 10-year horizon. Note that the investment horizon for most of the capital market assumption sets is between 5 and 10 years. A different assumption would result in a different distribution of returns.

### Investment Return Expectations of Various Forecasters

Investment Consultant	Distribution of 10-Year Average Geometric Net Nominal Return			Probability of Exceeding 7.00%	Probability of Exceeding 6.75%	Probability of Exceeding 6.50%	Probability of Exceeding 6.25%
	40th	50th	60th				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	3.23%	4.11%	5.00%	20.66%	22.71%	24.88%	27.16%
2	4.61%	5.56%	6.52%	35.22%	37.68%	40.20%	42.76%
3	4.86%	5.61%	6.38%	32.29%	35.30%	38.41%	41.61%
4	5.15%	5.92%	6.69%	36.23%	39.31%	42.46%	45.67%
5	5.10%	6.00%	6.91%	39.00%	41.69%	44.42%	47.19%
6	5.13%	6.07%	7.03%	40.26%	42.84%	45.47%	48.12%
7	5.15%	6.09%	7.03%	40.33%	42.94%	45.59%	48.27%
8	5.43%	6.29%	7.15%	41.73%	44.61%	47.52%	50.45%
9	5.48%	6.40%	7.33%	43.53%	46.22%	48.93%	51.65%
10	5.71%	6.47%	7.24%	43.11%	46.36%	49.64%	52.94%
11	5.64%	6.51%	7.38%	44.34%	47.21%	50.11%	53.01%
12	6.07%	6.96%	7.86%	49.54%	52.38%	55.21%	58.02%
13	6.37%	7.20%	8.03%	52.40%	55.44%	58.46%	61.44%
14	6.34%	7.25%	8.17%	52.78%	55.53%	58.25%	60.95%
<b>Average</b>	<b>5.30%</b>	<b>6.17%</b>	<b>7.05%</b>	<b>40.81%</b>	<b>43.59%</b>	<b>46.40%</b>	<b>49.23%</b>

The 50<sup>th</sup> percentile return is also related to the geometric average return. The geometric average of a sequence of returns over a number of years is the compound average of those returns over the number of years compounded. As the number of years in the geometric average increases and if the distributions of returns each year are independent and identically distributed, then the geometric average will converge to the median return. The median return is a reasonable rate of return for purposes of the valuation. The average of 50<sup>th</sup> percentile returns is 6.17% per year.

## Summary of Findings - Economic Assumptions (Concluded)

The current version of ASOP No. 27 suggests that either the expected geometric return (i.e., 50<sup>th</sup> percentile) or the expected arithmetic return is suitable for use as a reasonable investment return assumption. Based on the average of each of the forecasters' expectations, this would result in a range of 6.17% to 6.74% for the Retirement System. Nothing in this report should be construed as GRS giving investment advice.

Our analysis generally indicates forward-looking expectations lower than currently assumed for the assumed rate of return. The following table summarizes our preferred range of assumptions. It is important to note that an assumption outside of the preferred range is not necessarily unreasonable under ASOP No. 27.

<b>Preferred Range of Expectations</b>	<b>Price Inflation</b>	<b>Assumed Rate of Return</b>
Low End of Range	2.00%	6.25%
Midpoint of Range	2.25%	6.75%
High End of Range	2.50%	7.00%
Current Assumption	2.50%	7.00%

We have illustrated the approximate impact on contribution requirements if the investment return assumption were changed to 6.75% or 6.50% on page 21.

## SECTION C

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### MISCELLANEOUS ASSUMPTIONS AND METHODS



## Retirement System Option Factors

Option factors are calculated using the current interest assumption and the assumed rates of mortality. If a retiring member elects an optional form of benefit, the assumed benefit is multiplied by the appropriate option factor to produce the benefit actually payable. As a matter of common practice, option factors are usually revised to correspond to the new interest and mortality assumptions adopted with an experience study.

Currently, option factors for survivor benefits are calculated using a 7.25% interest rate assumption and the RP-2014 Healthy Annuitant Mortality Table projected to 2019 using the MP-2014 mortality improvement scale. Examples of option factors calculated using the current and the first alternate assumption sets are shown below. After the new demographic assumptions are adopted, **we recommend the actuarial factors as shown under Proposed be adopted for retirements on or after January 1, 2021** to allow time for administrative changes. We would also recommend that any such change be reviewed by legal counsel.

### Option Factor Comparison

Retiring Participants' Ages		50% Joint & Survivor		100% Joint & Survivor	
Retiree	Beneficiary	Current	Proposed	Current	Proposed
50	45	0.95521	0.95858	0.91426	0.92045
55	50	0.94430	0.94768	0.89447	0.90056
60	55	0.93109	0.93400	0.87106	0.87617
65	60	0.91451	0.91674	0.84248	0.84627

- **Current** – 7.25% interest rate assumption and a 75%/25% unisex blend of the RP-2014 Healthy Annuitant Mortality Table projected to 2019 using the MP-2014 mortality improvement scale.
- **Proposed** – 7.00% interest rate assumption and an 70%/30% unisex blend of the Pub-2010 Amount-Weighted, General, Healthy Retiree, Male and Female tables, with future mortality improvements projected to 2025 using scale MP-2019.

## Amortization Policy

Unfunded actuarial accrued liabilities were amortized by (principal & interest combined) level dollar contributions as according to the schedule below. The weighted average remaining period is 26.54 years. This change was made by the City per City Code Section 1.221 and first reflected in the June 30, 2015 valuation report.

Base Year	Current Balance	Financing Period	Amortization Factor	Dollar Payment	% of Payroll Contribution
2015	\$ 94,959,656	26 yrs.	12.235014	\$ 7,761,303	27.45%
2016	8,472,201	27	12.401513	683,159	2.42%
2017	(5,429,548)	28	12.557120	(432,388)	(1.53)%
2018	653,209	29	12.702547	51,423	0.18%
2019	11,505,216	30	12.838460	896,152	3.17%
<b>Total</b>	<b>\$ 110,160,734</b>	<b>26.54</b>	<b>12.295206</b>	<b>\$ 8,959,649</b>	<b>31.69%</b>

We do not recommend changing the period at this time. Lastly, we note that under Public Act 202, the maximum allowed amortization period is 19 years for Pension plan 2020 reporting.

## Asset Valuation Method

The City of Grand Rapids General Retirement System currently uses a 5-year asset smoothing method with no corridor. The Funding Value of Assets recognizes assumed investment income fully each year. Differences between actual and assumed investment income are phased-in over a closed 5-year period. This is a very common method among public retirement systems. Most systems use an averaging period between 3 and 10 years with 5 being the most common. We do not recommend any changes at this time.

## Load for Service Purchases

We received data from Retirement System staff containing current reported service purchase balances in the amount of \$1.9 million for active members. We have established the liability for service purchases to be approximately \$3.6 million – based on applying valuation interest to the initial contributions reported.

## Load for 13<sup>th</sup> Check

We have tested the market rate measure of returns both historically (against actual experience) and on a forward-looking basis (via a stochastic model). We expect that the returns on assets for the 13th check group will be reduced by 70 to 80 basis points going forward. To reflect this expectation, we placed a 7.5% load on affected liabilities- namely for those retirees not covered by the simple 1% escalator provision.

## SECTION D

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### CONTRIBUTION RATES BASED ON PROPOSED CHANGES

# Effects of Recommended Changes in Actuarial Assumptions on Retirement System Contribution and Funded Percent

## Summary of Assumption Sets

Assumption Set	Economic Assumptions			Demographic Assumptions
	Net Rate of Investment Return	Rate of Inflation		
		Wage	Spread	
A. Published Results	7.00%	3.25%	3.75%	Current
B. Proposed Demographic	7.00%	3.25%	3.75%	Proposed
C. Alternate Economic I	6.75%	3.00%	3.75%	Proposed
D. Alternate Economic II	6.50%	3.00%	3.50%	Proposed
E. Alternate Economic III	7.00%	3.00%	4.00%	Proposed

## Effects of Recommended Changes in Actuarial Assumptions on Retirement System Contribution and Funded Percent Results as of June 30, 2019<sup>#</sup>

	June 30, 2019 Valuation	Proposed Demographic Assumptions and Indicated Economic Assumptions			
Economic Assumptions	Current	Current	Alternate 1	Alternate 2	Alternate 3
Investment Return	7.00%	7.00%	6.75%	6.50%	7.00%
Wage Inflation	3.25%	3.25%	3.00%	3.00%	3.00%
Demographic Assumptions	Current	Proposed	Proposed	Proposed	Proposed
<b>Contributions for</b>	<b>% of Active Payroll</b>				
Total Normal Cost	15.41%	15.19%	15.64%	16.65%	14.77%
Member Contributions*	7.79%	7.82%	7.82%	7.82%	7.82%
Employer Normal Cost	7.62%	7.37%	7.82%	8.83%	6.95%
Unfunded Actuarial Accrued Liabilities	31.69%	35.81%	38.53%	41.70%	35.55%
<b>COMPUTED EMPLOYER RATE</b>	<b>39.31%</b>	<b>43.18%</b>	<b>46.35%</b>	<b>50.53%</b>	<b>42.50%</b>
Illustrative Contribution <sup>^</sup> (\$ millions)	\$ 11.1	\$ 12.1	\$ 13.0	\$ 14.1	\$ 11.8
Funded Ratio	79.6%	77.6%	75.8%	73.9%	77.8%

<sup>#</sup> **Illustrative impact.** New assumptions will first be effective for the next actuarial valuation.

\* Weighted average of various contribution rates.

<sup>^</sup> Based on projected fiscal year payroll.

**A change in assumptions will not change the long-term cost of the plan – only the timing of contributions to support the promised benefits.**

## **SECTION E**

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### **COMPLETE LISTING OF RECOMMENDED ASSUMPTIONS**

## Proposed Retirement Rates

<b>Retirement Ages</b>	<b>Percent Retiring</b>
50	40
51	40
52	40
53	40
54	40
55	40
56	40
57	40
58	40
59	40
60	40
61	40
62	40
63	40
64	40
65	50
66	60
67	70
68	80
69	90
70	100

## Proposed Withdrawal Rates

Sample Ages	Years of Service	% of Active members Seperating within Next Year	
		Men	Women
ALL	0	15.00	15.00
	1	8.00	8.00
	2	7.00	7.00
	3	6.00	6.00
	4	5.00	5.00
20	5 & Over	6.04	13.57
25		5.87	13.21
30		5.62	12.35
35		5.22	10.73
40		4.65	8.81
45		3.93	6.80
50		2.75	4.38
55		1.04	1.61
60		0.10	0.15



# Proposed Mortality Rates

**Pre-Retirement Mortality Rates**

Age	% Dying Next Year*	
	General	
	Male	Female
20	0.0384%	0.0141%
21	0.0381%	0.0133%
22	0.0357%	0.0124%
23	0.0343%	0.0115%
24	0.0330%	0.0106%
25	0.0329%	0.0108%
26	0.0363%	0.0123%
27	0.0387%	0.0138%
28	0.0424%	0.0153%
29	0.0448%	0.0169%
30	0.0484%	0.0197%
31	0.0520%	0.0212%
32	0.0554%	0.0239%
33	0.0585%	0.0252%
34	0.0612%	0.0277%
35	0.0648%	0.0299%
36	0.0680%	0.0319%
37	0.0706%	0.0349%
38	0.0739%	0.0364%
39	0.0765%	0.0387%
40	0.0798%	0.0409%
41	0.0825%	0.0439%
42	0.0860%	0.0456%
43	0.0891%	0.0483%
44	0.0932%	0.0510%
45	0.0983%	0.0548%
46	0.1045%	0.0588%
47	0.1110%	0.0630%
48	0.1199%	0.0676%
49	0.1293%	0.0736%
50	0.1394%	0.0801%
51	0.1521%	0.0881%
52	0.1656%	0.0966%
53	0.1808%	0.1066%
54	0.1967%	0.1169%
55	0.2153%	0.1294%
56	0.2355%	0.1417%
57	0.2582%	0.1546%
58	0.2821%	0.1679%
59	0.3069%	0.1823%
60	0.3330%	0.1976%
61	0.3600%	0.2126%
62	0.3872%	0.2283%
63	0.4155%	0.2458%
64	0.4435%	0.2653%
65	0.4723%	0.2859%

**Healthy Post-Retirement Mortality Rates**

Age	% Dying Next Year*	
	General	
	Male	Female
50	0.2789%	0.2142%
51	0.3015%	0.2281%
52	0.3275%	0.2450%
53	0.3559%	0.2630%
54	0.3886%	0.2814%
55	0.4238%	0.3008%
56	0.4621%	0.3207%
57	0.5033%	0.3415%
58	0.5468%	0.3616%
59	0.5941%	0.3839%
60	0.6419%	0.4079%
61	0.6917%	0.4356%
62	0.7441%	0.4669%
63	0.7978%	0.5038%
64	0.8563%	0.5444%
65	0.9214%	0.5920%
66	0.9959%	0.6466%
67	1.0822%	0.7093%
68	1.1819%	0.7831%
69	1.2981%	0.8689%
70	1.4315%	0.9681%
71	1.5836%	1.0831%
72	1.7597%	1.2156%
73	1.9596%	1.3671%
74	2.1892%	1.5398%
75	2.4515%	1.7360%
76	2.7505%	1.9574%
77	3.0913%	2.2088%
78	3.4799%	2.4941%
79	3.9208%	2.8180%
80	4.4230%	3.1879%
81	4.9935%	3.6097%
82	5.6394%	4.0906%
83	6.3652%	4.6388%
84	7.1744%	5.2641%
85	8.0734%	5.9754%
86	9.0612%	6.7859%
87	10.1372%	7.7003%
88	11.3089%	8.7235%
89	12.5695%	9.8499%
90	13.9248%	11.0720%
91	15.3528%	12.3669%
92	16.8482%	13.7136%
93	18.3917%	15.1121%
94	19.9820%	16.5642%
95	21.6137%	18.0815%
96	23.4247%	19.7288%
97	25.2907%	21.4821%
98	27.2292%	23.3335%
99	29.2162%	25.2814%
100	31.2364%	27.3181%
101	33.2716%	29.4221%
102	35.3028%	31.5433%
103	37.2999%	33.6715%
104	39.2536%	35.7732%
105	41.1519%	37.8479%
106	42.9921%	39.8838%
107	44.7481%	41.8393%
108	46.4297%	43.7197%
109	48.0045%	45.5171%
110	49.2895%	47.2105%

**Disabled Post-Retirement Mortality Rates**

Age	% Dying Next Year*	
	General	
	Male	Female
50	1.5020%	1.4307%
51	1.6078%	1.5025%
52	1.7207%	1.5808%
53	1.8381%	1.6650%
54	1.9576%	1.7502%
55	2.0785%	1.8323%
56	2.1966%	1.9060%
57	2.3089%	1.9684%
58	2.4159%	2.0170%
59	2.5173%	2.0522%
60	2.6126%	2.0777%
61	2.7041%	2.0944%
62	2.7936%	2.1094%
63	2.8855%	2.1259%
64	2.9786%	2.1482%
65	3.0721%	2.1788%
66	3.1704%	2.2243%
67	3.2750%	2.2865%
68	3.3889%	2.3695%
69	3.5166%	2.4751%
70	3.6595%	2.6065%
71	3.8247%	2.7638%
72	4.0148%	2.9493%
73	4.2330%	3.1634%
74	4.4812%	3.4098%
75	4.7653%	3.6905%
76	5.0851%	4.0076%
77	5.4460%	4.3635%
78	5.8508%	4.7621%
79	6.3039%	5.2066%
80	6.8078%	5.6993%
81	7.3676%	6.2433%
82	7.9811%	6.8400%
83	8.6530%	7.4956%
84	9.3804%	8.2086%
85	10.1634%	8.9857%
86	11.0054%	9.7948%
87	11.9053%	10.6193%
88	12.8764%	11.4546%
89	14.0871%	12.2998%
90	15.4253%	13.1713%
91	16.7874%	14.0861%
92	18.1594%	15.0581%
93	19.5260%	16.1111%
94	20.9013%	17.2631%
95	22.3021%	18.5358%
96	23.8936%	19.9973%
97	25.5661%	21.6422%
98	27.3568%	23.4098%
99	29.2525%	25.3027%
100	31.2364%	27.3181%
101	33.2716%	29.4221%
102	35.3028%	31.5433%
103	37.2999%	33.6715%
104	39.2536%	35.7732%
105	41.1519%	37.8479%
106	42.9921%	39.8838%
107	44.7481%	41.8393%
108	46.4297%	43.7197%
109	48.0045%	45.5171%
110	49.2895%	47.2105%

\* Actual tables extend further than sample ages shown.



## Proposed Disability Rates

Sample Ages	% of Active Members Becoming Disabled Within Next Year		
20			0.01 %
25			0.01
30			0.01
35			0.07
40			0.13
45			0.29
50			0.56
55			0.84
60			1.09

	Duty Related	Non-Duty Related	
Cause of Disability:	Men	30%	70%
	Women	30%	70%

## Proposed Rates of Salary Increase

Salary Increase Assumptions for an Individual Member			
Sample Ages	Merit & Seniority	Base (Economic)	Increase Next Year
20	4.16%	3.00%	7.16%
25	2.88	3.00	5.88
30	1.98	3.00	4.98
35	1.52	3.00	4.52
40	1.10	3.00	4.10
45	0.66	3.00	3.66
50	0.32	3.00	3.32
55	0.14	3.00	3.14
60	0.00	3.00	3.00
65	--	3.00	3.00

Additional service-based merit and seniority annual increases are:  
 4.00% for members with 1 year of service;  
 3.00% for members with 2 years of service; and  
 1.75% for members with 3 to 5 years of service.



May 5, 2020 (Updated June 8, 2020)

Board of Trustees  
City of Grand Rapids General Retirement System  
Grand Rapids, Michigan

Dear Board Members:

Enclosed is a copy of our report of Retirement System experience. We believe that the actuarial assumptions recommended in this experience study report represent, individually and in the aggregate, reasonable estimates of future experience of the City of Grand Rapids General Retirement System. We look forward to meeting with the Board to discuss the results of our review.

If you have any questions, please feel free to call (248) 799-9000.

Sincerely,

A handwritten signature in black ink that reads "James D. Anderson". The signature is written in a cursive, flowing style.

James D. Anderson, FSA, EA, FCA, MAAA

JDA:dj  
Enclosure

cc: Jeffrey T. Tebeau, GRS  
David L. Hoffman, GRS