GRS **Gabriel Roeder Smith & Company**
Consultants & Actuaries

CITY OF GRAND RAPIDS POLICE AND FIRE RETIREMENT SYSTEM

5-YEAR EXPERIENCE STUDY
DECEMBER 31, 2009 THROUGH DECEMBER 31, 2014

December 4, 2015

The Board of Trustees
City of Grand Rapids Police and Fire Retirement System
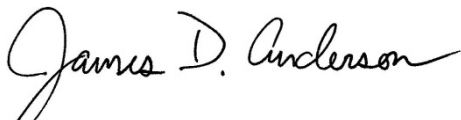Grand Rapids, Michigan

Dear Board Members:

Presented in this report are the results of an ***actuarial investigation of experience*** of the City of Grand Rapids Police and Fire 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 statistical data furnished for annual active member and retired life actuarial valuations during the period ***December 31, 2009 to December 31, 2014.***

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

James D. Anderson is a Member of the American Academy of Actuaries (MAAA), and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein. The signing individuals are independent of the plan sponsor.

Respectfully submitted,

James D. Anderson, FSA, EA, MAAA   David L. Hoffman

JDA/DLH:bd

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OVERVIEW

EXPERIENCE STUDY
INTRODUCTION

Each year as of December 31, the actuarial liabilities of the System are valued. In order to perform the valuation, assumptions must be made regarding the future experience of the System with regard to the following risk areas:

- Rates of **withdrawal** of active members.

- Rates of **disability** among active members.

- Patterns of **salary increases** to active members.

- Rates of **retirement** among active members.

- Rates of **mortality** among active members, retirants, and beneficiaries.

- Long-term rates of **investment return** to be generated by the assets of the System.

Assumptions should be carefully chosen and continually monitored. An unrealistic set of 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 (whether or not they are changing) also changes. The package of assumptions is then adjusted to reflect basic experience trends -- but not random year to year fluctuations.

No single experience period should be given full credibility in the setting of actuarial valuation assumptions. When we see significant differences between what is expected from our assumptions and actual experience, our strategy in recommending a change in assumptions is usually to select rates that would produce results somewhere between the actual and expected experience. In this way, with each experience study the actuarial assumptions become better and better representations of actual experience. Temporary conditions that might influence a particular experience study period will not unduly influence the choice of long-term assumptions.

We are recommending certain changes in assumptions. The various assumption changes and their impact on the required contribution are described on the following pages.

Withdrawal experience was as expected during the five year period. Twenty-eight (28) members withdrew over the five year period versus an expected 34 withdrawals. No change is recommended in this assumption.

Retirement experience was also as expected during the five year period. Sixty-three (63) members retired versus an expected 70 during the five year period. It was however observed that Firefighters were choosing to retire prior to age 55 when they reached the cap on the retirement benefit. We are recommending a 100% decrement pattern be applied to Firefighters once achieving 34 years of service regardless of age.

Disability experience was lower than expected for fire members and higher than expected for police members. This experience was the opposite of what was observed during the previous experience study. There have also been a lower proportion of Duty disability cases than the previously assumed 90% of all disabilities. The longer term observation is that there is little difference in disability experience between Police and Fire. We recommend using equal disability rates for Police and Fire going forward along with assuming only 75% of all disability cases are Duty related.

Pay increase rates (merit and seniority portion) have been lower, on average, than assumed over a decade. However, after adjusting for actual price inflation, we see little difference between observations and expectations. We are recommending no change in this assumption.

Retired Life Mortality. Based on the size of the population, we believe little credibility can be assigned to observations of mortality experience. Instead, we recommend a change to the RP-2014 Healthy Annuitant Mortality Table projected to 2019 using the MP-2014 mortality improvement scale. The new mortality rates produce life expectancies that are longer for males. In addition, we also recommend changing the mortality assumption for disabled lives to the RP-2014 Disabled Retirees projected to 2019 using the MP-2014 mortality improvement scale. These disabled mortality rates result in longer life expectancies for males.

Death-in-Service Mortality Rates. The recommended assumption is the RP-2014 Mortality Tables for Employees projected to 2019 using the MP-2014 mortality improvement scale.

Load for Service Purchases. We received data from Retirement System staff containing current reported service purchase balances in the amount of $5.6 million for active members. We have established the liability for service purchases to be approximately $11.0 million – based on applying valuation interest to the initial contributions reported.

Load for 13th 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 about 70-80 basis points going forward. To reflect this anticipation, we placed a 7.0% load on affected liabilities.

The combined effect of the proposed demographic assumption changes is shown on page 7. The result of our proposed changes is an increase of the employer contribution rate. This result is consistent with the demographic experience losses that occurred during the observation period.

Additional detail concerning the demographic experience is shown on pages 8 to 14. An expanded listing of recommended demographic assumptions is shown beginning on page 15.

We believe that the changes in mortality rates and the investment return assumption are to be applied to optional retirement benefit factors. The Board should establish an effective date for this purpose.

ECONOMIC ASSUMPTIONS

ECONOMIC ASSUMPTIONS

Economic assumptions include long-term rates of investment return and wage inflation (the across-the-board portion of salary increases). 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 more affected by external forces; namely inflation, general productivity changes and changes in financial markets. Estimates of economic activities are generally selected on the basis of the expectations in an inflation-free environment and then both are increased by some provision for long-term inflation.

If inflation and/or productivity increases are higher than expected, actual rates of salary increase and investment return are likely to exceed the assumed rates. Salaries increasing faster than expected produce unexpected liabilities. Investment return exceeding the assumed rates (whether due to manager performance, change in the mix of assets, or general inflation) results in unanticipated assets. To the extent that inflation, productivity, and other factors have about the same effect on both sides of the balance sheet, these additional assets and liabilities can offset one another over the long-term.

Current and proposed (Alternate) economic assumptions for the System are as follows:

	Current	**Alternate 1**	**Alternate 2**
Price Inflation	2.75%	2.75%	2.75%
Wage Inflation	3.50	3.50	3.50
Investment Return	7.50	7.25	6.50
Spread	4.00	3.75	3.00

The basis for these proposed assumptions follows.

Wage Inflation and Price Inflation (from the 2014 Trustees Report OASDI). For the 2014 Trustees Report, over the 65-year period from 2023 to 2088, the Trustees set the average annual growth rate in the OASDI covered wage to 5.2%, 3.8%, and 2.5% for Alternatives I, II and III, respectively. Also for the 2014 Trustees Report, the Trustees set the assumed ultimate annual rates of increase in the SPI-W (Price Inflation) to 3.4%, 2.7% and 2.0% for Alternatives I, II and III, respectively. Thus, for the 2014 Trustees Report, the Trustees set the average real wage differential, over the 65-year period from 2023 to 2088, to 1.8% (5.2 less 3.4), 1.1% (3.8 less 2.7), and 0.5% (2.5 less 2.0) for Alternatives I, II and III, respectively. These average real wage differentials for Alternatives I, II and III are approximately equal to those used in the 2013 Trustees Report.

The long-term intermediate assumption (Alternative II) used in the 2014 Social Security report is 2.7%. The proposed alternate economic assumptions used in this report reflect this price inflation assumption.

Investment Return. The allocation of assets within the universe of investment options will significantly impact the overall performance. Therefore, it is meaningful to identify the range of expected returns based on the System's targeted allocation of investments and an overall set of capital market assumptions.

Current Allocation	
Class	**Weight**
US Stocks	22.50%
Global Stocks	22.50%
Private Markets	5.00%
Core Bonds	12.50%
LTCore Bonds	12.50%
TIPS	10.00%
US RE Securities	5.00%
Commodities	5.00%
MLP	5.00%
Inflation	**100.00%**

The expected rate of return on investments is selected by the Board based upon information provided by the actuary and investment consultants. The assumption is developed using the building block approach beginning with an assumed rate of inflation plus the real return assumption. The real rate of return is estimated based on the simplified target asset allocation mentioned above. We used capital market expectations for various asset classes provided by eight nationally recognized investment consultants. The development of the average nominal return (using a price inflation assumption of 2.75% and an expense assumption of 25 basis points), net of investment and administrative expenses, is provided in the following tables.

Class	Total Return %	Risk %	Real Geometric %	Arithmetic %	Weight	Total Arithmetic %	Weighted Total Arithmetic %
US Stocks	6.50%	17.00%	4.55%	6.00%	22.50%	8.75%	1.97%
Global Stocks	6.70%	17.15%	4.75%	6.22%	22.50%	8.97%	2.02%
Private Markets	9.15%	27.50%	7.20%	10.98%	5.00%	13.73%	0.69%
Core Bonds	3.60%	5.00%	1.65%	1.78%	12.50%	4.53%	0.57%
LTCore Bonds	4.05%	10.00%	2.10%	2.60%	12.50%	5.35%	0.67%
TIPS	3.15%	6.00%	1.20%	1.38%	10.00%	4.13%	0.41%
US RE Securities	5.55%	15.50%	3.60%	4.80%	5.00%	7.55%	0.38%
Commodities	3.95%	15.00%	2.00%	3.13%	5.00%	5.88%	0.29%
MLP	9.45%	17.00%	7.50%	8.95%	5.00%	11.70%	0.59%
Inflation	**1.95%**				**100.00%**		**7.59%**

The first table above shows the expected arithmetic return, based on capital market assumptions produced by your consultant, adjusted for the System's long term price inflation assumption of 2.75%. The net return after administrative expenses is 7.34%.

Investment Consultant (1)	Investment Consultant Expected Nominal Return (2)	Investment Consultant Inflation Assumption (3)	Expected Real Return (2)–(3) (4)	Actuary Inflation Assumption (5)	Expected Nominal Return (4)+(5) (6)	Plan Incurred Administrative Expenses (7)	Expected Nominal Return Net of Expenses (6)-(7) (8)	Standard Deviation of Expected Return (1-Year) (9)
1	5.48%	2.12%	3.35%	2.75%	6.10%	0.25%	5.85%	10.40%
2	6.54%	2.50%	4.04%	2.75%	6.79%	0.25%	6.54%	11.50%
3	6.76%	2.50%	4.26%	2.75%	7.01%	0.25%	6.76%	11.40%
4	6.62%	2.25%	4.37%	2.75%	7.12%	0.25%	6.87%	11.80%
5	6.53%	2.11%	4.42%	2.75%	7.17%	0.25%	6.92%	10.80%
6	6.68%	2.20%	4.48%	2.75%	7.23%	0.25%	6.98%	11.00%
7	6.99%	2.26%	4.73%	2.75%	7.48%	0.25%	7.23%	10.60%
8	7.41%	2.20%	5.21%	2.75%	7.96%	0.25%	7.71%	12.00%
Average	**6.62%**	**2.27%**	**4.36%**	**2.75%**	**7.11%**	**0.25%**	**6.86%**	**11.19%**

As the above table shows, the average expected one-year return (net of expenses) of the eight firms is 6.86%. Most of the investment firms have an expected nominal return above 7.00%.

Investment Consultant (1)	Distribution of 20-Year Average Geometric Net Nominal Return			Probability of Exceeding 7.25% * (5)
	40th (2)	50th (3)	60th (4)	
1	4.75%	5.34%	5.92%	20.5%
2	5.27%	5.91%	6.56%	30.1%
3	5.49%	6.13%	6.78%	33.1%
4	5.55%	6.21%	6.88%	34.6%
5	5.77%	6.37%	6.98%	35.7%
6	5.79%	6.40%	7.02%	36.5%
7	6.10%	6.69%	7.29%	40.7%
8	6.36%	7.03%	7.71%	46.7%
Average	**5.64%**	**6.26%**	**6.89%**	**34.7%**

Alternate 1's return assumption net of expenses.

The final table above shows a narrow range of 20-year average net nominal returns (geometric).

Current standards define the reasonable range for the return assumption is between the expected geometric return (i.e., 50th percentile) and the expected arithmetic return. We observe that this range is 6.26% to 7.11% using a price inflation assumption of 2.75%.

These capital market assumptions generally apply for the next ten years. Fewer projections exist for longer periods and the use of the projections above for the longer term are conservative.

SUMMARY OF VALUATION RESULTS

COMPUTED CITY CONTRIBUTION RATES
AS OF DECEMBER 31, 2014
COMPARISON OF PRESENT AND ALTERNATE ASSUMPTIONS

	June 30, 2014 Valuation	Proposed Demographic Assumptions and Indicated Economic Assumptions		
Economic Assumptions	**Current**	**Current**	**Alternate 1**	**Alternate 2**
Investment Return	7.50%	7.50%	7.25%	6.50%
Wage Inflation	3.50%	3.50%	3.50%	3.50%
Demographic Assumptions	Current	New	New	New
Contributions for	**% of Active Payroll**			
Total Normal Cost	20.95%	21.50%	22.75%	27.06%
Member Contributions	10.25%	10.25%	10.25%	10.25%
Employer Normal Cost	10.70%	11.25%	12.50%	16.81%
Unfunded Actuarial Accrued Liabilities *	3.93%	8.10%	9.91%	15.29%
COMPUTED EMPLOYER RATE	**14.63%**	**19.35%**	**22.41%**	**32.10%**
Funded Ratio	94.4%	89.2%	86.8%	79.8%

Amortized as a level percent-of-payroll over a period of 24 years.
 # Weighted average of member contribution rates.

ACTUAL AND EXPECTED DEMOGRAPHIC EXPERIENCE FOR THE OBSERVATION PERIOD

Annual actuarial valuations are completed each year as of December 31. An important ingredient for the valuation is the census of current active members and benefit recipients. Key items of interest include:

Status

Date of birth

Gender

Date of departure (from active status)

Reason for departure

Credited service

Annual pay

Six years of active member and retiree data submissions were used for the experience study. From this data we determined which members left active service each year and the reason they left service (retirement, withdrawal, disability, etc.). The reported data is of sufficient quality and is adequate for this purpose.

The tables and charts in this report refer to the "rate" of employment termination due to some cause. As an example, consider 100 members age 55 and eligible for normal retirement. If 30 of the members actually retire, the "rate of retirement" is .30 (30 divided by 100).

"Exposure" means the number of members who can potentially terminate membership within a given year, due to a particular cause. For example, for retirement, the exposure is the number of members eligible to retire in a given year.

When actual experience is different from projected experience, we propose new actuarial assumptions which are generally between the present assumptions and the actual experience. This is a generally accepted method of making periodic adjustments to long-term actuarial assumptions.

AGE BASED WITHDRAWAL EXPERIENCE 2009 – 2014:
POLICE MEMBERS

Age	Withdrawals	Exposure	Crude Rates	Sample Rates Old	Sample Rates New	Expected Withdrawals Old	Expected Withdrawals New
Under 20	-	-	N/A	0.0460	0.0460	-	-
20-24	2	4	0.5000	0.0460	0.0460	-	-
25-29	-	45	0.0000	0.0460	0.0460	2	2
30-34	2	137	0.0146	0.0320	0.0320	4	4
35-39	3	330	0.0091	0.0220	0.0220	7	7
40-44	6	472	0.0127	0.0160	0.0160	6	6
45-49	6	330	0.0182	0.0120	0.0120	3	3
50-54	-	-	N/A	0.0120	0.0120	-	-
55-59	-	-	N/A	0.0120	0.0120	-	-
60-64	-	-	N/A	0.0120	0.0120	-	-
65-69	-	-	N/A	0.0120	0.0120	-	-
70-74	-	-	N/A	0.0120	0.0120	-	-
75 and over	-	-	N/A	0.0120	0.0120	-	-
Totals	19	1,318	0.0144	0.0167	0.0167	22	22
Ref				113	113		

The number of withdrawals was as expected during the five year period. No change is recommended in this assumption.

For comparison in the prior study, there were 47 actual versus 22 expected. A change was recommended and adopted.

AGE BASED WITHDRAWAL EXPERIENCE 2009 – 2014:
FIREFIGHTERS

Age	Withdrawals	Exposure	Crude Rates	Sample Rates		Expected Withdrawals	
				Old	New	Old	New
Under 20	-	-	N/A	0.0276	0.0276	-	-
20-24	1	21	0.0476	0.0276	0.0276	1	1
25-29	1	56	0.0179	0.0276	0.0276	1	1
30-34	3	96	0.0313	0.0192	0.0192	2	2
35-39	3	117	0.0256	0.0132	0.0132	2	2
40-44	1	206	0.0049	0.0096	0.0096	2	2
45-49	-	255	0.0000	0.0072	0.0072	2	2
50-54	-	241	0.0000	0.0072	0.0072	2	2
55-59	-	4	0.0000	0.0072	0.0072	-	-
60-64	-	1	0.0000	0.0072	0.0072	-	-
65-69	-	-	N/A	0.0072	0.0072	-	-
70-74	-	-	N/A	0.0072	0.0072	-	-
75 and over	-	-	N/A	0.0072	0.0072	-	-
Totals	9	997	0.0090	0.0120	0.0120	12	12
Ref				113	113		

The number of withdrawals was as expected during the five year period. No change is recommended in this assumption.

For comparison in the prior study, there were 13 actual and 6 expected. A change was recommended and adopted.

AGE AND SERVICE RETIREMENT EXPERIENCE 2009 – 2014
FIREFIGHTERS ONLY

| Age | Retirements | Exposure | Crude Rates | Sample Rates | | Expected Retirements | |
				Old	New*	Old	New*
Under 45	-	-	N/A	N/A	N/A	-	-
45	-	-	N/A	0.2500	0.2500	-	-
46	-	-	N/A	0.2500	0.2500	-	-
47	-	-	N/A	0.2500	0.2500	-	-
48	-	-	N/A	0.2500	0.2500	-	-
49	-	-	N/A	0.2500	0.2500	-	-
50	-	-	N/A	0.2500	0.2500	-	-
51	1	1	1.0000	0.2500	0.2500	-	1
52	-	-	N/A	0.2500	0.2500	-	-
53	1	1	1.0000	0.2500	0.2500	-	1
54	3	3	1.0000	0.2500	0.2500	-	3
55	7	31	0.2258	0.2500	0.2500	8	8
56	4	21	0.1905	0.2500	0.2500	5	5
57	3	11	0.2727	0.2500	0.2500	3	3
58	1	7	0.1429	0.2500	0.2500	2	2
59	1	6	0.1667	0.2500	0.2500	2	2
60	-	1	0.0000	0.5000	0.5000	0	0
61	-	1	0.0000	0.6000	0.6000	0	0
62	-	1	0.0000	0.7000	0.7000	0	0
63	1	2	0.5000	0.8000	0.8000	1	1
64	1	1	1.0000	0.9000	0.9000	0	0
65	-	-	N/A	1.0000	1.0000	-	-
66	-	-	N/A	1.0000	1.0000	-	-
67	-	-	N/A	1.0000	1.0000	-	-
68	-	-	N/A	1.0000	1.0000	-	-
69	-	-	N/A	1.0000	1.0000	-	-
70	-	-	N/A	1.0000	1.0000	-	-
71	-	-	N/A	1.0000	1.0000	-	-
72	-	-	N/A	1.0000	1.0000	-	-
73	-	-	N/A	1.0000	1.0000	-	-
74	-	-	N/A	1.0000	1.0000	-	-
Totals	23	87	0.2644			21	26
75 & Over	-	-	N/A			-	-
Total	23	87	0.2644			21	26

The number of retirements was as expected over the experience period. However Firefighters who were eligible to retire prior to age 55 as a result of reaching the service cap have been observed to be retiring immediately.

*We recommend assuming all firefighters will retire immediately upon reaching the service cap for their benefit (estimated to be 34 years of service for most). We observed this for five members, (there were nine such retirements observed in our prior study).

AGE AND SERVICE RETIREMENT EXPERIENCE 2009 – 2014
POLICE ONLY

Age	Retirements	Exposure	Crude Rates	Sample Rates		Expected Retirements	
				Old	New	Old	New
Under 45	-	-	N/A	N/A	N/A	-	-
45	-	-	N/A	0.2500	0.2500	-	-
46	-	-	N/A	0.2500	0.2500	-	-
47	-	-	N/A	0.2500	0.2500	-	-
48	-	-	N/A	0.2500	0.2500	-	-
49	-	-	N/A	0.2500	0.2500	-	-
50	13	41	0.3171	0.2500	0.2500	10	10
51	2	31	0.0645	0.2500	0.2500	8	8
52	1	27	0.0370	0.2500	0.2500	7	7
53	5	24	0.2083	0.2500	0.2500	6	6
54	2	17	0.1176	0.2500	0.2500	4	4
55	2	14	0.1429	0.2500	0.2500	4	4
56	4	10	0.4000	0.2500	0.2500	3	3
57	3	13	0.2308	0.2500	0.2500	3	3
58	4	9	0.4444	0.2500	0.2500	2	2
59	2	5	0.4000	0.2500	0.2500	1	1
60	1	3	0.3333	0.5000	0.5000	1	1
61	1	1	1.0000	0.6000	0.6000	0	0
62	-	-	N/A	0.7000	0.7000	-	-
63	-	-	N/A	0.8000	0.8000	-	-
64	-	-	N/A	0.9000	0.9000	-	-
65	-	-	N/A	1.0000	1.0000	-	-
66	-	-	N/A	1.0000	1.0000	-	-
67	-	-	N/A	1.0000	1.0000	-	-
68	-	-	N/A	1.0000	1.0000	-	-
69	-	-	N/A	1.0000	1.0000	-	-
70	-	-	N/A	1.0000	1.0000	-	-
71	-	-	N/A	1.0000	1.0000	-	-
72	-	-	N/A	1.0000	1.0000	-	-
73	-	-	N/A	1.0000	1.0000	-	-
74	-	-	N/A	1.0000	1.0000	-	-
Totals	40	195	0.2051			49	49
75 & Over	-	-	N/A			-	-
Total	40	195	0.2051			49	49

The number of retirements was as expected over the experience period. We recommend no change to the Police members retirement patterns.

For comparison in the prior study, there were nine actual and 26 expected retirements. A change was recommended and adopted.

DISABILITY EXPERIENCE 2009 - 2014
ALL MEMBERS

Age	Disabilities	Exposure	Crude Rates	Sample Rates		Expected Disabilities	
				Old (Police/Fire)	New	Old	New
Under 20	-	-	N/A	0.0008 / 0.0016	0.0012	-	-
20-24	-	25	0.0000	0.0008 / 0.0016	0.0012	-	-
25-29	-	101	0.0000	0.0008 / 0.0016	0.0012	-	-
30-34	-	233	0.0000	0.0011 / 0.0022	0.0017	-	-
35-39	4	447	0.0089	0.0025 / 0.0050	0.0038	1	2
40-44	2	678	0.0029	0.0050 / 0.0100	0.0075	5	5
45-49	5	585	0.0085	0.0085 / 0.0170	0.0128	7	7
50-54	3	241	0.0124	0.0132 / 0.0264	0.0198	6	5
55-59	-	4	0.0000	0.0192 / 0.0384	0.0288	-	-
60-64	-	-	N/A	0.0000 / 0.0000	0.0000	-	-
65-69	-	-	N/A	0.0000 / 0.0000	0.0000	-	-
70-74	-	-	N/A	0.0000 / 0.0000	0.0000	-	-
75 and over	-	-	N/A	0.0000 / 0.0000	0.0000	-	-
Totals	14	2,314	0.0061	0.0082	0.0082	19	19
Ref				35	35		

Disability experience was on the order with expectations over the 5 year period. However the number of disability cases was lower than expected for fire members and higher than expected for police members. This experience was the opposite of what was observed during the previous experience study. We recommend using equal disability rates for both Police and Firefighters going forward along with assuming only 75% of all disability cases are Duty related.

Service Based

Service Index	Number	Merit/Seniority % Increase		
		Actual	Expected	Proposed
1	25	8.86 %	17.00 %	17.00 %
2	51	17.08 %	7.00 %	7.00 %
3	57	8.21 %	6.00 %	6.00 %
4	47	10.13 %	5.00 %	5.00 %
5	32	3.82 %	4.00 %	4.00 %
6	34	1.70 %	1.00 %	1.00 %
7	41	1.14 %	1.00 %	1.00 %
8	31	0.91 %	1.00 %	1.00 %
9	50	0.95 %	1.00 %	1.00 %
10	71	1.65 %	1.00 %	1.00 %
11	90	1.24 %	1.00 %	1.00 %
12	93	0.98 %	1.00 %	1.00 %
13	124	0.58 %	1.00 %	1.00 %
14	137	0.80 %	1.00 %	1.00 %
15	160	0.71 %	1.00 %	1.00 %
16	193	0.96 %	1.00 %	1.00 %
17	164	0.85 %	1.00 %	1.00 %
18	159	1.45 %	1.00 %	1.00 %
19	127	0.58 %	1.00 %	1.00 %
20	128	0.98 %	1.00 %	1.00 %
21	101	0.81 %	1.00 %	1.00 %
22	108	0.88 %	1.00 %	1.00 %
23	69	0.52 %	1.00 %	1.00 %
24	67	1.48 %	1.00 %	1.00 %
25	40	0.41 %	1.00 %	1.00 %
26	63	0.36 %	1.00 %	1.00 %
27	76	0.62 %	1.00 %	1.00 %
28	51	0.72 %	1.00 %	1.00 %
29	42	1.46 %	1.00 %	1.00 %
30	17	0.41 %	1.00 %	1.00 %
31	7	(0.00)%	1.00 %	1.00 %
32	14	1.75 %	1.00 %	1.00 %
33	11	0.00 %	1.00 %	1.00 %
34	3	2.32 %	1.00 %	1.00 %
35	-	N/A	1.00 %	1.00 %
36	-	N/A	1.00 %	1.00 %
37	-	N/A	1.00 %	1.00 %
38	-	N/A	1.00 %	1.00 %
39	-	N/A	1.00 %	1.00 %
40	-	N/A	1.00 %	1.00 %
Other	-			
Total	2,483			

Changes in overall pay inflation, in the Country as a whole, were lower than the wage inflation assumption of 3.5%. If our wage inflation assumption was realized, actual increases would have closely matched the expected increases. We recommend no change in the merit and longevity pay assumption.

EXPANDED LISTING OF RECOMMENDED ASSUMPTIONS

PROPOSED PRE-RETIREMENT MORTALITY RATES

	% Dying Next Year	
Age	Male	Female
20	0.0359%	0.0144%
21	0.0400%	0.0145%
22	0.0437%	0.0146%
23	0.0459%	0.0151%
24	0.0467%	0.0154%
25	0.0440%	0.0159%
26	0.0421%	0.0166%
27	0.0411%	0.0175%
28	0.0407%	0.0185%
29	0.0410%	0.0195%
30	0.0417%	0.0208%
31	0.0428%	0.0222%
32	0.0442%	0.0236%
33	0.0458%	0.0250%
34	0.0475%	0.0264%
35	0.0491%	0.0277%
36	0.0503%	0.0289%
37	0.0515%	0.0305%
38	0.0531%	0.0322%
39	0.0550%	0.0344%
40	0.0577%	0.0370%
41	0.0615%	0.0402%
42	0.0662%	0.0441%
43	0.0722%	0.0487%
44	0.0795%	0.0541%
45	0.0881%	0.0602%
46	0.0982%	0.0672%
47	0.1096%	0.0748%
48	0.1224%	0.0834%
49	0.1366%	0.0927%
50	0.1521%	0.1028%
51	0.1691%	0.1133%
52	0.1876%	0.1244%
53	0.2088%	0.1360%
54	0.2327%	0.1479%
55	0.2590%	0.1603%
56	0.2884%	0.1732%
57	0.3212%	0.1865%
58	0.3579%	0.2005%
59	0.3992%	0.2153%
60	0.4456%	0.2314%
61	0.4982%	0.2490%
62	0.5576%	0.2683%
63	0.6247%	0.2901%
64	0.7001%	0.3143%
65	0.7846%	0.3412%
Ref	#1158sb0x1	#1159sb0x1

PROPOSED POST-RETIREMENT MORTALITY RATES

Age	% Dying Next Year		Age	% Dying Next Year	
	Male	Female		Male	Female
50	0.3667%	0.2582%	81	4.5208%	3.5354%
51	0.3961%	0.2730%	82	5.0411%	3.9399%
52	0.4263%	0.2892%	83	5.6291%	4.3972%
53	0.4600%	0.3069%	84	6.2933%	4.9140%
54	0.4957%	0.3261%	85	7.0416%	5.4976%
55	0.5328%	0.3471%	86	7.8853%	6.1562%
56	0.5713%	0.3701%	87	8.8333%	6.8996%
57	0.6107%	0.3957%	88	9.8971%	7.7371%
58	0.6513%	0.4241%	89	11.0893%	8.6831%
59	0.6937%	0.4560%	90	12.4247%	9.7407%
60	0.7387%	0.4918%	91	13.8620%	10.8991%
61	0.7876%	0.5320%	92	15.3713%	12.1453%
62	0.8415%	0.5768%	93	16.9426%	13.4798%
63	0.9016%	0.6265%	94	18.5682%	14.8957%
64	0.9689%	0.6818%	95	20.2507%	16.3956%
65	1.0439%	0.7430%	96	22.0009%	18.0191%
66	1.1271%	0.8113%	97	23.8131%	19.7317%
67	1.2191%	0.8871%	98	25.6936%	21.5323%
68	1.3209%	0.9714%	99	27.6495%	23.4100%
69	1.4337%	1.0654%	100	29.6553%	25.3600%
70	1.5588%	1.1702%	101	31.6983%	27.3713%
71	1.6980%	1.2868%	102	33.7492%	29.4210%
72	1.8537%	1.4173%	103	35.7754%	31.4932%
73	2.0284%	1.5622%	104	37.7824%	33.5646%
74	2.2242%	1.7243%	105	39.7420%	35.6322%
75	2.4452%	1.9042%	106	41.6449%	37.6737%
76	2.6941%	2.1044%	107	43.4853%	39.6709%
77	2.9756%	2.3283%	108	45.2410%	41.6140%
78	3.2938%	2.5795%	109	46.9190%	43.4922%
79	3.6533%	2.8608%	110	100.0000%	100.0000%
80	4.0602%	3.1777%	Ref	#1208sb0x1	#1209sb0x1

PROPOSED POST-RETIREMENT DISABLED MORTALITY RATES

Age	% Dying Next Year Male	% Dying Next Year Female	Age	% Dying Next Year Male	% Dying Next Year Female
50	1.8403%	1.1109%	81	7.4957%	6.0233%
51	1.8989%	1.1698%	82	8.0925%	6.5145%
52	1.9575%	1.2279%	83	8.7534%	7.0418%
53	2.0263%	1.2840%	84	9.4855%	7.6078%
54	2.0985%	1.3372%	85	10.2950%	8.2158%
55	2.1710%	1.3875%	86	11.1926%	8.8704%
56	2.2436%	1.4350%	87	12.1843%	9.5772%
57	2.3151%	1.4798%	88	13.2790%	10.3406%
58	2.3856%	1.5230%	89	14.4860%	11.1706%
59	2.4565%	1.5661%	90	15.8161%	12.0617%
60	2.5290%	1.6106%	91	17.1729%	13.0541%
61	2.6062%	1.6587%	92	18.5551%	14.1394%
62	2.6908%	1.7121%	93	19.9709%	15.3203%
63	2.7843%	1.7733%	94	21.4189%	16.5869%
64	2.8883%	1.8438%	95	22.9015%	17.9383%
65	3.0035%	1.9259%	96	24.4263%	19.4122%
66	3.1292%	2.0211%	97	25.9807%	20.9659%
67	3.2654%	2.1309%	98	27.5684%	22.5952%
68	3.4137%	2.2566%	99	29.1994%	24.2889%
69	3.5747%	2.4009%	100	30.8576%	26.0464%
70	3.7504%	2.5647%	101	32.5525%	27.8657%
71	3.9434%	2.7496%	102	34.2926%	29.7398%
72	4.1572%	2.9583%	103	36.0618%	31.6634%
73	4.3943%	3.1904%	104	37.8825%	33.6249%
74	4.6564%	3.4493%	105	39.7420%	35.6322%
75	4.9483%	3.7329%	106	41.6449%	37.6737%
76	5.2715%	4.0429%	107	43.4853%	39.6709%
77	5.6308%	4.3805%	108	45.2410%	41.6140%
78	6.0287%	4.7471%	109	46.9190%	43.4922%
79	6.4686%	5.1415%	110	48.5103%	45.3054%
80	6.9558%	5.5663%	Ref	#1258sb0x1	#1259sb0x1

PROPOSED WITHDRAWAL RATES

Firefighters				Police Members		
Age	Male	Female		Age	Male	Female
18	0.0276	0.0276		18	0.0460	0.0460
19	0.0276	0.0276		19	0.0460	0.0460
20	0.0276	0.0276		20	0.0460	0.0460
21	0.0276	0.0276		21	0.0460	0.0460
22	0.0276	0.0276		22	0.0460	0.0460
23	0.0276	0.0276		23	0.0460	0.0460
24	0.0276	0.0276		24	0.0460	0.0460
25	0.0276	0.0276		25	0.0460	0.0460
26	0.0276	0.0276		26	0.0460	0.0460
27	0.0276	0.0276		27	0.0460	0.0460
28	0.0252	0.0252		28	0.0420	0.0420
29	0.0228	0.0228		29	0.0380	0.0380
30	0.0228	0.0228		30	0.0380	0.0380
31	0.0204	0.0204		31	0.0340	0.0340
32	0.0192	0.0192		32	0.0320	0.0320
33	0.0168	0.0168		33	0.0280	0.0280
34	0.0168	0.0168		34	0.0280	0.0280
35	0.0156	0.0156		35	0.0260	0.0260
36	0.0144	0.0144		36	0.0240	0.0240
37	0.0132	0.0132		37	0.0220	0.0220
38	0.0120	0.0120		38	0.0200	0.0200
39	0.0108	0.0108		39	0.0180	0.0180
40	0.0108	0.0108		40	0.0180	0.0180
41	0.0096	0.0096		41	0.0160	0.0160
42	0.0096	0.0096		42	0.0160	0.0160
43	0.0084	0.0084		43	0.0140	0.0140
44	0.0084	0.0084		44	0.0140	0.0140
45	0.0084	0.0084		45	0.0140	0.0140
46	0.0072	0.0072		46	0.0120	0.0120
47	0.0072	0.0072		47	0.0120	0.0120
48	0.0072	0.0072		48	0.0120	0.0120
49	0.0072	0.0072		49	0.0120	0.0120
50	0.0072	0.0072		50	0.0120	0.0120
51	0.0072	0.0072		51	0.0120	0.0120
52	0.0072	0.0072		52	0.0120	0.0120
53	0.0072	0.0072		53	0.0120	0.0120
54	0.0072	0.0072		54	0.0120	0.0120
55	0.0072	0.0072		55	0.0120	0.0120
Wx	113	113		Wx	113	113
Wx Mult	120%	120%		Wx Mult	200%	200%

PROPOSED DISABILITY RATES

	% Becoming Disabled	
Age	Male	Female
20	0.12%	0.12%
21	0.12%	0.12%
22	0.12%	0.12%
23	0.12%	0.12%
24	0.12%	0.12%
25	0.12%	0.12%
26	0.12%	0.12%
27	0.12%	0.12%
28	0.12%	0.12%
29	0.12%	0.12%
30	0.12%	0.12%
31	0.14%	0.14%
32	0.17%	0.17%
33	0.20%	0.20%
34	0.24%	0.24%
35	0.27%	0.27%
36	0.33%	0.33%
37	0.38%	0.38%
38	0.44%	0.44%
39	0.51%	0.51%
40	0.59%	0.59%
41	0.66%	0.66%
42	0.75%	0.75%
43	0.84%	0.84%
44	0.95%	0.95%
45	1.05%	1.05%
46	1.16%	1.16%
47	1.28%	1.28%
48	1.41%	1.41%
49	1.55%	1.55%
50	1.68%	1.68%
51	1.83%	1.83%
52	1.98%	1.98%
53	2.15%	2.15%
54	2.33%	2.33%
55	2.51%	2.51%
56	2.69%	2.69%
57	2.88%	2.88%
58	3.09%	3.09%
59	3.30%	3.30%
60	0.00%	0.00%
Hx	35	35
Mult	150%	150%

Assumed 75% of disabilities are Duty related and 25% are Non-Duty related.

PROPOSED NORMAL RETIREMENT RATES

	% Retiring	
Age	Male	Female
45	25%	25%
46	25%	25%
47	25%	25%
48	25%	25%
49	25%	25%
50	25%	25%
51	25%	25%
52	25%	25%
53	25%	25%
54	25%	25%
55	25%	25%
56	25%	25%
57	25%	25%
58	25%	25%
59	25%	25%
60	50%	50%
61	60%	60%
62	70%	70%
63	80%	80%
64	90%	90%
65	100%	100%
66	100%	100%
67	100%	100%
68	100%	100%
69	100%	100%
70	100%	100%
71	100%	100%
72	100%	100%
73	100%	100%
74	100%	100%
75	100%	100%
76		
77		
78		
79		
80		
Rx	225	225
anchor	45	45

Firefighters with 34 or more years of service are assumed to retire within the next year.

Gabriel Roeder Smith & Company
Consultants & Actuaries

One Towne Square
Suite 800
Southfield, MI 48076-3723

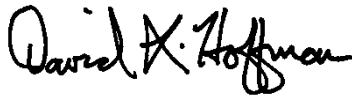248.799.9000 phone
248.799.9020 fax
www.gabrielroeder.com

December 4, 2015

Ms. Peggy Korzen
Executive Director
City of Grand Rapids Police and Fire Retirement System
233 East Fulton, Suite 216
Grand Rapids, Michigan 49503

Dear Peggy:

Enclosed are 20 copies of the report of an experience study covering the period from December 31, 2009 to December 31, 2014.

Sincerely,

David L. Hoffman

DLH:bd

Enclosures