City of Farmington Hills Employees' Retirement System
Review of System Experience
July 1, 2013 Through June 30, 2018

GRS

August 22, 2019

The Retirement Board
City of Farmington Hills
   Employees' Retirement System
31555 Eleven Mile Road
Farmington Hills, Michigan 48336
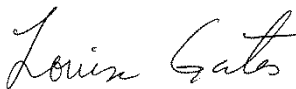
Dear Board Members:

Presented in this report are the results of a review of Retirement System experience. The investigation was conducted for the purpose of updating the actuarial assumptions used in valuing the City of Farmington Hills Employees' Retirement System actuarial liabilities and actuarially determined employer contributions.

The investigation was based upon the data furnished for the annual actuarial valuations during the period *July 1, 2013 through June 30, 2018.*
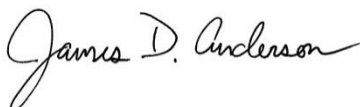
We have shown the expected impact of the proposed changes on valuation results as of June 30, 2018. This information is shown in Section D of this report.

Louise M. Gates and James D. Anderson are independent of the plan sponsor, 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,

Louise M. Gates, ASA, FCA, MAAA

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

LMG/JDA

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Introduction

Each year, as of June 30th, the actuarial liabilities of the City of Farmington Hills Employees' Retirement 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 **termination** of active members.
- Rates of **disability** among 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.
- 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; or

- 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. The results of this analysis are shown in Sections A and B of this report.

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.

The scope of this report is limited to assumptions and methods used in the pension actuarial valuation. We have also included factors for optional forms of payment. Analysis of assumptions specific to the retiree health valuation is beyond the scope of this project.

SECTION A

DEMOGRAPHIC ASSUMPTIONS

Normal Retirement

Discussion: Rates of normal or regular retirement are used to measure the probabilities of an eligible member retiring from City employment during the next year. During the study period, the actual number of retirements among general employees was generally consistent with the number projected by current assumptions. This experience suggests that the current normal retirement rates are a good fit with System experience for this group. For court employees, the actual number of retirements was significantly lower than projected by current assumptions during the study period. This experience suggests a need for lowering the expected rates of normal retirement for the Court group. The experience during the study period is summarized below:

General				Court		
Number of Regular Retirements				**Number of Regular Retirements**		
Year	**Expected**	**Actual**		**Year**	**Expected**	**Actual**
2013-2014	5.95	11		2013-2014	1.30	0
2014-2015	5.40	2		2014-2015	1.45	1
2015-2016	8.15	6		2015-2016	1.80	1
2016-2017	7.75	7		2016-2017	1.75	0
2017-2018	8.00	10		2017-2018	1.85	0
Total	**35.25**	**36**		**Total**	**8.15**	**2**

Recommendation: We recommend no change to the current normal retirement rates for general division employees. We recommend changing the normal retirement rates for the court employees to the rates shown on page 6.

Normal Retirement

Discussion: Rates of normal or regular retirement are used to measure the probabilities of an eligible member retiring from City employment during the next year. During the study period, the actual number of retirements among firefighter employees was generally consistent with the number projected by current assumptions. This suggests that the current rates are a good fit with the retirement experience for this group.

During the same period, the actual number of command officer retirements was significantly higher than the number projected by the current assumptions. We also note that there were no command officers who retired under the "30 & out" provision during the study period, or stated differently, no command officer who retired during the period was hired before age 20. Furthermore, approximately 90% of the officers who retired during the study period were in the 50 – 54 age range. This experience suggests a need to increase the rates of retirement for this group, in particular at early eligibility ages.

The number of patrol officer retirements during the study period was a bit lower than anticipated by actuarial assumptions. Currently, we assume that all police patrol officers hired before 2008 retire immediately upon reaching the pension benefit maximum (75% of FAC). During the study period, many but not all retiring patrol officers left on or before reaching the pension benefit maximum. This experience suggests a need for changing the retirement rates for this group. The experience during the study period is summarized below:

Police Patrol
Number of Regular Retirements

Year	Expected	Actual
2013-2014	2.20	1
2014-2015	2.50	2
2015-2016	1.60	1
2016-2017	1.30	2
2017-2018	0.04	0
Total	**7.64**	**6**

Police Command
Number of Regular Retirements

Year	Expected	Actual
2013-2014	0.30	1
2014-2015	0.30	0
2015-2016	0.90	2
2016-2017	0.75	3
2017-2018	0.45	3
Total	**2.70**	**9**

Fire
Number of Regular Retirements

Year	Expected	Actual
2013-2014	0.60	1
2014-2015	0.30	0
2015-2016	0.90	2
2016-2017	0.30	0
2017-2018	0.30	0
Total	**2.40**	**3**

Recommendation: We recommend no change to the firefighter retirement rates. We recommend changing the police patrol (pre-2008 hires) and police command officer retirement rates to the rates shown on page 6.

Early Reduced Retirement

Discussion: Rates of early reduced retirement are used to measure the probabilities of an eligible member retiring from City employment during the next year under the early retirement provisions. During the study period, the actual number of early retirements was generally consistent with actuarial expectations. This suggests that the current rates continue to be a good fit with actual System experience.

General
Number of Early Retirements

Year	Expected	Actual
2013-2014	0.20	1
2014-2015	0.21	0
2015-2016	0.17	0
2016-2017	0.14	0
2017-2018	0.12	0
Total	**0.84**	**1**

Court
Number of Early Retirements

Year	Expected	Actual
2013-2014	0.04	0
2014-2015	0.03	0
2015-2016	0.03	0
2016-2017	0.02	0
2017-2018	0.03	0
Total	**0.15**	**0**

Police Patrol
Number of Early Retirements

Year	Expected	Actual
2013-2014	0.00	0
2014-2015	0.00	0
2015-2016	0.01	0
2016-2017	0.01	0
2017-2018	0.00	0
Total	**0.02**	**0**

Police Command
Number of Early Retirements

Year	Expected	Actual
2013-2014	0.00	0
2014-2015	0.00	0
2015-2016	0.00	0
2016-2017	0.00	0
2017-2018	0.03	0
Total	**0.03**	**0**

Fire
Number of Early Retirements

Year	Expected	Actual
2013-2014	0.02	0
2014-2015	0.03	0
2015-2016	0.04	0
2016-2017	0.05	0
2017-2018	0.10	0
Total	**0.24**	**0**

Recommendation: We recommend no changes to the early reduced retirement rates for any employment group.

Normal Retirement Rates

Current Rates of Regular Retirement

Retirement Ages	Percent of Eligible Active Members Retiring			Years of Service	Police Command
	General	Court	Police Command		
50			**15%**	25	
51			**15**	26	
52			**15**	27	
53			**15**	28	
54			**15**	29	
55	30%	**30%**	**15**	30	40%
56	25	**25**	**15**	31	40
57	25	**25**	**15**	32	40
58	25	**25**	**15**	33	40
59	25	**25**	**15**	34	40
60	25	**25**	**100**	35	100
61	25	**25**			
62	30	**30**			
63	20	**20**			
64	25	**25**			
65	25	**25**			
66	30	**30**			
67	30	**30**			
68	30	**30**			
69	30	**30**			
70	100	**100**			

Retirement Ages	Percent of Eligible Active Members Retiring	Years of Service		
	Police Patrol Hired After 1/1/2008 and Fire Hired After 7/1/2008		Police Patrol Hired Before 1/1/2008	Fire Hired Before 7/1/2008
50	30%	25	**30%**	30%
51	30	26	**30**	30
52	30	27	**30**	30
53	30	28	**100**	30
54	30	29	**100**	30
55	20	30	**100**	100
56	20			
57	20			
58	20			
59	20			
60	100			

The incidence of retirement for police patrol hired before January 1, 2008 and firefighters hired before July 1, 2008 is assumed to be 100% when the participant reaches the benefit maximum. The incidence of retirement for firefighter members is assumed to be 100% at age 62.

Normal Retirement Rates

Proposed Rates of Regular Retirement

Retirement Ages	Percent of Eligible Active Members Retiring				
	General	Court	Police Command	Years of Service	Police Command
50			30%	25	
51			30	26	
52			30	27	
53			30	28	
54			30	29	
55	30%	20%	20	30	40%
56	25	15	15	31	40
57	25	15	15	32	40
58	25	15	15	33	40
59	25	15	15	34	40
60	25	20	100	35	100
61	25	25			
62	30	30			
63	20	20			
64	25	25			
65	25	25			
66	30	30			
67	30	30			
68	30	30			
69	30	30			
70	100	100			

Retirement Ages	Percent of Eligible Active Members Retiring			
	Police Patrol Hired After 1/1/2008 and Fire Hired After 7/1/2008	Years of Service	Police Patrol Hired Before 1/1/2008	Fire Hired Before 7/1/2008
50	30%	25	30%	30%
51	30	26	30	30
52	30	27	30	30
53	30	28	30	30
54	30	29	30	30
55	20	30	100	100
56	20			
57	20			
58	20			
59	20			
60	100			

The incidence of retirement for firefighter members is assumed to be 100% at age 62.

Early Reduced Retirement Rates

Current and Proposed Rates of Early Retirement

Retirement Ages	Percent of Eligible Active Members Retiring (Early Retirement)	
	General & Court	Police & Fire
50		1%
51		1
52		1
53		1
54		1
55		1
56		1
57	1%	1
58	1	1
59	1	1

Turnover

Discussion: This assumption measures the probabilities of members terminating City employment. Turnover rates are generally higher during the early years of employment and lower in subsequent years. A select period of 5 years is used to model this. Rates of separation from active membership (turnover rates) do not apply to members who are eligible to retire from the System.

We reviewed terminations among general and court employee members of the System based on their years of service at the time their City employment terminated. These individuals are eligible for a deferred pension benefit at the time of termination if they have completed 8 or more years of service. If a member terminates employment with less than 8 years of service, they are only eligible for a refund of their contributions.

During the study period, the number of vested terminated general and court members who chose to defer their pension benefit was generally consistent with expectations. This suggests that the current rates of termination/benefit deferral are a good match with the actual System experience. We also reviewed terminations from these 2 groups who received a refund of employee contributions during the study period. The results were consistent with what would be expected in a closed (or partially closed) System. The System was closed to new general members at various dates between 2006 and 2008. The court group was closed to new hires in 2015. The experience during the study period is summarized below.

General

Number of Vested Deferred Terminations				Number of Other Terminations		
Year	Expected	Actual		Year	Expected	Actual
2013-2014	0.90	0		2013-2014	1.32	0
2014-2015	0.90	1		2014-2015	1.10	0
2015-2016	0.80	1		2015-2016	0.91	0
2016-2017	0.78	0		2016-2017	0.76	0
2017-2018	0.77	0		2017-2018	0.66	0
Total	**4.15**	**2**		**Total**	**4.75**	**0**

Court

Number of Vested Deferred Terminations				Number of Other Terminations		
Year	Expected	Actual		Year	Expected	Actual
2013-2014	0.37	1		2013-2014	0.59	0
2014-2015	0.33	1		2014-2015	0.53	0
2015-2016	0.30	0		2015-2016	0.54	0
2016-2017	0.30	0		2016-2017	0.49	0
2017-2018	0.27	0		2017-2018	0.36	0
Total	**1.57**	**2**		**Total**	**2.51**	**0**

Recommendation: We recommend no changes to the termination rates for the general and court employment groups.

Turnover

Discussion: During the study period, the number of non-vested terminations in the police patrol group was significantly higher than the number anticipated by current actuarial assumptions. This suggests a need for increasing the rates of turnover for the patrol group. In addition, about two thirds of the actual non-vested terminations from this group had less than 5 years of service at termination. The termination experience for the groups during the study period is generally consistent with expectations. The experience during the study period is summarized below.

Police Patrol

Number of Vested Deferred Terminations				Number of Other Terminations		
Year	**Expected**	**Actual**		**Year**	**Expected**	**Actual**
2013-2014	0.17	0		2013-2014	1.41	1
2014-2015	0.14	0		2014-2015	1.41	2
2015-2016	0.15	1		2015-2016	1.25	1
2016-2017	0.14	0		2016-2017	1.24	5
2017-2018	0.13	1		2017-2018	1.27	5
Total	**0.73**	**2**		**Total**	**6.58**	**14**

Police Command

Number of Vested Deferred Terminations				Number of Other Terminations		
Year	**Expected**	**Actual**		**Year**	**Expected**	**Actual**
2013-2014	0.14	0		2013-2014	0.00	0
2014-2015	0.14	0		2014-2015	0.00	0
2015-2016	0.11	0		2015-2016	0.00	0
2016-2017	0.13	0		2016-2017	0.00	0
2017-2018	0.11	0		2017-2018	0.01	0
Total	**0.63**	**0**		**Total**	**0.01**	**0**

Fire

Number of Vested Deferred Terminations				Number of Other Terminations		
Year	**Expected**	**Actual**		**Year**	**Expected**	**Actual**
2013-2014	0.11	1		2013-2014	0.83	0
2014-2015	0.10	1		2014-2015	0.81	0
2015-2016	0.08	0		2015-2016	0.84	0
2016-2017	0.07	0		2016-2017	1.07	0
2017-2018	0.09	0		2017-2018	0.81	0
Total	**0.45**	**2**		**Total**	**4.36**	**0**

Recommendation: We recommend changing the turnover rates for the police patrol group. We recommend no change to the other turnover rates.

Turnover Rates

Current Rates of Turnover

Sample Ages	Years of Service	% of Active Members Separating within Next Year			
		General	Court	Police	Fire
ALL	0	11.00%	12.00%	6.00%	7.00%
	1	10.00	12.00	4.00	5.00
	2	8.00	10.00	3.50	3.50
	3	8.00	9.00	3.00	3.50
	4	7.00	9.00	2.50	3.00
20	5 & Over	6.00	6.00	3.00	3.00
25		5.50	5.50	3.00	3.00
30		4.40	4.40	2.50	2.50
35		3.90	3.90	1.50	1.50
40		3.40	3.40	0.70	0.70
45		3.00	3.00	0.50	0.50
50		2.00	2.00	0.50	0.50
55		1.40	1.40	0.50	0.50
60		1.40	1.40	0.50	0.50

Proposed Rates of Turnover

Sample Ages	Years of Service	% of Active Members Separating within Next Year			
		General	Court	Police	Fire
ALL	0	11.00%	12.00%	**8.00%**	7.00%
	1	10.00	12.00	**6.00**	5.00
	2	8.00	10.00	**5.00**	3.50
	3	8.00	9.00	**4.00**	3.50
	4	7.00	9.00	**3.00**	3.00
20	5 & Over	6.00	6.00	**3.00**	3.00
25		5.50	5.50	**3.00**	3.00
30		4.40	4.40	**2.50**	2.50
35		3.90	3.90	**1.00**	1.50
40		3.40	3.40	**0.70**	0.70
45		3.00	3.00	**0.50**	0.50
50		2.00	2.00	**0.50**	0.50
55		1.40	1.40	**0.50**	0.50
60		1.40	1.40	**0.50**	0.50

Disability

Discussion: Rates of disability are used to measure the probabilities of an eligible member becoming disabled and retiring from City employment with disability benefits. Disability rates do not apply to members who are eligible for normal or early retirement. During the study period, the actual number of disability retirements was generally consistent with the number expected during the study period for each of the groups. This suggests that the current disability rates continue to be a good fit with System experience. The experience during the study period is summarized below.

Number of Disability Retirements

Group	Expected	Actual
General	0.79	0
Court	0.16	0
Police Patrol	0.36	1
Police Command	0.19	0
Fire	0.26	0
Total	**1.76**	**1**

Proposal: We recommend no change to the current disability rates at this time. The current and proposed rates are shown below:

Disability Rates

Current and Proposed Rates of Disability

Sample Ages	Number of Disabilities Per 100 Eligible Members
20	0.01
25	0.02
30	0.04
35	0.07
40	0.12
45	0.19
50	0.28
55	0.40
60	0.57

Mortality

Discussion: The mortality assumption is used in the annual valuation of the City of Farmington Hills Employee's Retirement System to measure the probabilities of members dying before retirement and the probability of each benefit payment being made after retirement. The incidence of pre-retirement mortality is a relatively minor ingredient in the determination of System liabilities. This is due to the small incidence of death among current employees. In contrast, the assumed incidence of post- retirement mortality is a more significant component of System liabilities. The mortality tables currently being used in the annual valuation of the System are the RP-2000 mortality tables projected to the year 2020 using projection scale BB.

Newer mortality tables have been released since the year 2000. Things change and our understanding of things also changes. This is reflected in the most recent published mortality tables released in final form in 2019 by the Society of Actuaries (Pub-2010 mortality tables). These mortality tables include mortality rates based on analysis of experience of public plan populations using both a head count weighted approach and a benefit weighted approach. Head count weighted tables are a good fit for populations that are relatively uniform while the amount weighted tables are more appropriate for populations with a wide range of benefit amounts. Accordingly, we recommend the use of the Pub-2010 General amount weighted tables for the general and court group valuations and the head count weighted Safety tables for the police and fire groups.

Proposal: We recommend the following mortality tables for use in future valuations of the System:

General and Court

- **Healthy Pre-Retirement:** The Pub-2010 Amount-Weighted, General, Employee, Male and Female tables, with future mortality improvements projected to 2025 using scale MP-2018.

- **Healthy Post-Retirement:** The Pub-2010 Amount-Weighted, General, Healthy Retiree, Male and Female tables, with future mortality improvements projected to 2025 using scale MP-2018.

- **Disability Retirement:** The Pub-2010 Amount-Weighted, General, Disabled Retiree, Male and Female, with future mortality improvements projected to 2025 using scale MP-2018.

Police and Fire

- **Healthy Pre-Retirement:** The Pub-2010 Headcount-Weighted, Safety, Employee, Male and Female tables, with future mortality improvements projected to 2025 using scale MP-2018.

- **Healthy Post-Retirement:** The Pub-2010 Headcount-Weighted, Safety, Healthy Retiree, Male and Female tables, with future mortality improvements projected to 2025 using scale MP-2018.

- **Disability Retirement:** The Pub-2010 Headcount-Weighted, Safety, Disabled Retiree, Male and Female, with future mortality improvements projected to 2025 using scale MP-2018.

Mortality

Summary of Life Expectancies under the Current Tables

Single Life Retirement Values
Future Life Expectancy (Years)

Sample Ages	Men	Women
50	32.99	35.59
55	28.37	30.9
60	23.94	26.34
65	19.74	21.98
70	15.83	17.93
75	12.26	14.25
80	9.13	10.95

The table above is based on healthy life mortality rates.

Summary of Life Expectancies under the Proposed Tables

General and Court

Sample Ages	Healthy Pre-Retirement Future Life Expectancy (Years) Men	Women	Healthy Post-Retirement Future Life Expectancy (Years) Men	Women	Disabled Retirement Future Life Expectancy (Years) Men	Women
50	37.72	39.84	33.79	36.65	24.62	27.12
55	33.00	35.02	29.29	32.06	21.53	24.09
60	28.38	30.26	24.94	27.54	18.74	21.23
65	23.86	25.57	20.75	23.12	16.10	18.27
70	19.43	20.96	16.75	18.85	13.51	15.17
75	15.08	16.45	13.04	14.84	10.95	12.13
80	10.83	12.06	9.74	11.21	8.54	9.38

Police and Fire

Sample Ages	Healthy Pre-Retirement Future Life Expectancy (Years) Men	Women	Healthy Post-Retirement Future Life Expectancy (Years) Men	Women	Disabled Retirement Future Life Expectancy (Years) Men	Women
50	36.28	39.00	32.74	35.20	31.04	32.59
55	31.51	34.21	28.18	30.56	26.73	28.18
60	26.84	29.48	23.74	26.12	22.61	24.07
65	22.28	24.78	19.58	21.89	18.76	20.19
70	17.87	20.15	15.64	17.86	15.13	16.41
75	13.67	15.70	12.03	14.11	11.78	12.91
80	9.73	11.51	8.87	10.75	8.82	9.94

The Pub-2010 table rates shown above were based on a projection of mortality rates to the year 2025 using the MP-2018 projection scale.

SECTION B

ECONOMIC ASSUMPTIONS

Economic Assumptions
Investment Return and Inflation

Background

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 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.

While no specific price inflation assumption is necessary in order to perform the actuarial valuation of the System, price inflation is a key component of the underlying wage inflation and investment return assumptions. The chart on the following page shows historical averages of both price and wage inflation. The long-term historical average is 4.0% while short-term averages are in the 2.0% range. For the purpose of this study we considered future rates of price inflation from a variety of sources including a survey of price inflation expectations from 14 investment advisors that we survey. Most of the investment firms in our survey expect price inflation to be between 2.0% and 2.5% over the next 10 years. The 2019 annual report of the Social Security Trustees uses 2.60% as the long term intermediate inflation assumption. The federal reserve bank of Philadelphia 2019 projection of price inflation over the next 10 years is 2.20%. **Based upon the reviewed data, we recommend no change to the current price inflation assumption of 2.5% per year.**

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 rate of increase in National Average Earnings over the last 30 years is generally consistent with the current Retirement System assumption. The shorter term averages are below this rate and the 50 year average is above it. 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 recommendation for a 2.5% price inflation assumption, we believe a reasonable range for this assumption is from 3.00% to 3.50% a year.

We recommend a change to the current wage inflation assumption from 3.50% to 3.00%.

Economic Assumptions

The chart below shows average annual rates of price and wage inflation along with rates of productivity based on the indicated historical averages.

| Year | Annual Increase 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 %

Economic Assumptions

Investment Return: The investment return assumption is the actuarial assumption that has the largest impact on the actuarial valuation results of the Retirement System. As the population matures more of the actuarial accrued liabilities are related to non-active members. Under the circumstances, the need for asset liquidity increases to meet the increasing cash flow needs of the System.

Presented below is the approximate target asset allocation for the City of Farmington Hills Employees' Retirement System:

Asset Class	Target Allocation
Domestic Equity	46.00 %
International Equity	16.00 %
Domestic Bonds	17.00 %
International Bonds	2.00 %
Real Estate	5.00 %
Alternative Assets	11.00 %
Cash and Equivalents	3.00 %
Total	100.00 %

Based upon the target asset allocation, future expectations of investment returns for this portfolio were analyzed using the capital market expectations of various investment advisors. The final expected nominal investment return results are based upon a 2.5% price inflation assumption, which is the recommended assumption. Furthermore, the investment results presented are net of investment expenses. The following page shows the results of this analysis.

Economic Assumptions
Investment Return Expectations

Investment Return Forcaster	Investment Forecaster Expected Nominal Return	Investment Forecaster Inflation Assumption	Expected Real Return (2)–(3)	Actuary Inflation Assumption	Expected Nominal Return (4)+(5)	Investment 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	5.60%	2.20%	3.40%	2.50%	5.90%	0.50%	5.40%		13.23%
2	6.45%	2.50%	3.95%	2.50%	6.45%	0.50%	5.95%		13.15%
3	6.39%	2.50%	3.89%	2.50%	6.39%	0.50%	5.89%		12.19%
4	6.17%	2.20%	3.97%	2.50%	6.47%	0.50%	5.97%		10.40%
5	6.22%	2.00%	4.22%	2.50%	6.72%	0.50%	6.22%		11.14%
6	6.65%	2.25%	4.40%	2.50%	6.90%	0.50%	6.40%		12.71%
7	6.94%	2.21%	4.73%	2.50%	7.23%	0.50%	6.73%		13.72%
8	6.74%	2.00%	4.74%	2.50%	7.24%	0.50%	6.74%		13.24%
9	7.20%	2.26%	4.94%	2.50%	7.44%	0.50%	6.94%		13.41%
10	7.00%	2.30%	4.70%	2.50%	7.20%	0.50%	6.70%		10.78%
11	7.43%	2.31%	5.12%	2.50%	7.62%	0.50%	7.12%		13.19%
12	7.55%	2.15%	5.40%	2.50%	7.90%	0.50%	7.40%		12.95%
13	7.13%	1.70%	5.43%	2.50%	7.93%	0.50%	7.43%		11.93%
14	7.79%	2.00%	5.79%	2.50%	8.29%	0.50%	7.79%		12.22%
Average	**6.80%**	**2.18%**	**4.62%**	**2.50%**	**7.12%**	**0.50%**	**6.62%**		**12.45%**

Investment Return Forcaster	Distribution of 20-Year Average Geometric Net Nominal Return			Probability of exceeding 7.40%
	40th	50th	60th	
(1)	(2)	(3)	(4)	(5)
1	3.84%	4.57%	5.32%	17.02%
2	4.41%	5.15%	5.88%	22.14%
3	4.52%	5.20%	5.89%	20.98%
4	4.88%	5.47%	6.05%	20.33%
5	5.01%	5.64%	6.26%	23.96%
6	4.94%	5.65%	6.37%	26.87%
7	5.09%	5.86%	6.63%	30.68%
8	5.19%	5.93%	6.68%	30.92%
9	5.36%	6.11%	6.86%	33.27%
10	5.56%	6.16%	6.77%	30.38%
11	5.58%	6.32%	7.06%	35.60%
12	5.90%	6.63%	7.35%	39.39%
13	6.10%	6.77%	7.44%	40.60%
14	6.42%	7.10%	7.79%	45.61%
Average	**5.20%**	**5.90%**	**6.60%**	**29.84%**

Economic Assumptions
Investment Return Expectations

Actuaries are bound by Actuarial Standards of Practice (ASOP). ASOP No. 27 provides guidelines for the selection of economic assumptions for measuring pension obligations. The standard requires that economic assumptions be internally consistent with wage inflation and price inflation assumptions used in the valuation of the plan. The ASOP defines a reasonable assumption to have the following characteristics:

- It is appropriate for the purpose of the measurement;
- It reflects the actuary's professional judgement;
- It takes into account relevant current and historical economic data as of the measurement date;
- It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in the market data or a combination of the two; and
- It has no significant bias (it is not significantly optimistic or pessimistic)

The standard suggests that either the expected geometric return (i.e., 50th percentile) or the expected arithmetic return is suitable for use as a reasonable investment return assumption. Based on the average of each of the investment consultants' expectations, this would result in a range of 5.90% to 6.62% if all fourteen investment advisors were included. Including ten of the fourteen results provides a range of 6.2% to 7.0%.

The historical returns over the last five plan years (shown below) result in an average annual rate of return of 6.7%.

2018	2017	2016	2015	2014
7.57%	12.69%	-1.77%	-0.96%	17.19%

Recommendation: We recommend lowering the investment return assumption.

SECTION C

ACTUARIAL METHODS

Actuarial Methods

Amortization Policy

The most recent actuarial valuation of the System includes a 9-year closed amortization period for the general group, a 12-year closed amortization for the court group, and a 25-year closed amortization for the police and fire groups. The general and court group accrued liabilities are amortized using a level dollar amortization method while the public safety groups use a level percent of payroll amortization method. **We recommend lengthening the general and court division amortization periods beginning with the June 30, 2019 valuation. Section D shows the proposed periods.**

Actuarial Cost Method

The actuarial cost method is the liability allocation method the actuary uses to develop City contributions. The City of Farmington Hills Employees' Retirement System currently uses the entry age normal cost method. **We recommend no change to the current actuarial cost method.**

Asset Valuation Method

The City of Farmington Hills Employees' 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 closed 5-year periods. This is a very common method among public employee retirement systems. Most Michigan systems use an averaging period of 4 or 5 years. We recommend establishing a 'corridor', so that the funding value of assets does not diverge too far from the underlying market value. Systems that use a corridor will vary on the amount of the corridor, but it is typically between 10% and 30%. A Corridor of 80% would have no impact on 2018 actuarial valuation results. **We recommend adding an 80% corridor to the funding value of assets used in the annual valuations of the System.**

SECTION D

CONTRIBUTIONS BASED ON PROPOSED CHANGES

Summary of Current and Proposed Assumptions

Assumption Set	Investment Return	Wage Inflation	Demographic Assumptions
A. Current	7.40%	3.50%	Current
B. Proposed Demographic	7.40%	3.50%	Proposed
C. Alternate I	7.25%	3.00%	Proposed
D. Alternate II	7.00%	3.00%	Proposed

Proposed demographic assumptions and methods include all of the recommended changes shown in Sections A and C of this report. In addition, Assumption Sets B and D include a 20 year amortization period for the general and court divisions and a 25 year amortization period for the police and fire divisions. Assumption set C includes a 15 year amortization period for the general and court divisions and a 25 year amortization period for the police and firefighter divisions.

The amortization periods used in the most recent valuation of the System include a 9 year period for the general division, a 12 year period for the court and a 25 year period for the police and fire divisions.

Effect of Recommended Changes in Actuarial Assumptions on Actuarial Liabilities and Employer Contributions
Illustrative Results as of June 30, 2018

		General				Court			
Assumption Set		**A**	**B**	**C**	**D**	**A**	**B**	**C**	**D**
Interest Rate		7.40%	7.40%	7.25%	7.00%	7.40%	7.40%	7.25%	7.00%
Wage Inflation		3.50%	3.50%	3.00%	3.00%	3.50%	3.50%	3.00%	3.00%
Amortization Period		9	20	15	20	12	20	15	20
A.	Employer Normal Cost	$ 642,651	$ 666,547	$ 639,596	$ 683,059	$ 164,467	$ 169,028	$ 161,936	$ 174,239
B.	Actuarial Accrued Liability	$ 77,363,676	$ 79,729,170	$ 80,430,867	$ 82,463,203	$ 8,277,003	$ 8,436,755	$ 8,476,235	$ 8,726,354
C.	Actuarial Value of Assets	66,654,028	66,654,028	66,654,028	66,654,028	7,520,710	7,520,710	7,520,710	7,520,710
D.	Unfunded Accrued Liability (UAL) (B - C)	10,709,648	13,075,142	13,776,839	15,809,175	756,293	916,045	955,525	1,205,644
E.	UAL Payment	1,671,511	1,173,078	1,424,035	1,402,028	97,238	82,268	98,745	107,878
F.	Employer Contribution $ (A + E)	2,314,162	1,839,625	2,063,631	2,085,087	261,705	251,296	260,681	282,117

Using a 15 year amortization period with Assumption Set D above (instead of the 20 year period shown) for the general and court groups results in an employer contribution of $2.3 million for the general group and $0.3 million for the court group as of June 30, 2018.

Effect of Recommended Changes in Actuarial Assumptions on Actuarial Liabilities and Pension Contributions
Illustrative Results as of June 30, 2018

		Police				Fire			
Assumption Set		A	B	C	D	A	B	C	D
Interest Rate		7.40%	7.40%	7.25%	7.00%	7.40%	7.40%	7.25%	7.00%
Wage Inflation		3.50%	3.50%	3.00%	3.00%	3.50%	3.50%	3.00%	3.00%
Amortization Period		25	25	25	25	25	25	25	25
A.	Employer Normal Cost %	14.83%	14.82%	14.27%	15.36%	15.52%	15.20%	14.65%	15.73%
B.	Actuarial Accrued Liability	$ 81,754,384	$ 83,379,567	$ 84,070,013	$ 86,463,116	$ 25,435,906	$ 25,773,806	$ 25,937,543	$ 26,737,872
C.	Actuarial Value of Assets	64,461,296	64,461,296	64,461,296	64,461,296	21,256,056	21,256,056	21,256,056	21,256,056
D.	Unfunded Accrued Liability (UAL) (B - C)	17,293,088	18,918,271	19,608,717	22,001,820	4,179,850	4,517,750	4,681,487	5,481,816
E.	UAL Payment rate	12.30%	13.55%	14.68%	16.11%	5.68%	6.13%	6.63%	7.62%
F.	Employer Contribution % (A + E)	27.13%	28.37%	28.95%	31.47%	21.20%	21.33%	21.28%	23.35%
G.	Employer Contribution $	$ 2,378,241	$ 2,530,088	$ 2,556,928	$ 2,779,500	$ 973,481	$ 996,443	$ 984,526	$ 1,080,295

Effect of Recommended Changes in Actuarial Assumptions on Actuarial Liabilities and Employer Pension Contributions Summary of Illustrative Results as of June 30, 2018

Assumption Set	A	B	C	D
Interest Rate	**7.40%**	**7.40%**	**7.25%**	**7.00%**
Wage Inflation	**3.50%**	**3.50%**	**3.00%**	**3.00%**
Accrued Liability	$192,830,969	$197,319,298	$198,914,658	$204,390,545
Funding Value of Assets	159,892,090	159,892,090	159,892,090	159,892,090
Funding Percent	82.92%	81.03%	80.38%	78.23%
Employer Contribution $	5,927,589	5,617,452	5,865,766	6,226,999

SECTION E

OPTIONAL FORMS OF PAYMENT

Factors for Optional Forms of Payment

Discussion: When a member of the Retirement System retires, the member receives a monthly pension benefit. The normal form of benefit (straight life) does not depend on age; it depends on a benefit multiplier, final average compensation (FAC) and service at retirement. If a 55 year old member has the same multiplier, FAC and service as a 65 year old member, the 55 year old member's monthly benefit and the 65 year old member's monthly benefit will be exactly the same. The value of the 55 year old member's pension will be greater than the 65 year old member's pension because 55 year olds on average will live longer into the future than those age 65 and will therefore receive more benefit payments.

When a member elects a joint and survivorship (J&S) form of payment, the expected future "lifetime" associated with the member's pension increases because the pension is payable not only while the member is alive, but also while the member's beneficiary is alive. If the expected future "lifetime" of a monthly pension increases, the value of the pension also increases unless the amount of monthly pension payment is reduced. The Retirement System reduces the joint and survivorship monthly pension payment to an amount that yields the same actuarial value as a straight life pension based on life expectancy. This reduction is based on factors for optional forms of payment. These factors ("option factors") are based on an assumed life expectancy (using the proposed mortality table), interest (7.0%) and the ages of the individuals receiving the benefit. When one or more of these assumptions is updated for use in the annual valuations of the System it is appropriate to review the assumptions used for optional forms of payment. A sample of proposed option factors is shown below:

General and Court Retirees Factors for Optional Forms of Payment

Age at Retirement		50% Joint & Survivor With Pop- Up		75% Joint & Survivor With Pop- Up		100% Joint & Survivor With Pop- Up	
Retiree	Beneficiary	Present Factor	Proposed Factor	Present Factor	Proposed Factor	Present Factor	Proposed Factor
50	45	0.95377	0.96033	0.93222	0.94166	0.91163	0.92370
55	50	0.93755	0.94934	0.90916	0.92589	0.88243	0.90357
60	55	0.91638	0.93531	0.87960	0.90601	0.84567	0.87848
65	60	0.89058	0.91699	0.84439	0.88045	0.80275	0.84670

Police and Firefighter Retirees Factors for Optional Forms of Payment

Age at Retirement		50% Joint & Survivor With Pop- Up		75% Joint & Survivor With Pop- Up		100% Joint & Survivor With Pop- Up	
Retiree	Beneficiary	Present Factor	Proposed Factor	Present Factor	Proposed Factor	Present Factor	Proposed Factor
50	45	0.95377	0.95346	0.93222	0.93178	0.91163	0.91106
55	50	0.93755	0.93888	0.90916	0.91104	0.88243	0.88480
60	55	0.91638	0.91963	0.87960	0.88410	0.84567	0.85122
65	60	0.89058	0.89655	0.84439	0.85246	0.80275	0.81250

August 22, 2019

The Retirement Board
City of Farmington Hills
   Employees' Retirement System
31555 Eleven Mile Road
Farmington Hills, Michigan 48336

Dear Board Members:

Enclosed is one copy of our report of Retirement System experience.

I look forward to meeting with the Board to discuss the results of our review.

Sincerely,

Louise M. Gates, ASA, FCA, MAAA

Enclosure