



# City of Ann Arbor Employees' Retirement System

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Actuarial Experience Study  
2013-2017

August 16, 2018



# Purpose

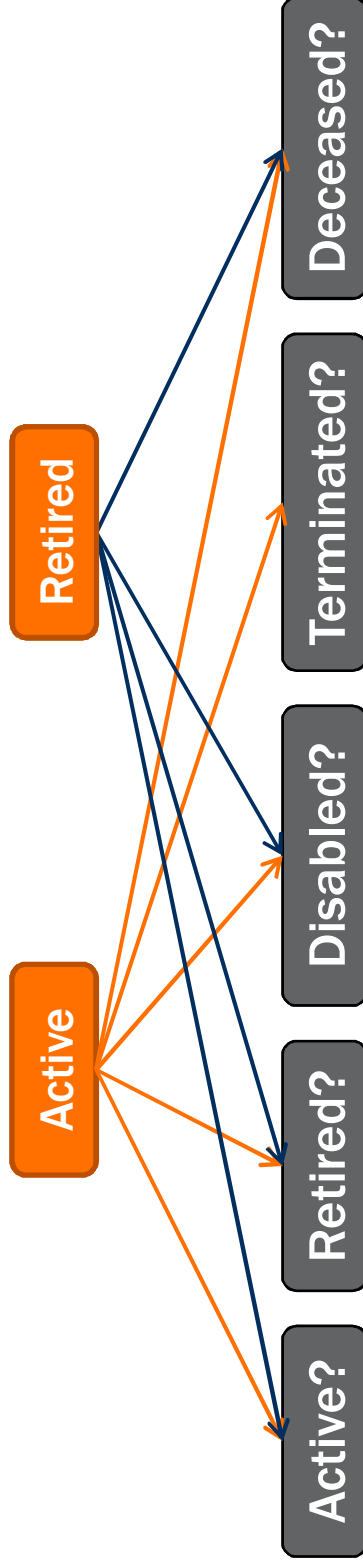
- Measure Accuracy of Valuation Assumptions
- Modify Assumptions as Needed
- Determine Cost Impact of Modified Assumptions



# Process

Data Collection – review of 5 years (2013-2017)

Over 8,400 records



Expected Incidence Exposure  
(Liability x Assumed Rate)



Actual Incidence  
Actual Exposure Released



# Assumptions – Pension (P) and OPEB (O)

## Demographic

- Post-retirement mortality (P,O)
- Pre-retirement mortality (P,O)
- Disability mortality/recovery (P,O)
- Disability (P,O)
- Withdrawal (P,O)
- Retirement (P,O)

## Economic

- Inflation (P,O)
- Investment Return (P,O)
- Compensation Increases/  
Salary Scale (P,O)
- Asset Valuation Method (P,O)
- Amortization Period (P,O)
- Trend (O)

# Considerations

For each assumptions studied, review of following:

- ✔ Significance of Assumption
- ✔ Credibility of Data
- ✔ Conservatism
- ✔ Professional Judgement



# Demographic Assumptions

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# POST MORTALITY RATES

# Post Retirement Mortality Rates - Pension

**Currently used - base rates**

Age	Male	Female
50	.002138	.001676
55	.003624	.002717
60	.006747	.005055
65	.012737	.009706
70	.022206	.016742
75	.037834	.028106
80	.064368	.045879

**Proposed - base rates**

Age	Male	Female
50	.004771	.002891
55	.006102	.003755
60	.008211	.005942
65	.012621	.009760
70	.020288	.015628
75	.033113	.025057
80	.055022	.041440

Significance of assumption: HIGH  
 Creditability of data: Moderate  
 Conservatism: Moderate  
 Professional judgement: Low

**Current table:** RP-2000 Combined Mortality Table set back 3 year for Female, set forward 2 year for male (with generational projected with Scale AA)

**Proposed table:** RP-2014 Adjusted Back to 2006 No Collar Healthy Annuitants (Generational w/ Scale MP-2017)

Changing from the above will better reflect the past 5 years. Increase in liability of 0.64%.





# Post Retirement Mortality Rates - OPEB

**Currently used - base rates**

Age	Male	Female
50	.002138	.001676
55	.003624	.002717
60	.006747	.005055
65	.012737	.009706
70	.022206	.016742
75	.037834	.028106
80	.064368	.045879

**Proposed - base rates**

Age	Male	Female
50	.004771	.002891
55	.006102	.003755
60	.008211	.005942
65	.012621	.009760
70	.020288	.015628
75	.033113	.025057
80	.055022	.041440

<b>Significance of assumption: HIGH</b>
<b>Creditability of data: Moderate</b>
<b>Conservatism: Moderate</b>
<b>Professional judgement: Low</b>

**Current table:** RP-2000 Combined Mortality set back 3 year for Female, set forward 2 year for male (**projected to 2007**)

**Proposed table:** RP-2014 Adjusted Back to 2006 No Collar Healthy Annuitants (Generational w/ Scale MP-2017)

Changing to the above will better reflect the past 5 years. Increase in liability of 6.7%.



# Post Retirement Mortality

Current Assumptions	Total Exposures	Actual	Expected
Head Count	3,814	98	103.37
Liability	699,926,274	171,719,564	192,410,729

Number of actual deaths was **less** than expected for the past 5 years based on the current mortality rates.

Proposed Assumptions	Total Exposures	Actual	Expected
Head Count	3,814	98	94.54
Liability	699,926,274	171,719,564	161,501,089

We do not recommend a separate mortality table for the three groups: Fire, Police, General. Separately, the Fire and Police populations are too small and matching mortality rates is not necessary.



## Post Retirement Mortality - Comments

- In general, the mortality of the retiree/survivor population has improved in recent years
- Mortality rates remain higher than those based on national average studies
- City of Ann Arbor's pension population includes a blend of blue collar and white collar positions
- Revised table recommended – RP-2014 Base Table Adjusted Back to 2006, Fully Generational Projection using Scale MP-17

# PRERETIREMENT MORTALITY RATES

# Pre Retirement Mortality Rates – Pension & OPEB

## Currently used rates

Age	Male	Female
25	.000376	.000207
30	.000444	.000264
35	.000773	.000475
40	.001079	.000706
45	.001508	.001124
50	.002138	.001676

## Proposed rates

Age	Male	Female
25	.000545	.000186
30	.00047	.000209
35	.000557	.000301
40	.000750	.000471
35	.001207	.000758
40	.001979	.001151

Significance of assumption: Low

Creditability of data: Moderate

Conservatism: Moderate

Professional judgement: Moderate

**Current table:** 75% of the RP-2000 Post Retirement Mortality  
**Proposed table:** RP-2014 Total Data Set Healthy Non-Annuitants  
 (Generational w/ Scale MP-2017)

Changing to the RP-2014 Total Data Set Mortality will better reflect the past 5 years.  
 Decrease in liability of (0.22%).



# Pre Retirement Mortality

Current Assumptions	Total Exposures	Actual	Expected
Head Count	2,684	0	3.7

Number of actual deaths was **less** than expected for the past 5 years based on the current mortality rates.

Proposed Assumptions	Total Exposures	Actual	Expected
Head Count	2,684	0	3.9

We do not recommend a separate mortality table for the three groups: Fire, Police, General. Separately, the Fire and Police populations are too small and matching mortality rates is not necessary.





## Pre Retirement Mortality - Comments

- In general, the mortality has improved in recent years
- Mortality rates remain **higher** than those based on national average studies
- City of Ann Arbor's pension population includes a blend of blue collar and white collar positions
- Revised table recommended – RP-2014 Total Data Set with MP-2017 projection scale



# Mortality - Deviation from National Studies

	Age Adjusted Mortality Rates (1999 - 2016)	Comments
United States	782.3	
Michigan	820.6	 4.9% Above US Average
Washtenaw County	691.7	 13.1% Below US Average





# DISABILITY RATES

# Disability Rates – Pension & OPEB

## Currently used rates

Age	General	Police	Fire
25	0.0006	0.0008	0.0002
30	0.0006	0.0008	0.0002
35	0.0006	0.0008	0.0002
40	0.00105	0.0014	0.0003
45	0.0024	0.0032	0.0008
50	0.0042	0.0056	0.0014
60	0.00855	0.0114	0.0029

## Proposed rates

No change

Significance of assumption: Low  
 Creditability of data: Low  
 Conservatism: Moderate  
 Professional judgement: Low



# Disability Rates-Pension & OPEB

Current Assumptions	Total Exposures	Actual	Expected
Head Count	2,684	0	7.15

Number of actual disability was **less** than expected for the past 5 years based on the current disability rates.

Over the last 5 years, there are not enough credible data to suggest any changes.



# WITHDRAWAL RATES

# Withdrawal Rates – General Ees

## Currently used rates

Age	Female	Male
20	0.065	0.032
25	0.065	0.032
30	0.065	0.032
35	0.05	0.025
40	0.05	0.025
45	0.05	0.025
50	0.05	0.025

## Proposed rates

Age	Female	Male
20	0.032	0.045
25	0.032	0.045
30	0.032	0.045
35	0.0325	0.035
40	0.0325	0.035
45	0.0325	0.035
50	0.0325	0.035

Significance of assumption: Moderate

Creditability of data: Moderate

Conservatism: Moderate

Professional judgement: Low

Rates are based on years of service with the ultimate rate continuing for service over 5 years. Only ultimate rates are shown in tables above.

Changing The withdrawal rates will better reflect the past 5 years. Increase in liability of 0.65%.

# Withdrawal Rates – General Ees

Current Assumptions	Total Exposures	Actual	Expected
Head Count	1,572	81	86

Number was **more** than expected for the past 5 years based on the current withdrawal rates.

Proposed Assumptions	Total Exposures	Actual	Expected
Head Count	1,572	81	78

We recommend a change in the ultimate rate at which an expected withdrawal will occur.



# Withdrawal Rates - Police

## Currently used rates

Age	> 5 years
20	0.024
25	0.024
30	0.024
35	0.01748
40	0.00736
45	0.0048
50	0.0048

## Proposed rates

No change

Significance of assumption: Moderate  
Credibility of data: Moderate  
Conservatism: Moderate  
Professional judgement: Low

Rates are based on years of service with the ultimate rate continuing for service over 5 years. Only ultimate rates are shown in tables above.

# Withdrawal Rates - Police

Current Assumptions	Total Exposures	Actual	Expected
Head Count	413	6	8.2

Number of actual Termination was **less** than expected for the past 5 years based on the current mortality rates.

Over the last 5 years, there are not enough credible data to suggest any changes.





# Withdrawal Rates - Fire

## Currently used rates

Age	> 5 years
20	0.014
25	0.014
30	0.011
35	0.009
40	0.01
45	0.009
50	0.005

## Proposed rates

No change

Significance of assumption: Moderate  
 Creditability of data: Low  
 Conservatism: Moderate  
 Professional judgement: Low

Rates are based on years of service with the ultimate rate continuing for service over 5 years. Only ultimate rates are shown in tables above.



# Withdrawal Rates - Fire

Current Assumptions	Total Exposures	Actual	Expected
Head Count	258	0	3.8

Number of actual Termination was **less** than expected for the past 5 years based on the current mortality rates.

Over the last 5 years, there are not enough credible data to suggest any changes.



# RETIREMENT RATES

# Retirement Rates – General Ees

## Currently used rates

Age	Normal	Early
50	45%	23%
51-53	40%	15%
54	40%	18%
55	40%	30%
56	40%	42%
58	25%	42%
60	25%	42%
61	35%	42%
65	60%	42%

## Proposed rates

Age	Normal	Early
50	25%	10%
51-53	25%	10%
54	25%	10%
55	25%	10%
56	25%	10%
58	25%	10%
60	30%	10%
61	30%	10%
65	60%	10%

Significance of assumption: Moderate

Creditability of data: HIGH

Conservatism: Moderate

Professional judgement: Moderate

Rates post-65 exist and not proposed to change.

Changing these rates will better reflect the past 5 years.  
Decrease in liability of (0.95 %).



# Retirement Rates – General Ees

## Current Assumptions

Age	Exposures	Actual	Expected
50-54	118	17	33.64
55-59	66	15	25.45
60-64	107	30	33.75
65+	20	8	9.80
Total	311	70	102.64

## Proposed Assumptions

Age	Exposures	Actual	Expected
50-54	118	17	20.2
55-59	66	15	9.9
60-64	107	30	32.1
65+	20	8	9.6
Total	311	70	71.8

# Retirement Rates – Police

## Currently used rates

Service	Rate
25	50%
26	35%
27	35%
28	35%
29	25%
30	25%
31	25%
32	25%
33	25%
34	25%
35	100%

## Proposed rates

Service	Rate
25	25%
26	25%
27	25%
28	25%
29	25%
30	25%
31	25%
32	25%
33	25%
34	25%
35	100%

**Significance of assumption:  
Moderate**

**Creditability of data: HIGH**

**Conservatism: Moderate**

**Professional judgement: Moderate**

Changing these rates will better reflect the past 5 years. Decrease in liability of (0.72 %).

## Retirement Rates – Police

Current Assumptions	Total Exposures	Actual	Expected
Head Count	57	19	26.05

Number was **less** than expected for the past 5 years based on the current rates.

Proposed Assumptions	Total Exposures	Actual	Expected
Head Count	57	19	15.7

We recommend a change in the rates at which an expected retirement will occur.



# Retirement Rates – Fire

## Currently used rates

Age	Rate
>54	25%
55	24%
56	24%
57	24%
58	24%
59	34%
60	100%

## Proposed rates

Age	Rate
>54	10%
55	25%
56	25%
57	25%
58	25%
59	25%
60	100%

**Significance of assumption: Moderate**

**Creditability of data: Moderate**

**Conservatism: Moderate**

**Professional judgement: Moderate**

Changing the rates will better reflect the past 5 years. Decrease in liability of (0.95%).



## Retirement Rates – Fire

Current Assumptions	Total Exposures	Actual	Expected
Head Count	73	11	18.94

Number was **less** than expected for the past 5 years based on the current rates.

Proposed Assumptions	Total Exposures	Actual	Expected
Head Count	73	11	11.65

We recommend a change in the rates at which an expected retirement will occur.

# Demographic Assumptions - Summary

Assumption	Recommend change
Post-retirement mortality	Yes
Pre-retirement mortality	Yes
Disability	No
Withdrawal	Yes
Retirement - Normal	Yes
Retirement - Early	Yes
Persistency/morbidity	No

Impact if all changes made	\$
Pension	(2,524,000)
OPEB	11,160,000



# Economic Assumptions

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# INFLATION

# Inflation

- Often incorporated into other assumptions
  - i.e. salary scale increases
- Not as significant to isolate this assumption if clarified that included within other assumption
- Current rate used: 3.5%
- Proposed rate: 2.5%

**Significance of assumption: Low**

**Creditability of data: Low**

**Conservatism: Low**

**Professional judgement: Low**

# Inflation - Background

<b>Historical</b>	
Five Year Average	1.31%
Ten Year Average	1.76%
Twenty Year Average	2.15%
<b>Forecasts</b>	
Federal Reserve Board (“Longer Run” PCE Inflation Prediction/Target)	2.00%
OASDI Report (Intermediate)	2.60%
Survey of Capital Market Projections (20-year)	2.44%
Wells Fargo Capital Market Assumptions (15 yr)	2.50%



# DISCOUNT RATE

# Discount Rate

- Also assumed rate of return
- Net return after plan expenses
- Current rate used: 7.00%
- Proposed rate: 7.00%

**Significance of assumption: HIGH**

**Creditability of data: N/A**

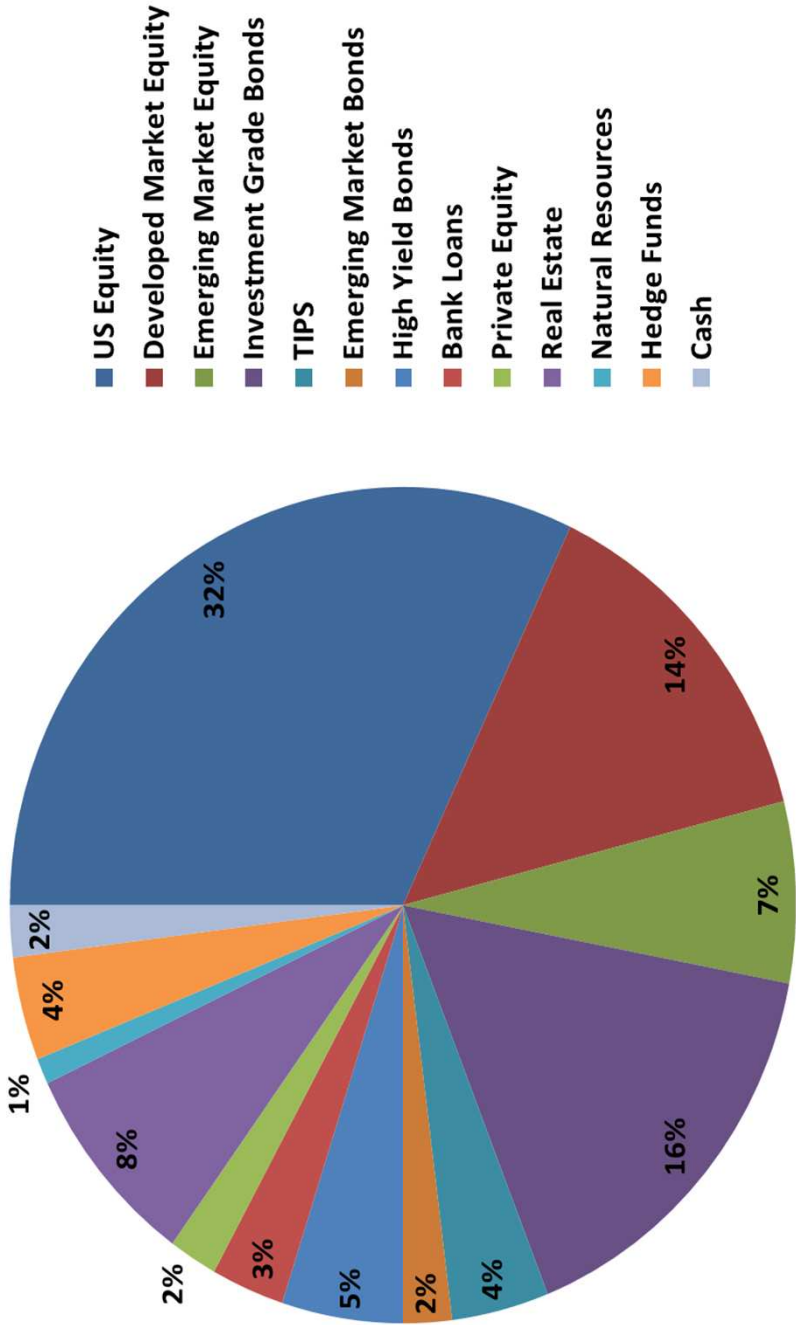
**Conservatism: HIGH**

**Professional judgement: Moderate**





# Discount Rate - Asset Distribution for Pension Plan as of March 31, 2018



Consistent with typical larger public funds

- 60%/40% broad allocation
- Use of private equity/equity hedges
- Diversification away from US only



# Discount Rate - Investment Survey Results

## Projected Return for the City of Ann Arbor Pension Plan

Investment Class	Current Allocation (March 31, 2018)	Investment Policy	Wells Fargo Capital Market Assumptions 10-15 Year Horizon (Geometric Return)	Return Component (Current Allocation)
US Equity	32%	31%	7.98%	2.55%
Developed Market Equity	14%	12%	7.50%	1.05%
Emerging Market Equity	7%	6%	9.20%	0.64%
Investment Grade Bonds	16%	19%	3.20%	0.51%
TIPS	4%	8%	2.70%	0.11%
Emerging Market Bonds	2%	2%	6.10%	0.12%
High Yield Bonds	5%	3%	6.10%	0.31%
Bank Loans	3%	2%	8.10%	0.24%
Private Equity	2%	3%	10.90%	0.22%
Real Estate	8%	9%	7.20%	0.58%
Natural Resources	1%	3%	4.40%	0.04%
Hedge Funds	4%	2%	5.10%	0.20%
Cash	2%	0%	2.50%	0.05%
				6.63%
Inflation				2.50%



## Discount Rate - Rates Used by Other Public Plans

- Wilshire Consulting, 2017 Report on State Retirement Systems - Median Assumption of 7.5%
- National Council on Public Employee Retirement Systems - 2016 Public Fund Survey - Average Assumption of 7.5%
- National Association of State Retirement Administrators 2016 Public Fund Survey - Median Assumption of 7.5% (approximately 60% have an assumption of 7.5% or less)
- Center for Retirement Research - Boston College - 2016 Assumed Return for Public Plans- 7.57%



# Discount Rate - Expense Considerations

- Certain expenses are paid from plan assets
  - Investment and administrative expenses
- Administrative expenses have averaged 0.15% of plan assets over the past five years
  - Approximately \$700,000 per year
- While no change to the discount rate is recommended, consideration should be given to a direct expense assumption
- An expense assumption of 0.15% of plan assets could be implemented in one of two ways
  - Reduce discount rate to 6.85% (present value of all future expenses)
  - Include 0.15% of assets in the normal cost (expenses included in cost annually)



# **SALARY SCALE**

# Salary Scale – General Ees

## Currently used rates

Age	Rate
30	0.0282
35	0.0214
40	0.0184
45	0.0147
50	0.0098
55	0.0068
60	0.005
64	0.005

## Proposed rates

No change

Significance of assumption:  
Moderate

Creditability of data: HIGH

Conservatism: Moderate

Professional judgement: Moderate

**Current table:** Age based.

**Proposed table:** No change



# Salary Scale – Police

## Currently used rates

Age	Rate
30	0.0324
35	0.0186
40	0.012
45	0.0088
50	0.0068
55	0.0054
60	0.003
64	0.003

## Proposed rates

Age	Rate
30	0.0474
35	0.0336
40	0.0270
45	0.0238
50	0.0218
55	0.0204
60	0.018
64	0.018

Significance of assumption: Moderate  
 Creditability of data: HIGH  
 Conservatism: Moderate  
 Professional judgement: Moderate

Changing the salary scale will better reflect the past 5 years. Increase in liability of 0.6%.



# Salary Scale – Fire

## Currently used rates

Age	Rate
30	0.0336
35	0.0194
40	0.012
45	0.0088
50	0.0068
55	0.0054
60	0.004
64	0.004

## Proposed rates

Age	Rate
30	0.0486
35	0.0344
40	0.027
45	0.0238
50	0.0218
55	0.0204
60	0.019
64	0.019

Significance of assumption: Moderate

Creditability of data: HIGH

Conservatism: Moderate

Professional judgement: Moderate

Changing the salary scale will better reflect the past 5 years. Increase in liability of 0.8%.



# OTHER ASSUMPTIONS

## Asset Valuation Method - Pension

- Five year moving average value
- Determine actual and expected return during past five years
  - Phase in the excess gains/losses at 20% per year
- This is the most common method of determining the Actuarial Value of Assets\*
- No corridor around the around the market value is currently specified
- We recommend including a 20% corridor around the market value of assets
  - No current impact
  - This could require higher contributions after a significant market correction

\* 2017 NCPERS Public Fund Survey

# Amortization Period

- Unfunded liabilities attributable to past service are amortized over a declining period, set at 23 years as of July 1, 2018. The period will continue to decline by 1 each year until reaching 15 years
- The average among public sector plans is 23.8 years\*
- Shorter amortization periods lead to higher contributions → more conservative
- No change recommended

\* 2017 NCPERS Public Fund Survey



## Trend – How much healthcare cost expected to grow?

- Current trend
  - Medical Pre-65: 8.25% decreasing to an ultimate of 4.50%
  - Medical Post-65 6.25% decreasing to an ultimate of 4.50% in 2031
- Proposed trend: no change
- According to the Center for Medicare Services, 2018 healthcare cost growth rates are as follows:

– HI (part A)	3.7%
– SMI Part B	3.6%
– SMI Part D	4.5%
– Total Medicare	3.8%



# Economic Assumptions - Summary

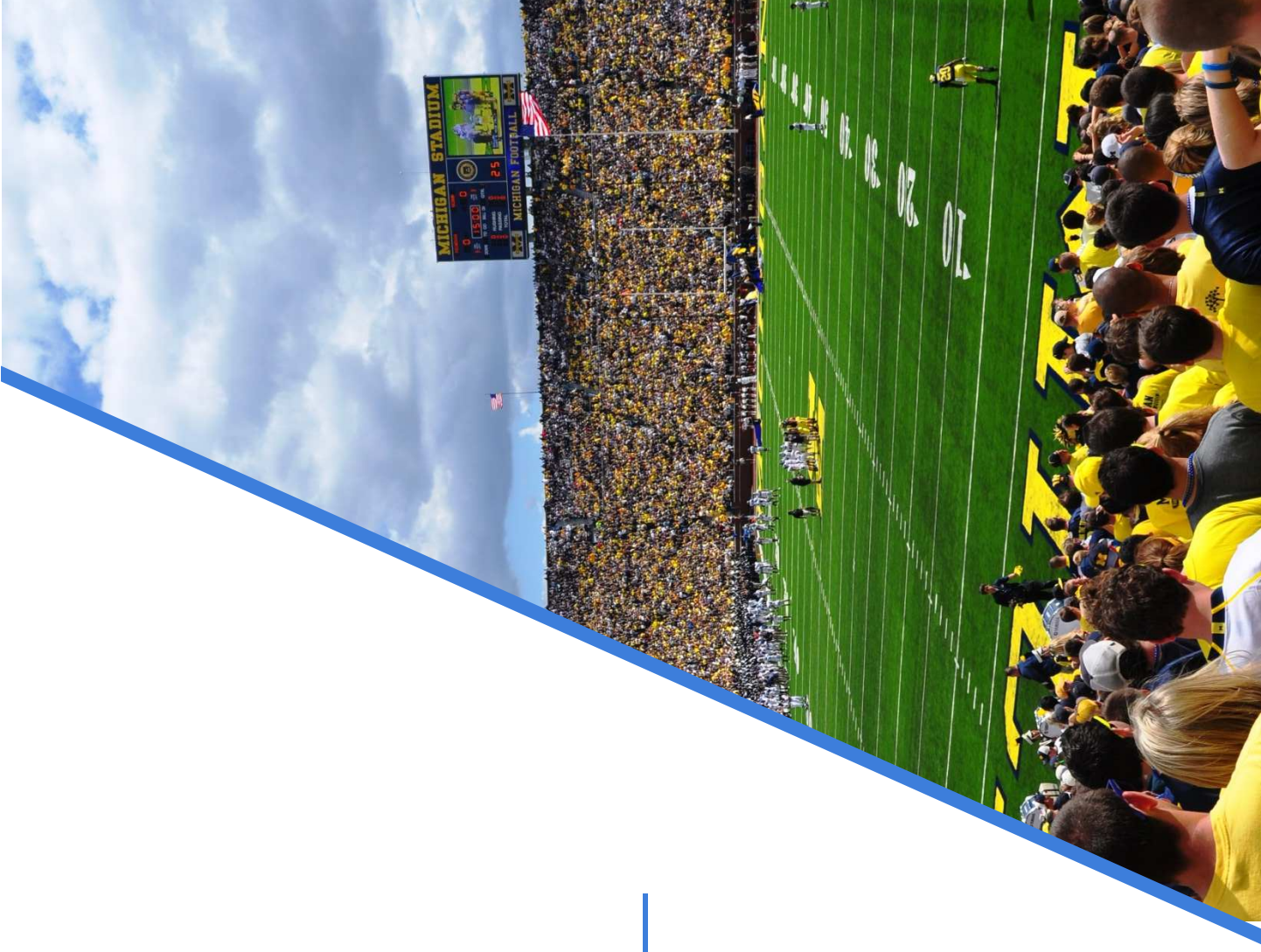
Assumption	Recommend change
Inflation	Yes
Discount Rate	No
Salary Scale	Yes
Asset Method	No
Amortization Period	No
Trend	No
Impact if all changes made	\$
Pension	1,854,000
OPEB	(5,000)





# Questions & Discussion

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## APPENDIX

All information in this presentation is prepared for City of Ann Arbor Employees' Retirement System and should not be used by any other party for any other purpose than to review the experience analysis performed for years 2013-2017.

Data, assumptions, methods, and provisions of all information shown herein, is representative of information provided by the City and Conduent. Each assumption used in this presentation represents a combination of a best estimate of future expectations and observed past experience as well as estimates inherent in related market data.

Future actuarial measurements may differ significantly from the current measurements presented in this presentation due to many factors; plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic trends and assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period of additional cost/contribution requirements based on the plan's funded status); and changes in plan provisions or applicable law.

