Municipal Employees' Retirement System

Municipal Employees' Retirement System of Michigan

Annual Actuarial Valuation Report
December 31, 2018 - Port Huron City of (7702)

GRS

GRS Retirement Consulting

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Spring, 2019

Port Huron City of

In care of:
Municipal Employees' Retirement System of Michigan
1134 Municipal Way
Lansing, Michigan 48917

This report presents the results of the Annual Actuarial Valuation, prepared for Port Huron City of (7702) as of December 31, 2018. The report includes the determination of liabilities and contribution rates resulting from the participation in the Municipal Employees' Retirement System of Michigan ("MERS"). This report contains the minimum actuarially determined contribution requirement, in alignment with the MERS Plan Document, Actuarial Policy, and the Michigan Constitution and governing statutes. Port Huron City of is responsible for the employer contributions needed to provide MERS benefits for its employees and former employees.

The purposes of this valuation are to:

- Measure funding progress as of December 31, 2018,
- Establish contribution requirements for the fiscal year beginning July 1, 2020,
- Provide information regarding the identification and assessment of risk,
- Provide actuarial information in connection with applicable Governmental Accounting Standards Board (GASB) statements, and
- Provide information to assist the local unit of government with state reporting requirements.

This valuation assumed the continuing ability of the plan sponsor to make the contributions necessary to fund this plan. A determination regarding whether or not the plan sponsor is actually able to do so is outside our scope of expertise and was not performed.

The findings in this report are based on data and other information through December 31, 2018. The valuation was based upon information furnished by MERS concerning Retirement System benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal reasonability and year-to-year consistency, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by MERS.

The Municipal Employees' Retirement Act, PA 427 of 1984 and the MERS' Plan Document Article VI sec. 71 (1)(d), provides the MERS Board with the authority to set actuarial assumptions and methods after consultation with the actuary. As the fiduciary of the plan, MERS Retirement Board sets certain assumptions for funding and GASB purposes. These assumptions are checked regularly through a comprehensive study, called an Experience Study. The most recent study was completed in 2015, as prepared by the prior actuary, and is the basis of the assumptions and methods currently in place. **At the February 28, 2019 board meeting, the MERS Retirement Board adopted new economic assumptions effective with the December 31, 2019 annual actuarial valuation, which will impact contributions beginning in 2021.** An illustration of the potential impact is found in this report.

The Michigan Department of Treasury provides required assumptions to be used for purposes of Public Act 202 reporting. These assumptions are for reporting purposes only and do not impact required contributions. Please refer to the State Reporting page found at the end of this report for information for this filing.

For a full list of all the assumptions used, please refer to the division-specific assumptions described in table(s) in this report, and to the Appendix on the MERS website at:
http://www.mersofmich.com/Portals/0/Assets/Resources/AAV-Appendix/MERS-2018AnnualActuarialValuation-Appendix.pdf.

The actuarial assumptions used for this valuation are reasonable for purposes of the measurement.

This report has been prepared by actuaries who have substantial experience valuing public employee retirement systems. To the best of our knowledge the information contained in this report is accurate and fairly presents the actuarial position of Port Huron City of as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and with applicable statutes.

David T. Kausch, Rebecca L. Stouffer, and Mark Buis are members of the American Academy of Actuaries. These actuaries meet the Academy's Qualification Standards to render the actuarial opinions contained herein. The signing actuaries are independent of the plan sponsor. GRS maintains independent consulting agreements with certain local units of government for services unrelated to the actuarial consulting services provided in this report.

The Retirement Board of the Municipal Employees' Retirement System of Michigan confirms that the System provides for payment of the required employer contribution as described in Section 20m of Act No. 314 of 1965 (MCL 38.1140m).

This information is purely actuarial in nature. It is not intended to serve as a substitute for legal, accounting or investment advice.

This report was prepared at the request of the MERS Retirement Board and may be provided only in its entirety by the municipality to other interested parties (MERS customarily provides the full report on request to associated third parties such as the auditor for the municipality). GRS is not responsible for the consequences of any unauthorized use. This report should not be relied on for any purpose other than the purposes described herein. Determinations of financial results, associated with the benefits described in this report, for purposes other than those identified above may be significantly different.

If you have reason to believe that the plan provisions are incorrectly described, that important plan provisions relevant to this valuation are not described, that conditions have changed since the calculations were made, that the information provided in this report is inaccurate or is in anyway incomplete, or if you need further information in order to make an informed decision on the subject matter in this report, please contact your Regional Manager at 1.800.767.MERS (6377).

Sincerely,

David T. Kausch

David T. Kausch, FSA, FCA, EA, MAAA

Rebecca L. Stouffer

Rebecca L. Stouffer, ASA, FCA, MAAA

Mark Buis

Mark Buis, FSA, FCA, EA, MAAA

Table of Contents

Executive Summary

Funded Ratio

The funded ratio of a plan is the percentage of the dollar value of the actuarial accrued liability that is covered by the actuarial value of assets. While funding ratio may be a useful plan measurement, understanding a plan's funding trend may be more important than a particular point in time. Refer to Table 7 to find a history of this information.

	12/31/2018	12/31/2017
Funded Ratio*	55%	55%

* Reflects assets from Surplus divisions, if any.

There has been a change in actuary and actuarial software since the December 31, 2017 valuation. Throughout this report are references to valuation results generated prior to the 2018 valuation date. Results prior to 2018 were received directly from the prior actuary or extracted from the previous valuation system by MERS's technology service provider.

Required Employer Contributions:

Your required employer contributions are shown in the following table. Employee contributions, if any, are in addition to the employer contributions. Changes to the actuarial assumptions and methods based on the 2015 Experience Study are phased-in over a 5-year period. This valuation reflects the fourth year of the phase-in.

Your minimum required contribution is the amount in the "Phase-in" columns. By default, MERS will invoice you the phased-in contribution amount, but strongly encourages you to contribute more than the minimum required contribution. If you requested and have been billed using No Phase-in rates, your 2019 rates will continue to use the No Phase-in method. If you have been billed using the Phased-in rates and wish to change to rates based on No Phase-in, please contact MERS.

	Percentage of Payroll				Monthly $ Based on Projected Payroll			
	Phase-in	No Phase-in	Phase-in	No Phase-in	Phase-in	No Phase-in	Phase-in	No Phase-in
Valuation Date:	12/31/2018	12/31/2018	12/31/2017	12/31/2017	12/31/2018	12/31/2018	12/31/2017	12/31/2017
Fiscal Year Beginning:	July 1, 2020	July 1, 2020	July 1, 2019	July 1, 2019	July 1, 2020	July 1, 2020	July 1, 2019	July 1, 2019
Division								
10 - NonUnion	-	-	-	-	$ 159,630	$ 163,220	$ 155,578	$ 163,882
12 - UWUA - Gen Local 532	-	-	-	-	88,639	91,143	79,870	84,878
13 - Police,Lts,Sgt	740.87%	744.79%	247.50%	257.31%	74,151	74,543	67,324	69,992
14 - Police Commun.	-	-	-	-	1,999	2,002	2,130	2,136
15 - McMorranPlace	-	-	-	-	7,200	7,375	5,920	6,270
16 - FireFighters	-	-	-	-	110,552	112,979	115,398	121,276
17 - Police Patrol	-	-	-	-	31,240	31,886	50,318	54,016
HA - Non-Union after 7/1/08	0.00%	0.00%	0.00%	0.00%	0	0	0	0
HB - UWUA - Local 532 after 5/1/10	0.86%	0.90%	1.95%	2.05%	1,312	1,381	2,727	2,865
HC - Fire after 7/1/2014	8.18%	8.18%	10.16%	10.16%	2,747	2,747	3,514	3,514
HD - Police Patrol after 7/1/2014	9.57%	9.59%	9.28%	9.34%	9,327	9,346	6,003	6,041
Municipality Total					**$ 486,797**	**$ 496,622**	**$ 488,782**	**$ 514,870**

Employee contribution rates:

	Employee Contribution Rate	
Valuation Date:	12/31/2018	12/31/2017
Division		
10 - NonUnion	6.00%	8.00%
12 - UWUA - Gen Local 532	8.00%	8.00%
13 - Police,Lts,Sgt	7.00%	11.71%
14 - Police Commun.	0.00%	0.00%
15 - McMorranPlace	0.00%	0.00%
16 - FireFighters	7.00%	10.00%
17 - Police Patrol	7.00%	10.00%
HA - Non-Union after 7/1/08	0.00%	0.00%
HB - UWUA - Local 532 after 5/1/10	0.00%	0.00%
HC - Fire after 7/1/2014	0.00%	0.00%
HD - Police Patrol after 7/1/2014	0.00%	0.00%

The employer may contribute more than the minimum required contributions, as these additional contributions will earn investment income and may result in lower future contribution requirements. Employers making contributions in excess of the minimum requirements may elect to apply the excess contribution immediately to a particular division, or segregate the excess into one or more of what MERS calls "Surplus" divisions. An election in the first case would immediately reduce any unfunded accrued liability and lower the amortization payments throughout the remaining amortization period. An election to set up Surplus divisions would not immediately lower future contributions, however the assets from the Surplus division could be transferred to an unfunded division in the future to reduce the unfunded liability in future years, or to be used to pay all or a portion of the minimum required contribution in a future year. For purposes of this report, the assets in any Surplus division have been included in the municipality's total assets, unfunded accrued liability and funded status, however, these assets are not used in calculating the minimum required contribution.

MERS strongly encourages employers to contribute more than the minimum contribution shown above.

Assuming that experience of the plan meets actuarial assumptions:

• To accelerate to a 100% funding ratio in 10 years, estimated monthly employer contributions for the fiscal year beginning in 2020 for the entire employer would be $793,412, instead of $496,622.

How and Why Do These Numbers Change?

In a defined benefit plan contributions vary from one annual actuarial valuation to the next as a result of the following:

- Changes in benefit provisions (see Table 2)
- Changes in actuarial assumptions and methods (see the Appendix)
- Experience of the plan (investment experience and demographic experience); this is the difference between actual experience of the plan and the actuarial assumptions.

Comments on Investment Rate of Return Assumption

A defined benefit plan is funded by employer contributions, participant contributions, and investment earnings. Investment earnings have historically provided **more than half** of the funding. The larger the share of benefits being provided from investment returns, the smaller the required contributions, and vice versa. Determining the contributions required to prefund the promised retirement benefits requires an assumption of what investment earnings are expected to add to the fund over a long period of time. This is called the **Investment Return Assumption**.

The MERS Investment Return Assumption is **7.75%** per year. This, along with all of our other actuarial assumptions, is reviewed at least every five years in an Experience Study that compares the assumptions used against actual experience and recommends adjustments if necessary. If your municipality would like to explore contributions at lower assumed investment return assumptions, please review the "what if" projection scenarios later in this report.

Assumption Change in 2019

At the February 28, 2019 board meeting, the MERS Retirement Board adjusted key economic assumptions. These assumptions, in particular the investment return assumption, have a significant effect on a plan's required contribution and funding level. Historically low interest rates, along with high equity market valuations, have led to reductions in projected returns for most asset classes. This has resulted in a Board adopted reduction in the investment rate of return assumption to 7.35%, effective with the December 31, 2019 valuation first impacting 2021 contributions. The Board also changed the assumed rate of wage inflation from 3.75% to 3.00%, with the same effective date. This report includes a "What If" scenario of 7.35%/3.00% in order to show the potential impact of this assumption change.

Comments on Asset Smoothing

To avoid dramatic spikes and dips in annual contribution requirements due to short term fluctuations in asset markets, MERS applies a technique called **asset smoothing**. This spreads out each year's investment gains or losses over the prior year and the following four years. This smoothing method is used to determine your actuarial value of assets (valuation assets), which is then used to determine both your funded ratio and your required contributions. The (smoothed) **actuarial rate of return for 2018 was 3.80%, while the actual market rate of return was (4.12)%.** To see historical details of the market rate of return, compared to the smoothed actuarial rate of return, refer to this report's Appendix, or view the "How Smoothing Works" video on the Defined Benefit resource page of the MERS website.

As of December 31, 2018 the actuarial value of assets is 110% of market value due to asset smoothing. This means that meeting the actuarial assumption in the next few years will require average annual market returns that exceed the 7.75% investment return assumption, or contribution requirements will continue to increase.

If the December 31, 2018 valuation results were based on market value instead of actuarial value:

- The funded percent of your entire municipality would be 50% (instead of 55%); and
- Your total employer contribution requirement for the fiscal year starting July 1, 2020 would be $6,544,620 (instead of $5,959,464)

Alternate Scenarios to Estimate the Potential Volatility of Results ("What If Scenarios")

The calculations in this report are based on assumptions about long-term economic and demographic behavior. These assumptions will never materialize in a given year, except by coincidence. Therefore the results will vary from one year to the next. The volatility of the results depends upon the characteristics of the plan. For example:

- Open divisions that have substantial assets compared to their active employee payroll will have more volatile employer contribution rates due to investment return fluctuations.
- Open divisions that have substantial accrued liability compared to their active employee payroll will have more volatile employer contribution rates due to demographic experience fluctuations.
- Small divisions will have more volatile contribution patterns than larger divisions because statistical fluctuations are relatively larger among small populations.
- Shorter amortization periods result in more volatile contribution patterns.

Many assumptions are important in determining the required employer contributions. In the following table, we show the impact of varying the Investment Return assumption and the Wage Inflation assumption. Lower investment returns would result in higher required employer contributions, and vice-versa. Lower wage inflation generally results in lower required employer contributions as a dollar amount in the long run, and vice versa.

The relative impact of each economic scenario below will vary from year to year, as the participant demographics change. The impact of each scenario should be analyzed for a given year, not from year to year. The results in the table are based on the December 31, 2018 valuation, and are for the municipality in total, not by division. These results do not reflect a 5-year phase in of the impact of the new actuarial assumptions.

It is important to note that calculations in this report are mathematical estimates based upon assumptions regarding future events, which may or may not materialize. Actuarial calculations can and do vary from one valuation to the next, sometimes significantly depending on the group's size. Projections are not predictions. Future valuations will be based on actual future experience.

The Retirement Board has adopted a change to the Investment Return Assumption from 7.75% to 7.35%, and the wage inflation from 3.75% to 3.00%. This change will be effective in the December 31, 2019 valuation which will impact the Fiscal Year 2021 contribution. The scenario shown using these assumptions as of December 31, 2018 is illustrative only. The actual impact of this change when reflected in the 2019 valuation will be different.

	Assumed Future Annual Smoothed Rate of Investment Return		
12/31/2018 Valuation Results	**Lower Future Annual Returns**	**Adopted 2019 Assumption**	**Valuation Assumptions**
Investment Return Assumption	**5.75%**	**7.35%**	**7.75%**
Wage Increase Assumption	**3.75%**	**3.00%**	**3.75%**
Accrued Liability	$ 187,331,256	$ 159,718,466	$ 153,841,245
Valuation Assets[1]	$ 84,834,041	$ 84,834,041	$ 84,834,041
Unfunded Accrued Liability	$ 102,497,215	$ 74,884,425	$ 69,007,204
Funded Ratio	45%	53%	55%
Monthly Normal Cost	$ 159,604	$ 78,410	$ 80,327
Monthly Amortization Payment	$ 526,236	$ 463,921	$ 414,101
Total Employer Contribution[2]	$ 685,840	$ 544,933	$ 496,622

[1] The Valuation Assets include assets from Surplus divisions, if any.

[2] If assets exceed accrued liabilities for a division, the division may have an overfunding credit to reduce the division's employer contribution requirement. If the overfunding credit is larger than the normal cost, the division's full credit is included in the municipality's amortization payment above but the division's total contribution requirement is zero. This can cause the displayed normal cost and amortization payment to not add up to the displayed total employer contribution.

Projection Scenarios

The next two pages show projections of the plan's funded ratio and computed employer contributions under the actuarial assumptions used in the valuation and alternate economic scenarios. All three projections take into account the past investment losses that will continue to affect the actuarial rate of return in the short term.

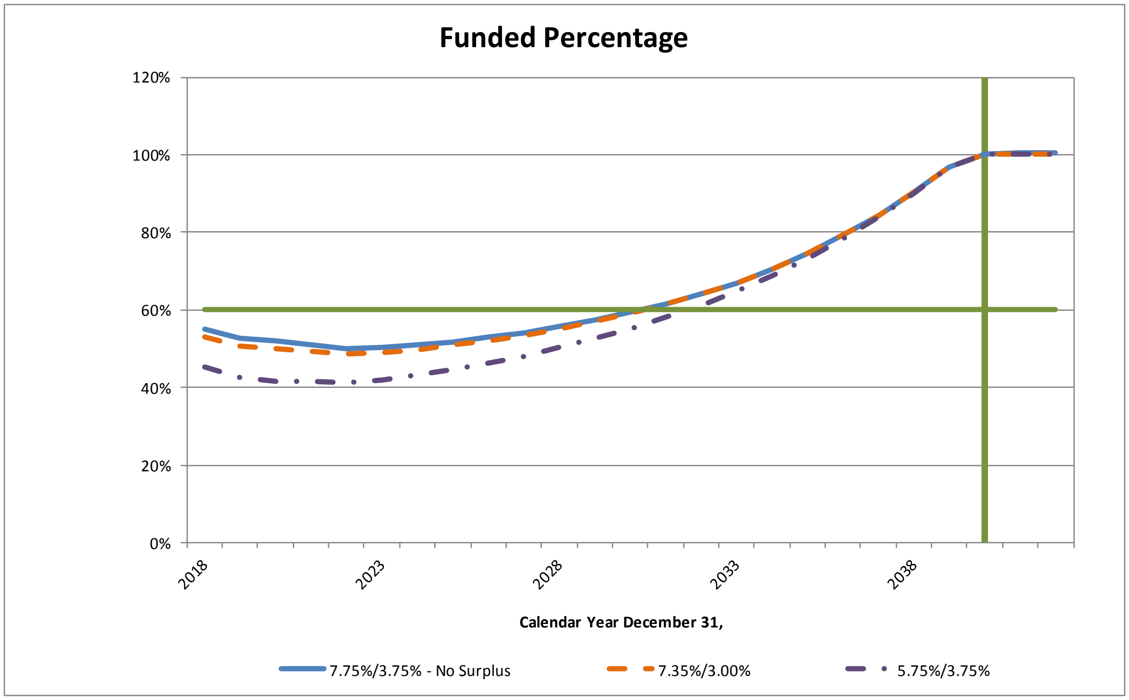
The 7.75%/3.75% scenario provides an estimate of computed employer contributions based on current actuarial assumptions, and a projected 7.75% market return. The other two scenarios may be useful if the municipality chooses to budget more conservatively, and make contributions in addition to the minimum requirements. The 7.35%/3.00% and 5.75%/3.75% projections provide an indication of the potential required employer contribution if these assumptions were met over the long-term.

Please note that one or more of your divisions trigger the 3 times benefit payout minimum contribution requirement during the projection period (see table following the projections and the graphs). This contribution requirement was designed so that a plan does not run out of money. This means that if assets in the plan are not enough to pay 3 years of benefit payouts, a minimum contribution is required to raise the level of the assets to be equal to at least 3 years of benefit payments. For a full description of this contribution requirement see the Appendix on the MERS website.

Valuation Year Ending 12/31	Fiscal Year Beginning 7/1	Actuarial Accrued Liability	Valuation Assets[2]	Funded Percentage	Computed Annual Employer Contribution
7.75%[1]/3.75%					
NO 5-YEAR PHASE-IN					
2018	2020	$ 153,841,245	$ 84,834,041	55%	$ 5,959,464
2019	2021	$ 154,700,000	$ 81,600,000	53%	$ 6,550,000
2020	2022	$ 155,700,000	$ 80,800,000	52%	$ 7,140,000
2021	2023	$ 156,600,000	$ 79,800,000	51%	$ 7,520,000
2022	2024	$ 157,400,000	$ 78,800,000	50%	$ 7,950,000
2023	2025	$ 158,100,000	$ 79,500,000	50%	$ 8,270,000
7.35%[1]/3.00%					
NO 5-YEAR PHASE-IN					
2018	2020	$ 159,718,466	$ 84,834,041	53%	$ 6,539,196
2019	2021	$ 160,400,000	$ 81,300,000	51%	$ 7,090,000
2020	2022	$ 161,200,000	$ 80,400,000	50%	$ 7,530,000
2021	2023	$ 161,800,000	$ 79,800,000	49%	$ 7,960,000
2022	2024	$ 162,400,000	$ 78,900,000	49%	$ 8,370,000
2023	2025	$ 162,800,000	$ 79,700,000	49%	$ 8,640,000
5.75%[1]/3.75%					
NO 5-YEAR PHASE-IN					
2018	2020	$ 187,331,256	$ 84,834,041	45%	$ 8,230,080
2019	2021	$ 188,100,000	$ 80,000,000	43%	$ 8,950,000
2020	2022	$ 189,000,000	$ 78,800,000	42%	$ 9,590,000
2021	2023	$ 189,800,000	$ 78,800,000	42%	$ 10,000,000
2022	2024	$ 190,500,000	$ 78,300,000	41%	$ 10,500,000
2023	2025	$ 191,200,000	$ 80,400,000	42%	$ 10,900,000

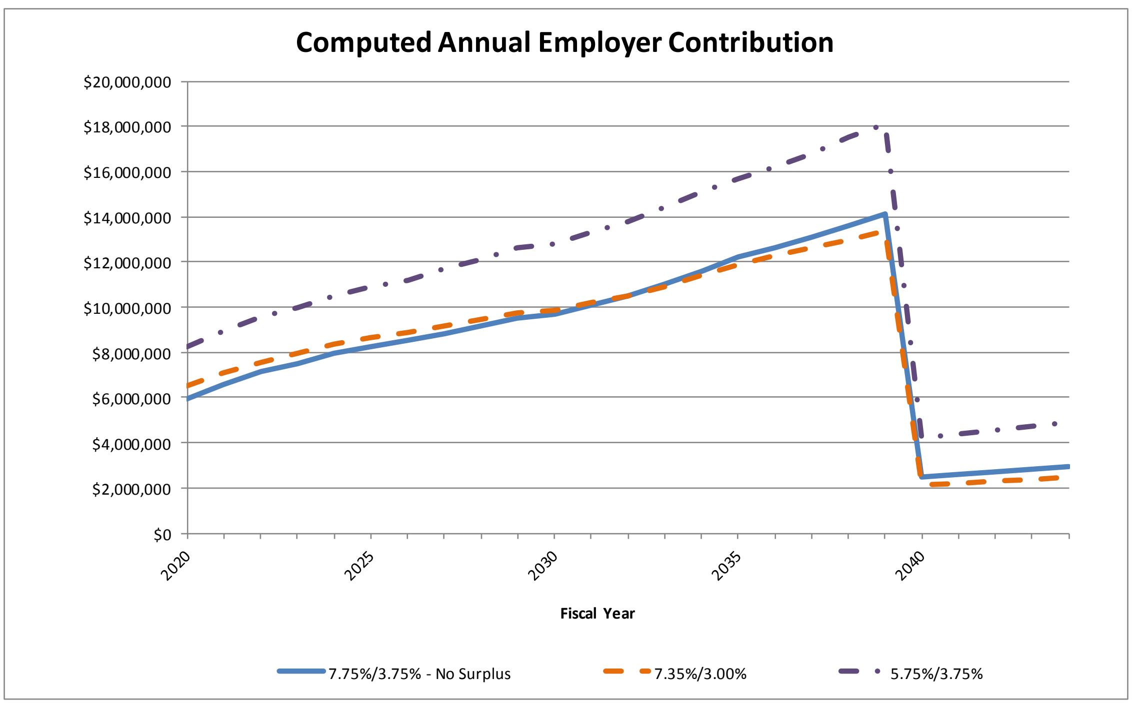
[1] Represents both the interest rate for discounting liabilities and the future investment return assumption on the Market Value of assets.

[2] Valuation Assets do not include assets from Surplus divisions, if any.



Notes:
All projected funded percentages are shown with no phase-in.

The green indicator lines have been added at 60% funded and 22 years following the valuation date for PA 202 purposes.



Notes:
All projected contributions are shown with no phase-in.

Valuation Year Ending 12/31	Fiscal Year Beginning 7/1	7.75%/3.75% No Phase-In	7.35%/3.00% No Phase-In	5.75%/3.75% No Phase-In
2018	2020	14	14	14
2019	2021	13, 14	14	13, 14
2020	2022	13	13	13
2021	2023	13	13	13
2022	2024	13	13	13
2023	2025	13	13	13

This table shows in any given year which division(s) are impacted by the 3 times benefit payout minimum required contribution. If "No" appears in the table, it means none of the divisions are impacted.

Table 1: Employer Contribution Details For the Fiscal Year Beginning July 1, 2020

Division	Total Normal Cost	Employee Contribut. Rate	Employer Contributions[1]: Employer Normal Cost	Employer Contributions[1]: Payment of the Unfunded Accrued Liability[4]	Employer Contributions[1]: Computed Employer Contribut. No Phase-In	Computed Employer Contribut. With Phase-In	Blended ER Rate No Phase-In[5]	Blended ER Rate With Phase-In[5]	Employee Contribut. Conversion Factor[2]
Percentage of Payroll									
10 - NonUnion	11.40%	6.00%	-	-	-	-	36.30%	35.46%	
12 - UWUA - Gen Local 532	14.30%	8.00%	-	-	-	-	36.47%	35.46%	
13 - Police,Lts,Sgt	12.91%	7.00%	5.91%	738.88%	744.79%	740.87%			0.57%
14 - Police Commun.	0.00%	0.00%	-	-	-	-			
15 - McMorranPlace	0.00%	0.00%	-	-	-	-			
16 - FireFighters	12.21%	7.00%	-	-	-	-	53.61%	52.48%	
17 - Police Patrol	12.44%	7.00%	-	-	-	-	11.65%	11.46%	
HA - Non-Union after 7/1/08	6.68%	0.00%	6.68%	-7.58%	0.00%	0.00%	36.30%	35.46%	0.94%
HB - UWUA - Local 532 after 5/1/10	6.26%	0.00%	6.26%	-5.36%	0.90%	0.86%	36.47%	35.46%	0.94%
HC - Fire after 7/1/2014	10.47%	0.00%	10.47%	-2.29%	8.18%	8.18%	53.61%	52.48%	0.95%
HD - Police Patrol after 7/1/2014	10.04%	0.00%	10.04%	-0.45%	9.59%	9.57%	11.65%	11.46%	0.95%
Estimated Monthly Contribution[3]									
10 - NonUnion			$ 10,835	$ 152,385	$ 163,220	$ 159,630			
12 - UWUA - Gen Local 532			6,322	84,821	91,143	88,639			
13 - Police,Lts,Sgt			592	73,951	74,543	74,151			
14 - Police Commun.			0	2,002	2,002	1,999			
15 - McMorranPlace			0	7,375	7,375	7,200			
16 - FireFighters			9,498	103,481	112,979	110,552			
17 - Police Patrol			13,953	17,933	31,886	31,240			
HA - Non-Union after 7/1/08			16,227	(18,421)	0	0			
HB - UWUA - Local 532 after 5/1/10			9,598	(8,217)	1,381	1,312			
HC - Fire after 7/1/2014			3,515	(768)	2,747	2,747			
HD - Police Patrol after 7/1/2014			9,787	(441)	9,346	9,327			
Total Municipality			**$ 80,327**	**$ 414,101**	**$ 496,622**	**$ 486,797**			
Estimated Annual Contribution[3]			**$ 963,924**	**$ 4,969,212**	**$ 5,959,464**	**$ 5,841,564**			

1 The above employer contribution requirements are in addition to the employee contributions, if any.

2 If employee contributions are increased/decreased by 1.00% of pay, the employer contribution requirement will decrease/increase by the Employee Contribution Conversion Factor. The conversion factor is usually under 1%, because employee contributions may be refunded at termination of employment, and not used to fund

retirement pensions. Employer contributions will all be used to fund pensions.

[3] For divisions that are open to new hires, estimated contributions are based on projected fiscal year payroll. Actual contributions will be based on actual reported monthly pays, and will be different from the above amounts. For divisions that will have no new hires (i.e., closed divisions), invoices will be based on the above dollar amounts which are based on projected fiscal year payroll. See description of Open Divisions and Closed Divisions in the Appendix.

[4] Note that if the overfunding credit is larger than the normal cost, the full credit is shown above but the total contribution requirement is zero. This will cause the displayed normal cost and unfunded accrued liability contributions to not add across.

[5] For linked divisions, the employer will be invoiced the Computed Employer Contribution with Phase-in rate shown above for each linked division (a contribution rate for the open division; a contribution dollar for the closed-but-linked division), unless the employer elects to contribute the Blended Employer Contribution rate shown above, by contacting MERS at 800-767-MERS (6377).

Please see the Comments on Asset Smoothing in the Executive Summary of this report.

Table 2: Benefit Provisions

10 - NonUnion: Closed to new hires, linked to Division HA

	2018 Valuation	2017 Valuation
Benefit Multiplier:	Bridged Benefit:2.50% Multiplier (80% max) Frozen FAC;2.00% Multiplier (no max)	2.50% Multiplier (80% max)
Bridged Benefit Date:	6/30/2018	
Normal Retirement Age:	60	60
Vesting:	10 years	10 years
Early Retirement (Unreduced):	55/25	55/25
Early Retirement (Reduced):	50/25	50/25
	55/15	55/15
Final Average Compensation:	3 years	3 years
Employee Contributions:	6.00%	8.00%
RS50% Percentage:	50%	50%
Act 88:	Yes (Adopted 12/13/1965)	Yes (Adopted 12/13/1965)

12 - UWUA - Gen Local 532: Closed to new hires, linked to Division HB

	2018 Valuation	2017 Valuation
Benefit Multiplier:	2.50% Multiplier (80% max)	2.50% Multiplier (80% max)
Normal Retirement Age:	60	60
Vesting:	10 years	10 years
Early Retirement (Unreduced):	55/25	55/25
Early Retirement (Reduced):	50/25	50/25
	55/15	55/15
Final Average Compensation:	3 years	3 years
Employee Contributions:	8.00%	8.00%
RS50% Percentage:	50%	50%
Act 88:	Yes (Adopted 12/13/1965)	Yes (Adopted 12/13/1965)

13 - Police,Lts,Sgt: Open Division

	2018 Valuation	2017 Valuation
Benefit Multiplier:	Bridged Benefit:2.75% Multiplier (80% max) Frozen FAC;2.00% Multiplier (no max)	2.75% Multiplier (80% max)
Bridged Benefit Date:	6/30/2018	
Normal Retirement Age:	60	60
Vesting:	10 years	10 years
Early Retirement (Unreduced):	50/25	50/25
Early Retirement (Reduced):	55/15	55/15
Final Average Compensation:	3 years	3 years
Employee Contributions:	7.00%	11.71%
RS50% Percentage:	50%	50%
D-2:	D2 (25%)	D2 (25%)
Act 88:	Yes (Adopted 12/13/1965)	Yes (Adopted 12/13/1965)

14 - Police Commun.: Closed to new hires

	2018 Valuation	2017 Valuation
Benefit Multiplier:	2.25% Multiplier (80% max)	2.25% Multiplier (80% max)
Normal Retirement Age:	60	60
Vesting:	10 years	10 years
Early Retirement (Unreduced):	55/25	55/25
Early Retirement (Reduced):	50/25	50/25
	55/15	55/15
Final Average Compensation:	3 years	3 years
Employee Contributions:	0.00%	0.00%
Act 88:	Yes (Adopted 12/13/1965)	Yes (Adopted 12/13/1965)

15 - McMorranPlace: Closed to new hires

	2018 Valuation	2017 Valuation
Benefit Multiplier:	2.25% Multiplier (80% max)	2.25% Multiplier (80% max)
Normal Retirement Age:	60	60
Vesting:	10 years	10 years
Early Retirement (Unreduced):	55/25	55/25
Early Retirement (Reduced):	50/25	50/25
	55/15	55/15
Final Average Compensation:	3 years	3 years
Employee Contributions:	0.00%	0.00%
Act 88:	Yes (Adopted 12/13/1965)	Yes (Adopted 12/13/1965)

16 - FireFighters: Closed to new hires, linked to Division HC

	2018 Valuation	2017 Valuation
Benefit Multiplier:	Bridged Benefit:2.50% Multiplier (80% max) Frozen FAC;2.00% Multiplier (no max)	2.50% Multiplier (80% max)
Bridged Benefit Date:	6/30/2018	
Normal Retirement Age:	60	60
Vesting:	10 years	10 years
Early Retirement (Unreduced):	50/25	50/25
Early Retirement (Reduced):	55/15	55/15
Final Average Compensation:	3 years	3 years
Employee Contributions:	7.00%	10.00%
RS50% Percentage:	50%	50%
D-2:	D2 (25%)	D2 (25%)
Act 88:	Yes (Adopted 12/13/1965)	Yes (Adopted 12/13/1965)

17 - Police Patrol: Closed to new hires, linked to Division HD

	2018 Valuation	2017 Valuation
Benefit Multiplier:	Bridged Benefit:2.50% Multiplier (80% max) Frozen FAC;2.00% Multiplier (no max)	2.50% Multiplier (80% max)
Bridged Benefit Date:	6/30/2018	
Normal Retirement Age:	60	60
Vesting:	10 years	10 years
Early Retirement (Unreduced):	50/25	50/25
Early Retirement (Reduced):	55/15	55/15
Final Average Compensation:	3 years	3 years
Employee Contributions:	7.00%	10.00%
RS50% Percentage:	50%	50%
D-2:	D2 (25%)	D2 (25%)
Act 88:	Yes (Adopted 12/13/1965)	Yes (Adopted 12/13/1965)

HA - Non-Union after 7/1/08: Open Division, linked to Division 10

	2018 Valuation	2017 Valuation
Benefit Multiplier:	1.25% Multiplier (no max)	Hybrid Plan - 1.25% Multiplier
Normal Retirement Age:	60	60
Vesting:	6 years	6 years
Early Retirement (Unreduced):	-	-
Early Retirement (Reduced):	-	-
Final Average Compensation:	3 years	3 years
Employee Contributions:	0.00%	0.00%
Act 88:	Yes (Adopted 12/13/1965)	Yes (Adopted 12/13/1965)

HB - UWUA - Local 532 after 5/1/10: Open Division, linked to Division 12

	2018 Valuation	2017 Valuation
Benefit Multiplier:	1.25% Multiplier (no max)	Hybrid Plan - 1.25% Multiplier
Normal Retirement Age:	60	60
Vesting:	6 years	6 years
Early Retirement (Unreduced):	-	-
Early Retirement (Reduced):	-	-
Final Average Compensation:	3 years	3 years
Employee Contributions:	0.00%	0.00%
Act 88:	Yes (Adopted 5/1/2010)	Yes (Adopted 5/1/2010)

HC - Fire after 7/1/2014: Open Division, linked to Division 16

	2018 Valuation	2017 Valuation
Benefit Multiplier:	2.00% Multiplier (no max)	Hybrid Plan - 2.00% Multiplier
Normal Retirement Age:	60	60
Vesting:	6 years	6 years
Early Retirement (Unreduced):	55/25	55/25
Early Retirement (Reduced):	-	-
Final Average Compensation:	3 years	3 years
Employee Contributions:	0.00%	0.00%
Act 88:	Yes (Adopted 5/27/2008)	Yes (Adopted 5/27/2008)

HD - Police Patrol after 7/1/2014: Open Division, linked to Division 17

	2018 Valuation	2017 Valuation
Benefit Multiplier:	2.00% Multiplier (no max)	Hybrid Plan - 2.00% Multiplier
Normal Retirement Age:	60	60
Vesting:	6 years	6 years
Early Retirement (Unreduced):	55/25	55/25
Early Retirement (Reduced):	-	-
Final Average Compensation:	3 years	3 years
Employee Contributions:	0.00%	0.00%
Act 88:	Yes (Adopted 5/27/2008)	Yes (Adopted 5/27/2008)

Table 3: Participant Summary

	2018 Valuation		2017 Valuation		2018 Valuation		
Division	Number	Annual Payroll[1]	Number	Annual Payroll[1]	Average Age	Average Benefit Service[2]	Average Eligibility Service[2]
10 - NonUnion							
Active Employees	42	$ 2,571,608	46	$ 2,611,127	51.0	19.5	19.5
Vested Former Employees	12	131,290	12	131,368	53.4	11.1	13.8
Retirees and Beneficiaries	145	4,192,388	141	4,075,717	70.5		
12 - UWUA - Gen Local 532							
Active Employees	24	$ 1,273,423	37	$ 1,955,938	52.5	18.7	18.7
Vested Former Employees	8	148,330	8	142,149	47.8	14.7	14.7
Retirees and Beneficiaries	100	2,466,482	95	2,211,687	69.0		
13 - Police,Lts,Sgt							
Active Employees	1	$ 109,523	3	$ 297,662	49.4	27.1	27.1
Vested Former Employees	0	0	0	0	0.0	0.0	0.0
Retirees and Beneficiaries	29	1,505,861	28	1,422,639	66.4		
14 - Police Commun.							
Active Employees	0	$ 0	0	$ 0	0.0	0.0	0.0
Vested Former Employees	2	2,885	2	2,886	52.6	2.4	15.5
Retirees and Beneficiaries	3	22,314	3	22,315	68.2		
15 - McMorranPlace							
Active Employees	0	$ 0	0	$ 0	0.0	0.0	0.0
Vested Former Employees	7	47,251	7	47,251	52.5	8.7	12.5
Retirees and Beneficiaries	12	242,063	12	242,063	73.9		
16 - FireFighters							
Active Employees	29	$ 2,097,710	33	$ 2,549,821	44.4	16.1	16.3
Vested Former Employees	0	0	0	0	0.0	0.0	0.0
Retirees and Beneficiaries	68	2,684,986	65	2,435,120	69.0		
17 - Police Patrol							
Active Employees	37	$ 3,142,886	39	$ 3,285,208	42.4	17.0	17.2
Vested Former Employees	4	45,425	5	49,110	47.7	7.3	13.7
Retirees and Beneficiaries	29	873,738	28	778,356	70.3		
HA - Non-Union after 7/1/08							
Active Employees	52	$ 2,282,355	35	$ 1,566,074	42.7	2.8	3.4
Vested Former Employees	2	4,180	1	906	35.4	5.0	9.3
Retirees and Beneficiaries	2	8,364	2	8,365	61.7		
HB - UWUA - Local 532 after 5/1/10							
Active Employees	36	$ 1,502,596	26	$ 1,163,423	36.7	2.6	2.6
Vested Former Employees	1	2,688	1	2,688	31.3	4.5	5.6
Retirees and Beneficiaries	0	0	0	0	0.0		

Table 3 (continued)

Division	2018 Valuation Number	2018 Valuation Annual Payroll[1]	2017 Valuation Number	2017 Valuation Annual Payroll[1]	2018 Valuation Average Age	2018 Valuation Average Benefit Service[2]	2018 Valuation Average Eligibility Service[2]
HC - Fire after 7/1/2014							
Active Employees	6	$ 264,606	3	$ 105,171	32.0	1.1	1.7
Vested Former Employees	0	0	0	0	0.0	0.0	0.0
Retirees and Beneficiaries	0	0	0	0	0.0		
HD - Police Patrol after 7/1/2014							
Active Employees	15	$ 730,562	7	$ 410,505	27.1	1.3	1.3
Vested Former Employees	0	0	0	0	0.0	0.0	0.0
Retirees and Beneficiaries	0	0	0	0	0.0		
Total Municipality							
Active Employees	**242**	**$ 13,975,269**	**229**	**$ 13,944,929**	**43.2**	**11.0**	**11.2**
Vested Former Employees	**36**	**382,049**	**36**	**376,358**	**49.7**	**10.0**	**13.4**
Retirees and Beneficiaries	**388**	**11,996,196**	**374**	**11,196,262**	**69.6**		
Total Participants	**666**		**639**				

[1] Annual payroll for active employees; annual deferred benefits payable for vested former employees; annual benefits being paid for retirees and beneficiaries.

[2] Descriptions can be found under Miscellaneous and Technical Assumptions in the Appendix.

Table 4: Reported Assets (Market Value)

Division	2018 Valuation		2017 Valuation	
	Employer and Retiree[1]	Employee[2]	Employer and Retiree[1]	Employee[2]
10 - NonUnion	$ 21,370,345	$ 1,491,219	$ 24,863,425	$ 1,397,760
12 - UWUA - Gen Local 532	15,200,643	786,601	17,833,148	1,004,555
13 - Police,Lts,Sgt	4,310,065	183,064	5,136,273	433,845
14 - Police Commun.	40,140	0	50,052	0
15 - McMorranPlace	1,243,198	0	1,489,304	0
16 - FireFighters	12,756,854	1,976,187	14,473,859	2,192,021
17 - Police Patrol	10,787,858	3,102,708	11,646,865	2,995,739
HA - Non-Union after 7/1/08	2,646,673	0	1,989,110	0
HB - UWUA - Local 532 after 5/1/10	1,226,549	0	1,007,150	0
HC - Fire after 7/1/2014	115,989	0	6,592	0
HD - Police Patrol after 7/1/2014	211,726	0	143,341	0
Municipality Total[3]	**$ 69,910,040**	**$ 7,539,779**	**$ 78,639,119**	**$ 8,023,920**
Combined Assets[3]	**$77,449,820**		**$86,663,039**	

[1] Reserve for Employer Contributions and Benefit Payments.
[2] Reserve for Employee Contributions.
[3] Totals may not add due to rounding.

The December 31, 2018 valuation assets (actuarial value of assets) are equal to 1.095342 times the reported market value of assets (compared to 1.011321 as of December 31, 2017). Refer to the Appendix for a description of the valuation asset derivation and a detailed calculation of valuation assets.

Table 5: Flow of Valuation Assets

Year Ended 12/31	Employer Contributions: Required	Employer Contributions: Additional	Employee Contributions	Investment Income (Valuation Assets)	Benefit Payments	Employee Contribution Refunds	Net Transfers	Valuation Asset Balance
2008	$ 2,216,237		$ 209,303	$ 3,775,027	$ (7,894,389)	$ (13,856)	$ (698,392)	$ 100,492,714
2009	2,259,733		293,446	2,990,622	(8,408,984)	(499)	28,109	97,655,141
2010	2,387,055		402,624	4,133,834	(8,834,732)	0	0	95,743,922
2011	2,652,709	$ 0	756,651	4,105,589	(9,299,977)	(812)	0	93,958,082
2012	2,679,344	0	997,424	3,581,621	(9,595,864)	0	23,107	91,643,714
2013	2,887,520	0	1,097,180	4,922,317	(9,747,601)	(51,553)	20,413	90,771,990
2014	3,266,049	0	1,153,294	4,915,721	(9,920,566)	(3,627)	(1)	90,182,860
2015	3,755,543	500,000	1,138,153	4,189,200	(10,334,726)	(30,548)	306,215	89,706,697
2016	3,850,070	500,000	1,040,220	4,152,272	(10,847,508)	(3,815)	0	88,397,936
2017	4,275,122	0	1,021,459	5,007,629	(11,057,994)	0	0	87,644,152
2018	4,457,393	500,000	830,053	3,045,013	(11,633,085)	(48,671)	39,186	84,834,041

Notes:

Transfers in and out are usually related to the transfer of participants between municipalities, and to employer and employee payments for service credit purchases (if any) that the governing body has approved.

Additional employer contributions, if any, are shown separately starting in 2011. Prior to 2011, additional contributions are combined with the required employer contributions.

The investment income column reflects the recognized investment income based on Valuation Assets. It does not reflect the market value investment return in any given year.

The Valuation Asset balance includes assets from Surplus divisions, if any.

Years where historical information is not available, will be displayed with zero values.

Table 6: Actuarial Accrued Liabilities and Valuation Assets as of December 31, 2018

Division	Actuarial Accrued Liability: Active Employees	Vested Former Employees	Retirees and Beneficiaries	Pending Refunds	Total	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
10 - NonUnion	$ 8,425,074	$ 908,447	$ 40,729,525	$ 2,459	$ 50,065,505	$ 25,041,231	50.0%	$ 25,024,274
12 - UWUA - Gen Local 532	5,551,472	885,653	24,870,918	0	31,308,043	17,511,500	55.9%	13,796,543
13 - Police,Lts,Sgt	859,742	0	16,129,309	0	16,989,051	4,921,513	29.0%	12,067,538
14 - Police Commun.	0	27,299	128,978	0	156,277	43,967	28.1%	112,310
15 - McMorranPlace	0	313,588	1,993,613	0	2,307,201	1,361,727	59.0%	945,474
16 - FireFighters	5,578,039	0	27,660,254	9,803	33,248,096	16,137,719	48.5%	17,110,377
17 - Police Patrol	9,796,689	189,002	8,430,950	51,755	18,468,396	15,214,921	82.4%	3,253,475
HA - Non-Union after 7/1/08	616,021	7,806	99,404	0	723,231	2,899,012	400.8%	(2,175,781)
HB - UWUA - Local 532 after 5/1/10	361,542	3,184	0	0	364,726	1,343,491	368.4%	(978,765)
HC - Fire after 7/1/2014	34,169	0	0	0	34,169	127,048	371.8%	(92,879)
HD - Police Patrol after 7/1/2014	176,550	0	0	0	176,550	231,912	131.4%	(55,362)
Total	**$ 31,399,298**	**$ 2,334,979**	**$120,042,951**	**$ 64,017**	**$ 153,841,245**	**$ 84,834,041**	**55.1%**	**$ 69,007,204**

The following results show the combined accrued liabilities and assets for each set of linked divisions. These results are already shown in the table on the prior page(s).

Table 6 (continued)

Division	Actuarial Accrued Liability					Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
	Active Employees	Vested Former Employees	Retirees and Beneficiaries	Pending Refunds	Total			
Linked Divisions HA, 10	$ 9,041,095	$ 916,253	$40,828,929	$ 2,459	$ 50,788,736	$ 27,940,243	55.0%	$ 22,848,493
Linked Divisions HB, 12	5,913,014	888,837	24,870,918	0	31,672,769	18,854,991	59.5%	12,817,778
Linked Divisions HC, 16	5,612,208	0	27,660,254	9,803	33,282,265	16,264,767	48.9%	17,017,498
Linked Divisions HD, 17	9,973,239	189,002	8,430,950	51,755	18,644,946	15,446,833	82.8%	3,198,113

Please see the Comments on Asset Smoothing in the Executive Summary of this report.

Table 7: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2004	$ 111,866,998	$ 97,583,458	87%	$ 14,283,540
2005	115,703,663	99,665,528	86%	16,038,135
2006	121,765,351	103,052,997	85%	18,712,354
2007	122,399,730	102,898,784	84%	19,500,946
2008	125,503,862	100,492,714	80%	25,011,148
2009	128,001,517	97,655,141	76%	30,346,376
2010	131,215,696	95,743,922	73%	35,471,774
2011	134,781,198	93,958,082	70%	40,823,116
2012	137,393,051	91,643,714	67%	45,749,337
2013	139,863,624	90,771,990	65%	49,091,634
2014	143,854,928	90,182,860	63%	53,672,068
2015	156,289,777	89,706,697	57%	66,583,080
2016	157,547,282	88,397,936	56%	69,149,346
2017	160,613,601	87,644,152	55%	72,969,449
2018	153,841,245	84,834,041	55%	69,007,204

Notes: Actuarial assumptions were revised for the 2004, 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

The Valuation Assets include assets from Surplus divisions, if any.

Years where historical information is not available will be displayed with zero values.

Tables 8 and 9: Division-Based Comparative Schedules

Division 10 - NonUnion

Table 8-10: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2008	$ 40,702,710	$ 34,047,238	84%	$ 6,655,472
2009	41,552,516	33,058,275	80%	8,494,241
2010	42,927,454	32,326,541	75%	10,600,913
2011	43,964,877	31,596,448	72%	12,368,429
2012	44,786,205	30,626,071	68%	14,160,134
2013	46,130,438	30,219,332	66%	15,911,106
2014	47,124,545	29,699,144	63%	17,425,401
2015	51,492,607	29,047,295	56%	22,445,312
2016	51,563,787	27,742,741	54%	23,821,046
2017	51,927,658	26,558,488	51%	25,369,170
2018	50,065,505	25,041,231	50%	25,024,274

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

Table 9-10: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2008	90	$ 4,583,037	$ 71,998	1.00%
2009	86	4,435,498	$ 74,770	2.00%
2010	82	4,281,175	$ 80,909	3.00%
2011	77	4,041,168	$ 83,205	6.00%
2012	69	3,562,483	$ 89,193	7.00%
2013	65	3,463,458	$ 97,954	8.00%
2014	64	3,473,674	$ 107,893	8.00%
2015	57	3,182,161	$ 145,156	8.00%
2016	51	2,848,314	$ 152,659	8.00%
2017	46	2,611,127	$ 163,882	8.00%
2018	42	2,571,608	$ 163,220	6.00%

1 For open divisions, a percent of pay contribution is shown. For closed divisions, a monthly dollar contribution is shown.

2 For each valuation year, the computed employer contribution is based on the employee rate. If the employee rate changes during the applicable fiscal year, the computed employer contributon will be adjusted.

Note: The contributions shown in Table 9 for the 12/31/2015 through 12/31/2019 valuations do **not** reflect the phase-in of the increased contribution requirements associated with the new actuarial assumptions. The full contribution without phase-in is shown in Table 9 above. The contribution requirements including the 5-year phase-in are shown on page 2.

See the Benefit Provision History, later in this report, for past benefit provision changes.

Years where historical information is not available, will be displayed with zero values.

Table 8-12: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2008	$ 26,756,067	$ 22,231,629	83%	$ 4,524,438
2009	26,925,646	21,728,018	81%	5,197,628
2010	27,693,148	21,430,409	77%	6,262,739
2011	28,264,340	21,374,637	76%	6,889,703
2012	28,706,241	21,106,271	74%	7,599,970
2013	28,994,919	20,839,788	72%	8,155,131
2014	29,742,312	20,528,485	69%	9,213,827
2015	31,414,458	20,014,155	64%	11,400,303
2016	31,709,315	19,616,323	62%	12,092,992
2017	31,793,929	19,050,965	60%	12,742,964
2018	31,308,043	17,511,500	56%	13,796,543

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

Table 9-12: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees Number	Active Employees Annual Payroll	Computed Employer Contribution[1]	Employee Contribution Rate[2]
2008	72	$ 3,459,525	18.35%	0.00%
2009	66	3,179,675	20.34%	0.00%
2010	66	3,211,928	$ 60,393	0.00%
2011	63	3,125,610	$ 50,995	6.00%
2012	60	2,924,492	$ 52,332	7.00%
2013	53	2,633,819	$ 53,538	8.00%
2014	49	2,502,621	$ 60,240	8.00%
2015	45	2,360,002	$ 77,175	8.00%
2016	40	2,106,728	$ 80,538	8.00%
2017	37	1,955,938	$ 84,878	8.00%
2018	24	1,273,423	$ 91,143	8.00%

1 For open divisions, a percent of pay contribution is shown. For closed divisions, a monthly dollar contribution is shown.

2 For each valuation year, the computed employer contribution is based on the employee rate. If the employee rate changes during the applicable fiscal year, the computed employer contributon will be adjusted.

Note: The contributions shown in Table 9 for the 12/31/2015 through 12/31/2019 valuations do **not** reflect the phase-in of the increased contribution requirements associated with the new actuarial assumptions. The full contribution without phase-in is shown in Table 9 above. The contribution requirements including the 5-year phase-in are shown on page 2.

See the Benefit Provision History, later in this report, for past benefit provision changes.

Years where historical information is not available, will be displayed with zero values.

Division 13 - Police,Lts,Sgt

Table 8-13: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2008	$ 14,429,897	$ 10,298,677	71%	$ 4,131,220
2009	14,828,681	10,145,042	68%	4,683,639
2010	15,640,806	9,831,825	63%	5,808,981
2011	16,104,357	9,123,150	57%	6,981,207
2012	16,097,978	8,372,102	52%	7,725,876
2013	16,217,723	7,878,127	49%	8,339,596
2014	16,474,536	7,418,451	45%	9,056,085
2015	17,228,924	6,890,012	40%	10,338,912
2016	17,209,757	6,269,607	36%	10,940,150
2017	17,106,743	5,633,177	33%	11,473,566
2018	16,989,051	4,921,513	29%	12,067,538

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

Table 9-13: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2008	13	$ 1,044,892	29.02%	6.71%
2009	9	805,129	39.03%	6.71%
2010	6	574,091	62.80%	6.71%
2011	5	482,598	85.46%	9.71%
2012	5	484,226	100.81%	10.71%
2013	5	493,043	106.02%	11.71%
2014	4	397,007	143.09%	11.71%
2015	4	400,878	167.99%	11.71%
2016	3	297,981	241.66%	11.71%
2017	3	297,662	257.31%	11.71%
2018	1	109,523	744.79%	7.00%

1 For open divisions, a percent of pay contribution is shown. For closed divisions, a monthly dollar contribution is shown.

2 For each valuation year, the computed employer contribution is based on the employee rate. If the employee rate changes during the applicable fiscal year, the computed employer contributon will be adjusted.

Note: The contributions shown in Table 9 for the 12/31/2015 through 12/31/2019 valuations do **not** reflect the phase-in of the increased contribution requirements associated with the new actuarial assumptions. The full contribution without phase-in is shown in Table 9 above. The contribution requirements including the 5-year phase-in are shown on page 2.

See the Benefit Provision History, later in this report, for past benefit provision changes.

Years where historical information is not available, will be displayed with zero values.

Table 8-14: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2008	$ 190,792	$ 48,209	25%	$ 142,583
2009	186,441	41,782	22%	144,659
2010	181,828	33,728	19%	148,100
2011	177,428	17,768	10%	159,660
2012	172,579	3,260	2%	169,319
2013	166,980	(9,954)	-6%	176,934
2014	162,035	(6,188)	-4%	168,223
2015	166,315	34,881	21%	131,434
2016	160,912	60,398	38%	100,514
2017	162,712	50,619	31%	112,093
2018	156,277	43,967	28%	112,310

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

Table 9-14: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2008	0	$ 0	$ 571	0.00%
2009	0	0	$ 736	0.00%
2010	0	0	$ 835	0.00%
2011	0	0	$ 954	0.00%
2012	0	0	$ 3,481	0.00%
2013	0	0	$ 6,360	0.00%
2014	0	0	$ 657	0.00%
2015	0	0	$ 1,006	0.00%
2016	0	0	$ 1,367	0.00%
2017	0	0	$ 2,136	0.00%
2018	0	0	$ 2,002	0.00%

1 For open divisions, a percent of pay contribution is shown. For closed divisions, a monthly dollar contribution is shown.

2 For each valuation year, the computed employer contribution is based on the employee rate. If the employee rate changes during the applicable fiscal year, the computed employer contributon will be adjusted.

Note: The contributions shown in Table 9 for the 12/31/2015 through 12/31/2019 valuations do **not** reflect the phase-in of the increased contribution requirements associated with the new actuarial assumptions. The full contribution without phase-in is shown in Table 9 above. The contribution requirements including the 5-year phase-in are shown on page 2.

See the Benefit Provision History, later in this report, for past benefit provision changes.

Years where historical information is not available, will be displayed with zero values.

Table 8-15: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2008	$ 2,566,361	$ 2,493,141	97%	$ 73,220
2009	2,673,889	2,335,431	87%	338,458
2010	2,659,896	2,172,671	82%	487,225
2011	2,573,265	2,040,823	79%	532,442
2012	2,494,437	1,930,502	77%	563,935
2013	2,360,132	1,864,334	79%	495,798
2014	2,304,822	1,802,657	78%	502,165
2015	2,408,705	1,718,256	71%	690,449
2016	2,403,745	1,613,971	67%	789,774
2017	2,382,665	1,506,164	63%	876,501
2018	2,307,201	1,361,727	59%	945,474

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

Table 9-15: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2008	10	$ 353,122	11.46%	0.00%
2009	7	224,823	18.75%	0.00%
2010	6	186,198	24.80%	0.00%
2011	7	241,680	22.62%	0.00%
2012	7	253,439	24.17%	0.00%
2013	7	253,508	22.55%	0.00%
2014	0	0	$ 2,562	0.00%
2015	0	0	$ 4,292	0.00%
2016	0	0	$ 5,289	0.00%
2017	0	0	$ 6,270	0.00%
2018	0	0	$ 7,375	0.00%

1 For open divisions, a percent of pay contribution is shown. For closed divisions, a monthly dollar contribution is shown.

2 For each valuation year, the computed employer contribution is based on the employee rate. If the employee rate changes during the applicable fiscal year, the computed employer contributon will be adjusted.

Note: The contributions shown in Table 9 for the 12/31/2015 through 12/31/2019 valuations do **not** reflect the phase-in of the increased contribution requirements associated with the new actuarial assumptions. The full contribution without phase-in is shown in Table 9 above. The contribution requirements including the 5-year phase-in are shown on page 2.

See the Benefit Provision History, later in this report, for past benefit provision changes.

Years where historical information is not available, will be displayed with zero values.

Division 16 - FireFighters

Table 8-16: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2008	$ 28,385,796	$ 20,877,889	74%	$ 7,507,907
2009	28,619,595	19,815,906	69%	8,803,689
2010	29,322,705	19,239,515	66%	10,083,190
2011	30,025,517	18,633,047	62%	11,392,470
2012	30,527,750	17,933,263	59%	12,594,487
2013	30,369,495	17,557,359	58%	12,812,136
2014	31,155,148	17,371,683	56%	13,783,465
2015	34,248,017	17,465,539	51%	16,782,478
2016	34,528,955	17,035,255	49%	17,493,700
2017	35,218,375	16,854,554	48%	18,363,821
2018	33,248,096	16,137,719	49%	17,110,377

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

Table 9-16: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2008	41	$ 2,654,412	$ 58,497	3.00%
2009	40	2,700,460	$ 62,368	4.00%
2010	43	2,825,582	29.18%	5.00%
2011	42	2,777,835	28.81%	8.00%
2012	41	2,831,577	31.89%	9.00%
2013	41	2,757,277	32.76%	10.00%
2014	41	2,841,031	$ 85,153	10.00%
2015	35	2,578,808	$ 109,540	10.00%
2016	35	2,584,342	$ 114,544	10.00%
2017	33	2,549,821	$ 121,276	10.00%
2018	29	2,097,710	$ 112,979	7.00%

1 For open divisions, a percent of pay contribution is shown. For closed divisions, a monthly dollar contribution is shown.

2 For each valuation year, the computed employer contribution is based on the employee rate. If the employee rate changes during the applicable fiscal year, the computed employer contributon will be adjusted.

Note: The contributions shown in Table 9 for the 12/31/2015 through 12/31/2019 valuations do **not** reflect the phase-in of the increased contribution requirements associated with the new actuarial assumptions. The full contribution without phase-in is shown in Table 9 above. The contribution requirements including the 5-year phase-in are shown on page 2.

See the Benefit Provision History, later in this report, for past benefit provision changes.

Years where historical information is not available, will be displayed with zero values.

Division 17 - Police Patrol

Table 8-17: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2008	$ 12,461,831	$ 10,485,872	84%	$ 1,975,959
2009	13,181,376	10,480,952	80%	2,700,424
2010	12,766,860	10,659,062	83%	2,107,798
2011	13,616,952	11,043,765	81%	2,573,187
2012	14,528,341	11,415,159	79%	3,113,182
2013	15,474,581	11,954,038	77%	3,520,543
2014	16,657,238	12,582,098	76%	4,075,140
2015	18,918,266	13,206,217	70%	5,712,049
2016	19,318,742	13,930,704	72%	5,388,038
2017	21,096,831	14,808,373	70%	6,288,458
2018	18,468,396	15,214,921	82%	3,253,475

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

Table 9-17: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2008	37	$ 2,352,577	14.84%	2.00%
2009	38	2,660,114	16.08%	2.00%
2010	42	2,921,025	11.90%	5.00%
2011	41	2,928,650	11.04%	8.00%
2012	41	3,002,156	11.82%	9.00%
2013	43	3,141,594	11.96%	10.00%
2014	43	3,180,983	$ 36,235	10.00%
2015	41	3,177,938	$ 49,950	10.00%
2016	40	3,139,662	$ 47,115	10.00%
2017	39	3,285,208	$ 54,016	10.00%
2018	37	3,142,886	$ 31,886	7.00%

1 For open divisions, a percent of pay contribution is shown. For closed divisions, a monthly dollar contribution is shown.

2 For each valuation year, the computed employer contribution is based on the employee rate. If the employee rate changes during the applicable fiscal year, the computed employer contributon will be adjusted.

Note: The contributions shown in Table 9 for the 12/31/2015 through 12/31/2019 valuations do **not** reflect the phase-in of the increased contribution requirements associated with the new actuarial assumptions. The full contribution without phase-in is shown in Table 9 above. The contribution requirements including the 5-year phase-in are shown on page 2.

See the Benefit Provision History, later in this report, for past benefit provision changes.

Years where historical information is not available, will be displayed with zero values.

Division HA - Non-Union after 7/1/08

Table 8-HA: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2008	$ 5,306	$ 4,485	85%	$ 821
2009	14,559	19,378	133%	(4,819)
2010	21,967	48,289	220%	(26,322)
2011	44,909	106,815	238%	(61,906)
2012	59,560	205,774	346%	(146,214)
2013	108,804	365,736	336%	(256,932)
2014	157,690	575,486	365%	(417,796)
2015	241,451	906,797	376%	(665,346)
2016	362,661	1,380,415	381%	(1,017,754)
2017	526,151	2,011,629	382%	(1,485,478)
2018	723,231	2,899,012	401%	(2,175,781)

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

Table 9-HA: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2008	5	$ 171,332	5.52%	0.00%
2009	6	209,933	5.20%	0.00%
2010	5	172,913	4.47%	0.00%
2011	7	294,832	3.98%	0.00%
2012	11	437,121	2.01%	0.00%
2013	15	625,802	1.29%	0.00%
2014	19	792,244	0.12%	0.00%
2015	23	1,079,024	2.67%	0.00%
2016	30	1,384,703	1.77%	0.00%
2017	35	1,566,074	0.00%	0.00%
2018	52	2,282,355	0.00%	0.00%

1 For open divisions, a percent of pay contribution is shown. For closed divisions, a monthly dollar contribution is shown.
2 For each valuation year, the computed employer contribution is based on the employee rate. If the employee rate changes during the applicable fiscal year, the computed employer contributon will be adjusted.

Note: The contributions shown in Table 9 for the 12/31/2015 through 12/31/2019 valuations do **not** reflect the phase-in of the increased contribution requirements associated with the new actuarial assumptions. The full contribution without phase-in is shown in Table 9 above. The contribution requirements including the 5-year phase-in are shown on page 2.

See the Benefit Provision History, later in this report, for past benefit provision changes.

Years where historical information is not available, will be displayed with zero values.

Division HB - UWUA - Local 532 after 5/1/10

Table 8-HB: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2008	$ 0	$ 0	0%	$ 0
2009	0	0	0%	0
2010	1,032	1,882	182%	(850)
2011	9,553	21,629	226%	(12,076)
2012	19,960	51,312	257%	(31,352)
2013	40,552	103,230	255%	(62,678)
2014	76,671	210,331	274%	(133,660)
2015	149,817	398,974	266%	(249,157)
2016	227,076	674,940	297%	(447,864)
2017	313,106	1,018,552	325%	(705,446)
2018	364,726	1,343,491	368%	(978,765)

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

Table 9-HB: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2008	0	$ 0	$ 0	0.00%
2009	0	0	$ 0	0.00%
2010	2	82,592	7.13%	0.00%
2011	3	109,392	5.49%	0.00%
2012	4	152,627	3.73%	0.00%
2013	9	324,420	3.43%	0.00%
2014	14	537,307	3.00%	0.00%
2015	20	842,274	3.94%	0.00%
2016	24	1,066,726	3.22%	0.00%
2017	26	1,163,423	2.05%	0.00%
2018	36	1,502,596	0.90%	0.00%

1 For open divisions, a percent of pay contribution is shown. For closed divisions, a monthly dollar contribution is shown.

2 For each valuation year, the computed employer contribution is based on the employee rate. If the employee rate changes during the applicable fiscal year, the computed employer contributon will be adjusted.

Note: The contributions shown in Table 9 for the 12/31/2015 through 12/31/2019 valuations do **not** reflect the phase-in of the increased contribution requirements associated with the new actuarial assumptions. The full contribution without phase-in is shown in Table 9 above. The contribution requirements including the 5-year phase-in are shown on page 2.

See the Benefit Provision History, later in this report, for past benefit provision changes.

Years where historical information is not available, will be displayed with zero values.

Division HC - Fire after 7/1/2014

Table 8-HC: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2008	$ 0	$ 0	0%	$ 0
2009	0	0	0%	0
2010	0	0	0%	0
2011	0	0	0%	0
2012	0	0	0%	0
2013	0	0	0%	0
2014	0	0	0%	0
2015	0	0	0%	0
2016	0	0	0%	0
2017	0	6,667	0%	(6,667)
2018	34,169	127,048	372%	(92,879)

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

Table 9-HC: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2008	0	$ 0	$ 0	0.00%
2009	0	0	$ 0	0.00%
2010	0	0	$ 0	0.00%
2011	0	0	$ 0	0.00%
2012	0	0	$ 0	0.00%
2013	0	0	$ 0	0.00%
2014	0	0	$ 0	0.00%
2015	0	0	$ 0	0.00%
2016	0	0	$ 0	0.00%
2017	3	105,171	10.16%	0.00%
2018	6	264,606	8.18%	0.00%

1 For open divisions, a percent of pay contribution is shown. For closed divisions, a monthly dollar contribution is shown.

2 For each valuation year, the computed employer contribution is based on the employee rate. If the employee rate changes during the applicable fiscal year, the computed employer contributon will be adjusted.

Note: The contributions shown in Table 9 for the 12/31/2015 through 12/31/2019 valuations do **not** reflect the phase-in of the increased contribution requirements associated with the new actuarial assumptions. The full contribution without phase-in is shown in Table 9 above. The contribution requirements including the 5-year phase-in are shown on page 2.

See the Benefit Provision History, later in this report, for past benefit provision changes.

Years where historical information is not available, will be displayed with zero values.

Division HD - Police Patrol after 7/1/2014

Table 8-HD: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2008	$ 0	$ 0	0%	$ 0
2009	0	0	0%	0
2010	0	0	0%	0
2011	0	0	0%	0
2012	0	0	0%	0
2013	0	0	0%	0
2014	(69)	713	0%	(782)
2015	21,217	24,571	116%	(3,354)
2016	62,332	73,582	118%	(11,250)
2017	85,431	144,964	170%	(59,533)
2018	176,550	231,912	131%	(55,362)

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 actuarial valuations.

Table 9-HD: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2008	0	$ 0	$ 0	0.00%
2009	0	0	$ 0	0.00%
2010	0	0	$ 0	0.00%
2011	0	0	$ 0	0.00%
2012	0	0	$ 0	0.00%
2013	0	0	$ 0	0.00%
2014	2	55,209	9.37%	0.00%
2015	4	187,261	10.13%	0.00%
2016	6	339,913	9.89%	0.00%
2017	7	410,505	9.34%	0.00%
2018	15	730,562	9.59%	0.00%

1 For open divisions, a percent of pay contribution is shown. For closed divisions, a monthly dollar contribution is shown.

2 For each valuation year, the computed employer contribution is based on the employee rate. If the employee rate changes during the applicable fiscal year, the computed employer contributon will be adjusted.

Note: The contributions shown in Table 9 for the 12/31/2015 through 12/31/2019 valuations do **not** reflect the phase-in of the increased contribution requirements associated with the new actuarial assumptions. The full contribution without phase-in is shown in Table 9 above. The contribution requirements including the 5-year phase-in are shown on page 2.

See the Benefit Provision History, later in this report, for past benefit provision changes.

Years where historical information is not available, will be displayed with zero values.

Table 10: Division-Based Layered Amortization Schedule

Division 10 - NonUnion

Table 10-10: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 7/1/2020: Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ 22,445,312	23	$ 23,922,841	20	$ 1,736,532
(Gain)/Loss	12/31/2016	696,872	22	788,192	20	57,216
(Gain)/Loss	12/31/2017	1,082,468	21	1,216,194	20	88,284
(Gain)/Loss	12/31/2018	2,329,893	20	2,605,925	20	189,168
Amendment	12/31/2018	(2,987,863)	20	(3,341,847)	20	(242,580)
Total				**$ 25,191,305**		**$ 1,828,620**

[1] For each type of UAL (layer), this is the original balance as of the date the layer was established.

[2] According to the MERS amortization policy, each type of UAL (layer) is amortized over a specific period (see Appendix on MERS website).

[3] This is the remaining balance as of the valuation date, projected to the beginning of the fiscal year shown above.

The unfunded accrued liability (UAL) as of December 31, 2018 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2018 valuation to take into account the expected future contributions that are based on past valuations. Each type of UAL (layer) is amortized over the appropriate period. Please see the Appendix on the MERS website for a detailed description of the amortization policy.

Note: The original balance and original amortization periods prior to 12/31/2018 were received from the prior actuary.

Table 10-12: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 7/1/2020 Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ 11,400,303	23	$ 12,125,513	20	$ 880,176
(Gain)/Loss	12/31/2016	358,547	22	405,531	20	29,436
(Gain)/Loss	12/31/2017	427,198	21	479,967	20	34,836
(Gain)/Loss	12/31/2018	904,150	20	1,011,268	20	73,404
Total				**$ 14,022,279**		**$ 1,017,852**

[1] For each type of UAL (layer), this is the original balance as of the date the layer was established.

[2] According to the MERS amortization policy, each type of UAL (layer) is amortized over a specific period (see Appendix on MERS website).

[3] This is the remaining balance as of the valuation date, projected to the beginning of the fiscal year shown above.

The unfunded accrued liability (UAL) as of December 31, 2018 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2018 valuation to take into account the expected future contributions that are based on past valuations. Each type of UAL (layer) is amortized over the appropriate period. Please see the Appendix on the MERS website for a detailed description of the amortization policy.

Note: The original balance and original amortization periods prior to 12/31/2018 were received from the prior actuary.

Table 10-13: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 7/1/2020: Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ 10,338,912	23	$ 10,955,043	20	$ 795,216
(Gain)/Loss	12/31/2016	393,311	22	444,855	20	32,292
(Gain)/Loss	12/31/2017	271,857	21	305,440	20	22,176
(Gain)/Loss	12/31/2018	552,050	20	617,454	20	44,820
Amendment	12/31/2018	(87,314)	20	(97,658)	20	(7,092)
Total				**$ 12,225,134**		**$ 887,412**

[1] For each type of UAL (layer), this is the original balance as of the date the layer was established.

[2] According to the MERS amortization policy, each type of UAL (layer) is amortized over a specific period (see Appendix on MERS website).

[3] This is the remaining balance as of the valuation date, projected to the beginning of the fiscal year shown above.

The unfunded accrued liability (UAL) as of December 31, 2018 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2018 valuation to take into account the expected future contributions that are based on past valuations. Each type of UAL (layer) is amortized over the appropriate period. Please see the Appendix on the MERS website for a detailed description of the amortization policy.

Note: The original balance and original amortization periods prior to 12/31/2018 were received from the prior actuary.

Table 10-14: Layered Amortization Schedule

				Amounts for Fiscal Year Beginning 7/1/2020		
Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ 131,434	12	$ 64,823	6	$ 20,688
(Gain)/Loss	12/31/2016	3,257	10	3,247	8	480
(Gain)/Loss	12/31/2017	14,115	10	15,005	9	2,004
(Gain)/Loss	12/31/2018	6,196	10	6,930	10	852
Total				**$ 90,005**		**$ 24,024**

[1] For each type of UAL (layer), this is the original balance as of the date the layer was established.

[2] According to the MERS amortization policy, each type of UAL (layer) is amortized over a specific period (see Appendix on MERS website).

[3] This is the remaining balance as of the valuation date, projected to the beginning of the fiscal year shown above.

The unfunded accrued liability (UAL) as of December 31, 2018 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2018 valuation to take into account the expected future contributions that are based on past valuations. Each type of UAL (layer) is amortized over the appropriate period. Please see the Appendix on the MERS website for a detailed description of the amortization policy.

Note: The original balance and original amortization periods prior to 12/31/2018 were received from the prior actuary.

Division 15 - McMorranPlace

Table 10-15: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 7/1/2020 Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ 690,449	20	$ 700,976	14	$ 65,676
(Gain)/Loss	12/31/2016	91,740	18	101,167	14	9,480
(Gain)/Loss	12/31/2017	68,053	16	75,312	14	7,056
(Gain)/Loss	12/31/2018	59,988	14	67,095	14	6,288
Total				**$ 944,550**		**$ 88,500**

[1] For each type of UAL (layer), this is the original balance as of the date the layer was established.

[2] According to the MERS amortization policy, each type of UAL (layer) is amortized over a specific period (see Appendix on MERS website).

[3] This is the remaining balance as of the valuation date, projected to the beginning of the fiscal year shown above.

The unfunded accrued liability (UAL) as of December 31, 2018 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2018 valuation to take into account the expected future contributions that are based on past valuations. Each type of UAL (layer) is amortized over the appropriate period. Please see the Appendix on the MERS website for a detailed description of the amortization policy.

Note: The original balance and original amortization periods prior to 12/31/2018 were received from the prior actuary.

Division 16 - FireFighters

Table 10-16: Layered Amortization Schedule

				Amounts for Fiscal Year Beginning 7/1/2020		
Type of UAL	**Date Established**	**Original Balance[1]**	**Original Amortization Period[2]**	**Outstanding UAL Balance[3]**	**Remaining Amortization Period[2]**	**Annual Amortization Payment**
Initial	12/31/2015	$ 16,782,478	23	$ 17,822,198	20	$ 1,293,696
(Gain)/Loss	12/31/2016	247,589	22	280,032	20	20,328
(Gain)/Loss	12/31/2017	562,789	21	632,311	20	45,900
(Gain)/Loss	12/31/2018	920,631	20	1,029,702	20	74,748
Amendment	12/31/2018	(2,375,933)	20	(2,657,419)	20	(192,900)
Total				**$ 17,106,824**		**$ 1,241,772**

[1] For each type of UAL (layer), this is the original balance as of the date the layer was established.

[2] According to the MERS amortization policy, each type of UAL (layer) is amortized over a specific period (see Appendix on MERS website).

[3] This is the remaining balance as of the valuation date, projected to the beginning of the fiscal year shown above.

The unfunded accrued liability (UAL) as of December 31, 2018 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2018 valuation to take into account the expected future contributions that are based on past valuations. Each type of UAL (layer) is amortized over the appropriate period. Please see the Appendix on the MERS website for a detailed description of the amortization policy.

Note: The original balance and original amortization periods prior to 12/31/2018 were received from the prior actuary.

Table 10-17: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
				Amounts for Fiscal Year Beginning 7/1/2020		
Initial	12/31/2015	$ 5,712,049	23	$ 6,168,704	20	$ 447,780
(Gain)/Loss	12/31/2016	(553,325)	22	(625,845)	20	(45,432)
(Gain)/Loss	12/31/2017	815,588	21	916,341	20	66,516
(Gain)/Loss	12/31/2018	701,823	20	784,971	20	56,976
Amendment	12/31/2018	(3,826,214)	20	(4,279,521)	20	(310,644)
Total				**$ 2,964,650**		**$ 215,196**

[1] For each type of UAL (layer), this is the original balance as of the date the layer was established.

[2] According to the MERS amortization policy, each type of UAL (layer) is amortized over a specific period (see Appendix on MERS website).

[3] This is the remaining balance as of the valuation date, projected to the beginning of the fiscal year shown above.

The unfunded accrued liability (UAL) as of December 31, 2018 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2018 valuation to take into account the expected future contributions that are based on past valuations. Each type of UAL (layer) is amortized over the appropriate period. Please see the Appendix on the MERS website for a detailed description of the amortization policy.

Note: The original balance and original amortization periods prior to 12/31/2018 were received from the prior actuary.

Table 10-HA: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 7/1/2020: Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ (665,346)	10	$ (521,749)	10	$ (63,816)
(Gain)/Loss	12/31/2016	(380,438)	15	(410,885)	13	(40,752)
(Gain)/Loss	12/31/2017	(483,807)	15	(533,077)	14	(49,944)
(Gain)/Loss	12/31/2018	(668,640)	15	(747,856)	15	(66,540)
Total				**$ (2,213,567)**		**$ (221,052)**

[1] For each type of UAL (layer), this is the original balance as of the date the layer was established.

[2] According to the MERS amortization policy, each type of UAL (layer) is amortized over a specific period (see Appendix on MERS website).

[3] This is the remaining balance as of the valuation date, projected to the beginning of the fiscal year shown above.

The unfunded accrued liability (UAL) as of December 31, 2018 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2018 valuation to take into account the expected future contributions that are based on past valuations. Each type of UAL (layer) is amortized over the appropriate period. Please see the Appendix on the MERS website for a detailed description of the amortization policy.

Note: The original balance and original amortization periods prior to 12/31/2018 were received from the prior actuary.

Division HB - UWUA - Local 532 after 5/1/10

Table 10-HB: Layered Amortization Schedule

				Amounts for Fiscal Year Beginning 7/1/2020		
Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ (249,157)	10	$ (197,905)	10	$ (24,204)
(Gain)/Loss	12/31/2016	(207,037)	15	(223,608)	13	(22,176)
(Gain)/Loss	12/31/2017	(258,023)	15	(284,295)	14	(26,640)
(Gain)/Loss	12/31/2018	(257,158)	15	(287,624)	15	(25,584)
Total				**$ (993,432)**		**$ (98,604)**

[1] For each type of UAL (layer), this is the original balance as of the date the layer was established.

[2] According to the MERS amortization policy, each type of UAL (layer) is amortized over a specific period (see Appendix on MERS website).

[3] This is the remaining balance as of the valuation date, projected to the beginning of the fiscal year shown above.

The unfunded accrued liability (UAL) as of December 31, 2018 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2018 valuation to take into account the expected future contributions that are based on past valuations. Each type of UAL (layer) is amortized over the appropriate period. Please see the Appendix on the MERS website for a detailed description of the amortization policy.

Note: The original balance and original amortization periods prior to 12/31/2018 were received from the prior actuary.

Division HC - Fire after 7/1/2014

Table 10-HC: Layered Amortization Schedule

				Amounts for Fiscal Year Beginning 7/1/2020		
Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
(Gain)/Loss	12/31/2017	$ (6,672)	15	$ (7,355)	14	$ (684)
(Gain)/Loss	12/31/2018	(85,691)	15	(95,843)	15	(8,532)
Total				**$ (103,198)**		**$ (9,216)**

[1] For each type of UAL (layer), this is the original balance as of the date the layer was established.

[2] According to the MERS amortization policy, each type of UAL (layer) is amortized over a specific period (see Appendix on MERS website).

[3] This is the remaining balance as of the valuation date, projected to the beginning of the fiscal year shown above.

The unfunded accrued liability (UAL) as of December 31, 2018 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2018 valuation to take into account the expected future contributions that are based on past valuations. Each type of UAL (layer) is amortized over the appropriate period. Please see the Appendix on the MERS website for a detailed description of the amortization policy.

Note: The original balance and original amortization periods prior to 12/31/2018 were received from the prior actuary.

Division HD - Police Patrol after 7/1/2014

Table 10-HD: Layered Amortization Schedule

				Amounts for Fiscal Year Beginning 7/1/2020		
Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ (3,354)	10	$ (642)	10	$ (84)
(Gain)/Loss	12/31/2016	(9,234)	15	(9,973)	13	(984)
(Gain)/Loss	12/31/2017	(48,889)	15	(53,873)	14	(5,052)
(Gain)/Loss	12/31/2018	8,258	15	9,236	15	828
Total				**$ (55,252)**		**$ (5,292)**

[1] For each type of UAL (layer), this is the original balance as of the date the layer was established.

[2] According to the MERS amortization policy, each type of UAL (layer) is amortized over a specific period (see Appendix on MERS website).

[3] This is the remaining balance as of the valuation date, projected to the beginning of the fiscal year shown above.

The unfunded accrued liability (UAL) as of December 31, 2018 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2018 valuation to take into account the expected future contributions that are based on past valuations. Each type of UAL (layer) is amortized over the appropriate period. Please see the Appendix on the MERS website for a detailed description of the amortization policy.

Note: The original balance and original amortization periods prior to 12/31/2018 were received from the prior actuary.

GASB 68 Information

The following information has been prepared to provide some of the information necessary to complete GASB Statement No. 68 disclosures. Statement 68 is effective for fiscal years beginning after June 15, 2014. Additional resources, including an Implementation Guide, are available at http://www.mersofmich.com/.

Actuarial Valuation Date:		12/31/2018
Measurement Date of the Total Pension Liability (TPL):		12/31/2018
At 12/31/2018, the following employees were covered by the benefit terms:		
Inactive employees or beneficiaries currently receiving benefits:		388
Inactive employees entitled to but not yet receiving benefits (including refunds):		52
Active employees:		242
		682
Total Pension Liability as of 12/31/2017 measurement date:	$	156,773,624
Total Pension Liability as of 12/31/2018 measurement date:	$	150,363,669
Service Cost for the year ending on the 12/31/2018 measurement date:	$	1,666,791
Change in the Total Pension Liability due to:		
- Benefit changes[1]:	$	(8,911,168)
- Differences between expected and actual experience[2]:	$	374,885
- Changes in assumptions[2]:	$	0

[1] A change in liability due to benefit changes is immediately recognized when calculating pension expense for the year.

[2] Changes in liability due to differences between actual and expected experience, and changes in assumptions, are recognized in pension expense over the average remaining service lives of all employees.

Average expected remaining service lives of all employees (active and inactive):		4
Covered employee payroll: (Needed for Required Supplementary Information)	$	13,975,269

Sensitivity of the Net Pension Liability to changes in the discount rate:

	1% Decrease (7.00%)	Current Discount Rate (8.00%)	1% Increase (9.00%)
Change in Net Pension Liability as of 12/31/2018:	$ 14,777,308	$ -	$ (12,640,932)

Note: The current discount rate shown for GASB 68 purposes is higher than the MERS assumed rate of return. This is because for GASB 68 purposes, the discount rate must be gross of administrative expenses, whereas for funding purposes it is net of administrative expenses.

Benefit Provision History

The following benefit provision history is provided by MERS. Any corrections to this history or discrepancies between this information and information displayed elsewhere in the valuation report should be reported to MERS. All provisions are listed by date of adoption.

10 - NonUnion	
1/1/2019	Non Standard Compensation Definition
7/1/2018	Benefit B-2
7/1/2018	Participant Contribution Rate 6%
6/30/2018	Frozen FAC
12/1/2016	Service Credit Purchase Estimates - Yes
7/1/2013	Member Contribution Rate 8.00%
7/1/2012	Member Contribution Rate 7.00%
7/1/2011	Member Contribution Rate 6.00%
6/1/2011	Exclude Temporary Employees requiring less than 10 months
7/1/2010	Member Contribution Rate 3.00%
7/1/2009	Member Contribution Rate 2.00%
7/1/2008	Member Contribution Rate 1.00%
7/1/2000	Benefit B-4 (80% max)
7/1/1990	Benefit RS 50 (50% Post-Ret. Spouse Benefits)
7/1/1987	Benefit FAC-3 (3 Year Final Average Compensation)
7/1/1987	Benefit B-3 (80% max)
7/1/1987	Benefit F55 (With 25 Years of Service)
1/1/1983	Flexible E 2% COLA Adopted (01/01/1983)
3/28/1977	Blanket Resolution (Military Service)
7/1/1976	Member Contribution Rate 0.00%
7/1/1975	Benefit C-2/Base C-1 (Old)
7/1/1968	Benefit C-1 (Old)
1/1/1967	Benefit FAC-5 (5 Year Final Average Compensation)
1/1/1967	10 Year Vesting
1/1/1967	Benefit C (Old)
1/1/1967	Member Contribution Rate 3.00% Under $4,200.00 - Then 5.00%
12/13/1965	Covered by Act 88
	Fiscal Month - July
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

12 - UWUA - Gen Local 532	
12/1/2016	Service Credit Purchase Estimates - Yes
7/1/2013	Member Contribution Rate 8.00%
7/1/2012	Member Contribution Rate 7.00%
7/1/2011	Member Contribution Rate 6.00%
6/1/2011	Exclude Temporary Employees requiring less than 10 months
1/1/2011	Member Contribution Rate 3.00%
7/1/2000	Benefit B-4 (80% max)
9/1/1992	Benefit RS 50 (50% Post-Ret. Spouse Benefits)
1/1/1989	Benefit FAC-3 (3 Year Final Average Compensation)
1/1/1989	10 Year Vesting

12 - UWUA - Gen Local 532

1/1/1989	Benefit B-3 (80% max)
1/1/1989	Benefit F55 (With 25 Years of Service)
1/1/1983	Flexible E 2% COLA Adopted (01/01/1983)
7/1/1980	Member Contribution Rate 0.00%
12/13/1965	Covered by Act 88
	Fiscal Month - July
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

13 - Police,Lts,Sgt

1/1/2019	Non Standard Compensation Definition
7/1/2018	Benefit B-2
7/1/2018	Participant Contribution Rate 7%
6/30/2018	Frozen FAC
12/1/2016	Service Credit Purchase Estimates - Yes
7/1/2013	Member Contribution Rate 11.71%
7/1/2012	Member Contribution Rate 10.71%
7/1/2011	Member Contribution Rate 9.71%
6/1/2011	Exclude Temporary Employees requiring less than 10 months
7/1/2006	Member Contribution Rate 6.71%
7/1/2005	Member Contribution Rate 7.21%
7/1/2004	Member Contribution Rate 7.71%
7/1/2003	Member Contribution Rate 8.21%
7/1/2002	Benefit D2 Plan
7/1/1999	2.75% Multiplier (80% max)
7/1/1999	Member Contribution Rate 8.71%
1/1/1999	Benefit F50 (With 25 Years of Service)
7/1/1993	Blanket Resolution (Military Service)
7/1/1993	Benefit B-4 (80% max)
7/1/1989	Benefit RS 50 (50% Post-Ret. Spouse Benefits)
7/1/1989	Benefit FAC-3 (3 Year Final Average Compensation)
7/1/1989	10 Year Vesting
7/1/1989	Benefit B-3 (80% max)
7/1/1989	Benefit F55 (With 25 Years of Service)
7/1/1989	Member Contribution Rate 4.00%
1/1/1983	Flexible E 2% COLA Adopted (01/01/1983)
12/13/1965	Covered by Act 88
	Fiscal Month - July
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

14 - Police Commun.

12/1/2016	Service Credit Purchase Estimates - Yes
6/1/2011	Exclude Temporary Employees requiring less than 10 months
1/1/1990	Benefit FAC-3 (3 Year Final Average Compensation)
1/1/1990	10 Year Vesting
1/1/1990	Benefit B-3 (80% max)
1/1/1990	Benefit F55 (With 25 Years of Service)
1/1/1990	Member Contribution Rate 0.00%

14 - Police Commun.

1/1/1983	Flexible E 2% COLA Adopted (01/01/1983)
12/13/1965	Covered by Act 88
	Fiscal Month - July
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

15 - McMorranPlace

12/1/2016	Service Credit Purchase Estimates - Yes
6/1/2011	Exclude Temporary Employees requiring less than 10 months
9/1/1991	Benefit FAC-3 (3 Year Final Average Compensation)
9/1/1991	10 Year Vesting
9/1/1991	Benefit B-3 (80% max)
7/1/1987	Member Contribution Rate 0.00%
7/1/1973	Benefit F55 (With 25 Years of Service)
12/13/1965	Covered by Act 88
	Fiscal Month - July
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

16 - FireFighters

1/1/2019	Non Standard Compensation Definition
7/1/2018	Benefit B-2
7/1/2018	Participant Contribution Rate 7%
6/30/2018	Frozen FAC
12/1/2016	Service Credit Purchase Estimates - Yes
7/1/2013	Member Contribution Rate 10.00%
7/1/2012	Member Contribution Rate 9.00%
7/1/2011	Member Contribution Rate 8.00%
6/1/2011	Exclude Temporary Employees requiring less than 10 months
7/1/2010	Member Contribution Rate 5.00%
7/1/2009	Member Contribution Rate 4.00%
7/1/2008	Member Contribution Rate 3.00%
7/1/2006	Member Contribution Rate 2.00%
7/1/2005	Member Contribution Rate 2.50%
7/1/2004	Member Contribution Rate 3.00%
7/1/2003	Member Contribution Rate 3.50%
7/1/2002	Benefit D2 Plan
7/1/1996	Blanket Resolution (Military Service)
7/1/1996	Benefit B-4 (80% max)
7/1/1992	Benefit RS 50 (50% Post-Ret. Spouse Benefits)
7/1/1992	Benefit FAC-3 (3 Year Final Average Compensation)
7/1/1992	10 Year Vesting
7/1/1992	Benefit B-3 (80% max)
7/1/1992	Benefit F50 (With 25 Years of Service)
7/1/1992	Member Contribution Rate 4.00%
12/13/1965	Covered by Act 88
	Fiscal Month - July
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

17 - Police Patrol

1/1/2019	Non Standard Compensation Definition
7/1/2018	Benefit B-2
7/1/2018	Participant Contribution Rate 7%
6/30/2018	Frozen FAC
12/1/2016	Service Credit Purchase Estimates - Yes
7/1/2013	Member Contribution Rate 10.00%
7/1/2012	Member Contribution Rate 9.00%
7/1/2011	Member Contribution Rate 8.00%
6/1/2011	Exclude Temporary Employees requiring less than 10 months
7/1/2010	Member Contribution Rate 5.00%
7/1/2006	Member Contribution Rate 2.00%
7/1/2005	Member Contribution Rate 2.50%
7/1/2004	Member Contribution Rate 3.00%
7/1/2003	Member Contribution Rate 3.50%
7/1/2002	Benefit D2 Plan
1/1/1995	Member Contribution Rate 4.00%
1/1/1994	Benefit B-4 (80% max)
2/1/1993	Benefit RS 50 (50% Post-Ret. Spouse Benefits)
2/1/1993	Benefit FAC-3 (3 Year Final Average Compensation)
2/1/1993	10 Year Vesting
2/1/1993	Benefit B-3 (80% max)
2/1/1993	Benefit F50 (With 25 Years of Service)
2/1/1993	Member Contribution Rate 4.80%
12/13/1965	Covered by Act 88
	Fiscal Month - July
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

HA - Non-Union after 7/1/08

1/1/2019	Non Standard Compensation Definition
6/1/2011	Exclude Temporary Employees requiring less than 10 months
7/1/2008	Benefit FAC-3 (3 Year Final Average Compensation)
7/1/2008	6 Year Vesting
7/1/2008	Day of work defined as 7.5 Hours a Day for All employees.
7/1/2008	1.25% Multiplier
12/13/1965	Covered by ACT 88
	Fiscal Month - July
	Defined Benefit Normal Retirement Age - 60
	No Early Reduced Conditions

HB - UWUA - Local 532 after 5/1/10

6/1/2011	Exclude Temporary Employees requiring less than 10 months
5/1/2010	Benefit FAC-3 (3 Year Final Average Compensation)
5/1/2010	6 Year Vesting
5/1/2010	Covered by ACT 88
5/1/2010	Day of work defined as 8 Hours a Day for Group employees.
5/1/2010	1.25% Multiplier
	Fiscal Month - July
	Defined Benefit Normal Retirement Age - 60

HB - UWUA - Local 532 after 5/1/10

	No Early Reduced Conditions

HC - Fire after 7/1/2014

1/1/2019	Non Standard Compensation Definition
7/1/2014	Exclude Temporary Employees requiring less than 10 months
7/1/2014	Benefit FAC-3 (3 Year Final Average Compensation)
7/1/2014	6 Year Vesting
7/1/2014	Day of work defined as 8 Hours a Day for All employees.
7/1/2014	2.0% Multiplier
7/1/2014	Benefit F55 (With 25 Years of Service)
5/27/2008	Covered by ACT 88
	Fiscal Month - July
	Defined Benefit Normal Retirement Age - 60
	No Early Reduced Conditions

HD - Police Patrol after 7/1/2014

1/1/2019	Non Standard Compensation Definition
7/1/2014	Exclude Temporary Employees requiring less than 10 months
7/1/2014	Benefit FAC-3 (3 Year Final Average Compensation)
7/1/2014	6 Year Vesting
7/1/2014	Day of work defined as 8 Hours a Day for All employees.
7/1/2014	2.0% Multiplier
7/1/2014	Benefit F55 (With 25 Years of Service)
5/27/2008	Covered by ACT 88
	Fiscal Month - July
	Defined Benefit Normal Retirement Age - 60
	No Early Reduced Conditions

Plan Provisions, Actuarial Assumptions, and Actuarial Funding Method

Details on MERS plan provisions, actuarial assumptions, and actuarial methodology can be found in the Appendix. Some actuarial assumptions are specific to this municipality and its divisions. These are listed below.

Increase in Final Average Compensation

Division	FAC Increase Assumption
All Divisions	4.00%

Withdrawal Rate Scaling Factor

Division	Withdrawal Rate Scaling Factor
All Divisions	68%

Miscellaneous and Technical Assumptions

Loads – None.

Amortization Policy for Closed Divisions

Closed Division	Amortization Option
14 - Police Commun.	Accelerated to 5-Year Amortization
15 - McMorranPlace	Accelerated to 5-Year Amortization

Please see Appendix on MERS website for a detailed description of the amortization options available for closed divisions within an open municipality.

Risk Commentary

Determination of the accrued liability, the employer contribution, and the funded ratio requires the use of assumptions regarding future economic and demographic experience. Risk measures, as illustrated in this report, are intended to aid in the understanding of the effects of future experience differing from the assumptions used in the course of the actuarial valuation. Risk measures may also help with illustrating the potential volatility in the accrued liability, the actuarially determined contribution and the funded ratio that result from the differences between actual experience and the actuarial assumptions.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to such factors as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions due to changing conditions; 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, or additional cost or contribution requirements based on the Plan's funded status); and changes in plan provisions or applicable law. The scope of an actuarial valuation does not include an analysis of the potential range of such future measurements.

Examples of risk that may reasonably be anticipated to significantly affect the plan's future financial condition include:

- **Investment Risk** – actual investment returns may differ from the expected returns;
- **Asset/Liability Mismatch** – changes in asset values may not match changes in liabilities, thereby altering the gap between the accrued liability and assets and consequently altering the funded status and contribution requirements;
- **Salary and Payroll Risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
- **Longevity Risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
- **Other Demographic Risks –** members may terminate, retire or become disabled at times or with benefits other than assumed resulting in actual future accrued liability and contributions differing from expected.

  The effects of certain trends in experience can generally be anticipated. For example, if the investment return since the most recent actuarial valuation is less (or more) than the assumed rate, the cost of the plan can be expected to increase (or decrease). Likewise if longevity is improving (or worsening), increases (or decreases) in cost can be anticipated.

PLAN MATURITY MEASURES

Risks facing a pension plan evolve over time. A young plan with virtually no investments and paying few benefits may experience little investment risk. An older plan with a large number of members in pay status and a significant trust may be much more exposed to investment risk. Generally accepted plan maturity measures include the following:

1. Ratio of the market value of assets to total payroll	5.5
2. Ratio of actuarial accrued liability to payroll	11.0
3. Ratio of actives to retirees and beneficiaries	0.6
4. Ratio of market value of assets to benefit payments	6.6
5. Ratio of net cash flow to market value of assets (boy)	-6.8%

RATIO OF MARKET VALUE OF ASSETS TO TOTAL PAYROLL

The relationship between assets and payroll is a useful indicator of the potential volatility of contributions. For example, if the market value of assets is 2.0 times the payroll, a return on assets 5% different than assumed would equal 10% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in plan sponsor contributions as a percentage of payroll.

RATIO OF ACTUARIAL ACCRUED LIABILITY TO PAYROLL

The relationship between actuarial accrued liability and payroll is a useful indicator of the potential volatility of contributions for a fully funded plan. A funding policy that targets a funded ratio of 100% is expected to result in the ratio of assets to payroll and the ratio of liability to payroll converging over time.

RATIO OF ACTIVES TO RETIREES AND BENEFICIARIES

A young plan with many active members and few retirees will have a high ratio of active to retirees. A mature open plan may have close to the same number of actives to retirees resulting in a ratio near 1.0. A super-mature or closed plan may have significantly more retirees than actives resulting in a ratio below 1.0.

RATIO OF MARKET VALUE OF ASSETS TO BENEFIT PAYMENTS

The MERS' Actuarial Policy requires a total minimum contribution equal to the excess (if any) of three times the expected annual benefit payments over the projected market value of assets as of the participating municipality or court's Fiscal Year for which the contribution applies. The ratio of market value of assets to benefit payments as of the valuation date provides an indication of whether the division is at risk for triggering the minimum contribution rule in the near term. If the division triggers this minimum contribution rule, the required employer contributions could increase dramatically relative to previous valuations.

RATIO OF NET CASH FLOW TO MARKET VALUE OF ASSETS

A positive net cash flow means contributions exceed benefits and expenses. A negative cash flow means existing funds are being used to make payments. A certain amount of negative net cash flow is generally expected to occur when benefits are prefunded through a qualified trust. Large negative net cash flows as a percent of assets may indicate a super-mature plan or a need for additional contributions.

State Reporting

The following information has been prepared to provide some of the information necessary to complete the pension reporting requirements for the State of Michigan's Local Government Retirement System Annual Report (Form No. 5572). Additional resources are available at www.mersofmich.com and on the State website.

Form 5572 Line Reference	Description	Result
10	**Membership as of December 31, 2018**	
11	Indicate number of active members	242
12	Indicate number of inactive members	36
13	Indicate number of retirees and beneficiaries	388
14	**Investment Performance for Calendar Year Ending December 31, 2018[1]**	
15	Enter actual rate of return - prior 1-year period	-3.64%
16	Enter actual rate of return - prior 5-year period	4.94%
17	Enter actual rate of return - prior 10-year period	8.25%
18	**Actuarial Assumptions**	
19	Actuarial assumed rate of investment return[2]	7.75%
20	Amortization method utilized for funding the system's unfunded actuarial accrued liability, if any	Level Percent
21	Amortization period utilized for funding the system's unfunded actuarial accrued liability, if any[3]	20
22	Is each division within the system closed to new employees?[4]	No
23	**Uniform Assumptions**	
24	Enter retirement pension system's actuarial value of assets using uniform assumptions	$84,834,041
25	Enter retirement pension system's actuarial accrued liabilities using uniform assumptions	$165,140,977
27	Actuarially Determined Contribution (ADC) using uniform assumptions, Fiscal Year Ending June 30,2019	$6,460,944

1. The Municipal Employees' Retirement System's investment performance has been provided to GRS from MERS Investment Staff and included here for reporting purposes. This investment performance figures reported are net of fees on a rolling calendar-year basis for the previous 1-, 5-, and 10-year periods as required under PA 530.
2. Net of administrative and investment expenses.
3. Populated with the longest amortization period remaining in the amortization schedule, across all divisions in the plan. This is when each division and the plan in total is expected to reach 100% funded if all assumptions are met.
4. If all divisions within the employer are closed, "yes." If at least one division is open (including shadow divisions) indicate "no."