Municipal Employees' Retirement System of Michigan

Annual Actuarial Valuation Report
December 31, 2019 - Meridian Chtr Twp (3315)

Spring, 2020

Meridian Chtr Twp

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 Meridian Chtr Twp (3315) as of December 31, 2019. 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. Meridian Chtr Twp 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, 2019,
- Establish contribution requirements for the fiscal year beginning January 1, 2021,
- 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, 2019. 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. A study was completed in 2015, as prepared by the prior actuary, and is the basis of the demographic 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. **At the February 27, 2020 board meeting, the MERS Retirement Board adopted demographic assumptions effective with the December 31, 2020 annual actuarial valuation, which will impact contributions beginning in 2022.** 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-2019AnnualActuarialValuation-Appendix.pdf

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

This report does not reflect the recent and still developing impact of COVID-19, which is likely to influence demographic and economic experience, at least in the short-term. We will continue to monitor these developments and their impact on the MERS Defined Benefit and Hybrid plans. Actual experience will be reflected in each subsequent annual valuation, as experience emerges.

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 Meridian Chtr Twp 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

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Rebecca L. Stouffer

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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.

	12/31/2019	12/31/2018
Funded Ratio*	62%	63%

* Reflects assets from Surplus divisions, if any.

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 fully phased-in with this valuation.

Effective this valuation, the MERS Retirement Board has adopted a reduction in the investment rate of return assumption from 7.75% to 7.35% and a reduction in the rate of wage inflation from 3.75% to 3.00%. Changes to these assumptions are effective for contributions beginning in 2021 and may be phased-in. This valuation reflects the first year of phase-in.

By default, MERS will invoice you based on the amount in the "No Phase-in" columns. This amount will be considered the minimum required contribution unless you request to be billed the "Phase-in" rates. If you wish to be billed using the phased-in rates, please contact MERS, at which point the alternate minimum required contribution will be the amount in the "Phase-in" columns. Please note that this approach is different than in years past.

	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:	12/31/2019	12/31/2019	12/31/2018	12/31/2018	12/31/2019	12/31/2019	12/31/2018	12/31/2018
Fiscal Year Beginning:	January 1, 2021	January 1, 2021	January 1, 2020	January 1, 2020	January 1, 2021	January 1, 2021	January 1, 2020	January 1, 2020
Division								
01 - DPW	-	-	-	-	$ 11,965	$ 13,093	$ 9,878	$ 10,172
02 - Police Patrol	26.74%	28.95%	24.59%	25.07%	40,027	43,330	38,272	39,012
05 - Firefighters	-	-	-	-	118,361	125,690	106,051	107,672
10 - Admin Professional	-	-	-	-	8,560	9,370	8,087	8,416
11 - Teamsters	-	-	13.97%	14.04%	1,267	1,516	1,022	1,027
12 - Admin Prof on/aft 1/1/17	2.40%	2.43%	4.15%	4.15%	481	487	853	853
13 - DPW on/aft 01/1/17	3.15%	3.19%	2.97%	2.97%	789	798	668	668
20 - Police Command	72.16%	77.29%	62.12%	63.21%	51,765	55,443	45,809	46,613
50 - Fire on/aft 1/1/17	2.24%	2.18%	1.63%	1.63%	588	573	216	216
Municipality Total					**$ 233,803**	**$ 250,300**	**$ 210,856**	**$ 214,649**

Employee contribution rates:

	Employee Contribution Rate	
Valuation Date:	12/31/2019	12/31/2018
Division		
01 - DPW	5.00%	5.00%
02 - Police Patrol	8.29%	8.29%
05 - Firefighters	7.76%	7.76%
10 - Admin Professional	5.00%	5.00%
11 - Teamsters	5.00%	5.00%
12 - Admin Prof on/aft 1/1/17	5.00%	5.00%
13 - DPW on/aft 01/1/17	5.00%	5.00%
20 - Police Command	11.24%	11.24%
50 - Fire on/aft 1/1/17	7.76%	7.76%

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 2021 for the entire employer would be $373,254, instead of $250,300.

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 a significant portion 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 **7.35%** 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 from 7.75% 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.

Assumption Change in 2020

A 5-year experience study analyzing historical experience from 2013 through 2018 was completed in February 2020. In addition to changes to the economic assumptions which will take effect with the Fiscal year 2021 contribution rates, the experience study recommends updated demographic assumptions, including adjustments to the following actuarial assumptions: mortality, retirement, disability, and termination rates. A complete description of the proposed assumptions may be found in the Appendix to the valuation. Changes to the demographic assumptions resulting from the experience study have been approved by the MERS Retirement Board and are to be effective beginning with the December 31, 2020 actuarial valuation first impacting 2022 contributions. This report includes a "What If" scenario of the approved 2020 assumption changes in an effort to show employers the anticipated impact on contribution rates.

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 2019 was 4.77%, while the actual market rate of return was 13.41%.** 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, 2019, the actuarial value of assets is 101% 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 7.35% investment return assumption, or contribution requirements will continue to increase.

If the December 31, 2019 valuation results were based on market value instead of actuarial value:

- The funded percent of your entire municipality would be 61% (instead of 62%); and
- Your total employer contribution requirement for the fiscal year starting January 1, 2021 would be $3,049,620 (instead of $3,003,600).

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 demographic assumptions. Lower investment returns would result in higher required employer contributions, and vice-versa. Alternate demographic assumptions may result in higher or lower employer contributions depending on the demographic characteristics of the plan participants.

The relative impact of the economic and demographic scenarios 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, 2019 valuation, and are for the municipality in total, not by division. These results do not reflect a 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.

In addition to economic assumption changes effective with Fiscal Year 2021 contributions, the Retirement Board has also adopted a change to certain demographic and other assumptions effective for the December 31, 2020 valuation which will impact the Fiscal Year 2022 contributions. Please see the section labeled "Assumption Change in 2020" for more information. The scenario shown using these assumptions as of December 31, 2019 is illustrative only. The actual impact of this change when reflected in the 2020 Annual Actuarial Valuation report will be different.

	Assumed Future Annual Smoothed Rate of Investment Return		
12/31/2019 Valuation Results	**Lower Future Annual Returns[3]**	**2020 Adopted Demographic Assumptions**	**Valuation Assumptions**
Investment Return Assumption	**5.35%**	**7.35%**	**7.35%**
Wage Increase Assumption	**3.00%**	**3.00%**	**3.00%**
Accrued Liability	$ 94,964,574	$ 76,415,357	$ 74,014,966
Valuation Assets[1]	$ 46,002,599	$ 46,002,599	$ 46,002,599
Unfunded Accrued Liability	$ 48,961,975	$ 30,412,758	$ 28,012,367
Funded Ratio	48%	60%	62%
Monthly Normal Cost	$ 106,469	$ 49,803	$ 47,644
Monthly Amortization Payment	$ 290,093	$ 219,216	$ 202,656
Total Employer Contribution[2]	$ 396,562	$ 269,019	$ 250,300

[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.

[3] Based on current demographic assumptions.

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 and demographic assumption 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 7.35%/3.00% scenario provides an estimate of computed employer contributions based on current actuarial assumptions, and a projected 7.35% 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 2020 adopted demographic assumption and 5.35%/3.00% projection scenarios provide an indication of the potential required employer contribution if these assumptions were met over the long-term.

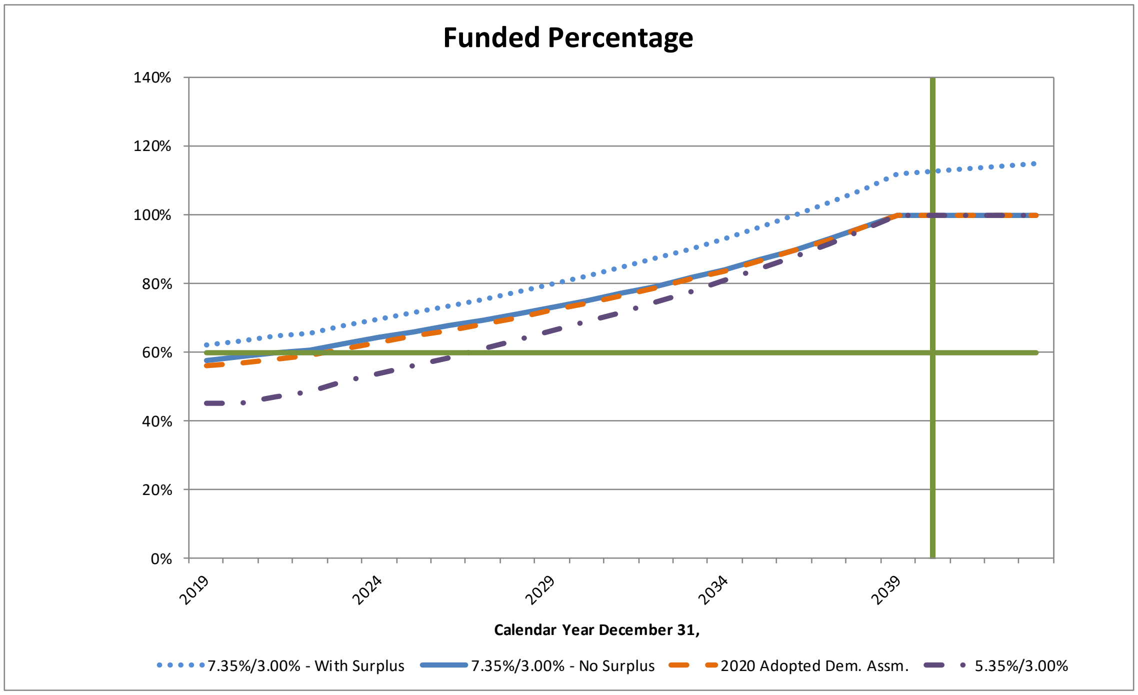
Your municipality includes one or more Surplus divisions. The assets in a Surplus division may be used to reduce future employer contributions or to accelerate the date by which the municipality becomes 100% funded. The timing and use of these Surplus assets is discretionary.

The Funded Percentage graph shows projections of funded status under the 7.35% investment return assumption, both including the Surplus assets (contributed as of the valuation date), and without the Surplus assets. The graph including the Surplus assets assumes these Surplus assets grow with interest and are not used to lower future employer contributions. We modeled the projections including the Surplus assets in this fashion because the use of these assets is discretionary by the employer and we do not know when and how the employer will use them. Once the employer uses these Surplus assets, any future employer contributions are expected to be lower than those shown in the projections.

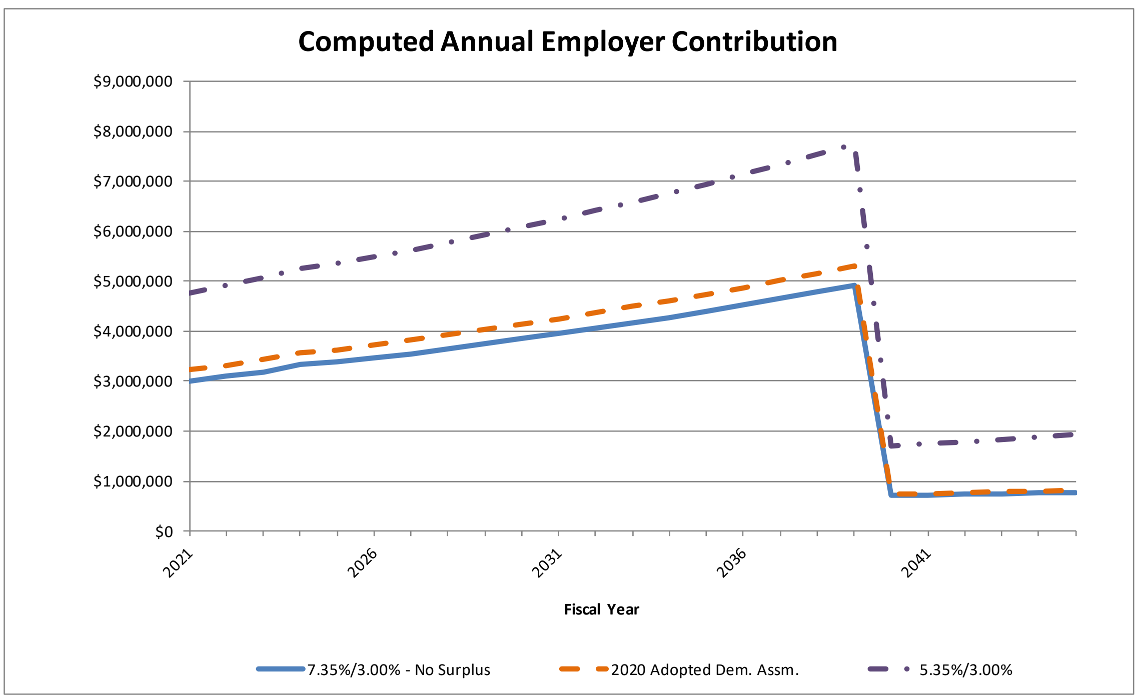
Valuation Year Ending 12/31	Fiscal Year Beginning 1/1	Actuarial Accrued Liability	Valuation Assets[2]	Funded Percentage	Computed Annual Employer Contribution
7.35%[1]/3.00% - Current Demographic Assumptions					
NO 5-YEAR PHASE-IN					
2019	2021	$ 74,014,966	$ 42,723,031	58%	$ 3,003,600
2020	2022	$ 76,400,000	$ 44,800,000	59%	$ 3,090,000
2021	2023	$ 78,900,000	$ 47,200,000	60%	$ 3,190,000
2022	2024	$ 81,400,000	$ 49,400,000	61%	$ 3,330,000
2023	2025	$ 83,800,000	$ 52,500,000	63%	$ 3,380,000
2024	2026	$ 86,200,000	$ 55,400,000	64%	$ 3,460,000
7.35%[1]/3.00% - Adopted 2020 Demographic Assumptions					
NO 5-YEAR PHASE-IN					
2019	2021	$ 76,415,357	$ 42,723,031	56%	$ 3,228,228
2020	2022	$ 79,000,000	$ 44,800,000	57%	$ 3,320,000
2021	2023	$ 81,700,000	$ 47,400,000	58%	$ 3,430,000
2022	2024	$ 84,400,000	$ 49,800,000	59%	$ 3,570,000
2023	2025	$ 87,000,000	$ 53,200,000	61%	$ 3,630,000
2024	2026	$ 89,600,000	$ 56,300,000	63%	$ 3,720,000
5.35%[1]/3.00% - Current Demographic Assumptions					
NO 5-YEAR PHASE-IN					
2019	2021	$ 94,964,574	$ 42,723,031	45%	$ 4,758,744
2020	2022	$ 97,700,000	$ 44,000,000	45%	$ 4,930,000
2021	2023	$ 100,600,000	$ 47,300,000	47%	$ 5,080,000
2022	2024	$ 103,500,000	$ 50,400,000	49%	$ 5,250,000
2023	2025	$ 106,300,000	$ 54,600,000	51%	$ 5,350,000
2024	2026	$ 109,000,000	$ 58,600,000	54%	$ 5,490,000

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.
Assumes assets from Surplus divisions will not be used to lower employer contributions during the projection period.
The green indicator lines have been added at 60% funded and 21 years following the valuation date for PA 202 purposes.



Notes:
All projected contributions are shown with no phase-in.
Projected employer contributions do not reflect the use of any assets from the Surplus divisions.

Table 1: Employer Contribution Details For the Fiscal Year Beginning January 1, 2021

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									
01 - DPW	11.99%	5.00%	-	-	-	-	16.29%	14.96%	
02 - Police Patrol	19.59%	8.29%	11.30%	17.65%	28.95%	26.74%			0.79%
05 - Firefighters	16.86%	7.76%	-	-	-	-	62.69%	59.05%	
10 - Admin Professional	11.12%	5.00%	-	-	-	-	15.97%	14.65%	
11 - Teamsters	0.00%	5.00%	-	-	-	-			
12 - Admin Prof on/aft 1/1/17	7.68%	5.00%	2.68%	-0.25%	2.43%	2.40%	15.97%	14.65%	0.80%
13 - DPW on/aft 01/1/17	8.02%	5.00%	3.02%	0.17%	3.19%	3.15%	16.29%	14.96%	0.89%
20 - Police Command	19.84%	11.24%	8.60%	68.69%	77.29%	72.16%			0.72%
50 - Fire on/aft 1/1/17	9.94%	7.76%	2.18%	0.00%	2.18%	2.24%	62.69%	59.05%	0.81%
Estimated Monthly Contribution[3]									
01 - DPW			$ 4,210	$ 8,883	$ 13,093	$ 11,965			
02 - Police Patrol			16,912	26,418	43,330	40,027			
05 - Firefighters			15,936	109,754	125,690	118,361			
10 - Admin Professional			2,550	6,820	9,370	8,560			
11 - Teamsters			0	1,516	1,516	1,267			
12 - Admin Prof on/aft 1/1/17			538	(51)	487	481			
13 - DPW on/aft 01/1/17			756	42	798	789			
20 - Police Command			6,169	49,274	55,443	51,765			
50 - Fire on/aft 1/1/17			573	0	573	588			
Total Municipality			**$ 47,644**	**$ 202,656**	**$ 250,300**	**$ 233,803**			
Estimated Annual Contribution[3]			**$ 571,728**	**$ 2,431,872**	**$ 3,003,600**	**$ 2,805,636**			

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 No 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

01 - DPW: Closed to new hires, linked to Division 13

	2019 Valuation	2018 Valuation
Benefit Multiplier:	2.25% Multiplier (80% max)	2.25% Multiplier (80% max)
Normal Retirement Age:	60	60
Vesting:	6 years	6 years
Early Retirement (Unreduced):	55/20	55/20
Early Retirement (Reduced):	50/25 55/15	50/25 55/15
Final Average Compensation:	5 years	5 years
Employee Contributions:	5.00%	5.00%
Act 88:	Yes (Adopted 7/10/2001)	Yes (Adopted 7/10/2001)

02 - Police Patrol: Open Division

	2019 Valuation	2018 Valuation
Benefit Multiplier:	2.75% Multiplier (80% max)	2.75% Multiplier (80% max)
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
COLA for Future Retirees:	2.50% (Non-Compound)	2.50% (Non-Compound)
Employee Contributions:	8.29%	8.29%
D-2:	D2 (25%)	D2 (25%)
Act 88:	Yes (Adopted 7/10/2001)	Yes (Adopted 7/10/2001)

05 - Firefighters: Closed to new hires, linked to Division 50

	2019 Valuation	2018 Valuation
Benefit Multiplier:	Bridged Benefit: 2.75% Multiplier (80% max) Termination FAC; 2.50% Multiplier (80% max)	Bridged Benefit:2.75% Multiplier (80% max) Termination FAC;2.50% Multiplier (80% max)
Bridged Benefit Date:	12/31/2016	12/31/2016
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
COLA for Future Retirees:	2.50% (Non-Compound)	2.50% (Non-Compound)
Employee Contributions:	7.76%	7.76%
D-2:	D2 (25%)	D2 (25%)
Act 88:	Yes (Adopted 7/10/2001)	Yes (Adopted 7/10/2001)

10 - Admin Professional: Closed to new hires, linked to Division 12

	2019 Valuation	2018 Valuation
Benefit Multiplier:	Bridged Benefit: 2.50% Multiplier (80% max) Termination FAC; 2.25% Multiplier (80% max)	Bridged Benefit:2.50% Multiplier (80% max) Termination FAC;2.25% Multiplier (80% max)
Bridged Benefit Date:	12/31/2016	12/31/2016
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:	5 years	5 years
Employee Contributions:	5.00%	5.00%
Act 88:	Yes (Adopted 7/10/2001)	Yes (Adopted 7/10/2001)

11 - Teamsters: Open Division

	2019 Valuation	2018 Valuation
Benefit Multiplier:	2.00% Multiplier (no max)	2.00% Multiplier (no max)
Normal Retirement Age:	60	60
Vesting:	6 years	6 years
Early Retirement (Unreduced):	55/20	55/20
Early Retirement (Reduced):	50/25	50/25
	55/15	55/15
Final Average Compensation:	5 years	5 years
Employee Contributions:	5.00%	5.00%
Act 88:	Yes (Adopted 7/10/2001)	Yes (Adopted 7/10/2001)

12 - Admin Prof on/aft 1/1/17: Open Division, linked to Division 10

	2019 Valuation	2018 Valuation
Benefit Multiplier:	1.50% Multiplier (no max)	1.50% Multiplier (no 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:	5 years	5 years
Employee Contributions:	5.00%	5.00%
Act 88:	Yes (Adopted 7/10/2001)	Yes (Adopted 7/10/2001)

13 - DPW on/aft 01/1/17: Open Division, linked to Division 01

	2019 Valuation	2018 Valuation
Benefit Multiplier:	1.50% Multiplier (80% max)	1.50% Multiplier (80% max)
Normal Retirement Age:	60	60
Vesting:	6 years	6 years
Early Retirement (Unreduced):	55/20	55/20
Early Retirement (Reduced):	50/25	50/25
	55/15	55/15
Final Average Compensation:	5 years	5 years
Employee Contributions:	5.00%	5.00%
Act 88:	Yes (Adopted 7/10/2001)	Yes (Adopted 7/10/2001)

20 - Police Command: Open Division

	2019 Valuation	2018 Valuation
Benefit Multiplier:	2.75% Multiplier (80% max)	2.75% Multiplier (80% max)
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
COLA for Future Retirees:	2.50% (Non-Compound)	2.50% (Non-Compound)
Employee Contributions:	11.24%	11.24%
D-2:	D2 (25%)	D2 (25%)
Act 88:	Yes (Adopted 7/10/2001)	Yes (Adopted 7/10/2001)

50 - Fire on/aft 1/1/17: Open Division, linked to Division 05

	2019 Valuation	2018 Valuation
Benefit Multiplier:	1.75% Multiplier (no max)	1.75% Multiplier (no 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:	7.76%	7.76%
D-2:	D2 (25%)	D2 (25%)
Act 88:	Yes (Adopted 7/10/2001)	Yes (Adopted 7/10/2001)

Table 3: Participant Summary

Division	2019 Valuation Number	2019 Valuation Annual Payroll[1]	2018 Valuation Number	2018 Valuation Annual Payroll[1]	2019 Valuation Average Age	2019 Valuation Average Benefit Service[2]	2019 Valuation Average Eligibility Service[2]
01 - DPW							
Active Employees	15	$ 717,406	18	$ 840,383	43.7	9.2	9.6
Vested Former Employees	3	41,447	4	39,192	41.4	11.2	11.2
Retirees and Beneficiaries	23	409,247	19	313,900	67.5		
Pending Refunds	6		6				
02 - Police Patrol							
Active Employees	29	$ 1,692,903	29	$ 1,734,688	34.0	7.7	8.5
Vested Former Employees	11	181,673	10	144,600	46.9	9.8	14.5
Retirees and Beneficiaries	15	641,441	14	573,362	58.9		
Pending Refunds	15		15				
05 - Firefighters							
Active Employees	30	$ 2,128,554	31	$ 2,019,738	43.8	15.4	15.6
Vested Former Employees	4	112,095	3	84,849	49.7	15.3	15.9
Retirees and Beneficiaries	29	1,505,163	29	1,476,058	63.7		
Pending Refunds	5		5				
10 - Admin Professional							
Active Employees	13	$ 556,959	15	$ 617,920	49.9	14.9	15.2
Vested Former Employees	11	94,287	11	94,287	53.3	9.9	17.3
Retirees and Beneficiaries	12	251,853	12	251,854	71.0		
Pending Refunds	11		9				
11 - Teamsters							
Active Employees	0	$ 0	1	$ 81,544	0.0	0.0	0.0
Vested Former Employees	0	0	0	0	0.0	0.0	0.0
Retirees and Beneficiaries	6	161,932	5	137,161	70.8		
Pending Refunds	0		0				
12 - Admin Prof on/aft 1/1/17							
Active Employees	4	$ 141,313	4	$ 147,733	38.1	0.9	0.9
Vested Former Employees	0	0	0	0	0.0	0.0	0.0
Retirees and Beneficiaries	1	1,682	0	0	66.2		
Pending Refunds	3		1				
13 - DPW on/aft 01/1/17							
Active Employees	7	$ 247,142	4	$ 152,299	38.0	1.4	1.4
Vested Former Employees	0	0	0	0	0.0	0.0	0.0
Retirees and Beneficiaries	0	0	0	0	0.0		
Pending Refunds	2		1				

Table 3 (continued)

Division	2019 Valuation Number	2019 Valuation Annual Payroll[1]	2018 Valuation Number	2018 Valuation Annual Payroll[1]	2019 Valuation Average Age	2019 Valuation Average Benefit Service[2]	2019 Valuation Average Eligibility Service[2]
20 - Police Command							
Active Employees	10	$ 811,353	10	$ 822,149	43.4	17.7	17.9
Vested Former Employees	0	0	0	0	0.0	0.0	0.0
Retirees and Beneficiaries	15	788,114	14	710,502	60.1		
Pending Refunds	0		0				
50 - Fire on/aft 1/1/17							
Active Employees	4	$ 149,751	2	$ 57,481	31.3	1.0	3.8
Vested Former Employees	0	0	0	0	0.0	0.0	0.0
Retirees and Beneficiaries	0	0	0	0	0.0		
Pending Refunds	1		1				
Total Municipality							
Active Employees	**112**	**$ 6,445,381**	**114**	**$ 6,473,935**	**40.9**	**10.8**	**11.3**
Vested Former Employees	**29**	**429,501**	**28**	**362,928**	**49.1**	**10.7**	**15.4**
Retirees and Beneficiaries	**101**	**3,759,433**	**93**	**3,462,837**	**64.6**		
Pending Refunds	**43**		**38**				
Total Participants	**285**		**273**				

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	2019 Valuation		2018 Valuation	
	Employer and Retiree[1]	Employee[2]	Employer and Retiree[1]	Employee[2]
01 - DPW	$ 4,157,930	$ 241,565	$ 3,812,991	$ 258,311
02 - Police Patrol	9,255,268	1,444,120	8,130,100	1,585,250
05 - Firefighters	11,845,173	2,427,674	10,437,088	2,229,418
10 - Admin Professional	3,200,170	357,568	2,931,342	323,308
11 - Teamsters	1,310,331	0	1,249,679	25,209
12 - Admin Prof on/aft 1/1/17	29,343	8,216	8,787	8,094
13 - DPW on/aft 01/1/17	13,714	20,782	5,242	10,785
20 - Police Command	6,712,793	1,122,936	5,657,012	1,154,302
50 - Fire on/aft 1/1/17	4,494	15,231	1,061	6,190
S1 - Surplus Assoc Fire	1,618,455	0	716,087	0
S2 - Surplus Assoc Police	1,618,455	0	716,087	0
Municipality Total[3]	**$ 39,766,124**	**$ 5,638,093**	**$ 33,665,475**	**$ 5,600,867**
Combined Assets[3]	**$45,404,217**		**$39,266,342**	

[1] Reserve for Employer Contributions and Benefit Payments.

[2] Reserve for Employee Contributions.

[3] Totals may not add due to rounding.

The December 31, 2019 valuation assets (actuarial value of assets) are equal to 1.013179 times the reported market value of assets (compared to 1.095342 as of December 31, 2018). Refer to the Appendix for a description of the valuation asset derivation and a detailed calculation of valuation assets.

Assets in the Surplus division(s) are employer assets that have been reserved to be used by the employer at some point in the future to stabilize increases in contributions. These assets are not used in calculating the employer contribution for the fiscal year beginning January 1, 2021.

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
2009	$ 1,506,924		$ 515,452	$ 1,458,907	$ (1,394,003)	$ (1,362)	$ 0	$ 25,330,637
2010	1,587,121		463,721	1,569,522	(1,730,326)	(27,856)	0	27,192,819
2011	1,443,888	$ 0	447,636	1,497,200	(1,930,596)	(15,477)	0	28,635,470
2012	1,502,982	0	440,059	1,394,558	(2,073,753)	0	0	29,899,316
2013	1,727,389	0	446,814	1,873,685	(2,184,485)	(7,344)	0	31,755,375
2014	1,863,475	0	445,419	1,878,815	(2,457,430)	(3,012)	106,873	33,589,515
2015	2,065,675	0	434,297	1,678,089	(2,837,027)	0	0	34,930,549
2016	1,835,443	999,999	442,227	2,065,803	(3,002,485)	(62,383)	12,712	37,221,865
2017	2,318,478	1,141,890	473,016	2,351,814	(3,092,898)	0	46,837	40,461,002
2018	2,302,708	1,500,041	500,743	1,572,989	(3,319,579)	(7,832)	0	43,010,072
2019	2,264,527	1,590,180	503,378	2,210,081	(3,573,024)	(2,615)	0	46,002,599

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, 2019

Division	Actuarial Accrued Liability					Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
	Active Employees	Vested Former Employees	Retirees and Beneficiaries	Pending Refunds	Total			
01 - DPW	$ 1,264,844	$ 120,165	$ 4,414,850	$ 10,934	$ 5,810,793	$ 4,457,476	76.7%	$ 1,353,317
02 - Police Patrol	4,671,069	974,048	9,220,517	53,968	14,919,602	10,840,396	72.7%	4,079,206
05 - Firefighters	10,847,309	850,458	19,686,872	50,653	31,435,292	14,460,949	46.0%	16,974,343
10 - Admin Professional	1,629,366	735,092	2,263,986	27,342	4,655,786	3,604,626	77.4%	1,051,160
11 - Teamsters	0	0	1,553,728	0	1,553,728	1,327,599	85.5%	226,129
12 - Admin Prof on/aft 1/1/17	10,089	0	19,822	1,743	31,654	38,054	120.2%	(6,400)
13 - DPW on/aft 01/1/17	38,633	0	0	1,522	40,155	34,950	87.0%	5,205
20 - Police Command	4,744,588	0	10,803,542	0	15,548,130	7,938,996	51.1%	7,609,134
50 - Fire on/aft 1/1/17	16,916	0	0	2,910	19,826	19,985	100.8%	(159)
S1 - Surplus Assoc Fire	0	0	0	0	0	1,639,784		(1,639,784)
S2 - Surplus Assoc Police	0	0	0	0	0	1,639,784		(1,639,784)
Total	**$ 23,222,814**	**$ 2,679,763**	**$ 47,963,317**	**$ 149,072**	**$ 74,014,966**	**$ 46,002,599**	**62.2%**	**$ 28,012,367**

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 12, 10	$ 1,639,455	$ 735,092	$ 2,283,808	$ 29,085	$ 4,687,440	$ 3,642,680	77.7%	$ 1,044,760
Linked Divisions 13, 01	1,303,477	120,165	4,414,850	12,456	5,850,948	4,492,426	76.8%	1,358,522
Linked Divisions 50, 05	10,864,225	850,458	19,686,872	53,563	31,455,118	14,480,934	46.0%	16,974,184

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
2005	$ 32,944,186	$ 16,753,818	51%	$ 16,190,368
2006	35,846,996	18,966,620	53%	16,880,376
2007	38,924,237	21,360,928	55%	17,563,309
2008	42,180,888	23,244,719	55%	18,936,169
2009	43,641,255	25,330,637	58%	18,310,618
2010	45,576,292	27,192,819	60%	18,383,473
2011	48,645,859	28,635,470	59%	20,010,389
2012	50,274,592	29,899,316	60%	20,375,276
2013	53,345,909	31,755,375	60%	21,590,534
2014	56,783,968	33,589,515	59%	23,194,453
2015	61,743,003	34,930,549	57%	26,812,454
2016	64,160,503	37,221,865	58%	26,938,638
2017	65,850,156	40,461,002	61%	25,389,154
2018	68,549,666	43,010,072	63%	25,539,594
2019	74,014,966	46,002,599	62%	28,012,367

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012, 2015 and 2019 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.

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.

Tables 8 and 9: Division-Based Comparative Schedules

Division 01 - DPW

Table 8-01: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2009	$ 3,879,049	$ 3,266,522	84%	$ 612,527
2010	4,005,919	3,442,780	86%	563,139
2011	4,234,114	3,605,216	85%	628,898
2012	4,028,810	3,732,886	93%	295,924
2013	4,289,392	3,964,718	92%	324,674
2014	4,594,329	4,144,956	90%	449,373
2015	5,065,997	4,235,234	84%	830,763
2016	5,135,243	4,351,046	85%	784,197
2017	5,244,386	4,462,325	85%	782,061
2018	5,384,787	4,459,467	83%	925,320
2019	5,810,793	4,457,476	77%	1,353,317

Notes: Actuarial assumptions were revised for the 2009, 2010, 2011, 2012, 2015 and 2019 actuarial valuations.

Table 9-01: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2009	22	$ 1,007,657	11.82%	2.30%
2010	21	950,103	11.70%	2.30%
2011	19	881,149	12.86%	2.30%
2012	19	856,300	10.97%	2.30%
2013	20	946,020	11.06%	2.30%
2014	20	929,958	12.08%	2.30%
2015	20	901,017	15.07%	2.30%
2016	19	833,791	15.08%	2.30%
2017	18	851,342	$ 9,180	5.00%
2018	18	840,383	$ 10,172	5.00%
2019	15	717,406	$ 13,093	5.00%

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 contribution 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.

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 8-02: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2009	$ 8,015,481	$ 5,848,382	73%	$ 2,167,099
2010	8,103,472	6,513,330	80%	1,590,142
2011	9,045,395	7,155,998	79%	1,889,397
2012	9,936,249	7,733,715	78%	2,202,534
2013	10,905,480	8,360,322	77%	2,545,158
2014	11,449,292	8,871,931	78%	2,577,361
2015	12,319,976	9,279,287	75%	3,040,689
2016	12,838,642	10,013,827	78%	2,824,815
2017	13,859,271	10,769,157	78%	3,090,114
2018	14,165,177	10,641,630	75%	3,523,547
2019	14,919,602	10,840,396	73%	4,079,206

Notes: Actuarial assumptions were revised for the 2009, 2010, 2011, 2012, 2015 and 2019 actuarial valuations.

Table 9-02: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2009	32	$ 2,054,030	14.82%	8.29%
2010	29	1,806,921	14.01%	8.29%
2011	28	1,754,080	16.25%	8.29%
2012	27	1,723,624	17.93%	8.29%
2013	28	1,773,779	19.10%	8.29%
2014	25	1,587,254	20.72%	8.29%
2015	27	1,649,619	22.66%	8.29%
2016	27	1,699,331	21.59%	8.29%
2017	28	1,777,631	22.53%	8.29%
2018	29	1,734,688	25.07%	8.29%
2019	29	1,692,903	28.95%	8.29%

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 contribution 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.

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 8-05: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2009	$ 19,137,933	$ 9,053,047	47%	$ 10,084,886
2010	20,287,429	9,632,575	47%	10,654,854
2011	21,458,833	9,979,003	47%	11,479,830
2012	21,924,381	10,296,036	47%	11,628,345
2013	23,137,298	10,871,647	47%	12,265,651
2014	24,841,557	11,507,153	46%	13,334,404
2015	26,584,583	11,924,919	45%	14,659,664
2016	27,867,803	12,930,519	46%	14,937,284
2017	28,177,223	13,516,293	48%	14,660,930
2018	28,979,635	13,874,155	48%	15,105,480
2019	31,435,292	14,460,949	46%	16,974,343

Notes: Actuarial assumptions were revised for the 2009, 2010, 2011, 2012, 2015 and 2019 actuarial valuations.

Table 9-05: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2009	38	$ 2,434,749	31.21%	7.76%
2010	33	2,183,250	35.34%	7.76%
2011	32	2,115,390	39.70%	7.76%
2012	32	2,070,575	43.48%	7.76%
2013	32	2,123,299	44.85%	7.76%
2014	32	2,061,494	49.38%	7.76%
2015	32	2,037,634	55.69%	7.76%
2016	32	2,086,805	56.20%	7.76%
2017	32	2,033,490	$ 101,798	7.76%
2018	31	2,019,738	$ 107,672	7.76%
2019	30	2,128,554	$ 125,690	7.76%

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 contribution 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.

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 8-10: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2009	$ 3,089,490	$ 2,286,939	74%	$ 802,551
2010	3,277,716	2,449,430	75%	828,286
2011	3,520,950	2,556,521	73%	964,429
2012	3,642,837	2,618,706	72%	1,024,131
2013	3,803,228	2,748,191	72%	1,055,037
2014	3,943,903	2,895,820	73%	1,048,083
2015	4,328,690	3,022,706	70%	1,305,984
2016	4,429,119	3,185,399	72%	1,243,720
2017	4,353,843	3,534,108	81%	819,735
2018	4,447,557	3,564,955	80%	882,602
2019	4,655,786	3,604,626	77%	1,051,160

Notes: Actuarial assumptions were revised for the 2009, 2010, 2011, 2012, 2015 and 2019 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		
2009	22	$ 895,714	12.83%	3.90%
2010	18	723,841	14.20%	3.90%
2011	18	704,419	15.99%	3.90%
2012	18	696,170	17.13%	3.90%
2013	19	770,061	16.56%	3.90%
2014	17	699,196	17.51%	3.90%
2015	19	756,724	19.68%	3.90%
2016	19	783,370	18.67%	3.90%
2017	17	673,625	$ 7,925	5.00%
2018	15	617,920	$ 8,416	5.00%
2019	13	556,959	$ 9,370	5.00%

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 contribution 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.

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 8-11: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2009	$ 1,701,009	$ 488,720	29%	$ 1,212,289
2010	1,597,765	462,443	29%	1,135,322
2011	1,580,710	451,619	29%	1,129,091
2012	1,584,636	439,610	28%	1,145,026
2013	1,593,999	436,926	27%	1,157,073
2014	1,605,233	442,491	28%	1,162,742
2015	1,737,395	355,421	21%	1,381,974
2016	1,724,994	270,628	16%	1,454,366
2017	1,549,888	1,381,962	89%	167,926
2018	1,488,750	1,396,438	94%	92,312
2019	1,553,728	1,327,599	85%	226,129

Notes: Actuarial assumptions were revised for the 2009, 2010, 2011, 2012, 2015 and 2019 actuarial valuations.

Table 9-11: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2009	2	$ 137,611	53.68%	2.00%
2010	2	129,971	53.28%	2.00%
2011	2	131,835	53.91%	2.00%
2012	2	132,347	58.92%	2.00%
2013	2	135,314	58.76%	2.00%
2014	2	136,484	58.89%	2.00%
2015	1	66,496	352.21%	2.00%
2016	1	74,010	121.95%	2.00%
2017	1	78,313	13.62%	5.00%
2018	1	81,544	14.04%	5.00%
2019	0	0	$ 1,516	5.00%

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 contribution 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.

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
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	222	3,915	1764%	(3,693)
2018	12,734	18,490	145%	(5,756)
2019	31,654	38,054	120%	(6,400)

Notes: Actuarial assumptions were revised for the 2009, 2010, 2011, 2012, 2015 and 2019 actuarial valuations.

Table 9-12: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2009	0	$ 0	$0.00	0.00%
2010	0	0	$0.00	0.00%
2011	0	0	$0.00	0.00%
2012	0	0	$0.00	0.00%
2013	0	0	$0.00	0.00%
2014	0	0	$0.00	0.00%
2015	0	0	$0.00	0.00%
2016	0	0	$0.00	0.00%
2017	2	77,819	5.59%	5.00%
2018	4	147,733	4.15%	5.00%
2019	4	141,313	2.43%	5.00%

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 contribution 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.

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 8-13: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
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	5,967	5,217	87%	750
2018	20,539	17,555	85%	2,984
2019	40,155	34,950	87%	5,205

Notes: Actuarial assumptions were revised for the 2009, 2010, 2011, 2012, 2015 and 2019 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		
2009	0	$ 0	$0.00	0.00%
2010	0	0	$0.00	0.00%
2011	0	0	$0.00	0.00%
2012	0	0	$0.00	0.00%
2013	0	0	$0.00	0.00%
2014	0	0	$0.00	0.00%
2015	0	0	$0.00	0.00%
2016	0	0	$0.00	0.00%
2017	3	83,530	2.87%	5.00%
2018	4	152,299	2.97%	5.00%
2019	7	247,142	3.19%	5.00%

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 contribution 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.

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 8-20: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2009	$ 7,818,293	$ 4,387,027	56%	$ 3,431,266
2010	8,303,991	4,692,261	57%	3,611,730
2011	8,805,857	4,887,113	56%	3,918,744
2012	9,157,679	5,078,363	56%	4,079,316
2013	9,616,512	5,373,571	56%	4,242,941
2014	10,349,654	5,727,164	55%	4,622,490
2015	11,706,362	6,112,982	52%	5,593,380
2016	12,164,702	6,470,446	53%	5,694,256
2017	12,659,356	6,788,025	54%	5,871,331
2018	14,043,572	7,460,719	53%	6,582,853
2019	15,548,130	7,938,996	51%	7,609,134

Notes: Actuarial assumptions were revised for the 2009, 2010, 2011, 2012, 2015 and 2019 actuarial valuations.

Table 9-20: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2009	9	$ 705,851	33.42%	11.24%
2010	9	675,028	35.90%	11.24%
2011	9	681,394	39.51%	11.24%
2012	9	687,414	43.46%	11.24%
2013	9	695,724	45.30%	11.24%
2014	9	685,804	49.49%	11.24%
2015	9	710,674	58.51%	11.24%
2016	9	720,662	59.49%	11.24%
2017	9	748,325	60.62%	11.24%
2018	10	822,149	63.21%	11.24%
2019	10	811,353	77.29%	11.24%

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 contribution 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.

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 8-50: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
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	0	0%	0
2018	6,915	7,943	115%	(1,028)
2019	19,826	19,985	101%	(159)

Notes: Actuarial assumptions were revised for the 2009, 2010, 2011, 2012, 2015 and 2019 actuarial valuations.

Table 9-50: Computed Employer Contributions - Comparative Schedule

Valuation Date December 31	Active Employees		Computed Employer Contribution[1]	Employee Contribution Rate[2]
	Number	Annual Payroll		
2009	0	$ 0	$0.00	0.00%
2010	0	0	$0.00	0.00%
2011	0	0	$0.00	0.00%
2012	0	0	$0.00	0.00%
2013	0	0	$0.00	0.00%
2014	0	0	$0.00	0.00%
2015	0	0	$0.00	0.00%
2016	0	0	$0.00	0.00%
2017	0	0	$0.00	0.00%
2018	2	57,481	1.63%	7.76%
2019	4	149,751	2.18%	7.76%

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 contribution 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.

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-S1: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2009	$ 0	$ 0		$ 0
2010	0	0		0
2011	0	0		0
2012	0	0		0
2013	0	0		0
2014	0	0		0
2015	0	0		0
2016	0	0		0
2017	0	0		0
2018	0	784,360		(784,360)
2019	0	1,639,784		(1,639,784)

Notes: Actuarial assumptions were revised for the 2009, 2010, 2011, 2012, 2015 and 2019 actuarial valuations.

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

Division S2 - Surplus Assoc Police

Table 8-S2: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2009	$ 0	$ 0		$ 0
2010	0	0		0
2011	0	0		0
2012	0	0		0
2013	0	0		0
2014	0	0		0
2015	0	0		0
2016	0	0		0
2017	0	0		0
2018	0	784,360		(784,360)
2019	0	1,639,784		(1,639,784)

Notes: Actuarial assumptions were revised for the 2009, 2010, 2011, 2012, 2015 and 2019 actuarial valuations.

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

Table 10: Division-Based Layered Amortization Schedule

Division 01 - DPW

Table 10-01: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 1/1/2021: Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ 830,763	23	$ 885,972	19	$ 68,328
(Gain)/Loss	12/31/2016	(82,526)	22	(90,123)	19	(6,948)
(Gain)/Loss	12/31/2017	5,781	21	6,262	19	480
Amendment	12/31/2017	(9,047)	21	(9,817)	19	(756)
(Gain)/Loss	12/31/2018	138,266	20	149,302	19	11,520
(Gain)/Loss	12/31/2019	222,251	19	238,586	19	18,396
Assumption	12/31/2019	192,311	19	201,934	19	15,576
Total				**$ 1,382,116**		**$ 106,596**

[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, 2019 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2019 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 02 - Police Patrol

Table 10-02: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 1/1/2021: Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ 3,040,689	23	$ 3,173,723	19	$ 244,752
(Gain)/Loss	12/31/2016	(280,062)	22	(305,814)	19	(23,580)
(Gain)/Loss	12/31/2017	260,150	21	282,182	19	21,756
(Gain)/Loss	12/31/2018	394,380	20	425,845	19	32,844
(Gain)/Loss	12/31/2019	(70,906)	19	(76,118)	19	(5,868)
Assumption	12/31/2019	581,584	19	610,839	19	47,112
Total				**$ 4,110,657**		**$ 317,016**

[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, 2019 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2019 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 10-05: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 1/1/2021: Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ 14,659,664	23	$ 15,273,950	19	$ 1,177,884
(Gain)/Loss	12/31/2016	(5,596)	22	(6,107)	19	(468)
(Gain)/Loss	12/31/2017	(236,519)	21	(256,539)	19	(19,788)
Amendment	12/31/2017	(168,365)	21	(182,621)	19	(14,088)
(Gain)/Loss	12/31/2018	375,305	20	405,256	19	31,248
(Gain)/Loss	12/31/2019	654,589	19	702,701	19	54,192
Assumption	12/31/2019	1,120,922	19	1,142,024	19	88,068
Total				**$ 17,078,664**		**$ 1,317,048**

[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, 2019 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2019 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 10-10: Layered Amortization Schedule

				Amounts for Fiscal Year Beginning 1/1/2021		
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	$ 1,305,984	23	$ 1,365,785	19	$ 105,324
(Gain)/Loss	12/31/2016	(92,486)	22	(100,984)	19	(7,788)
(Gain)/Loss	12/31/2017	(403,688)	21	(437,871)	19	(33,768)
Amendment	12/31/2017	(24,631)	21	(26,727)	19	(2,064)
(Gain)/Loss	12/31/2018	87,723	20	94,720	19	7,308
(Gain)/Loss	12/31/2019	16,887	19	18,128	19	1,404
Assumption	12/31/2019	141,332	19	148,205	19	11,424
Total				**$ 1,061,256**		**$ 81,840**

[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, 2019 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2019 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 10-11: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 1/1/2021: Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ 1,381,974	23	$ 1,327,762	19	$ 102,396
(Gain)/Loss	12/31/2016	982	22	1,069	19	84
(Gain)/Loss	12/31/2017	(1,143,013)	21	(1,239,813)	19	(95,616)
Amendment	12/31/2017	(907)	21	(979)	19	(72)
(Gain)/Loss	12/31/2018	4,855	20	5,238	19	408
(Gain)/Loss	12/31/2019	89,079	19	95,626	19	7,380
Assumption	12/31/2019	44,293	19	46,834	19	3,612
Total				**$ 235,737**		**$ 18,192**

[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, 2019 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2019 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

				Amounts for Fiscal Year Beginning 1/1/2021		
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	$ (3,693)	15	$ (3,831)	13	$ (384)
(Gain)/Loss	12/31/2018	(1,776)	15	(1,888)	14	(180)
(Gain)/Loss	12/31/2019	(1,355)	15	(1,455)	15	(132)
Assumption	12/31/2019	778	15	863	15	84
Total				**$ (6,311)**		**$ (612)**

[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, 2019 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2019 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

				Amounts for Fiscal Year Beginning 1/1/2021		
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	$ 750	15	$ 783	13	$ 84
(Gain)/Loss	12/31/2018	2,176	15	2,315	14	216
(Gain)/Loss	12/31/2019	1,609	15	1,727	15	156
Assumption	12/31/2019	461	15	477	15	48
Total				**$ 5,302**		**$ 504**

[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, 2019 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2019 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 10-20: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 1/1/2021: Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ 5,593,380	23	$ 5,843,417	19	$ 450,624
(Gain)/Loss	12/31/2016	(22,439)	22	(24,501)	19	(1,884)
(Gain)/Loss	12/31/2017	129,426	21	140,390	19	10,824
(Gain)/Loss	12/31/2018	663,143	20	716,065	19	55,224
(Gain)/Loss	12/31/2019	374,994	19	402,556	19	31,044
Assumption	12/31/2019	574,489	19	589,508	19	45,456
Total				**$ 7,667,435**		**$ 591,288**

[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, 2019 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2019 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 10-50: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 1/1/2021: Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
(Gain)/Loss	12/31/2018	$ (1,028)	15	$ (1,094)	14	$ (108)
(Gain)/Loss	12/31/2019	991	15	1,064	15	96
Assumption	12/31/2019	(131)	15	(141)	15	(12)
Total				**$ (171)**		**$ (24)**

[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, 2019 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2019 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:		12/31/2019
Measurement Date of the Total Pension Liability (TPL):		12/31/2019
At 12/31/2019, the following employees were covered by the benefit terms:		
Inactive employees or beneficiaries currently receiving benefits:		101
Inactive employees entitled to but not yet receiving benefits (including refunds):		72
Active employees:		112
		285
Total Pension Liability as of 12/31/2018 measurement date:	$	66,626,952
Total Pension Liability as of 12/31/2019 measurement date:	$	71,804,504
Service Cost for the year ending on the 12/31/2019 measurement date:	$	984,875
Change in the Total Pension Liability due to:		
- Benefit changes[1]:	$	0
- Differences between expected and actual experience[2]:	$	14,112
- Changes in assumptions[2]:	$	2,527,677
Average expected remaining service lives of all employees (active and inactive):		4

[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.

Covered employee payroll: (Needed for Required Supplementary Information)	$	6,445,381

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

	1% Decrease (6.60%)	Current Discount Rate (7.60%)	1% Increase (8.60%)
Change in Net Pension Liability as of 12/31/2019:	$ 8,988,733	$ -	$ (7,477,895)

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.

GASB 68 Information

This page is for those municipalities who need to "roll-forward" their total pension liability due to the timing of completion of the actuarial valuation in relation to their fiscal year-end.

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 www.mersofmich.com.

Actuarial Valuation Date:	12/31/2019
Measurement Date of the Total Pension Liability (TPL):	12/31/2020

At 12/31/2019, the following employees were covered by the benefit terms:

Inactive employees or beneficiaries currently receiving benefits:	101
Inactive employees entitled to but not yet receiving benefits (including refunds):	72
Active employees:	112
	285

Total Pension Liability as of 12/31/2019 measurement date:	$	69,301,252
Total Pension Liability as of 12/31/2020 measurement date:	$	74,143,871
Service Cost for the year ending on the 12/31/2020 measurement date:	$	1,035,428
Change in the Total Pension Liability due to:		
- Benefit changes[1]:	$	0
- Differences between expected and actual experience[2]:	$	(26,382)
- Changes in assumptions[2]:	$	2,444,167
Average expected remaining service lives of all employees (active and inactive):		4

[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.

Covered employee payroll: (Needed for Required Supplementary Information)	$	6,445,381

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

	1% Decrease (6.60%)	Current Discount Rate (7.60%)	1% Increase (8.60%)
Change in Net Pension Liability as of 12/31/2020:	$ 9,167,560	$ -	$ (7,633,851)

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.

01 - DPW

1/1/2017	Day of Work defined as 10 8 hour days
1/1/2017	Non Standard Compensation Definition
1/1/2017	Participant Contribution Rate 5%
12/1/2016	Service Credit Purchase Estimates - Yes
7/1/2005	Benefit B-3 (80% max)
7/1/2005	Member Contribution Rate 2.30%
7/10/2001	Covered by Act 88
7/1/1997	Benefit B-2
7/1/1997	Benefit F55 (With 20 Years of Service)
7/1/1995	Benefit FAC-5 (5 Year Final Average Compensation)
7/1/1995	6 Year Vesting
7/1/1995	Benefit C-1 (New)
7/1/1995	Member Contribution Rate 0.00%
7/1/1995	Fiscal Month - January
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

02 - Police Patrol

12/1/2016	Service Credit Purchase Estimates - Yes
1/1/2007	Member Contribution Rate 8.29%
12/1/2005	Benefit D2 Plan
12/1/2005	Benefit FAC-3 (3 Year Final Average Compensation)
12/1/2005	2.75% Multiplier (80% max)
12/1/2005	Member Contribution Rate 8.79%
1/1/2002	Member Contribution Rate 4.50%
7/10/2001	Covered by Act 88
1/1/2000	Benefit B-4 (80% max)
1/1/2000	Member Contribution Rate 6.50%
1/1/2000	E2 2.5% COLA for future retirees (01/01/2000)
1/1/1999	Member Contribution Rate 2.50%
7/1/1996	Benefit FAC-5 (5 Year Final Average Compensation)
7/1/1996	10 Year Vesting
7/1/1996	Benefit B-3 (80% max)
7/1/1996	Benefit F50 (With 25 Years of Service)
7/1/1996	Member Contribution Rate 3.50%
7/1/1995	Fiscal Month - January
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

05 - Firefighters

1/1/2017	Day of work defined as 100.8 hours in a month
1/1/2017	Non Standard Compensation Definition

05 - Firefighters

1/1/2017	Benefit B-4 (80% max)
12/31/2016	Current FAC
12/1/2016	Service Credit Purchase Estimates - Yes
1/1/2005	Member Contribution Rate 7.76%
1/1/2004	2.75% Multiplier (80% max)
1/1/2004	Member Contribution Rate 8.07%
7/10/2001	Covered by Act 88
7/1/1999	Benefit D2 Plan
7/1/1999	Benefit FAC-3 (3 Year Final Average Compensation)
7/1/1999	10 Year Vesting
7/1/1999	Benefit B-4 (80% max)
7/1/1999	Benefit F50 (With 25 Years of Service)
7/1/1999	Member Contribution Rate 4.19%
7/1/1999	E2 2.5% COLA for future retirees (07/01/1999)
7/1/1995	Fiscal Month - January
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

10 - Admin Professional

4/1/2017	Participant Contribution Rate 5%
1/1/2017	Day of Work defined as 10 8 hour days
1/1/2017	Non Standard Compensation Definition
1/1/2017	Benefit B-3 (80% max)
12/31/2016	Current FAC
12/1/2016	Service Credit Purchase Estimates - Yes
1/1/2007	Benefit B-4 (80% max)
1/1/2007	Member Contribution Rate 3.90%
1/1/2004	Benefit B-3 (80% max)
1/1/2004	Member Contribution Rate 1.50%
7/10/2001	Covered by Act 88
7/1/2000	Benefit B-2
7/1/2000	Member Contribution Rate 0.60%
1/1/1998	Benefit FAC-5 (5 Year Final Average Compensation)
1/1/1998	10 Year Vesting
1/1/1998	Benefit C-1 (New)
1/1/1998	Benefit F55 (With 25 Years of Service)
1/1/1998	Member Contribution Rate 0.00%
7/1/1995	Fiscal Month - January
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

11 - Teamsters

1/1/2018	Participant Contribution Rate 5%
12/1/2016	Service Credit Purchase Estimates - Yes
1/1/2004	6 Year Vesting
1/1/2002	Member Contribution Rate 2.00%
7/10/2001	Covered by Act 88
7/1/2000	Benefit FAC-5 (5 Year Final Average Compensation)
7/1/2000	10 Year Vesting

11 - Teamsters

7/1/2000	Benefit B-2
7/1/2000	Benefit F55 (With 20 Years of Service)
7/1/2000	Member Contribution Rate 0.00%
7/1/1995	Fiscal Month - January
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

12 - Admin Prof on/aft 1/1/17

1/1/2017	Day of Work defined as 10 8 hour days
1/1/2017	Benefit FAC-5 (5 Year Final Average Compensation)
1/1/2017	Non Standard Compensation Definition
1/1/2017	10 Year Vesting
1/1/2017	Defined Benefit Normal Retirement Age - 60
1/1/2017	Service Credit Purchase Estimates - Yes
1/1/2017	Benefit C-1 (New)
1/1/2017	Benefit F55 (With 25 Years of Service)
1/1/2017	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years
1/1/2017	Participant Contribution Rate 5%
7/10/2001	Covered by Act 88
7/1/1995	Fiscal Month - January

13 - DPW on/aft 01/1/17

1/1/2017	Participant Contribution Rate 5%
1/1/2017	Day of Work defined as 10 8 hour days
1/1/2017	Benefit FAC-5 (5 Year Final Average Compensation)
1/1/2017	Non Standard Compensation Definition
1/1/2017	6 Year Vesting
1/1/2017	Defined Benefit Normal Retirement Age - 60
1/1/2017	Service Credit Purchase Estimates - Yes
1/1/2017	1.5% multiplier (80% max)
1/1/2017	Benefit F55 (With 20 Years of Service)
1/1/2017	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years
1/1/2017	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years
7/10/2001	Covered by Act 88
7/1/1995	Fiscal Month - January

20 - Police Command

7/1/2018	Non Standard Compensation Definition
12/1/2016	Service Credit Purchase Estimates - Yes
8/1/2005	2.75% Multiplier (80% max)
8/1/2005	Member Contribution Rate 11.24%
1/1/2005	Member Contribution Rate 5.50%
1/1/2003	Member Contribution Rate 8.00%
1/1/2002	Member Contribution Rate 7.00%
1/1/2002	E2 2.5% COLA for future retirees (07/01/2001)
7/10/2001	Covered by Act 88
7/1/2001	Benefit D2 Plan
7/1/2001	Benefit B-4 (80% max)
7/1/2001	Benefit F50 (With 25 Years of Service)

20 - Police Command

7/1/2001	Member Contribution Rate 6.00%
1/1/2001	Member Contribution Rate 4.50%
1/1/1998	Benefit FAC-3 (3 Year Final Average Compensation)
1/1/1998	10 Year Vesting
1/1/1998	Benefit B-3 (80% max)
1/1/1998	Benefit F55 (With 15 Years of Service)
1/1/1998	Eligible at Age 52 (With 25 Years of Service)
1/1/1998	Member Contribution Rate 5.50%
7/1/1995	Fiscal Month - January
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

50 - Fire on/aft 1/1/17

1/1/2017	Day of work defined as 100.8 hours in a month
1/1/2017	Benefit D2 Plan
1/1/2017	Benefit FAC-3 (3 Year Final Average Compensation)
1/1/2017	Non Standard Compensation Definition
1/1/2017	10 Year Vesting
1/1/2017	Defined Benefit Normal Retirement Age - 60
1/1/2017	Service Credit Purchase Estimates - Yes
1/1/2017	1.75% multiplier
1/1/2017	Benefit F55 (With 25 Years of Service)
1/1/2017	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years
1/1/2017	Participant Contribution Rate 7.76%
7/10/2001	Covered by Act 88
7/1/1995	Fiscal Month - January

S1 - Surplus Assoc Fire

7/1/1995	Fiscal Month - January

S2 - Surplus Assoc Police

7/1/1995	Fiscal Month - January

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	1.00%

Withdrawal Rate Scaling Factor

Division	Withdrawal Rate Scaling Factor
All Divisions	80%

Miscellaneous and Technical Assumptions

Loads – None.

Amortization Policy for Closed Divisions

Closed Division	Amortization Option
11 - Teamsters	Non-Accelerated Amortization

Please see the 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:

	12/31/2019	12/31/2018
1. Ratio of the market value of assets to total payroll	7.0	6.1
2. Ratio of actuarial accrued liability to payroll	11.5	10.6
3. Ratio of actives to retirees and beneficiaries	1.1	1.2
4. Ratio of market value of assets to benefit payments	12.7	11.8
5. Ratio of net cash flow to market value of assets (boy)	2.0%	2.4%

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, 2019**	
11	Indicate number of active members	112
12	Indicate number of inactive members (excluding pending refunds)	29
13	Indicate number of retirees and beneficiaries	101
14	**Investment Performance for Calendar Year Ending December 31, 2019[1]**	
15	Enter actual rate of return - prior 1-year period	14.02%
16	Enter actual rate of return - prior 5-year period	6.39%
17	Enter actual rate of return - prior 10-year period	7.97%
18	**Actuarial Assumptions**	
19	Actuarial assumed rate of investment return[2]	7.35%
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]	19
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	$45,736,168
25	Enter retirement pension system's actuarial accrued liabilities using uniform assumptions	$79,745,093
27	Actuarially Determined Contribution (ADC) using uniform assumptions, Fiscal Year Ending December 31, 2020	$3,492,984

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 investment expenses 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."