MUNICIPAL EMPLOYEES' RETIREMENT SYSTEM OF MICHIGAN

ANNUAL ACTUARIAL VALUATION REPORT DECEMBER 31, 2017

CASCADE CHTR TWP (4110)

Spring, 2018

Cascade 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 as of December 31, 2017. The report includes the determination of liabilities and contribution rates resulting from the participation of Cascade Chtr Twp (4110) in the Municipal Employees' Retirement System of Michigan ("MERS"). MERS is an independent, professional retirement services company that was created to administer retirement plans for Michigan municipalities on a not-for-profit basis. This report contains the minimum actuarially determined contribution requirement, in alignment with the MERS Plan Documents, funding policy and Michigan Constitution. Cascade Chtr Twp is responsible for the employer contributions needed to provide MERS benefits for its employees and former employees under the Michigan Constitution and the MERS Plan Document.

The purpose of the December 31, 2017 annual actuarial valuation is to:

- Measure funding progress
- Establish contribution requirements for the fiscal year beginning January 1, 2019
- Provide actuarial information in connection with applicable Governmental Accounting Standards Board (GASB) statements

This valuation report should not be relied upon for any other purpose. Reliance on information contained in this report by anyone for anything other than the intended purpose could be misleading.

The valuation uses financial data, plan provision data, and participant data as of December 31, 2017 furnished by MERS. In accordance with Actuarial Standards of Practice No. 23, the data was checked for internal and year to year consistency as well as general reasonableness, but was not otherwise audited. CBIZ Retirement Plan Services does not assume responsibility for the accuracy or completeness of the data used in this valuation.

The actuarial assumptions and methods are adopted by the MERS Retirement Board, and are reviewed every five years in an Experience Study. The most recent study was completed in 2015. Please refer to the division-specific assumptions described in table(s) in this report, and to the Appendix on the MERS website at:
www.mersofmich.com/Portals/0/Assets/Resources/AAV-Appendix/MERS-2017AnnualActuarialValuation-Appendix.pdf.

The actuarial assumptions used for this valuation produce results that we believe are reasonable.

To the best of our knowledge, this report is complete and accurate, was prepared in conformity with generally recognized actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and is in compliance with Act No. 220 of the Public Acts of 1996, as amended, and the MERS Plan Document as revised. All of the undersigned are members of the American Academy of Actuaries (MAAA), and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein. 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 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). CBIZ Retirement Plan Services is not responsible for the consequences of any unauthorized use.

You should notify MERS if you disagree with anything contained in the report or are aware of any information that would affect the results of the report that have not been communicated to us. 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,

Cathy Nagy, MAAA, FSA
Jim Koss, MAAA, ASA
Curtis Powell, MAAA, EA

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Executive Summary

Funded Ratio and Required Employer Contributions

The MERS Defined Benefit Plan is an agent multiple-employer plan, meaning that assets are pooled for investment purposes but separate accounts are maintained for each individual employer. Each municipality is responsible for their own plan liabilities; MERS does not borrow from one municipality's account to pay for another.

The funded ratio of a plan is the percentage of the dollar value of the accrued benefits that is covered by the actuarial value of assets.

Your Funded Ratio:

	12/31/2017 *	12/31/2016
Funded Ratio	79%	80%

* Reflects assets from Surplus divisions, if any.

Michigan Law requires that pension plans be pre-funded, meaning money is set aside now to pay for future benefits. Pension plans are usually funded by employer and employee contributions, and investment income.

How quickly a plan attains the 100% funding goal depends on many factors such as:

- The current funded ratio
- The future experience of the plan
- The amortization period

It is more important to look at the trend in the funded ratio over a period of time than at a particular point in time.

Your Required Employer Contributions:

Your computed employer contributions are shown in the following table. Employee contributions, if any, are in addition to the computed employer contributions. Changes to the assumptions and methods based on the 2015 Experience Study were first reflected in the December 31, 2015 valuations. The impact of these changes is being phased-in over a 5 year period. The phase-in allows the employer to spread the impact of the new assumptions over 5 fiscal years. This valuation reflects the third year of the phase-in.

Your minimum required contribution is the amount in the “Phase-in” columns. By default, MERS will invoice you the phased-in contribution amount, but strongly encourages you to contribute more than the minimum required contribution. If for 2018 your municipality is making employer contributions based on rates without the phase-in applied, contact MERS to ensure the No Phase-in rate is used again for 2019 and not the defaulted phase-in rates.

	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:	**12/31/2017**	**12/31/2017**	**12/31/2016**	**12/31/2016**	**12/31/2017**	**12/31/2017**	**12/31/2016**	**12/31/2016**
Fiscal Year Beginning:	**January 1, 2019**	**January 1, 2019**	**January 1, 2018**	**January 1, 2018**	**January 1, 2019**	**January 1, 2019**	**January 1, 2018**	**January 1, 2018**
Division								
01 - General	12.54%	13.34%	11.31%	12.58%	$ 29,548	$ 31,426	$ 25,103	$ 27,920
Municipality Total					**$ 29,548**	**$ 31,426**	**$ 25,103**	**$ 27,920**

Employee contribution rates reflected in the valuations are shown below:

	Employee Contribution Rate	
Valuation Date:	**12/31/2017**	**12/31/2016**
Division		
01 - General	5.04%	5.04%

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 divisions 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 2019 for the entire employer would be $41,661, instead of $31,426.

If you are interested in making additional contributions, please contact MERS and they can assist you with evaluating your options.

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. For example:
    - Lower actual investment returns would result in higher required employer contributions, and vice-versa.
    - Smaller than assumed pay increases would lower required employer contributions.
    - Reductions in the number of active employees would lower required contribution dollars, but would usually increase the contribution rate expressed as a percentage of (the now lower) payroll.
    - Retirements at earlier ages than assumed would usually increase required employer contributions.
    - More non-vested terminations of employment than assumed would decrease required contributions.
    - More disabilities or survivor (death) benefits than assumed would increase required contributions.
    - Longer lifetimes after retirement than assumed would increase required employer contributions.

Actuarial valuations do not affect the ultimate cost of the plan; the benefit payments (current and future) determine the cost of the plan. Actuarial valuations only affect the timing of the contributions into the plan. Because assumptions are for the long term, plan experience will not match the actuarial assumptions in any given year (except by coincidence). Each annual actuarial valuation will adjust the required employer contributions up or down based on the prior year's actual experience.

Comments on Investment Return Assumption and Asset Smoothing

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

The MERS Investment Return Assumption is **7.75%** per year. This, along with all of our other actuarial assumptions, is reviewed 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 investment return assumptions, please review the budget projection scenarios later in this report.

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 2017 was 6.08%, while the actual market rate of return was 13.07%**. 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 visit our Defined Benefit resource page on the MERS website.

As of December 31, 2017 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 7.75% investment return assumption, or contribution requirements will continue to increase.

If the December 31, 2017 valuation results were based on market value instead of the actuarial value:

- The funded percent of your entire municipality would be 78% (instead of 79%); and
- Your total employer contribution requirement for the fiscal year starting January 1, 2019 would be $384,384 (instead of $377,112).

Risk Characteristics of Defined Benefit Plans

It is important to understand that Defined Benefit retirement plans, the plan sponsor, and the plan participants are exposed to certain risks. While risks cannot be eliminated entirely, they can be managed through various strategies. Below are a few examples of risk (this is not an all-inclusive list):

- Economic - investment return, wage inflation, etc.
- Demographic - longevity, disability, retirement, etc.
- Plan Sponsor and Employees - contribution volatility, attract/retain employees, etc.

The MERS Retirement Board adopts certain assumptions and methods to manage the economic and demographic risks, and the contribution volatility risks. For example, the investment risk is the largest economic risk and is managed by having a balanced portfolio and a clearly defined investment strategy. Demographic risks are managed by preparing special studies called experience studies on a regular basis to determine if the assumptions used are reasonable compared to the experience. An Experience Study is completed every five years to review the assumptions and methods. The next Experience Study will be completed in 2020.

Risk can also be managed through a plan design that provides benefits that are sustainable in the long run.

The Actuarial Standards Board has issued Actuarial Standards of Practice (ASOP) No. 51. This standard will be effective for any actuarial work with a measurement date on or after November 1, 2018. This means, the December 31, 2018 and later annual actuarial valuation reports for MERS will have to comply with this standard. This standard will require the actuary to identify risks that, in the actuary's professional judgment may significantly impact the plan's future financial condition. The actuary will have to assess the potential effects of the identified risks on the plan's future financial condition. The assessment may or may not be based on numerical calculations. However, the assessment should reflect the specifics of the plan (i.e. funded status, plan demographics, funding policy, etc.). If the actuary concludes that numerical calculations are necessary to assess the risk, the actuary can use various methods to quantify the risk such as scenario tests, sensitivity tests, stress tests, etc.

Some of these risk assessment measures have already been incorporated in the MERS annual valuation reports. For example, the projections of funded percentage and employer contributions shown on the following pages could be used to gauge the risk associated with long term investment rates of return different than the assumed 7.75% annual rate. A history of the municipality's funded percentage as shown in Table 7, could indicate the trend in funded status over time.

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.

The analysis in this section is intended to review the potential volatility of the actuarial valuation results. 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.

Many assumptions are important in determining the required employer contributions. In the table below, we show the impact of varying the Investment Return Assumption. Lower investment returns would result in higher required employer contributions, and vice-versa.

The relative impact of each investment return scenario below will vary from year to year, as the participant demographics change. The impact of each scenario should be analyzed for a given year, not from year to year. The results in the table are based on the December 31, 2017 valuation, and are for the municipality in total, not by division. These results do not reflect a 5-year phase in of the impact of the new actuarial assumptions.

	Assumed Future Annual Smoothed Investment Return Assumption			
	Lower Future Annual Returns		**Valuation Assumption**	**Higher Returns**
12/31/2017 Valuation Results	**5.75%**	**6.75%**	**7.75%**	**8.75%**
Accrued Liability	$ 14,079,806	$ 12,339,517	$ 10,898,360	$ 9,693,660
Valuation Assets[1]	$ 8,572,203	$ 8,572,203	$ 8,572,203	$ 8,572,203
Unfunded Accrued Liability	$ 5,507,603	$ 3,767,314	$ 2,326,157	$ 1,121,457
Funded Ratio	61%	70%	79%	88%
Monthly Normal Cost	$ 32,865	$ 24,243	$ 17,599	$ 12,463
Monthly Amortization Payment	$ 27,019	$ 20,234	$ 13,827	$ 7,135
Total Employer Contribution[2]	$ 59,884	$ 44,477	$ 31,426	$ 19,598

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

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

Projection Scenarios

The next two pages show projections of the plan's funded ratio and computed employer contributions under the actuarial assumptions used in the valuation and alternate assumed long-term investment return assumption scenarios. All four projections take into account the past investment losses that will continue to affect the actuarial rate of return in the short term. Under the 7.75% scenarios in the table on the next page, two sets of projections are shown:

- Based on the phase-in over 5 fiscal years (beginning in 2017) of the increased contribution requirements associated with the new actuarial assumptions. This projects your minimum required contribution.
- Based on no phase-in of the increased contribution requirements.

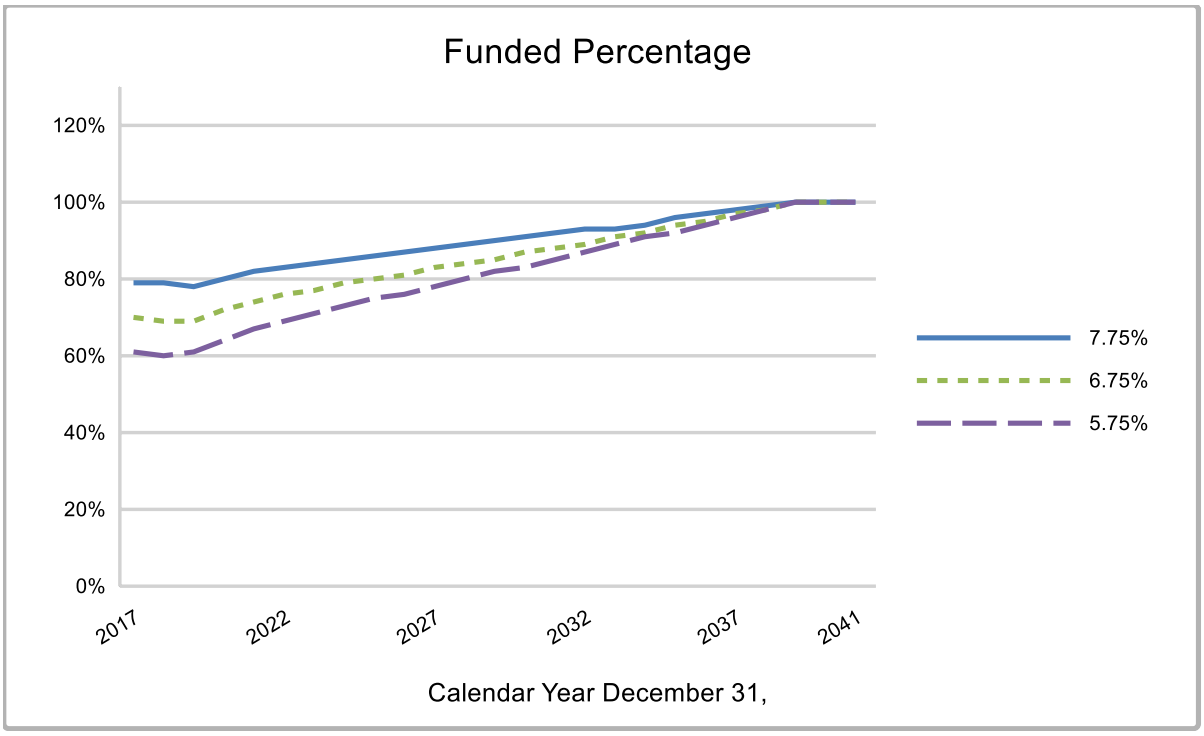
The 7.75% scenarios provide an estimate of computed employer contributions based on current actuarial assumptions, and a projected 7.75% market return. The other two scenarios may be useful if the municipality chooses to budget more conservatively, and make contributions in addition to the minimum requirements. The 6.75% and 5.75% projections provide an indication of the potential required employer contribution if MERS were to realize annual investment returns of 6.75% and 5.75% over the long-term.

The projections are shown both in tabular and graphical form in total for the employer. The tables show projections for six years. The graphs show projections for twenty five years.

Valuation Year Ending 12/31	Fiscal Year Beginning 1/1	Actuarial Accrued Liability	Valuation Assets[2]	Funded Percentage	Computed Annual Employer Contribution
7.75%[1]					
WITH 5-YEAR PHASE-IN					
2017	2019	$ 10,898,360	$ 8,572,203	79%	$ 354,576
2018	2020	11,600,000	9,130,000	79%	391,000
2019	2021	12,400,000	9,650,000	78%	432,000
2020	2022	13,200,000	10,500,000	80%	437,000
2021	2023	13,900,000	11,400,000	82%	443,000
2022	2024	14,700,000	12,200,000	83%	459,000
NO 5-YEAR PHASE-IN					
2017	2019	$ 10,898,360	$ 8,572,203	79%	$ 377,112
2018	2020	11,600,000	9,130,000	79%	401,000
2019	2021	12,400,000	9,680,000	78%	429,000
2020	2022	13,200,000	10,500,000	80%	434,000
2021	2023	13,900,000	11,400,000	82%	440,000
2022	2024	14,700,000	12,200,000	83%	456,000
6.75%[1]					
NO 5-YEAR PHASE-IN					
2017	2019	$ 12,339,517	$ 8,572,203	70%	$ 533,724
2018	2020	13,100,000	9,040,000	69%	576,000
2019	2021	14,000,000	9,650,000	69%	610,000
2020	2022	14,800,000	10,600,000	72%	623,000
2021	2023	15,700,000	11,600,000	74%	637,000
2022	2024	16,500,000	12,500,000	76%	661,000
5.75%[1]					
NO 5-YEAR PHASE-IN					
2017	2019	$ 14,079,806	$ 8,572,203	61%	$ 718,608
2018	2020	15,000,000	8,960,000	60%	777,000
2019	2021	15,900,000	9,660,000	61%	818,000
2020	2022	16,800,000	10,700,000	64%	840,000
2021	2023	17,700,000	11,800,000	67%	864,000
2022	2024	18,700,000	12,800,000	69%	896,000

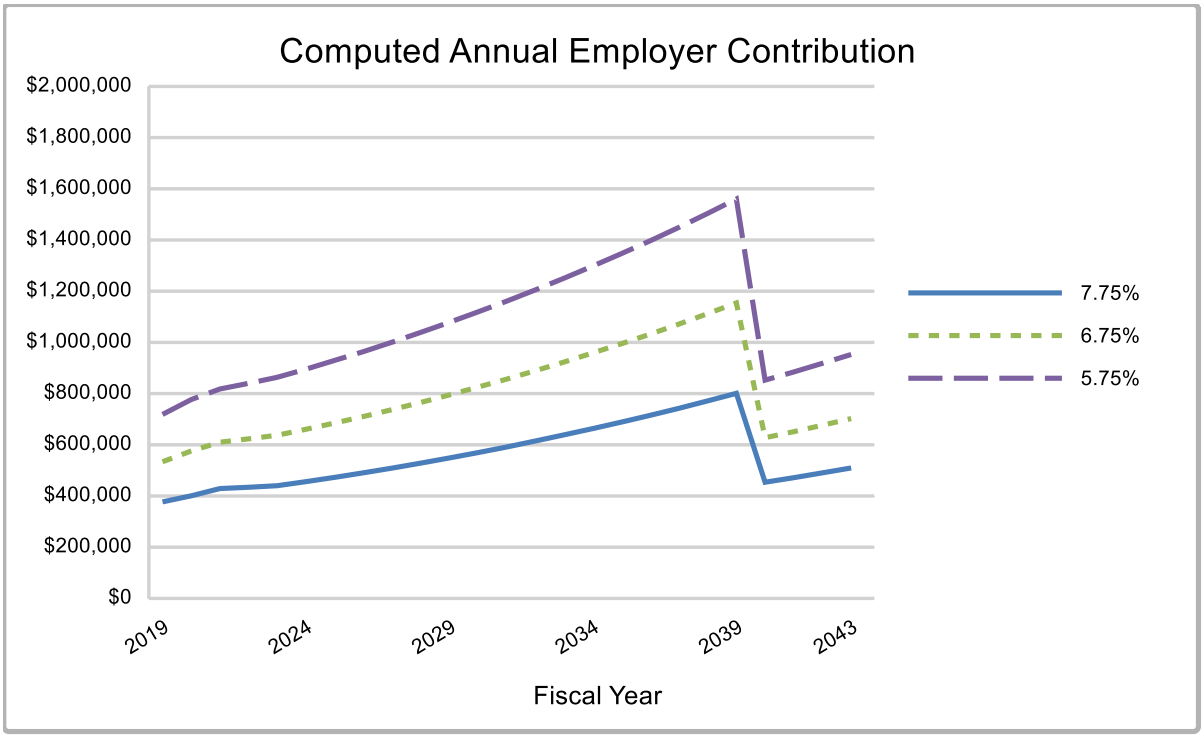
1 Represents both the interest rate for discounting liabilities and the future investment return assumption on the Market Value of assets.

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



Notes:

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



Notes:

All projected contributions are shown with no phase-in.

Employer Contribution Details For the Fiscal Year Beginning January 1, 2019

Table 1

Division	Total Normal Cost	Employee Contribut. Rate	Employer Contributions[1]			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]
			Employer Normal Cost	Payment of the Unfunded Accrued Liability[4]	Computed Employer Contribut. No Phase-In				
Percentage of Payroll									
01 - General	12.51%	5.04%	7.47%	5.87%	13.34%	12.54%			0.87%
Estimated Monthly Contribution[3]									
01 - General			$ 17,599	$ 13,827	$ 31,426	$ 29,548			
Total Municipality			**$ 17,599**	**$ 13,827**	**$ 31,426**	**$ 29,548**			
Estimated Annual Contribution[3]			**$ 211,188**	**$ 165,924**	**$ 377,112**	**$ 354,576**			

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 If projected assets exceed projected liabilities as of the beginning of the January 1, 2019 fiscal year, the negative unfunded accrued liability is treated as overfunding credit and is used to reduce the contribution. This amortization is used to reduce the employer contribution rate. Note that if the overfunding credit is larger than the normal cost, the full credit is shown above but the total contribution requirement is zero. This will cause the displayed normal cost and unfunded accrued liability contributions to not add across.

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

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

Benefit Provisions

Table 2

01 - General: Open Division

	2017 Valuation	2016 Valuation
Benefit Multiplier:	2.00% Multiplier (no max)	2.00% Multiplier (no max)
Normal Retirement Age:	60	60
Vesting:	8 years	8 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
COLA for Future Retirees:	2.50% (Non-Compound)	2.50% (Non-Compound)
Employee Contributions:	5.04%	5.04%
D-2:	D-2 (25%)	D-2 (25%)
Act 88:	No	No

Participant Summary

Table 3

Division	2017 Valuation		2016 Valuation		2017 Valuation		
	Number	Annual Payroll[1]	Number	Annual Payroll[1]	Average Age	Average Benefit Service[2]	Average Eligibility Service[2]
01 - General							
Active Employees	43	$ 2,626,444	41	$ 2,474,196	49.2	9.5	10.4
Vested Former Employees	5	51,283	6	76,258	49.1	10.4	10.4
Retirees and Beneficiaries	22	415,360	20	361,706	67.4		
Total Municipality							
Active Employees	**43**	**$ 2,626,444**	**41**	**$ 2,474,196**	**49.2**	**9.5**	**10.4**
Vested Former Employees	**5**	**51,283**	**6**	**76,258**	**49.1**	**10.4**	**10.4**
Retirees and Beneficiaries	**22**	**415,360**	**20**	**361,706**	**67.4**		
Total Participants	**70**		**67**				

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

2 Description can be found under Miscellaneous and Technical Assumptions in the Appendix.

Reported Assets (Market Value)

Table 4

Division	2017 Valuation		2016 Valuation	
	Employer and Retiree[1]	Employee[2]	Employer and Retiree[1]	Employee[2]
01 - General	$ 6,958,411	$ 1,517,832	$ 5,961,077	$ 1,571,928
Municipality Total	**$ 6,958,411**	**$ 1,517,832**	**$ 5,961,077**	**$ 1,571,928**
Combined Assets	**$8,476,243**		**$7,533,005**	

1 Reserve for Employer Contributions and Benefit Payments

2 Reserve for Employee Contributions

The December 31, 2017 valuation assets (actuarial value of assets) are equal to 1.011321 times the reported market value of assets (compared to 1.077095 as of December 31, 2016). The derivation of valuation assets is described, and detailed calculations of valuation assets are shown, in the Appendix.

Flow of Valuation Assets

Table 5

Year Ended 12/31	Employer Contributions		Employee Contributions	Investment Income (Valuation Assets)	Benefit Payments	Employee Contribution Refunds	Net Transfers	Valuation Asset Balance
	Required	Additional						
2007	$ 210,082		$ 108,111	$ 250,039	$ (77,526)	$ (3,162)	$ 0	$ 3,531,059
2008	212,192		101,969	191,938	(115,243)	(49,400)	4,101	3,876,616
2009	204,074		102,022	266,724	(151,307)	(9,729)	0	4,288,400
2010	204,204		124,502	283,699	(166,457)	(65,764)	0	4,668,584
2011	205,344	$ 0	112,118	290,988	(170,351)	(3,321)	0	5,103,362
2012	211,951	0	105,976	282,521	(174,244)	0	0	5,529,566
2013	219,505	375,435	111,092	386,326	(243,045)	0	0	6,378,879
2014	210,338	461,628	106,318	406,818	(284,894)	(8,017)	0	7,271,070
2015	232,013	0	117,128	380,237	(338,110)	(9,626)	0	7,652,712
2016	245,342	0	123,282	429,450	(337,024)	0	0	8,113,762
2017	290,039	0	124,705	503,997	(395,140)	(65,160)	0	8,572,203

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 Assets include assets from Surplus divisions, if any.

Actuarial Accrued Liabilities and Valuation Assets
As of December 31, 2017

Table 6

Division	Actuarial Accrued Liability	Valuation Assets[1]	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
01 - General				
Active Employees	$ 5,410,152	$ 3,083,995	57.0%	$ 2,326,157
Vested Former Employees	351,754	351,754	100.0%	0
Retirees And Beneficiaries	5,133,240	5,133,240	100.0%	0
Pending Refunds	3,214	3,214	100.0%	0
Total	**$ 10,898,360**	**$ 8,572,203**	**78.7%**	**$ 2,326,157**
Total Municipality				
Active Employees	**$ 5,410,152**	**$ 3,083,995**	**57.0%**	**$ 2,326,157**
Vested Former Employees	**351,754**	**351,754**	**100.0%**	**0**
Retirees and Beneficiaries	**5,133,240**	**5,133,240**	**100.0%**	**0**
Pending Refunds	**3,214**	**3,214**	**100.0%**	**0**
Total	**$ 10,898,360**	**$ 8,572,203**	**78.7%**	**$ 2,326,157**

[1] Includes both employer and employee assets.

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

Actuarial Accrued Liabilities - Comparative Schedule

Table 7

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2004	$ 3,689,877	$ 2,165,082	59%	$ 1,524,795
2005	4,154,374	2,508,939	60%	1,645,435
2006	4,643,462	3,043,515	66%	1,599,947
2007	5,054,324	3,531,059	70%	1,523,265
2008	5,559,371	3,876,616	70%	1,682,755
2009	5,724,247	4,288,400	75%	1,435,847
2010	5,913,046	4,668,584	79%	1,244,462
2011	6,439,968	5,103,362	79%	1,336,606
2012	7,100,010	5,529,566	78%	1,570,444
2013	8,064,843	6,378,879	79%	1,685,964
2014	8,457,216	7,271,070	86%	1,186,146
2015	9,910,943	7,652,712	77%	2,258,231
2016	10,174,725	8,113,762	80%	2,060,963
2017	10,898,360	8,572,203	79%	2,326,157

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

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

Division 01 - General

Table 8-01: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2007	$ 5,054,324	$ 3,531,059	70%	$ 1,523,265
2008	5,559,371	3,876,616	70%	1,682,755
2009	5,724,247	4,288,400	75%	1,435,847
2010	5,913,046	4,668,584	79%	1,244,462
2011	6,439,968	5,103,362	79%	1,336,606
2012	7,100,010	5,529,566	78%	1,570,444
2013	8,064,843	6,378,879	79%	1,685,964
2014	8,457,216	7,271,070	86%	1,186,146
2015	9,910,943	7,652,712	77%	2,258,231
2016	10,174,725	8,113,762	80%	2,060,963
2017	10,898,360	8,572,203	79%	2,326,157

Notes: Actuarial assumptions were revised for the 2008, 2009, 2010, 2011, 2012 and 2015 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		
2007	41	$ 2,056,906	10.15%	4.82%
2008	40	2,065,910	10.98%	4.99%
2009	37	2,001,513	10.40%	4.99%
2010	37	1,984,632	9.04%	6.09%
2011	38	2,084,507	9.63%	5.46%
2012	38	2,119,513	11.17%	5.00%
2013	36	2,130,553	11.34%	5.04%
2014	35	2,047,653	10.03%	5.04%
2015	39	2,314,281	13.52%	5.04%
2016	41	2,474,196	12.58%	5.04%
2017	43	2,626,444	13.34%	5.04%

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. The contribution requirements including the 5-year phase-in are shown on page 6.

See the Benefit Provision History on page 25 for past benefit provision changes.

Division 01 - General

Table 10-01: Layered Amortization Schedule

Type of UAL	Date Established	Original Balance[1]	Original Amortization Period[2]	Amounts for Fiscal Year Beginning 1/1/2019		
				Outstanding UAL Balance[3]	Remaining Amortization Period[2]	Annual Amortization Payment
Initial	12/31/2015	$ 2,258,231	23	$ 2,399,834	21	$ 168,672
(Gain)/Loss	12/31/2016	(302,516)	22	(328,149)	21	(23,064)
(Gain)/Loss	12/31/2017	268,237	21	289,025	21	20,316
Total				**$ 2,360,710**		**$ 165,924**

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, 2017 (see Table 6) is projected to the beginning of the fiscal year for which the contributions are being calculated. This allows the 2017 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.

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 www.mersofmich.com.

Actuarial Valuation Date:		12/31/2017
Measurement Date of Total Pension Liability (TPL):		12/31/2017
At 12/31/2017, the following employees were covered by the benefit terms:		
Inactive employees or beneficiaries currently receiving benefits:		22
Inactive employees entitled to but not yet receiving benefits:		5
Active employees:		43
		70
Covered employee payroll: (Needed for Required Supplementary Information)	$	2,626,444
Average expected remaining service lives of all employees (active and inactive):		5
Total Pension Liability as of 12/31/2016 measurement date:	$	9,871,402
Total Pension Liability as of 12/31/2017 measurement date:	$	10,576,992
Service Cost for the year ending on the 12/31/2017 measurement date:	$	308,607
Change in the Total Pension Liability due to:		
- Benefit changes[1]:	$	0
- Differences between expected and actual experience[2]:	$	73,639
- Changes in assumptions[2]:	$	0

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

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

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

	1% Decrease (7.00%)	Current Discount Rate (8.00%)	1% Increase (9.00%)
Change in Net Pension Liability as of 12/31/2017:	$ 1,376,355	-	$ (1,153,143)

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:	12/31/2017
Measurement Date of Total Pension Liability (TPL):	12/31/2018

At 12/31/2017, the following employees were covered by the benefit terms:

Inactive employees or beneficiaries currently receiving benefits:	22
Inactive employees entitled to but not yet receiving benefits:	5
Active employees:	43
	70

Covered employee payroll: (Needed for Required Supplementary Information)	$	2,626,444
Average expected remaining service lives of all employees (active and inactive):		5
Total Pension Liability as of 12/31/2017 measurement date:	$	10,564,726
Total Pension Liability as of 12/31/2018 measurement date:	$	11,295,374
Service Cost for the year ending on the 12/31/2018 measurement date:	$	324,267
Change in the Total Pension Liability due to:		
- Benefit changes[1]:	$	0
- Differences between expected and actual experience[2]:	$	13,247
- Changes in assumptions[2]:	$	0

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

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

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

	1% Decrease (7.00%)	Current Discount Rate (8.00%)	1% Increase (9.00%)
Change in Net Pension Liability as of 12/31/2018:	$ 1,442,282	-	$ (1,210,145)

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 - General

12/1/2016	Service Credit Purchase Estimates - Yes
1/1/2013	Member Contribution Rate 5.04%
1/1/2012	Member Contribution Rate 5.00%
1/1/2011	Member Contribution Rate 5.46%
1/1/2010	Member Contribution Rate 6.09%
1/1/2009	Member Contribution Rate 4.99%
1/1/2008	Member Contribution Rate 4.82%
4/1/2007	Exclude Temporary Employees requiring less than 12 months
1/1/2007	Member Contribution Rate 5.05%
1/1/2005	E2 2.5% COLA for future retirees (03/01/2004)
3/1/2004	Benefit F55 (With 25 Years of Service)
3/1/2004	Member Contribution Rate 3.29%
3/1/2004	Fiscal Month - January
3/1/2004	Day of work defined as 80 Hours a Month for All employees.
3/1/2004	Benefit D2 Plan
3/1/2004	Benefit FAC-5 (5 Year Final Average Compensation)
3/1/2004	8 Year Vesting
3/1/2004	Benefit B-2
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years
	Defined Benefit Normal Retirement Age - 60

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	100%

Miscellaneous and Technical Assumptions

Loads – None.