



City of Ishpeming
County of Marquette
State of Michigan

Comprehensive Financial Plan
For Pension and
Other Post-Employment Benefits

May 18, 2021

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COMPREHENSIVE FINANCIAL PLAN FOR PENSION AND OTHER POST-EMPLOYMENT BENEFITS

This Comprehensive Financial Plan for Pension Benefits (the "Plan") is being prepared pursuant to Section 518 of Public Act 34 of 2001, as amended (the "Act 34"). In accordance with Act 34, the City of Ishpeming (the "City") is planning to issue bonds to finance a portion of the City's unfunded pension liability for the City's Municipal Employees Retirement System ("MERS") pension plan for general government employees, as further described in this Plan.

Act 34 requires the City to take certain steps in order to be eligible to issue bonds to fund a portion of its pension liability, including:

1. The closure of its defined benefit pension plan, with effective date as shown on page 2 herein.
2. The preparation, approval, and public posting of this Plan analyzing the funding of the City's defined benefit pension plans.
3. Publication of a Notice of Intent to issue bonds, and expiration of the right of referendum relating thereto.
4. Obtaining a credit rating from a nationally recognized rating agency in the "A" rating category or higher.
5. Certifying the City has funded its defined benefit plans' annual actuarially determined contribution for the most recently available three (3) audited financial statement years.
6. Certifying the City is compliant with the reporting requirements in accordance with the Protecting Local Government Retirement and Benefits Act, Public Act 202, of 2017.
7. Provide evidence that it has the legal debt capacity to issue the proposed bonds.
8. Have applied for and obtained approval from the Michigan Department of Treasury to issue the bonds.

The Plan provided herein will provide a general overview of the City's pension/retirement plans, the historical and proposed funding for these plans, as well as analysis of the estimated benefit of issuing limited tax general obligation bonds to fund a portion of the City's unfunded pension liability as authorized by Act 34.

PENSION PLANS OVERVIEW

The City has two defined benefit pension plans which cover substantially all employees hired prior to January 1, 2020, the Municipal Employees' Retirement System of Michigan ("MERS") for general government employees and the Policemen and Firemen Retirement System (the "System").

Defined Benefit Plan - MERS

MERS is an agent multiple employer, statewide public employee pension plan established by the Michigan Legislature under Public Act 35 of 1945 and administered by a nine-member retirement board. MERS issues a publicly available financial report that includes financial statements and required supplementary information. This report may be obtained by accessing the MERS website at www.mersofmich.com.

The City approved the closure of the MERS plan for new hires for all divisions as of January 1, 2020. The City has implemented a defined contribution plan for employees no longer eligible for the defined benefit plan.

Membership – Membership in the MERS plan is made up of 3 Divisions including various employee groups hired prior to various plan closing dates. A breakdown of the employees covered by the plan as of the December 31, 2019 valuation is provided below.

Division #	Division	Active	Vested Former	Retirees & Beneficiaries	Pending Refunds	Total
01	CI & Pub Wks	22	3	32	5	62
10	Supervisory excl City Mngr.	4	1	5	1	11
11	Union/Supervisor	2	0	5	2	9
Total		28	4	42	8	82

Source: 12/31/2019 MERS Annual Actuarial Valuation, page 10

Benefits – The MERS plan provides retirement, disability, and death benefits to full-time employee groups who were hired prior to various plan closing dates. To be eligible, employees must have worked at least 10 days in a calendar month. The plan provides for an annual automatic 2.5% (non-compounded) cost of living allowance increase after age 55 or 50. The plan has a 10 year vesting period with a normal retirement age of 60 years, with the ability to begin drawing at age 55 with 15 years of service at a reduced benefit, or at age 50 with 25 years of service without reduced benefit.

Benefit terms, within the parameters established by MERS, are generally established and amended by authority of the City Council, usually after negotiation of these terms with the affected unions.

Contribution Rates – The City is required to contribute at least equal to the actuarially determined rate, as established by MERS Retirement Board. The actuarially determined rate is the estimated amount necessary to finance the cost of benefits earned by employees during the year (commonly referred to as "normal cost"), with an additional amount to finance any unfunded accrued

liability. The City establishes contribution rates to be paid by its covered employees.

Covered employees contribute a percentage of their salary as follows:

Division #	Division	Employee Contribution %
01	CI & Pub Wks	5.43%
10	Supervisory excl City Mngr.	7.51%
11	Union/Supervisor	9.70%

Source: 12/31/2019 MERS Annual Actuarial Valuation, page 9

Funding - As of December 31, 2019, the MERS Plan had an unfunded liability as shown in the following table, based on actuarial value of assets and the market value of assets.

Pension Funding - MERS	Actuarial Value of Assets (12/31/2019)	Market Value of Assets (12/31/2019)	Market Value of Assets (12/30/2020*)
Actuarial Accrued Liability (AAL)	\$19,040,138	\$19,040,138	\$19,040,138
Value of Assets	\$8,577,906	\$8,466,328	\$9,266,607
Unfunded Actuarial Liability (UAL)	\$10,462,232	\$10,573,810	\$9,773,531
Funded Ratio	45.05%	44.47%	48.67%
Covered Payroll	\$1,492,241	\$1,492,241	\$1,492,241
UAL as % of Covered Payroll	701.11%	708.59%	654.96%

Source: December 31, 2019 MERS Annual Actuarial Valuation; pages 5, 11 of MERS Statement of Fiduciary Net Position as of 12/30/2020

*If the market value of assets is used in determining the amount to be funded through the issuance of bonds, an updated market value will be used which is within 150 days of the bond closing.

A breakdown of the unfunded or (overfunded) actuarial liability by division is shown below. Please note the breakdown by division below does not reflect the MERS 2020 Adopted Demographic Assumptions.

Division	Based on Actuarial Value of Assets, 12/31/19			Based on Market Value of Assets, 12/31/19		Based on Market Value of Assets, 12/31/2020*	
	Actuarial Accrued Liability 12/31/19	Actuarial Value of Assets	Unfunded Actuarial Liability	Market Value of Assets	Unfunded Actuarial Liability	Market Value of Assets	Unfunded Actuarial Liability
01	\$12,567,660	\$6,339,074	\$6,228,586	\$6,256,618	\$6,311,042	\$6,874,361	\$5,693,299
10	2,373,198	1,145,376	1,227,822	1,130,477	1,242,721	1,240,787	1,132,411
11	3,641,089	1,040,609	2,600,480	1,027,073	2,614,016	1,092,566	2,548,523
S1 ¹	0	52,847	(52,847)	52,159	(52,159)	58,893	(58,893)
	\$18,581,947	\$8,577,906	\$10,004,041	\$8,466,327	\$10,115,620	\$9,266,607	\$9,315,340

Source: December 31, 2019 MERS Annual Actuarial Valuation (pg.11,13); Market Value includes employee contributions and benefit payments; MERS Statement of Fiduciary Net Position for the year/quarter ending 12/31/2020

¹ Represents Unassociated Surplus: 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

*If the market value of assets is used in determining the amount to be funded through the issuance of bonds, an updated market value will be used which is within 150 days of the bond closing.

The key actuarial assumptions used in determining the actuarial valuation of the City's MERS Plan as of December 31, 2019 included:

- Assume rate of wage inflation of 3.00% (reduced from 3.75% previously)
- Investment rate of return of 7.35% (reduced from 7.75% previously)
- 5-year smoothing period of investment gains and losses

In February 2020 MERS adopted updated demographic assumptions which will be effective with the December 31, 2020 actuarial valuation which will impact the liability and resulting 2022 contributions.

As assumptions are intended to be long-term assumptions, the actual Plan experience will not match the actuarial assumptions. Therefore, with each annual actuarial valuation the annual required contributions may increase, or decrease based on the prior year's actual experience.

For further details on the MERS assumptions, please see Appendix A or the following link:

<http://www.mersofmich.com/Employer/Work-Scenarios/Unfunded-Liability>

Detail on the City's historical funding for the MERS Plan is provided below:

MERS Historical Pension Funding				
Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Unfunded AAL	Funded Ratio
12/31/2010	\$7,994,750	\$12,141,837	\$4,147,087	65.84%
12/31/2011	8,038,246	12,502,771	4,464,525	64.29%
12/31/2012	8,033,750	13,181,663	5,147,913	60.95%
12/31/2013	8,213,071	14,130,225	5,917,154	58.12%
12/31/2014	8,276,586	14,620,546	6,343,960	56.61%
12/31/2015	8,321,467	15,611,063	7,289,596	53.30%
12/31/2016	8,450,672	16,336,081	7,885,409	51.73%
12/31/2017	8,578,370	16,797,445	8,219,075	51.07%
12/31/2018	8,400,613	17,461,749	9,061,136	48.11%
12/31/2019	8,577,906	18,581,947	10,004,041	46.16%

Source: December 31, 2019 MERS Annual Actuarial Valuation, page 14.

Below is a history of City contributions for the MERS Plan:

MERS Historical Pension Funding			
Year Ending 12/31	Annual Required Contribution	City's Contribution	Percentage of ARC Contributed
12/31/2010	\$259,506	\$259,506	100.00%
12/31/2011	299,347	299,347	100.00%
12/31/2012	324,447	324,447	100.00%
12/31/2013	348,394	348,394	100.00%
12/31/2014	436,888	436,888	100.00%
12/31/2015	474,038	474,475	100.09%
12/31/2016	537,664	537,664	100.00%
12/31/2017	565,838	565,838	100.00%
12/31/2018	601,641	601,641	100.00%
12/31/2019	774,571	825,951	106.63%

Source: December 31, 2019 MERS Annual Actuarial Valuation, page 12.

Closure of Plan – As noted and shown on page 2, the City has closed all divisions of its MERS plan to new employees as of January 1, 2020.

Defined Contribution Plan

As part of closing the MERS defined benefit pension plan, the City has also established a defined contribution plan for certain employees who meet the eligibility requirements. The City's defined contribution plan has a 3-year employee vesting period whereby the City contributes 10% of employee compensation and employees contribute 5%. Benefit terms, including contribution requirements for the Defined Contribution Plan are established and may be amended by City Council.

Cost Containment Measures-MERS Pension

The City has taken various measures to reduce the City's pension liability related to the MERS defined benefit pension plan and ongoing cost, as further described below.

- The City's Pension Plan has three divisions. To date, all divisions have been closed to new hires. Pursuant to Section 518(10) of the Act, employee benefits within the closed divisions of the Pension Plan will not increase. Pursuant to Section 518(12) of the Act, the closed divisions will not be reopened to new hires.

The City has been increasing its employee member contribution rates. The maximum member contribution rate allowed by MERS is 10%.

- Division 1 – Clerical and Public Works member contribution rate was 5.35% in 2015 and under the existing contract has increased to 5.43%.

- Division 10 – Supervisory member contribution rate was 5.00% in 1992 and has since increased to 7.51% (2000).
- Division 11 – Union/Supervisor member contribution rate of 9.70% was established in 2000 and remains near the maximum contribution rate allowed by MERS to date.
- A surplus division was established with MERS (Division S1 – Surplus Unassociated) and two payments were made to Division S1 in 2019 totaling \$51,156.68, which consisted of \$26,458 that the City had reserved in fund balance for payment to the surplus division as well as \$24,698.68 in healthcare savings as described in the City's corrective action plan.
- A complete history of the benefit provisions of the City's MERS plan may be found in the December 31, 2019 Annual Actuarial Valuation on pages 24 and 25.

Police and Fire Pension Plan

Bonds will not be issued by the City for its Police and Fire Retirement System. The plan does not qualify in accordance with the Act, as the plan remains open.

The City provides defined benefit pension benefits to police and fire employees who meet eligibility requirements. The City is the administrator of the single-employer public employee retirement system established and administered by the City to provide pension benefits for the Police and Fire Department employees.

The System provides retirement, disability and death benefits to plan members and their beneficiaries. Management of the System is vested in City of Ishpeming Act 345 Police-Fire Pension Board of the City of Ishpeming, Michigan Policemen and Firemen Retirement System, which consists of five members: two that are elected (two representing police employees), two that are appointed by the City Council of the City of Ishpeming and one that is the Treasurer of the City of Ishpeming.

Membership – As of the most recent actuarial reports dated December 31, 2019, total membership for the Police and Fire Retirement System consisted of:

Membership	Total
Inactive Employees or beneficiaries receiving benefits	20
Terminated Vested Participants	4
Active Employees	9
Total	33

Source: 12/31/2019 GRS Actuarial Valuation Report, pages B-8 and B-10.

Benefits – The plan provides retirement, disability, and death benefits to full-time employee groups. To be eligible, employees must have 25 or more years of service or be of age 60 regardless of service. Benefits equal 2.5% of 3-year

Average Final Compensation (AFC) times first 25 years of service plus 1% of AFC times years of service in excess of 25 years. Additional details of the benefit provisions are provided on page B-1 of the 12/31/2019 Actuarial Valuation Report.

Benefit terms, within the parameters established by the plan, are generally established and amended by authority of the City Council, upon a recommendation from the Pension Board, usually after negotiation of the terms with the affected groups.

Contribution Rates - The City contributes to the Police and Fire Pension Plan December through February as taxes are collected and remitted to the Plan. The City's computed contributions for the fiscal year beginning January 1, 2021 expressed as a percent of payroll include the following:

UAAL	27.69%
Normal Cost	<u>24.15%</u>
City's Total	51.84%

The employee contribution rate is 5% of gross wages. The City's annual required contribution for its fiscal year ended December 31, 2019 was \$229,122. The City's contributions are funded through an Act 345 millage. The millage levied in 2020 for Act 345 retirement was 2.4762 mills.

Funding – As of December 31, 2019, the System's Plan actuarial value of assets was \$4,506,864 and the actuarial accrued liability was \$6,628,402, for an unfunded actuarial accrued liability (UAAL) of \$2,121,538 and funding ratio of 67.99%. The table below provides the unfunded liability based on the December 31, 2019 and 2018 actuarial reports.

Pension Funding - Police and Fire	Actuarial Value of Assets (12/31/2019)	Actuarial Value of Assets (12/31/2018)
Actuarial Accrued Liability (AAL)	\$6,628,402	\$6,688,702
Value of Assets	4,506,864	4,610,434
Unfunded Actuarial Liability (UAL)	\$2,121,538	\$2,078,268
Funded Ratio	67.99%	68.93%
Covered Payroll	\$515,441	\$486,037
UAL as % of Covered Payroll	411.60%	427.59%

Source: 12/31/2019 GRS Actuarial Valuation Report, page A-5

The key actuarial assumptions used in determining the actuarial valuation of the City's Police and Fire Retirement Plan as of December 31, 2019 included:

- Investment rate of return of 7.0%, net of investment expense, including inflation
- Salary Increases of 3.5% in the long-term
- Inflation of 3.5%

As assumptions are intended to be long-term assumptions, the actual plan experience will not match the actuarial assumptions. Therefore, with each annual

actuarial valuation the annual required contributions may increase, or decrease based on the prior year's actual experience.

Detail on the City's historical funding for the Fire and Police Pension Plan is provided below:

Fire and Police Historical Pension Funding				
Actuarial Valuation Date	Actuarial Value of Assets	Actuarial Accrued Liability (AAL)	Unfunded AAL	Funded Ratio
12/31/2010	\$4,816,472	\$6,034,581	\$1,218,109	79.81%
12/31/2011	4,610,020	6,149,988	1,539,968	74.96%
12/31/2012	4,486,863	6,465,540	1,978,677	69.40%
12/31/2013	4,798,400	6,626,378	1,827,978	72.41%
12/31/2014	4,905,641	6,415,944	1,510,303	76.46%
12/31/2015	4,890,716	6,337,538	1,446,822	77.17%
12/31/2016	4,917,986	6,464,961	1,546,975	76.07%
12/31/2017	4,874,238	6,622,757	1,748,519	73.60%
12/31/2018	4,610,434	6,688,702	2,078,268	68.93%
12/31/2019	4,506,864	6,628,402	2,121,538	67.99%

*Source: 12/31/2019 GRS Actuarial Valuation Report, City of Ishpeming
Policemen and Firemen Retirement System page A-5*

Below is a history of City contributions for the Police and Fire Plan:

Police and Fire Historical Pension Funding			
Year Ending 12/31	Annual Required Contribution	City's Annual Contribution	Percentage of ARC Contributed
12/31/2010	\$139,448	\$139,448	100.00%
12/31/2011	160,724	160,724	100.00%
12/31/2012	149,207	149,207	100.00%
12/31/2013	158,948	158,948	100.00%
12/31/2014	201,791	201,791	100.00%
12/31/2015	199,322	199,322	100.00%
12/31/2016	188,906	188,906	100.00%
12/31/2017	163,490	163,490	100.00%
12/31/2018	178,625	178,625	100.00%
12/31/2019	229,122	229,122	100.00%

*Source: GRS Policemen and Firemen Retirement System Report,
12/31/2019, page A-9.*

Cost Containment Measures-Police and Fire Pension

The City has taken measures to curb the cost of Police and Fire Pension plan including the Board adopting a 25-year closed amortization for the 2014 valuation affecting fiscal year 2016 and later contributions. As of the December 31, 2019

valuation, there are 20 years remaining in the amortization of the Unfunded Actuarial Accrued Liability (UAAL). Adoption of the closed amortization increased the rate at which the System's funded ratio trends towards 100% and also ensures that the UAAL would be expected to be paid off at the end of the amortization period.

POST EMPLOYMENT HEALTH CARE BENEFITS PLAN

The City has a defined contribution Post Employment Health Plan (PEHP) administered by Nationwide Retirement Solutions. Terms for eligibility and contribution rates are specified in the City's various collective bargaining agreements. Individual employee accounts consist of employer contributions and investment returns. The Plan does not have any vesting requirements; therefore, employees are immediately vested. Employee contributions range from \$28 to \$32 per pay period, respectively, based on union contracts. The City matches employee contributions to the Plan. For the year ended December 31, 2019, the City's contributions totaled approximately \$28,486.

COMPLIANCE WITH PROTECTING LOCAL GOVERNMENT RETIREMENT AND BENEFITS ACT

The City is fully compliant with the Protecting Local Government Retirement and Benefits Act 202 of 2017 ("Act 202"). Act 202 considers pension plans underfunded when the systems funding ratio is below 60% and the annual required contribution is greater than 10% of the governmental fund revenues.

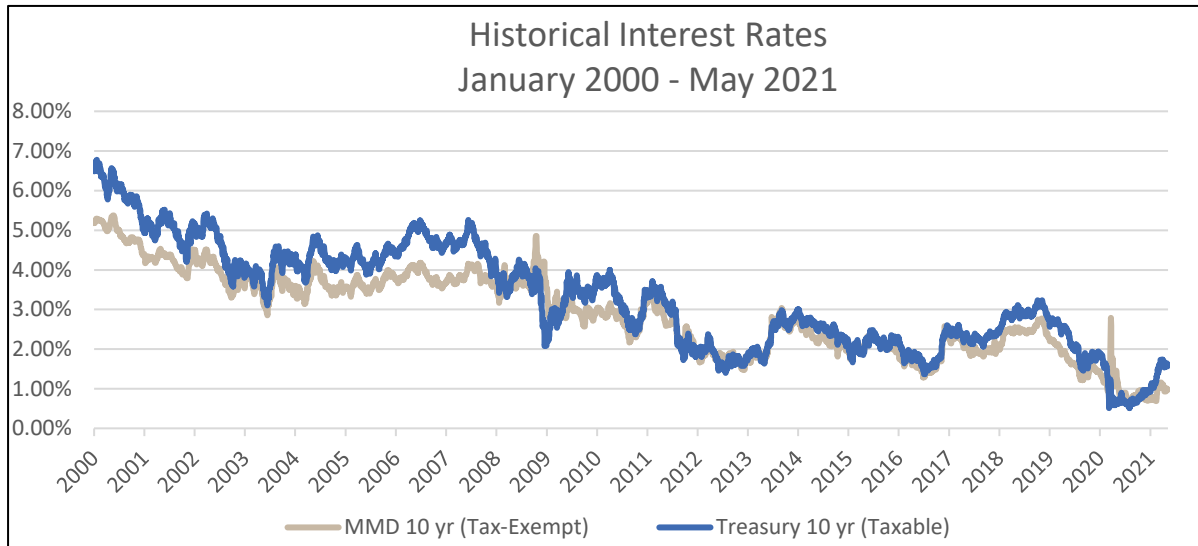
Pursuant to Act 202, the MERS defined benefit plan is considered underfunded. Therefore, as required by Act 202, the City filed a Corrective Action Plan, which was approved by the Michigan Department of Treasury on May 24, 2019.

RATING REQUIREMENT

The City is in the process of obtaining a rating from one of the major credit rating agencies, and the rating will be received prior to sale of the bonds. The City understands that it must achieve a credit rating in the 'A' category or higher from at least one rating agency in order to receive approval from the Michigan Department of Treasury and issue the bonds. The City's existing credit rating with S&P Global is 'A' respectively, a copy of the latest available report is included in Appendix F herein.

BOND ISSUANCE CONSIDERATIONS

The City anticipates issuing bonds as authorized by Act 34 to partially fund the unfunded pension liability for its MERS Plan. The chart below shows a history of 10-year US Treasury rates along with the 10-year tax-exempt national AAA rated MMD interest rates. Since interest rates are near historically low levels, the City anticipates receiving favorable interest rates for the limited tax general obligation bonds to fund its pension obligation.



Source: Refinitiv TM3 as of May 12, 2021

Determination of Bond Amount

Act 34 limits the amount the City can bond to achieve a funded level of 95% based on the actuarial value of assets or market value of assets, respectively.

The annual required contribution the City makes for its defined benefit pension plans is comprised of two parts, the unfunded accrued liability, and the normal cost component. The unfunded accrued liability is the portion of the pension liability that is not funded, while the normal cost is the cost of future benefits earned by employees in the current year. Under Act 34, only a portion of the unfunded accrued liability may be financed with bonds, to the 95% funding level, depending on the value of assets used, as noted above.

The City is planning to issue an amount that will achieve the maximum funding level possible for its MERS plan, based on either the market value of assets or the actuarial value of assets. This determination will be made prior to the bond sale. The sources and uses for these two different options are shown on the following page. Also shown is the projected funding levels before and after the proposed bonds are issued.

The City understands that a more recent market value of assets, determined within 150 days of closing, will need to be used if the bond amount is based on the market value of assets.

Based on the actuarial value and market value information provided on page 3, the maximum amount which may be funded with bond proceeds, based on actuarial value of assets and the market value of assets is shown below.

Pension Funding	Actuarial Value of Assets (12/31/2019)	Market Value of Assets (12/31/2019)	Market Value of Assets (12/30/2020*)
Actuarial Accrued Liability (AAL)	\$19,040,138	\$19,040,138	\$19,040,138
Value of Assets	\$8,577,906	\$8,466,328	\$9,266,607
Unfunded Actuarial Liability (UAL)	\$10,462,232	\$10,573,810	\$9,773,531
Funded Ratio	45.05%	44.47%	48.67%
Maximum Funding Level Bondable	95.00%	95.00%	95.00%
Maximum Funding Level	\$18,088,131	\$18,088,131	\$18,088,131
Value of Assets	\$8,577,906	\$8,466,328	\$9,266,607
Maximum Amount to be Bonded:	\$9,510,225	\$9,621,803	\$8,821,524

Source: December 31, 2019 MERS Annual Actuarial Valuation, pages 5, 11; MERS Statement of Fiduciary Net Position as of 12/30/2020

*If the market value of assets is used in determining the amount to be funded through the issuance of bonds, an updated market value will be used which is within 150 days of the bond closing.

The table below shows the estimated maximum bond amounts using both the actuarially value of assets and market value of assets as of December 31, 2019 and the market value of assets as of December 31, 2020. Should the City fund based on the market value of assets, the bond amount will be based on the unfunded liability using the market value of assets within 150 days of the bond closing. In order to provide flexibility for changes in the market value of assets, as well as the impact of the new actuarial valuation which is expected to be available in late June 2021, the City is using a not-to-exceed bond amount of \$12,000,000.

Estimated Bond Amount - 95% Funding				
		Based on UAL Using 12/31/19 Actuarial Value of Assets	Based on UAL Using 12/31/19 Market Value of Assets	Based on UAL Using 12/31/20 Market Value of Assets
(a)	Actuarial Accrued Liability (AAL)	\$19,040,138	\$19,040,138	\$19,040,138
(b)	Maximum % Funding Level for Bonding	95.00%	95.00%	95.00%
(c)	Maximum Funding Level for Bonding in Dollars (a x b)	18,088,131	18,088,131	18,088,131
(d)	Less: Value of Assets*	8,577,906	8,466,328	9,266,607
(e)	Unfunded Liability to be Bonded (c - d)	\$9,510,225	\$9,621,803	\$8,821,524
(f)	Plus: Estimated Issuance Cost ¹	254,775	258,000	248,279
(g)	Estimated Bond Amount (e + f)	\$9,765,000	\$9,880,000	\$9,070,000
(h)	Funding Level After Bonding (d + e / a)	95.00%	95.00%	95.00%
(i)	Funding Level Before Bonding (d / a)	45.05%	44.47%	48.67%

Source*: Source: December 31, 2019 MERS Annual Actuarial Valuation pages 5, 11; MERS Statement of Fiduciary Net Position as of 12/30/2020

¹ Includes estimated underwriter's discount; allotment for bond insurance and contingency

The City is planning to issue the bonds using whichever methodology results in the highest funding amount in order to achieve the maximum funding level, while also achieving the required minimum net present value savings as provided by Act 34.

Legal Debt Limitation Compliance

As of May 18, 2021, the City's outstanding debt is shown below:

City of Ishpeming - Direct Debt as of May 18, 2021

<u>Dated</u>		<u>Final</u>	<u>Principal</u>
<u>Date</u>	<u>Type / Purpose</u>	<u>Maturity</u>	<u>Outstanding</u>
08/02/00	Bldg. Auth., Series 2000 - Building	07/01/30	\$467,000
09/17/02	Bldg. Auth., Series 2002 - Building	09/01/32	51,000
05/25/11	General Capital Improvement	03/01/30	1,540,000
10/15/15	Bldg. Auth., Series 2015A - Building	08/01/45	1,255,000
01/14/16	Bldg. Auth., Series 2016 - Building	08/01/45	223,000
07/20/17	Water Supply Revenue, Series 2017	06/01/57	8,536,000
10/26/17	2017 General Obligation Unlimited Tax	05/01/29	595,000
TOTAL DIRECT DEBT			\$12,667,000

Based on the above outstanding debt, as well as the City's 2020 State Equalized Value along with other equivalent valuation, the City has the legal debt capacity to issue the Bonds, at the proposed not-to-exceed amount, as computed below:

LEGAL DEBT MARGIN - As of May 18, 2021	
2020 State Equalized Value (SEV)	\$141,419,895
Plus: Equivalent SEV of State Revenue Sharing*	39,930,390
Total Equivalent Valuation	\$181,350,285
Legal Debt Limit - 10% of SEV	\$18,135,028
 Total Bonded Debt Outstanding	 \$12,667,000
Less: Revenue Bonds	(8,536,000)
Net Amount Subject to Legal Debt Limit	\$4,131,000
 LEGAL DEBT MARGIN AVAILABLE	 \$14,004,028
 Not-to-Exceed Amount of Pension Bonds	 \$12,000,000
Share of Legal Debt Margin Available After Pension Bonds	14.31%
Est. Legal Debt Margin Available After Pension Bonds	\$2,004,028

Source: Marquette County Equalization Department & City of Ishpeming; Municipal Advisory Council of Michigan

*As authorized in section 117.49 of the Home Rule City (Act 279 of 1909). Represents state shared revenue of \$835,779 divided by the total City millage rate of 20.9309 x \$1,000

In order to provide a buffer for the variance in the market value of assets and/or updated actuarial liability valuation which may become available prior to the issuance of the bonds, the City has set a maximum not-to-exceed bond amount of \$12,000,000 to fund its pension obligation, which is within the City's legal debt capacity as shown above.

Proposed Bond Structure and Estimated Savings

Act 34 requires the debt service schedule for the bonds to not materially deviate from level or descending annual debt service. However, the City may take into account other municipal securities when determining the level annual debt service for the first 5 years of the issuance.

Act 34 also requires the projected net present value savings between the actuarially determined amortization payments at the plans investment rate of return, and the debt service requirements to be at least 15% of the par amount of the bonds, unless the Michigan Department of Treasury determines that it is in the financial best interest of the City. This minimum savings threshold could impact the size, structure and timing of the bonds.

The savings analyses provided herein compare the estimated payments the City will need to make if it issues bonds to fund the pension obligation to the maximum 95% level based on actuarial value of assets and market value of assets, versus those it is currently projected to make. If the City issues bonds, it will be responsible for the bond payments, the remaining UAL amortization payments (which will be required due to the remaining unfunded liability), and the normal cost. If the City does not issue pension bonds, it will be responsible for the full UAL amortization payments and the normal cost.

The analyses assume that the actuarial assumptions are accurate, including that the future rate of return is 7.35%. Appendix E includes comparative analysis at the lowered assumed rates of return of 6.35% and 5.35% (or 1% and 2% below the current rate of return assumption) for the options that assume the actuarial value of assets.

Analysis Using the Actuarial Value of Assets

Pension Analysis - Market Rates with 7.35% Discount Rate - Assuming Actuarial Value of Assets as of 12-31-2019							
Year Ending 12/31	UAL Payment (a)	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$952,007 UAL Remaining After Bonding (d)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 3.05% (e)
2021	\$813,000	-	\$609,750	\$18,495	\$628,245	\$184,755	\$182,928
2022	837,000	\$701,687	--	76,163	777,850	59,150	56,830
2023	863,000	705,829	--	78,528	784,357	78,643	73,320
2024	888,000	704,899	--	80,803	785,703	102,297	92,548
2025	915,000	702,578	--	83,260	785,838	129,162	113,390
2026	942,000	703,665	--	85,717	789,382	152,618	130,012
2027	971,000	703,212	--	88,356	791,568	179,432	148,326
2028	1,000,000	706,304	--	90,995	797,298	202,702	162,597
2029	1,030,000	703,177	--	93,724	796,902	233,098	181,440
2030	1,060,000	704,848	--	96,454	801,302	258,698	195,401
2031	1,090,000	705,600	--	99,184	804,784	285,216	209,049
2032	1,130,000	705,403	--	102,824	808,227	321,773	228,856
2033	1,160,000	704,227	--	105,554	809,781	350,219	241,708
2034	1,190,000	702,043	--	108,284	810,327	379,673	254,273
2035	1,230,000	703,742	--	111,923	815,665	414,335	269,266
2036	1,270,000	704,211	--	115,563	819,774	450,226	283,923
2037	1,300,000	703,013	--	118,293	821,306	478,694	292,932
2038	1,340,000	700,428	--	121,933	822,361	517,639	307,379
2039	1,380,000	706,982	--	125,573	832,554	547,446	315,448
2040	--	--	--	--	--	--	--
	\$20,409,000	\$12,671,848	\$609,750	\$1,801,625	\$15,083,223	\$5,325,777	\$3,739,625

- (a) Based on GRS Letter dated March 2, 2021; UAL Funded with Bond Proceeds: \$9,510,225
assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS Estimated Bond Amount: \$9,765,000
- (b) Estimate only based on estimated interest rates as of 5/11/2021 All-In TIC: 3.287%
plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service) NPV Savings as % of Principal: **38.30%**
- (c) Assumes 9 months of UAL payments will be made prior to the bonds being sold
- (d) Assumes \$9,510,225 payment towards UAL, leaving 9.10% of UAL payments remaining unfunded.
- (e) Represents Arbitrage Yield (including bond insurance)

Analysis Using the Market Value of Assets

Pension Analysis - Market Rates with 7.35% Discount Rate - Assuming Market Value of Assets as of 12-31-2019							
Year Ending 12/31	UAL Payment (a)	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$952,007 UAL Remaining After Bonding (d)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 3.05% (e)
2021	\$822,000	-	\$616,500	\$18,502	\$635,002	\$186,998	\$185,148
2022	847,000	\$710,252	--	76,259	786,511	60,489	58,116
2023	872,000	713,845	--	78,510	792,355	79,645	74,253
2024	898,000	712,850	--	80,851	793,701	104,299	94,356
2025	925,000	710,450	--	83,282	793,732	131,268	115,236
2026	953,000	711,443	--	85,803	797,245	155,755	132,681
2027	982,000	710,881	--	88,414	799,294	182,706	151,027
2028	1,010,000	713,851	--	90,935	804,786	205,214	164,607
2029	1,040,000	710,595	--	93,636	804,231	235,769	183,512
2030	1,070,000	712,137	--	96,337	808,474	261,526	197,528
2031	1,110,000	712,755	--	99,938	812,693	297,307	217,899
2032	1,140,000	712,419	--	102,639	815,059	324,941	231,096
2033	1,170,000	711,100	--	105,340	816,440	353,560	243,999
2034	1,210,000	713,691	--	108,942	822,633	387,367	259,409
2035	1,240,000	715,083	--	111,643	826,725	413,275	268,558
2036	1,280,000	715,234	--	115,244	830,478	449,522	283,457
2037	1,320,000	713,702	--	118,845	832,548	487,452	298,267
2038	1,360,000	710,773	--	122,447	833,220	526,780	312,780
2039	1,400,000	712,068	--	126,048	838,116	561,884	323,737
2040	--	--	--	--	--	--	--
	\$20,649,000	\$12,823,128	\$616,500	\$1,803,615	\$15,243,243	\$5,405,757	\$3,795,666

- (a) Based on GRS Letter dated March 2, 2021; UAL Funded with Bond Proceeds: \$9,621,803
assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS Estimated Bond Amount: \$9,880,000
- (b) Estimate only based on estimated interest rates as of 5/11/2021 All-In TIC: 3.283%
plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service) NPV Savings as % of Principal: **38.42%**
- (c) Assumes 9 months of UAL payments will be made prior to the bonds being sold
- (d) Assumes \$9,621,803 payment towards UAL, leaving 9.00% of UAL payments remaining unfunded.
- (e) Represents Arbitrage Yield (including bond insurance)

Based on the preceding analysis, the City has determined that it is financially beneficial to pursue the issuance of bonds to fund a portion of the pension obligation.

Acknowledgment of future Annual Required Contributions

Since the actuarial value of the defined benefit plan's assets and liabilities are subject to change, the City acknowledges that it is possible the unfunded accrued liability may increase after the issuance of the bonds, thereby requiring the City to make additional actuarially determined amortization payments to the defined benefit plan beyond the principal and interest payments due on the bonds.

For example, MERS reduced the rate of return assumption from 7.75% to 7.35% effective with the December 31, 2019 actuarial report. Additionally, as mentioned earlier, MERS adopted updated demographic assumptions effective with the December 31, 2020 annual actuarial valuation which will impact contributions beginning 2022. Therefore, depending on the actual plan experience, as well as any other assumption change, the actuarial determined liability, and associated unfunded actuarial liability may continue to increase if rate of return assumptions were to be reduced again in the future.

Impact on Changes of Rate of Return on Investments

The calculation determining the unfunded actuarial accrued liability is based upon, among other assumptions, a 7.35% future annual investment rate of return on the actuarial value of assets. If actual investment returns achieved are lower than 7.35% annually the result would be a higher liability. Likewise, if the actual rate of return achieved is higher than 7.35%, the result would be a lower liability. The table below summarizes the City's unfunded actuarial accrued liability under different rate of return assumptions using the actuarial value of assets as of December 31, 2019.

Assumed Future Annual Smoothed Rate of Investment Return			
12/31/2019 Valuation Results	7.35%	6.35%	5.35%
Accrued Liability	\$19,040,138	\$ 21,477,906	\$23,336,294
Valuation Assets ¹	8,466,328	8,466,328	8,466,328
Unfunded Accrued Liability	\$10,573,810	\$13,011,578	\$14,869,966
Funded Ratio Without Bonding	44%	39%	36%
Adjusted Unfunded Accrued Liability			
Net of Estimated Bond Proceeds ²	952,007	3,389,775	5,248,163
Adjusted Funded Ratio Net of Estimated Bond Proceeds²	95%	84%	78%

¹ Assumes Market Value of Assets as of 12/31/2019

² Assumes application of \$9,621,803 of bond proceeds

Source: GRS Letter dated March 2, 2021; assumes 2020 adopted demographic assumptions; assumes market value of assets

The City understands that the actual savings achieved depends on many factors, including future financial or demographic experience, including the actual investment rate of return earned and the interest rate received on the bonds. Below is a table showing the estimated savings on a Net Present Value (NPV) basis for different combinations of bond interest rates and future projected investment rates of return. If future rates of return are lower than the 7.35% projected rate, the City's annual required contributions will increase, and the savings will be lower than projected in the analysis provided earlier.

The estimated NPV savings shown below are projected assuming the City issues bonds at an amount to achieve a 95% funding level based on the market value of assets as of 12/31/2019. The scenarios assume current estimated bond interest rates and current interest rates plus and minus 0.50%, as well as the current actuarial assumed investment rate of return of 7.35% along with a 1% and 2% lower rate of return.

NPV Savings	Current Bond Interest Rates - 0.50%	Current Bond Interest Rates*	Current Bond Interest Rates + 0.50%
	NPV Savings \$	NPV Savings \$	NPV Savings \$
Expected Rate of Return (7.35%)	\$4,443,352	\$3,795,666	\$3,193,994
Exp. Rate of Return less 100 bps (6.35%)	\$3,270,830	\$2,678,620	\$2,128,866
Exp. Rate of Return less 200 bps (5.35%)	\$3,044,893	\$2,463,398	\$1,923,668

**Current Interest Rates reflect market conditions as of May 11, 2021 plus 0.50%; assumes use of bond insurance*

- Schedules based on market value of assets

Historical Rate of Returns on Investments

Below is a comparison of the current investment rate of return with the returns of the MERS system for the past one, five, ten, and fifteen years as of December 31, 2019, as well as the historical earning rates since 2010.

MERS Historical Rate of Returns	
Assumed Rate of Return:	7.35%
One Year Average (2019):	14.14%
Five Year Average (2015-2019):	6.86%
Ten Year Average (2010-2015):	8.41%
Fifteen Year Average (2005-2019):	7.04%

MERS Historical Rate of Returns	
Year	Rate of Return
2019	14.14%
2018	-3.51%
2017	13.40%
2016	11.10%
2015	-0.85%
2014	6.68%
2013	15.00%
2012	11.39%
2011	2.30%
2010	14.43%

Source: 2019 MERS-wide Actuarial Report:

<https://resources.mersofmich.com/SharePointFormsService/Default.aspx?Publication=YourPartnerRetirement.pdf>

DESCRIPTION OF ACTION REQUIRED TO MEET OBLIGATIONS

The City allocates pension costs to the various departments that receive benefits based on historical staff membership in the Plans. Similarly, the annual debt service for the Bonds to fund the pension obligations will be allocated proportionately to the departments that receive pension benefits. Revenue sources for the funds that will be allocated portions of the annual bond payments include annual operating levies, state shared revenues, utilities, and other sources of annual revenue.

The City Manager and Finance Director complete an annual budget by fund and present it to the City Council for approval. The budget also includes a five-year capital investment plan. The annual debt service amounts for each fund within the budget will be included in the annual budget process to be presented and approved by the City Council annually. The bonds to fund the pension obligations will carry the City's limited tax general obligation full faith and credit pledge; therefore, the annual debt service will be legally required to be part of the City's total budget.

PLAN COMPLIANCE

As outlined in Act 34, the Plan contains the following elements:

Section 518 Subsection	Description	Page # and/or Appendix
5a	The preparation, approval, and public posting of this Plan analyzing the funding of the City's retirement and post-employment health care benefit plans.	The entirety of the Plan
5b	Evidence that the debt issuance along with other funds will be sufficient to eliminate the unfunded pension and accrued post-employment health care liability.	Page 12
5c	Provide evidence that it has the legal debt capacity to issue the proposed bonds.	Page 13
5d	Debt service schedule level or descending	Page 15-16
5e	Projected net present value savings is at least 15% of the par amount of the bonds.	Page 15-16
5f	Comparison of the current rate of return assumption to the actual annual rate of returns for the past 1, 5 and 10 years.	Page 18
5g	Acknowledgement that the figures are subject to change which could result in additional payments.	Page 17
5h	Certification the City has funded its defined benefit plans' annual actuarially determined contribution for the most recently available three (3) audited financial statement years.	Page 5
5i	Certification that the City is compliant on reporting requirements pursuant to Protecting Local Government Retirement and Benefits Act Public Act 202 of 2017.	Page 10
5j	Certification that the Plan is complete and accurate.	Page 21

Act 34 also requires the Plan be prepared and made publicly available. Accordingly, the City has prepared this Plan, which has been approved by the City Council on May 18, 2021 and has been made available in the City's clerk office for public review. It has also been posted and made publicly available on the City's website at <https://ishpemingcity.org>.

CERTIFICATIONS

The City has prepared this Comprehensive Financial Plan for Pension Benefits as required under Act 34 for the issuance of limited tax general obligation bonds to fund pension liability. In preparing this plan, information has been obtained from the Municipal Employees Retirement System and its actuary, GRS, the City's Police and Fire Retirement System and its actuary, GRS, and PFM Financial Advisors LLC. The City believes the information provided by these firms to be reliable.

I certify the following:

- This Comprehensive Financial Plan is complete and accurate to the best of my knowledge and belief.
- The City's most recent audit report indicates the sum of all the City's defined benefit plans' actual contributions for the most recent 3 fiscal years are 100% or greater than the sum of all the City's defined benefit plans' actuarially determined contributions for the most recent 3 fiscal years.
- The City is compliant on any reporting requirements in accordance with the protecting local government retirement and benefits act, 2017 PA 202, MCL 38.2819.


James R. Lampman, CPA
Finance Director
City of Ishpeming

Dated: May 18, 2021



Appendix A: Municipal Employees
Retirement System of Michigan
Annual Actuarial Valuation Report
December 31, 2019



Municipal Employees' Retirement System of Michigan

Annual Actuarial Valuation Report
December 31, 2019 - Ishpeming, City of (5204)





Spring, 2020

Ishpeming, City of

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

This report presents the results of the Annual Actuarial Valuation, prepared for Ishpeming, City of (5204) 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. Ishpeming, City of is responsible for the employer contributions needed to provide MERS benefits for its employees and former employees.

The purposes of this valuation are to:

- Measure funding progress as of December 31, 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 Ishpeming, City of as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, with the Actuarial Standards of Practice issued by the Actuarial Standards Board, and with applicable statutes.

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

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



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

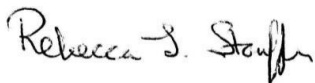
This report was prepared at the request of the MERS Retirement Board and may be provided only in its entirety by the municipality to other interested parties (MERS customarily provides the full report on request to associated third parties such as the auditor for the municipality). GRS is not responsible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

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

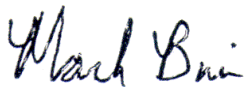
Sincerely,



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



Rebecca L. Stouffer, ASA, FCA, MAAA



Mark Buis, FSA, FCA, EA, MAAA



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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*	46%	48%

* 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 - CI & Pub Wks	47.71%	50.46%	47.25%	48.33%	\$ 47,794	\$ 50,548	\$ 41,989	\$ 42,946
10 - Supervisory excl City Mngr	48.60%	51.39%	46.42%	47.28%	9,497	10,043	8,644	8,805
11 - Union/Supervisor	137.17%	144.25%	126.42%	128.49%	16,737	17,601	15,144	15,392
Municipality Total					\$ 74,028	\$ 78,192	\$ 65,777	\$ 67,143

Employee contribution rates:

Valuation Date:	Employee Contribution Rate	
	12/31/2019	12/31/2018
Division		
01 - CI & Pub Wks	5.43%	5.43%
10 - Supervisory excl City Mngr	7.51%	7.51%
11 - Union/Supervisor	9.70%	9.70%

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 \$117,601, instead of \$78,192.

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 46% (instead of 46%); and
- Your total employer contribution requirement for the fiscal year starting January 1, 2021 would be \$947,484 (instead of \$938,304).

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.

12/31/2019 Valuation Results	Assumed Future Annual Smoothed Rate of Investment Return		
	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	\$ 23,336,294	\$ 19,040,138	\$ 18,581,947
Valuation Assets ¹	\$ 8,577,906	\$ 8,577,906	\$ 8,577,906
Unfunded Accrued Liability	\$ 14,758,388	\$ 10,462,232	\$ 10,004,041
Funded Ratio	37%	45%	46%
Monthly Normal Cost	\$ 26,014	\$ 12,630	\$ 13,239
Monthly Amortization Payment	\$ 81,660	\$ 68,114	\$ 64,953
Total Employer Contribution²	\$ 107,674	\$ 80,744	\$ 78,192

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.

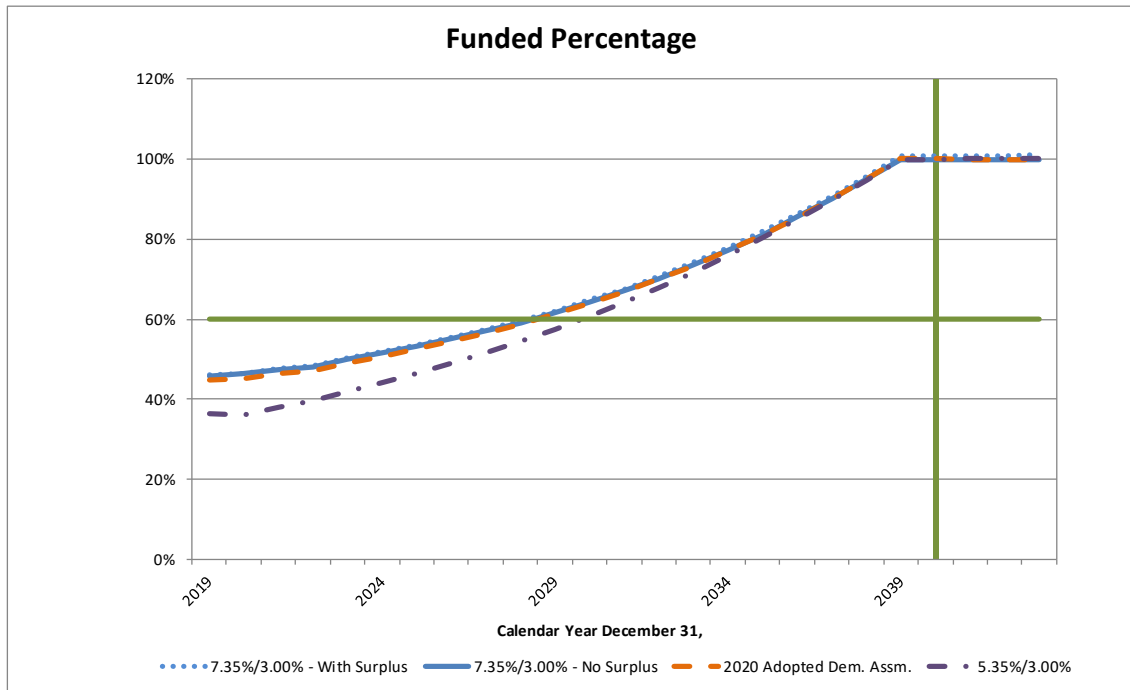


The Funded Percentage graph shows projections of funded status under the 7.35% investment return assumption, both including the Surplus assets (contributed as of the valuation date), and without the Surplus assets. The graph including the Surplus assets assumes these Surplus assets grow with interest 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	\$ 18,581,947	\$ 8,525,059	46%	\$ 938,304
2020	2022	\$ 18,900,000	\$ 8,750,000	46%	\$ 970,000
2021	2023	\$ 19,300,000	\$ 9,120,000	47%	\$ 1,000,000
2022	2024	\$ 19,600,000	\$ 9,450,000	48%	\$ 1,040,000
2023	2025	\$ 19,900,000	\$ 9,960,000	50%	\$ 1,070,000
2024	2026	\$ 20,200,000	\$ 10,400,000	52%	\$ 1,100,000
7.35%¹/3.00% - Adopted 2020 Demographic Assumptions					
NO 5-YEAR PHASE-IN					
2019	2021	\$ 19,040,138	\$ 8,525,059	45%	\$ 968,928
2020	2022	\$ 19,400,000	\$ 8,740,000	45%	\$ 1,000,000
2021	2023	\$ 19,800,000	\$ 9,150,000	46%	\$ 1,030,000
2022	2024	\$ 20,100,000	\$ 9,510,000	47%	\$ 1,080,000
2023	2025	\$ 20,500,000	\$ 10,100,000	49%	\$ 1,100,000
2024	2026	\$ 20,800,000	\$ 10,600,000	51%	\$ 1,130,000
5.35%¹/3.00% - Current Demographic Assumptions					
NO 5-YEAR PHASE-IN					
2019	2021	\$ 23,336,294	\$ 8,525,059	37%	\$ 1,292,088
2020	2022	\$ 23,700,000	\$ 8,590,000	36%	\$ 1,340,000
2021	2023	\$ 24,100,000	\$ 9,160,000	38%	\$ 1,390,000
2022	2024	\$ 24,500,000	\$ 9,690,000	40%	\$ 1,440,000
2023	2025	\$ 24,900,000	\$ 10,400,000	42%	\$ 1,480,000
2024	2026	\$ 25,300,000	\$ 11,200,000	44%	\$ 1,520,000

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.

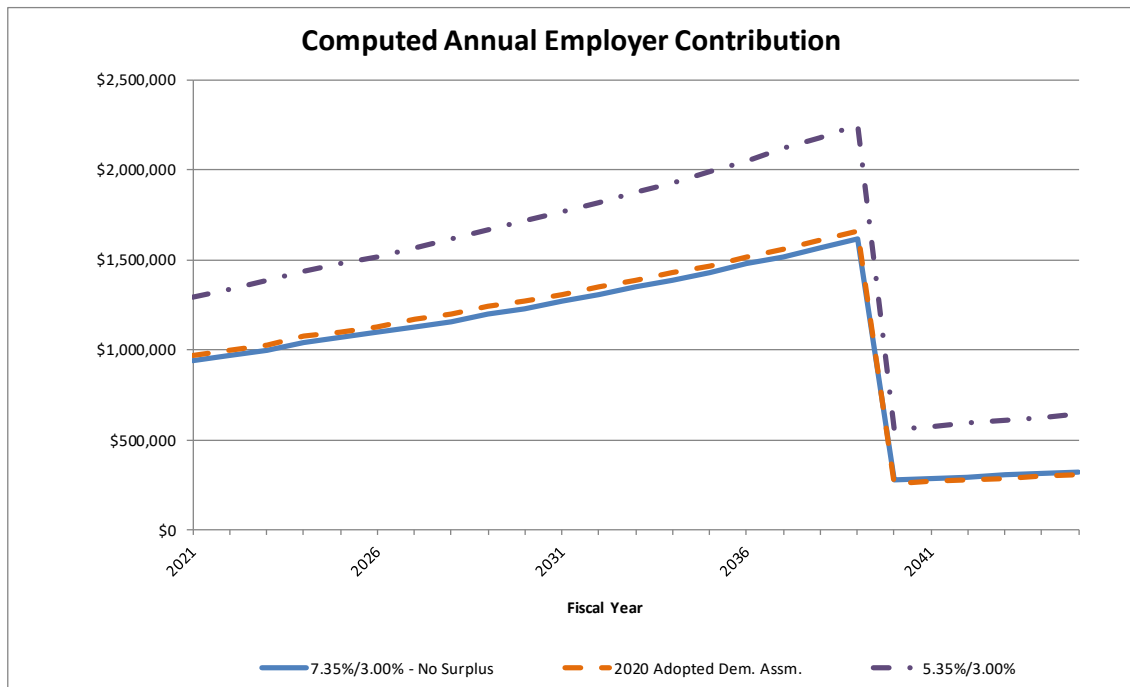


Notes:

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			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 - CI & Pub Wks	15.69%	5.43%	10.26%	40.20%	50.46%	47.71%			0.85%
10 - Supervisory excl City Mngr	18.43%	7.51%	10.92%	40.47%	51.39%	48.60%			0.90%
11 - Union/Supervisor	16.47%	9.70%	6.77%	137.48%	144.25%	137.17%			0.67%
Estimated Monthly Contribution³									
01 - CI & Pub Wks			\$ 10,279	\$ 40,269	\$ 50,548	\$ 47,794			
10 - Supervisory excl City Mngr			2,134	7,909	10,043	9,497			
11 - Union/Supervisor			826	16,775	17,601	16,737			
Total Municipality			\$ 13,239	\$ 64,953	\$ 78,192	\$ 74,028			
Estimated Annual Contribution³			\$ 158,868	\$ 779,436	\$ 938,304	\$ 888,336			

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 - CI & Pub Wks: Open Division

	2019 Valuation	2018 Valuation
Benefit Multiplier:	2.50% Multiplier (80% max)	2.50% Multiplier (80% max)
Normal Retirement Age:	60	60
Vesting:	10 years	10 years
Early Retirement (Unreduced):	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:	5.43%	5.43%
Act 88:	Yes (Adopted 2/3/1965)	Yes (Adopted 2/3/1965)

10 - Supervisory excl City Mngr: Open Division

	2019 Valuation	2018 Valuation
Benefit Multiplier:	2.50% Multiplier (80% max)	2.50% Multiplier (80% max)
Normal Retirement Age:	60	60
Vesting:	10 years	10 years
Early Retirement (Unreduced):	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:	7.51%	7.51%
Act 88:	Yes (Adopted 2/3/1965)	Yes (Adopted 2/3/1965)

11 - Union/Supervisor: Open Division

	2019 Valuation	2018 Valuation
Benefit Multiplier:	2.50% Multiplier (80% max)	2.50% Multiplier (80% max)
Normal Retirement Age:	60	60
Vesting:	10 years	10 years
Early Retirement (Unreduced):	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:	9.70%	9.70%
Act 88:	Yes (Adopted 2/3/1965)	Yes (Adopted 2/3/1965)

Table 3: Participant Summary

Division	2019 Valuation		2018 Valuation		2019 Valuation		
	Number	Annual Payroll ¹	Number	Annual Payroll ¹	Average Age	Average Benefit Service ²	Average Eligibility Service ²
01 - CI & Pub Wks							
Active Employees	22	\$ 1,133,189	20	\$ 990,554	42.9	8.6	8.7
Vested Former Employees	3	29,187	3	29,187	55.4	13.4	13.4
Retirees and Beneficiaries	32	762,664	33	754,293	68.1		
Pending Refunds	5		6				
10 - Supervisory excl City Mngr							
Active Employees	4	\$ 221,033	4	\$ 207,624	46.8	6.9	14.3
Vested Former Employees	1	15,278	1	15,278	55.0	12.8	12.8
Retirees and Beneficiaries	5	148,088	5	145,215	69.1		
Pending Refunds	1		1				
11 - Union/Supervisor							
Active Employees	2	\$ 138,019	2	\$ 133,551	44.3	18.8	18.8
Vested Former Employees	0	0	0	0	0.0	0.0	0.0
Retirees and Beneficiaries	5	243,675	5	239,073	71.9		
Pending Refunds	2		2				
Total Municipality							
Active Employees	28	\$ 1,492,241	26	\$ 1,331,729	43.6	9.1	10.2
Vested Former Employees	4	44,465	4	44,465	55.3	13.3	13.3
Retirees and Beneficiaries	42	1,154,427	43	1,138,581	68.7		
Pending Refunds	8		9				
Total Participants	82		82				

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 - CI & Pub Wks	\$ 5,675,055	\$ 581,563	\$ 5,221,439	\$ 518,884
10 - Supervisory excl City Mngr	936,627	193,850	772,360	164,930
11 - Union/Supervisor	873,932	153,141	854,219	137,566
S1 - Surplus Unassociated	52,159	0	0	0
Municipality Total³	\$ 7,537,774	\$ 928,554	\$ 6,848,017	\$ 821,380
Combined Assets³	\$8,466,328		\$7,669,397	

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		Employee Contributions	Investment Income (Valuation Assets)	Benefit Payments	Employee Contribution Refunds	Net Transfers	Valuation Asset Balance
	Required	Additional						
2009	\$ 263,784		\$ 80,260	\$ 321,748	\$ (600,181)	\$ (2,631)	\$ 0	\$ 7,993,332
2010	259,506		75,200	371,287	(693,308)	(11,267)	0	7,994,750
2011	299,347	\$ 0	74,740	374,965	(703,888)	(1,668)	0	8,038,246
2012	324,447	0	73,165	335,569	(737,677)	0	0	8,033,750
2013	348,394	0	72,379	466,153	(850,915)	(2,807)	146,117	8,213,071
2014	436,888	0	72,136	453,634	(871,432)	(27,711)	0	8,276,586
2015	474,038	437	73,403	393,655	(896,652)	0	0	8,321,467
2016	537,664	0	78,625	419,385	(969,634)	(159)	63,324	8,450,672
2017	565,838	0	81,313	494,952	(1,014,200)	(205)	0	8,578,370
2018	601,641	0	81,804	302,486	(1,100,447)	(63,241)	0	8,400,613
2019	774,571	51,380	99,951	391,455	(1,134,067)	(5,997)	0	8,577,906

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 - CI & Pub Wks	\$ 2,791,934	\$ 286,199	\$ 9,443,740	\$ 45,787	\$ 12,567,660	\$ 6,339,074	50.4%	\$ 6,228,586
10 - Supervisory excl City Mngr	405,869	142,600	1,824,598	131	2,373,198	1,145,376	48.3%	1,227,822
11 - Union/Supervisor	880,115	0	2,729,743	31,231	3,641,089	1,040,609	28.6%	2,600,480
S1 - Surplus Unassociated	0	0	0	0	0	52,847		(52,847)
Total	\$ 4,077,918	\$ 428,799	\$ 13,998,081	\$ 77,149	\$ 18,581,947	\$ 8,577,906	46.2%	\$ 10,004,041

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	\$ 9,752,385	\$ 7,115,352	73%	\$ 2,637,033
2006	10,228,720	7,416,851	73%	2,811,869
2007	10,703,233	7,839,665	73%	2,863,568
2008	10,962,099	7,930,352	72%	3,031,747
2009	11,662,905	7,993,332	69%	3,669,573
2010	12,141,837	7,994,750	66%	4,147,087
2011	12,502,771	8,038,246	64%	4,464,525
2012	13,181,663	8,033,750	61%	5,147,913
2013	14,130,225	8,213,071	58%	5,917,154
2014	14,620,546	8,276,586	57%	6,343,960
2015	15,611,063	8,321,467	53%	7,289,596
2016	16,336,081	8,450,672	52%	7,885,409
2017	16,797,445	8,578,370	51%	8,219,075
2018	17,461,749	8,400,613	48%	9,061,136
2019	18,581,947	8,577,906	46%	10,004,041

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 - CI & Pub Wks

Table 8-01: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2009	\$ 7,662,800	\$ 5,715,386	75%	\$ 1,947,414
2010	8,056,702	5,769,152	72%	2,287,550
2011	8,327,239	5,834,749	70%	2,492,490
2012	8,940,944	5,864,361	66%	3,076,583
2013	9,699,172	6,089,521	63%	3,609,651
2014	10,153,064	6,239,508	62%	3,913,556
2015	10,843,248	6,372,460	59%	4,470,788
2016	11,400,368	6,487,579	57%	4,912,789
2017	11,759,682	6,645,941	57%	5,113,741
2018	11,823,261	6,287,616	53%	5,535,645
2019	12,567,660	6,339,074	50%	6,228,586

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	27	\$ 1,030,435	19.15%	5.35%
2010	26	974,435	21.93%	5.35%
2011	25	962,946	23.41%	5.35%
2012	21	814,207	32.27%	5.35%
2013	21	908,584	33.34%	5.35%
2014	21	954,341	34.15%	5.35%
2015	23	981,416	38.82%	5.35%
2016	22	1,020,466	41.08%	5.39%
2017	22	1,019,173	43.15%	5.41%
2018	20	990,554	48.33%	5.43%
2019	22	1,133,189	50.46%	5.43%

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.

Division 10 - Supervisory excl City Mngr

Table 8-10: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2009	\$ 1,530,898	\$ 965,001	63%	\$ 565,897
2010	1,580,372	972,897	62%	607,475
2011	1,624,630	978,690	60%	645,940
2012	1,663,787	983,287	59%	680,500
2013	1,785,010	982,442	55%	802,568
2014	1,779,448	965,556	54%	813,892
2015	1,911,981	945,159	49%	966,822
2016	2,045,814	1,014,223	50%	1,031,591
2017	2,100,476	1,025,399	49%	1,075,077
2018	2,176,602	1,026,654	47%	1,149,948
2019	2,373,198	1,145,376	48%	1,227,822

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	3	\$ 91,569	39.82%	7.51%
2010	2	93,178	41.89%	7.51%
2011	2	94,216	44.42%	7.51%
2012	2	96,402	49.10%	7.51%
2013	3	133,010	42.23%	7.51%
2014	3	126,587	48.33%	7.51%
2015	3	125,208	58.63%	7.51%
2016	3	146,324	55.09%	7.51%
2017	3	152,427	56.30%	7.51%
2018	4	207,624	47.28%	7.51%
2019	4	221,033	51.39%	7.51%

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.

Division 11 - Union/Supervisor

Table 8-11: Actuarial Accrued Liabilities - Comparative Schedule

Valuation Date December 31	Actuarial Accrued Liability	Valuation Assets	Percent Funded	Unfunded (Overfunded) Accrued Liabilities
2009	\$ 2,469,207	\$ 1,312,945	53%	\$ 1,156,262
2010	2,504,763	1,252,701	50%	1,252,062
2011	2,550,902	1,224,807	48%	1,326,095
2012	2,576,932	1,186,102	46%	1,390,830
2013	2,646,043	1,141,108	43%	1,504,935
2014	2,688,034	1,071,522	40%	1,616,512
2015	2,855,834	1,003,848	35%	1,851,986
2016	2,889,899	948,870	33%	1,941,029
2017	2,937,287	907,030	31%	2,030,257
2018	3,461,886	1,086,343	31%	2,375,543
2019	3,641,089	1,040,609	29%	2,600,480

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	3	\$ 150,930	46.79%	9.70%
2010	3	153,586	48.75%	9.70%
2011	3	139,595	57.12%	9.70%
2012	3	157,567	57.60%	9.70%
2013	2	123,399	79.18%	9.70%
2014	2	114,846	90.21%	9.70%
2015	2	123,266	100.22%	9.70%
2016	2	129,267	102.25%	9.70%
2017	2	140,820	101.08%	9.70%
2018	2	133,551	128.49%	9.70%
2019	2	138,019	144.25%	9.70%

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.

Division S1 - Surplus Unassociated

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	0		0
2019	0	52,847		(52,847)

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 - CI & Pub Wks

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	\$ 4,470,788	23	\$ 4,665,050	19	\$ 359,760
(Gain)/Loss	12/31/2016	349,127	22	381,229	19	29,400
Amendment	12/31/2016	(222)	22	(247)	19	(24)
(Gain)/Loss	12/31/2017	134,615	21	146,014	19	11,256
Amendment	12/31/2017	(123)	21	(129)	19	(12)
(Gain)/Loss	12/31/2018	378,510	20	408,716	19	31,524
Amendment	12/31/2018	(282)	20	(303)	19	(24)
(Gain)/Loss	12/31/2019	216,534	19	232,449	19	17,928
Assumption	12/31/2019	424,558	19	433,329	19	33,420
Total				\$ 6,266,108		\$ 483,228

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 10 - Supervisory excl City Mngr

Table 10-10: 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	\$ 966,822	23	\$ 1,011,903	19	\$ 78,036
(Gain)/Loss	12/31/2016	41,627	22	45,464	19	3,504
(Gain)/Loss	12/31/2017	31,722	21	34,407	19	2,652
(Gain)/Loss	12/31/2018	65,440	20	70,657	19	5,448
(Gain)/Loss	12/31/2019	(11,844)	19	(12,714)	19	(984)
Assumption	12/31/2019	79,680	19	81,106	19	6,252
Total				\$ 1,230,823		\$ 94,908

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 11 - Union/Supervisor

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	\$ 1,851,986	23	\$ 1,925,566	19	\$ 148,500
(Gain)/Loss	12/31/2016	57,207	22	62,465	19	4,812
(Gain)/Loss	12/31/2017	68,535	21	74,328	19	5,736
(Gain)/Loss	12/31/2018	326,869	20	352,946	19	27,216
(Gain)/Loss	12/31/2019	72,337	19	77,654	19	5,988
Assumption	12/31/2019	118,278	19	117,380	19	9,048
Total				\$ 2,610,339		\$ 201,300

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:	42
Inactive employees entitled to but not yet receiving benefits (including refunds):	12
Active employees:	<u>28</u>
	82
Total Pension Liability as of 12/31/2018 measurement date:	\$ 17,020,787
Total Pension Liability as of 12/31/2019 measurement date:	\$ 18,101,753
Service Cost for the year ending on the 12/31/2019 measurement date:	\$ 226,076
Change in the Total Pension Liability due to:	
- Benefit changes ¹ :	\$ 0
- Differences between expected and actual experience ² :	\$ 75,324
- Changes in assumptions ² :	\$ 594,526
Average expected remaining service lives of all employees (active and inactive):	3

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)	\$ 1,492,241
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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:	\$ 2,057,637	\$ -	\$ (1,721,878)

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:	42
Inactive employees entitled to but not yet receiving benefits (including refunds):	12
Active employees:	<u>28</u>
	82

Total Pension Liability as of 12/31/2019 measurement date:	\$	17,303,930
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Total Pension Liability as of 12/31/2020 measurement date:	\$	18,404,398
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Service Cost for the year ending on the 12/31/2020 measurement date:	\$	235,763
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Change in the Total Pension Liability due to:

- Benefit changes ¹ :	\$	0
- Differences between expected and actual experience ² :	\$	219,561
- Changes in assumptions ² :	\$	571,248

Average expected remaining service lives of all employees (active and inactive):	3
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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)	\$	1,492,241
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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:	\$ 2,078,823	\$ -	\$ (1,740,550)

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 - CI & Pub Wks

1/1/2019	Participant Contribution Rate 5.43%
1/1/2018	Participant Contribution Rate 5.41%
1/1/2017	Participant Contribution Rate 5.39%
12/1/2016	Service Credit Purchase Estimates - Yes
1/1/2008	E 2% COLA Adopted (01/01/2008)
1/1/2006	E 2% COLA Adopted (01/01/2006)
1/1/2005	E 2% COLA Adopted (01/01/2005)
1/1/2003	Benefit FAC-3 (3 Year Final Average Compensation)
1/1/2003	E 2% COLA Adopted (01/01/2003)
1/1/2002	Benefit B-4 (80% max)
1/1/2002	E 2% COLA Adopted (01/01/2002)
1/1/2001	E 2% COLA Adopted (01/01/2001)
1/1/2001	E2 2.5% COLA for future retirees (01/01/1996)
1/1/2000	Benefit B-3 (80% max)
1/1/2000	Member Contribution Rate 5.35%
1/1/2000	E 2% COLA Adopted (01/01/2000)
1/1/2000	E2 2% COLA for future retirees (01/01/1996)
1/1/1999	Flexible E 2% COLA Adopted (01/01/1999)
1/1/1999	E2 2.3% COLA for future retirees (01/01/1996)
1/1/1998	E 2% COLA Adopted (01/01/1998)
1/1/1996	Benefit F50 (With 25 Years of Service)
1/1/1996	E2 2.5% COLA for future retirees (01/01/1996)
1/1/1995	E 2% COLA Adopted (01/01/1995)
12/1/1994	Temporary Benefit F55 (With 20 Years of Service) (12/01/1994 - 02/01/1995)
1/1/1993	Benefit C-2/Base B-1
7/1/1992	Temporary Benefit C-2/Base B-1 (07/01/1992 - 10/03/1992)
2/20/1985	Exclude Temporary Employees
1/1/1985	E 2% COLA Adopted (01/01/1985)
1/1/1983	E 2% COLA Adopted (01/01/1983)
1/1/1982	E 2% COLA Adopted (01/01/1982)
1/1/1981	E 2% COLA Adopted (01/01/1981)
1/1/1975	Benefit F55 (With 25 Years of Service)
1/1/1970	10 Year Vesting
1/1/1970	Benefit C-1 (Old)
1/1/1970	Fiscal Month - January
2/3/1965	Covered by Act 88
1/1/1958	Benefit FAC-5 (5 Year Final Average Compensation)
1/1/1958	Member Contribution Rate 3.00% Under \$4,200.00 - Then 5.00%
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

10 - Supervisory excl City Mngr

12/1/2016	Service Credit Purchase Estimates - Yes
1/1/2006	E 2% COLA Adopted (01/01/2006)
1/1/2003	Benefit FAC-3 (3 Year Final Average Compensation)
1/1/2003	E 2% COLA Adopted (01/01/2003)
1/1/2002	E 2% COLA Adopted (01/01/2002)
1/1/2001	E 2% COLA Adopted (01/01/2001)
1/1/2001	E2 2.5% COLA for future retirees (01/01/1996)
5/1/2000	Benefit B-4 (80% max)
5/1/2000	Member Contribution Rate 7.51%
1/1/2000	E 2% COLA Adopted (01/01/2000)
1/1/2000	E2 2% COLA for future retirees (01/01/1996)
1/1/1999	Flexible E 2% COLA Adopted (01/01/1999)
1/1/1999	E2 2.3% COLA for future retirees (01/01/1996)
1/1/1998	E 2% COLA Adopted (01/01/1998)
1/1/1996	Benefit F50 (With 25 Years of Service)
1/1/1996	E2 2.5% COLA for future retirees (01/01/1996)
1/1/1995	E 2% COLA Adopted (01/01/1995)
1/1/1993	Benefit B-2
1/1/1993	Benefit F55 (With 25 Years of Service)
10/3/1992	Benefit C-1 (Old)
10/1/1992	Benefit FAC-5 (5 Year Final Average Compensation)
10/1/1992	Member Contribution Rate 3.00% Under \$4,200.00 - Then 5.00%
2/20/1985	Exclude Temporary Employees
12/1/1970	10 Year Vesting
1/1/1970	Fiscal Month - January
2/3/1965	Covered by Act 88
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

11 - Union/Supervisor

12/1/2016	Service Credit Purchase Estimates - Yes
1/1/2006	E 2% COLA Adopted (01/01/2006)
1/1/2003	Benefit FAC-3 (3 Year Final Average Compensation)
1/1/2003	E 2% COLA Adopted (01/01/2003)
3/1/2002	Temporary Benefit FAC-3 (3 Year Final Average Compensation) (03/01/2002 - 09/03/2002)
5/1/2000	Benefit FAC-5 (5 Year Final Average Compensation)
5/1/2000	10 Year Vesting
5/1/2000	Benefit B-4 (80% max)
5/1/2000	Benefit F50 (With 25 Years of Service)
5/1/2000	Member Contribution Rate 9.70%
1/1/1996	E2 2.5% COLA for future retirees (01/01/1996)
1/1/1970	Fiscal Month - January
2/3/1965	Covered by Act 88
	Defined Benefit Normal Retirement Age - 60
	Early Reduced (.5%) at Age 50 with 25 Years or Age 55 with 15 Years

S1 - Surplus Unassociated

1/1/1970	Fiscal Month - January
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Plan Provisions, Actuarial Assumptions, and Actuarial Funding Method

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

Increase in Final Average Compensation

Division	FAC Increase Assumption
All Divisions	4.00%

Withdrawal Rate Scaling Factor

Division	Withdrawal Rate Scaling Factor
All Divisions	100%

Miscellaneous and Technical Assumptions

Loads – None.

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:

	<u>12/31/2019</u>	<u>12/31/2018</u>
1. Ratio of the market value of assets to total payroll	5.7	5.8
2. Ratio of actuarial accrued liability to payroll	12.5	13.1
3. Ratio of actives to retirees and beneficiaries	0.7	0.6
4. Ratio of market value of assets to benefit payments	7.4	6.6
5. Ratio of net cash flow to market value of assets (boy)	-2.8%	-5.7%

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	28
12	Indicate number of inactive members (excluding pending refunds)	4
13	Indicate number of retirees and beneficiaries	42
14	Investment Performance for Calendar Year Ending December 31, 2019¹	
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	\$8,528,225
25	Enter retirement pension system's actuarial accrued liabilities using uniform assumptions	\$19,798,669
27	Actuarially Determined Contribution (ADC) using uniform assumptions, Fiscal Year Ending December 31, 2020	\$1,016,688

- 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."



Appendix B: GRS Supplemental Valuation – Amortization Payments Projection and Market Value Reports



March 2, 2021

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

Re: Ishpeming, City of (5204) – All Divisions – Projections of Amortization Payment of Unfunded Accrued Liability

The purpose of this letter is to illustrate the pattern of the annual amortization payments to fund the Unfunded Accrued Liability (UAL) as of December 31, 2019, under the amortization policy which would be followed. The results are calculated using a 7.35%, 6.35% and 5.35% return assumption, all with a 3.00% wage inflation assumption for analysis of application requests to issue Long-Term Securities under PA 575 of 2018. This legislation limits the amount of Unfunded Accrued Liability available for bonding. We recommend consultation with your bond consultant and legal counsel to ensure compliance with this legislation. The report shows these amortization payments of the UAL calculated using both the actuarial value and market value of assets. The report consists of separate sections containing the following additional detail.

- An executive summary that provides a brief explanation of the results.
- Results sections illustrating the pattern in annual amortization payments under the three alternate interest rate scenarios and both the market and actuarial valuation of assets.

This report was prepared at the request of MERS on behalf of the municipality and is intended for use by the municipality and those designated or approved by the municipality. **The report may be provided to parties other than the municipality only in its entirety.** GRS is not responsible for unauthorized use of this report.

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 valuation was based upon information furnished by MERS staff, concerning Retirement System benefits, financial transactions, plan provisions and active members, terminated members, retirees and beneficiaries. We checked for internal reasonability, but did not audit the data. We are not responsible for the accuracy or completeness of the information provided by the municipality and MERS staff.

The estimates from this study should not be used for short term budgeting purposes because the assumptions are designed to be a long-term expectation of future events. These estimates illustrate the long-term pattern of amortization payments under different funding policies. A projection of contribution rates for budgeting purposes would require additional analysis, which is beyond the scope of this study.

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.

The 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. This report was prepared using certain assumptions approved by the Board. The MERS Board adopted the actuarial assumptions based on the recommendations of both the current and prior actuary. A description of these assumptions and methods can be found as follows:

- Plan Document, v04302020,
- Actuarial Policy, DOC 8062 (2020-06-25), and
- 2019 Appendix to the Annual Actuarial Valuation Report.

On February 27, 2020, the Board adopted new demographic assumptions for use beginning with the December 31, 2020 annual valuation report. These assumptions include a version of the Pub-2010 mortality tables and fully generational mortality improvements with scale MP-2019. Changes resulting from these studies will have an impact on the level of calculated employer contributions. The 2020 Demographic Assumptions were used in the report.

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 the municipality as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices and in conformity with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

David T. Kausch and Kurt Dosson are Members of the American Academy of Actuaries (MAAA) and meet the Academy's Qualification Standards to render the actuarial opinions contained herein.

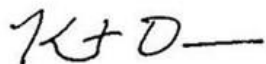
The signing actuaries are independent of the plan sponsor.

If you have any questions or need additional information, please contact your MERS representative at 800-767-MERS.

Sincerely,



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



Kurt Dosson, ASA, MAAA



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Executive Summary

A discussion of pension obligation bonds is beyond the scope of this letter. However, it is important for the employer to understand and acknowledge the following implications of funding the UAL using pension obligation bonds:

1. **The employer will continue to be responsible for funding the employer normal cost as long as there are active members in the plan,**
2. **If future financial or demographic experience is less favorable than assumed, additional UAL may emerge which would require additional employer contributions, and**
3. **Fully funding the current UAL does not guarantee that there will be no employer contribution requirements in the future.**

This actuarial report was not developed for purposes of bond disclosures and may not be appropriate for that purpose. It is possible that we may have included material that is not appropriate to the situation, or that we may have omitted material that is appropriate or even required. We do not accept responsibility for errors in the bond disclosure even if such errors are directly related to the services we have performed. We are not registered municipal advisors with the SEC.

Our calculations were based on the following:

- Demographic information, financial information, benefit provisions and funding methods provided by MERS for the December 31, 2019 annual actuarial valuation, except where otherwise noted.
- Assumption sets, without any phase-in of the impact of assumption changes:
 - Investment Rate of Return/Wage Inflation/Demographic Assumptions:
 - 7.35%/3.00%/2020 Demographic Assumptions,
 - 6.35%/3.00%/2020 Demographic Assumptions, and
 - 5.35%/3.00%/2020 Demographic Assumptions.
- The employer contributions through December 31, 2020 are not affected, and are based on previous annual actuarial valuations.
- No bonding proceeds are incorporated as part of the calculations. Beginning asset values are those used in the December 31, 2019 actuarial valuation.
- As requested by MERS, all assets from the surplus division S1 were transferred to Division 11 in all exhibits in this report.

As always, the MERS actuaries will closely watch the funding progress of all divisions. The actuaries may recommend changes to the amortization policy in the future if they deem it necessary for the financial security of benefits provided by the municipality, which could result in more accelerated employer contributions than those shown in this report.

Issuance of a POB may affect the risk profile of the Plan. Contribution of POB bond proceeds to the plan improves the funded status of the Plan, and also increases the potential for contribution volatility in future annual actuarial valuation reports. At this time, we do not believe additional risk assessment is necessary. Plan maturity risk metrics will be updated in future annual actuarial valuation reports.

We projected the annual amortization payments, starting with the amortization periods in effect for the calendar year beginning January 1, 2020, under the amortization policies available for each division as in effect for the December 31, 2019 annual actuarial valuation. **Any normal cost payments are in addition to the amortization payment, and are not affected by the amortization policy used.**

These results are for illustration purposes only. Actual amortization payments will depend on the results of future annual actuarial valuations.



Ishpeming, City of (5204)
Supplemental Valuation Results – All Divisions

Projected Amortization Payments
Based on December 31, 2019 Actuarial Valuation Data
Using 7.35% Interest Rate, 3.00% Wage Inflation, and 2020 Demographic
Assumptions*

Calendar Year Beginning January 1,	Based on the Actuarial Value of Assets		Based on the Market Value of Assets	
	Beginning of Year UAL Balance	Amortization Payment	Beginning of Year UAL Balance	Amortization Payment
2020	\$10,500,000	\$665,000	\$10,600,000	\$665,000
2021	10,500,000	813,000	10,700,000	822,000
2022	10,500,000	837,000	10,600,000	847,000
2023	10,400,000	863,000	10,500,000	872,000
2024	10,200,000	888,000	10,400,000	898,000
2025	10,100,000	915,000	10,200,000	925,000
2026	9,870,000	942,000	9,980,000	953,000
2027	9,620,000	971,000	9,730,000	982,000
2028	9,320,000	1,000,000	9,430,000	1,010,000
2029	8,970,000	1,030,000	9,070,000	1,040,000
2030	8,560,000	1,060,000	8,660,000	1,070,000
2031	8,090,000	1,090,000	8,180,000	1,110,000
2032	7,550,000	1,130,000	7,640,000	1,140,000
2033	6,940,000	1,160,000	7,020,000	1,170,000
2034	6,250,000	1,190,000	6,320,000	1,210,000
2035	5,470,000	1,230,000	5,540,000	1,240,000
2036	4,600,000	1,270,000	4,650,000	1,280,000
2037	3,630,000	1,300,000	3,670,000	1,320,000
2038	2,540,000	1,340,000	2,570,000	1,360,000
2039	1,340,000	1,380,000	1,350,000	1,400,000

* The amortization schedules shown above assume all actuarial assumptions are met in future years, including actuarial and market rates of return at the stated interest rate.

Ishpeming, City of (5204)
Supplemental Valuation Results – All Divisions

Projected Amortization Payments
Based on December 31, 2019 Actuarial Valuation Data
Using 6.35% Interest Rate, 3.00% Wage Inflation, and 2020 Demographic
Assumptions*

Calendar Year Beginning January 1,	Based on the Actuarial Value of Assets		Based on the Market Value of Assets	
	Beginning of Year UAL Balance	Amortization Payment	Beginning of Year UAL Balance	Amortization Payment
2020	\$12,800,000	\$665,000	\$12,900,000	\$665,000
2021	12,900,000	920,000	13,000,000	928,000
2022	12,800,000	947,000	12,900,000	956,000
2023	12,600,000	976,000	12,700,000	985,000
2024	12,400,000	1,000,000	12,500,000	1,010,000
2025	12,200,000	1,040,000	12,300,000	1,040,000
2026	11,900,000	1,070,000	12,000,000	1,080,000
2027	11,500,000	1,100,000	11,600,000	1,110,000
2028	11,100,000	1,130,000	11,200,000	1,140,000
2029	10,600,000	1,160,000	10,700,000	1,180,000
2030	10,100,000	1,200,000	10,200,000	1,210,000
2031	9,520,000	1,240,000	9,610,000	1,250,000
2032	8,850,000	1,270,000	8,940,000	1,280,000
2033	8,100,000	1,310,000	8,180,000	1,320,000
2034	7,270,000	1,350,000	7,330,000	1,360,000
2035	6,330,000	1,390,000	6,390,000	1,400,000
2036	5,300,000	1,430,000	5,350,000	1,450,000
2037	4,160,000	1,480,000	4,200,000	1,490,000
2038	2,900,000	1,520,000	2,930,000	1,530,000
2039	1,520,000	1,570,000	1,530,000	1,580,000

* The amortization schedules shown above assume all actuarial assumptions are met in future years, including actuarial and market rates of return at the stated interest rate.

Ishpeming, City of (5204)
Supplemental Valuation Results – All Divisions

Projected Amortization Payments
Based on December 31, 2019 Actuarial Valuation Data
Using 5.35% Interest Rate, 3.00% Wage Inflation, and 2020 Demographic
Assumptions*

Calendar Year Beginning January 1,	Based on the Actuarial Value of Assets		Based on the Market Value of Assets	
	Beginning of Year UAL Balance	Amortization Payment	Beginning of Year UAL Balance	Amortization Payment
2020	\$15,600,000	\$665,000	\$15,700,000	\$665,000
2021	15,800,000	1,030,000	15,900,000	1,040,000
2022	15,500,000	1,070,000	15,600,000	1,070,000
2023	15,300,000	1,100,000	15,400,000	1,110,000
2024	15,000,000	1,130,000	15,100,000	1,140,000
2025	14,600,000	1,160,000	14,700,000	1,170,000
2026	14,200,000	1,200,000	14,300,000	1,210,000
2027	13,700,000	1,240,000	13,800,000	1,240,000
2028	13,200,000	1,270,000	13,300,000	1,280,000
2029	12,600,000	1,310,000	12,700,000	1,320,000
2030	11,900,000	1,350,000	12,000,000	1,360,000
2031	11,200,000	1,390,000	11,200,000	1,400,000
2032	10,300,000	1,430,000	10,400,000	1,440,000
2033	9,410,000	1,470,000	9,480,000	1,490,000
2034	8,400,000	1,520,000	8,460,000	1,530,000
2035	7,290,000	1,560,000	7,340,000	1,580,000
2036	6,070,000	1,610,000	6,120,000	1,620,000
2037	4,740,000	1,660,000	4,780,000	1,670,000
2038	3,290,000	1,710,000	3,320,000	1,720,000
2039	1,720,000	1,760,000	1,730,000	1,770,000

* The amortization schedules shown above assume all actuarial assumptions are met in future years, including actuarial and market rates of return at the stated interest rate.

Important Comments

1. The actuarial value of assets used to determine both the funded ratio and the required employer contribution is based on a smoothed value of assets. Only a portion of each year's investment market gain or loss is recognized in the current actuarial value of assets; the remaining portions of gains and losses will be reflected in future years' actuarial value of assets. This reduces the asset volatility impact on the determined required employer contribution and funded ratio. The smoothed actuarial rate of return for 2019 was 4.77%.

As of December 31, 2019, the actuarial value of assets is 101% of market value. This means that there is a net outstanding asset loss that is not yet recognized in the actuarial value of assets. Absent future asset gains offsetting the net outstanding asset loss, the net outstanding asset loss will be recognized in future actuarial valuations and is expected to decrease funded ratios and increase employer contribution requirements.

2. Unless otherwise indicated, a funded status measurement is based upon the actuarial accrued liability and the actuarial value of assets. The measurement is:
 - a. Inappropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations.
 - b. Inappropriate for assessing benefit security for the membership.
 - c. Dependent upon the actuarial cost method which, in combination with the amortization policy and asset valuation method, affects the timing and amounts of future contributions. The amounts of future contributions will differ from those assumed due to future actual experience differing from assumed.

A funded status measurement of 100% is not synonymous with no required future contributions. If the funded status were 100%, the Plan would still require future normal cost contributions (i.e., the cost of the active membership accruing an additional year of service credit).

3. The results do not show the potential impact on other post-employment benefits (such as retiree health care insurance) or ancillary benefits (such as life insurance).
4. The results of separate actuarial valuations generally cannot be added together to produce a correct estimate of the employer contributions. The total can be considerably greater than the sum of the parts due to the interaction of various plan provisions and assumptions used.
5. 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 this supplemental actuarial valuation does not include an analysis of the potential range of such future measurements.

Important Comments (Concluded)

6. This report was prepared using ProVal's valuation model, a software product of Winklevoss Technologies. We are relying on the ProVal model. We performed tests of the ProVal model with this assignment and made a reasonable attempt to understand the developer's intended purpose of, general operation of, major sensitivities and dependencies within, and key strengths and limitations of the ProVal model. In our professional judgment, the ProVal valuation model has the capability to provide results that are consistent with the purposes of the valuation and has no material limitations or known weaknesses.
7. This report was prepared using our financing and projection model which in our professional judgment has the capability to provide results that are consistent with the purposes of the request and has no material limitations or known weaknesses. We performed tests to ensure that the model reasonably represents that which is intended to be modeled.



Appendix C: City of Ishpeming
Police and Fire Retirement System
Actuarial Valuation Report for the
Fiscal Year Ended December 31, 2019

City of Ishpeming
Policemen and Firemen Retirement System
Fiftieth Annual Actuarial Valuation Report
December 31, 2019



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A-4	Financial Objective Achievement Tests - Comparative Statements
A-7	Computed and Actual City Contributions - Comparative Statement
A-8	Schedule of Funding Progress
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April 20, 2020

Retirement Board
City of Ishpeming
Policemen and Firemen Retirement System
Ishpeming, Michigan

Dear Board Members:

Submitted in this report are the results of the actuarial valuation of the assets, actuarial values and contribution requirements associated with benefits provided by the City of Ishpeming Policemen and Firemen Retirement System, which is based upon Act No. 345 of the Public Acts of 1937, as amended.

This report was prepared at the request of the Board and is intended for use by the Retirement System and those designated or approved by the Board. This report may be provided to parties other than the System only in its entirety and only with the permission of the Board. GRS is not responsible for unauthorized use of this report.

The date of the valuation was December 31, 2019. The purpose of the valuation and gain/loss analysis is to measure funding progress in relation to the actuarial cost method and to determine employer contribution rates. Calculations required for compliance with the Governmental Accounting Standards Board (GASB) Statement Nos. 67 and 68 are not included in this report. 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.

The computed contribution rates in this report are determined using the actuarial assumptions and methods disclosed in Section C of this report. This report includes risk metrics on page A-12 and A-13 but does not include a more robust assessment of the risks of future experience not meeting the actuarial assumptions. Additional assessment of risks was outside the scope of this assignment.

Valuation results, comments and conclusion are contained in Section A.

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 the Finance Director, 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 the Finance Director. This information is summarized in Section B.

This report was prepared using assumptions adopted by the Board. All actuarial assumptions used in this report are reasonable for the purposes of this valuation. Additional information about the actuarial assumptions is included in Section C of this report.

The signing individuals are independent of the plan sponsor.

This report has been prepared by individuals 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 the City of Ishpeming Policemen and Firemen Retirement System as of the valuation date. All calculations have been made in conformity with generally accepted actuarial principles and practices, and with the Actuarial Standards of Practice issued by the Actuarial Standards Board.

Abra D. Hill is a Member of the American Academy of Actuaries (MAAA) and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

Respectfully submitted,



R. Michael Gano



Abra D. Hill, ASA, FCA, MAAA



David L. Hoffman

RMG/ADH/DLH:ah

C0906



SECTION A

VALUATION RESULTS, COMMENTS AND CONCLUSION

Financial Objective

The financial objective of the Retirement System is to establish and receive contributions, expressed as percents of active member payroll, which will remain approximately level from year-to-year and will not have to be increased for future generations of citizens. This objective meets the requirements of Act No. 345 of the Public Acts of 1937, as amended, and the Michigan Constitution.

Contribution Rates

The Retirement System is supported by member contributions, City contributions and investment income from Retirement System assets.

Contributions which satisfy the financial objective are determined by an annual actuarial valuation and are sufficient to:

- (1) cover the actuarial present value of benefits assigned to the current year by the actuarial cost methods described in Section C (the normal cost); and
- (2) amortize over a period of future years the actuarial present value of benefits not covered by valuation assets and anticipated future normal costs (unfunded actuarial accrued liability).

Contribution requirements for the fiscal year beginning January 1, 2021 are shown on page A-2.

Contributions Computed to Meet the Financial Objective of the Retirement System for the Fiscal Year Beginning January 1, 2021

Contributions for	Contributions Expressed as Percents of Payroll
Normal Cost	
Age & service benefits	19.34 %
Death and disability benefits	1.39
Termination benefits	
Deferred age & service benefits	1.07
Refunds of member contributions	0.35
Administrative Expenses	<u>2.00</u>
Total Normal Cost	24.15 %
 Unfunded Actuarial Accrued Liability	 27.69 %
 Total Contribution Requirement	 51.84 %
Member portion	<u>5.00</u> %
City portion	46.84 %

Unfunded actuarial accrued liabilities resulting from amendments to benefit provisions were amortized as a level percent of active member payroll over a closed period of 20 years.

Procedures for determining dollar contribution amounts are described on page A-3.

Comparative contribution amounts for prior fiscal years are shown on page A-7.

Determining Dollar Contributions

For any period of time, the percent-of-payroll contribution rate needs to be converted to dollar amounts. We recommend one of the following procedures:

- (1) Contribute dollar amounts at the end of each payroll period which are equal to the City's percent-of-payroll contribution requirements of 46.84%, multiplied by the covered active member payroll for the period. Adjustments should be made as necessary to exclude items of pay that are not covered compensation for Retirement System benefits and to include special payments that are covered compensation.
- (2) Contribute \$258,629 in equal monthly, quarterly, etc., installments throughout the fiscal year. If, on the average, contributions are made at a later date than mid-year, interest should be added at the rate of 0.57% for each month of delay.

Financial Objective Achievement Tests

The Retirement System's financial objective is to meet long-term benefit promises through contributions that remain approximately level from year-to-year as a percent of active member payroll. If the contributions to the System are level in concept and soundly executed, the System will ***pay all promised benefits when due -- the ultimate test of financial soundness***. Testing for level contribution rates is ***the long-term solvency test***. Year-by-year computed contribution rates are displayed on page A-7.

The following page presents two tests measuring the funding progress of the Retirement System. The two tests are described below:

TEST 1 - The ratio of Valuation Assets (VA) to the Entry Age Actuarial Accrued Liability (EAAL). The ratio is expected to gradually increase in the absence of benefit improvements and changes in actuarial assumptions.

TEST 2 - The ratio of the Unfunded Actuarial Accrued Liability (UAAL) to Member Payroll (MP). In a soundly financed retirement system, the amount of the unfunded actuarial accrued liability will be controlled and prevented from increasing in the absence of benefit increases or strengthening of actuarial assumptions. However, in an inflationary environment it is seldom practical to impose this control on dollar amounts which are depreciating in value. The ratio is a relative index of condition where inflation is present in both items. The ratio is expected to gradually decrease in the absence of benefit increases and changes in actuarial assumptions.

Financial Objective Achievement Tests - Comparative Statement

Valuation Date Dec. 31	(1) Valuation Assets	(2) Member Payroll	(3) AAL*	(4) UAAL*	Continuation Tests	
					TEST 1 (1) / (3)	TEST 2 (4) / (2)
2000 #	\$ 4,942,904	\$ 725,201	\$ 4,015,471	\$ (927,433)	123 %	- %
2001	5,130,212	799,178	4,505,994	(624,218)	114	-
2002	5,210,180	841,057	4,731,566	(478,614)	110	-
2003 @	5,316,108	753,650	5,045,974	(270,134)	105	-
2004	5,395,745	770,263	5,318,589	(77,156)	101	-
2005	5,476,760	765,143	5,734,681	257,921	96	34
2006	5,536,098	455,750	5,898,103	362,005	94	79
2007	5,639,791	472,266	6,012,631	372,840	94	79
2008	5,094,576	450,111	6,079,113	984,537	84	219
2009	4,925,254	490,598	6,170,793	1,245,539	80	254
2010	4,816,472	441,036	6,034,581	1,218,109	80	276
2011	4,610,020	407,599	6,149,988	1,539,968	75	378
2012 @	4,486,863	475,834	6,465,540	1,978,677	69	416
2013	4,798,400	487,529	6,626,378	1,827,978	72	375
2014	4,905,641	462,485	6,415,944	1,510,303	76	327
2015 @	4,890,716	458,896	6,337,538	1,446,822	77	315
2016 @	4,917,986	424,035	6,464,961	1,546,975	76	365
2017	4,874,238	475,382	6,622,757	1,748,519	74	368
2018	4,610,434	486,037	6,688,702	2,078,268	69	428
2019	4,506,864	515,441	6,628,402	2,121,538	68	412

@ After changes in actuarial assumptions.

After changes in benefit provisions.

* Prior to the December 31, 2001 valuation, actuarial present value of credited projected benefits was used.

AAL - Actuarial Accrued Liabilities. **UAAL** - Unfunded Actuarial Accrued Liabilities.

Short Condition Test Comparative Statement

The Short Condition Test is another way of looking at a system's progress under its funding program - based on the entry age actuarial accrued liability. In a short condition test, the plan's valuation assets are compared with: 1) Active member contributions on deposit; 2) The liabilities for future benefits to present retired lives; and 3) The liabilities allocated to service already rendered by active members. In a system that has been following the discipline of level percent-of-payroll financing, the liabilities for active member contributions on deposit (liability 1) and the liabilities for future benefits to present retired lives (liability 2) will be fully covered by valuation assets (except in rare circumstances). In addition, the liabilities assigned to service already rendered by active members (liability 3) will be partially covered by the remainder of valuation assets. The larger the funded portion of liability 3, the stronger the condition of the system. Liability 3 being fully funded is uncommon and not necessarily a by-product of level percent-of-payroll financing methods.

The schedule below illustrates the history of liabilities 1, 2 and 3.

Entry Age Actuarial Accrued Liability *											
Val. Date Dec. 31		(1)	(2)	(3)	Valuation Assets	Portion of Present Value Covered by Assets					
		Active Member Contr.	Retirees and Benef.	Active Members (Employer Financed Portion)		(1)	(2)	(3)			
2000	\$	329,924	\$ 1,959,314	\$ 1,838,328	\$ 5,239,739	100	%	100	%	160	%
2001		270,518	2,784,010	1,451,466	5,130,212	100		100		143	
2002		303,052	2,690,453	1,738,061	5,210,180	100		100		128	
2003 @		347,241	2,819,941	1,878,792	5,316,108	100		100		114	
2004		387,449	2,801,833	2,129,307	5,395,745	100		100		104	
2005		387,767	3,157,558	2,189,356	5,476,760	100		100		88	
2006		217,946	4,380,176	1,299,981	5,536,098	100		100		72	
2007		220,329	4,319,956	1,472,346	5,639,791	100		100		75	
2008		240,638	4,207,561	1,630,914	5,094,576	100		100		40	
2009		228,140	4,527,308	1,415,345	4,925,254	100		100		12	
2010		227,767	4,457,641	1,349,173	4,816,472	100		100		10	
2011		197,549	4,385,732	1,566,707	4,610,020	100		100		2	
2012 @		229,989	4,436,402	1,799,149	4,486,863	100		96		0	
2013		252,774	4,856,114	1,517,490	4,798,400	100		94		0	
2014		236,204	4,623,865	1,555,875	4,905,641	100		100		3	
2015 @		208,726	4,519,098	1,609,714	4,890,716	100		100		10	
2016 @		140,376	5,039,726	1,284,859	4,917,986	100		95		0	
2017		114,679	5,485,451	1,022,627	4,874,238	100		87		0	
2018		139,025	5,396,928	1,152,749	4,610,434	100		83		0	
2019		124,887	5,291,375	1,212,140	4,506,864	100		83		0	

@ After changes in actuarial assumptions.

After changes in benefit provisions.

* Prior to the December 31, 2001 valuation, actuarial present value of credited projected benefits was used.

Computed and Actual City Contributions Comparative Statement

Fiscal Year Beginning Jan. 1	Valuation Date Dec. 31	Actual Dollar Contribution	Valuation Payroll*	% of Payroll Contribution	
				Computed	Estimated Actual
1997	1996	\$ 65,166	\$ 619,511	10.82 %	10.52 %
1998	1997 #@	58,433	644,959	9.06	9.06
1999	1998 #	78,170	685,097	11.41	11.41
2000	1999 #	70,240	724,122	9.70	9.70
2001	2000	58,053	725,201	6.98	8.01
2002	2001	60,232	799,178	10.70	7.54
2003	2002	106,478	841,057	12.66	12.66
2004	2002	106,478	841,057	12.66	12.66
2005	2003 @	103,643	753,650	13.16	13.16
2006	2004	126,033	770,263	15.58	15.58
2007	2005 *	94,165	443,867	19.64	19.64
2008	2006 *	108,895	455,750	21.88	21.88
2009	2007	113,460	472,266	22.00	22.00
2010	2008	139,448	450,111	28.37	28.37
2011	2009	160,724	490,598	30.00	30.00
2012	2010	149,207	441,036	30.98	30.98
2013	2011	158,948	407,599	35.71	35.71
2014	2012 @	201,791	475,834	38.07	38.07
2015	2013 @	199,322	487,529	36.21	36.21
2016	2014	188,906	462,485	35.87	35.87
2017	2015 @	163,490	458,896	34.94	34.94
2018	2016 @	178,625	424,035	39.32	39.32
2019	2017	229,122	475,382	42.16	42.16
2020	2018		486,037	46.81	
2021	2019		515,441	46.84	

@ After changes in actuarial assumptions and/or methods.

After changes in benefit provisions.

* Fire Department was terminated as of 1/1/2006. Fire payroll was excluded for the 2005 valuation.



Schedule of Funding Progress

Actuarial Valuation Date	(a) Actuarial Value of Assets	(b) Entry Age Actuarial Accrued Liability	(b-a) Unfunded Accrued Liability (UAL)	(a/b) Funded Ratio	(c) Annual Covered Payroll	[(b-a)/c] UAL as a Percentage of Covered Payroll
12/31/2010	\$ 4,816,472	\$ 6,034,581	\$ 1,218,109	80	\$ 441,036	276 %
12/31/2011	4,610,020	6,149,988	1,539,968	75	407,599	378
12/31/2012 #	4,486,863	6,465,540	1,978,677	69	475,834	416
12/31/2013	4,798,400	6,626,378	1,827,978	72	487,529	375
12/31/2014	4,905,641	6,415,944	1,510,303	76	462,485	327
12/31/2015 #	4,890,716	6,337,538	1,446,822	77	458,896	315
12/31/2016 #	4,917,986	6,464,961	1,546,975	76	424,035	365
12/31/2017	4,874,238	6,622,757	1,748,519	74	475,382	368
12/31/2018	4,610,434	6,688,702	2,078,268	69	486,037	428
12/31/2019	4,506,864	6,628,402	2,121,538	68	515,441	412

After changes in actuarial assumptions.

Schedule of Employer Contributions

Fiscal Year Ending December 31	Annual Required Contribution	Percent Contributed
2010	\$ 139,448	100.0 %
2011	160,724	100.0
2012	149,207	100.0
2013	158,948	100.0
2014	201,791	100.0
2015	199,322	100.0
2016	188,906	100.0
2017	163,490	100.0
2018	178,625	100.0
2019	229,122	100.0

Comments and Conclusion

Comment A: The activities of the Retirement System and its members, in aggregate, were unfavorable during the plan year ended December 31, 2019 (see page A-15). The unfavorable experience was primarily the result of investment losses on a funding value basis. This occurred because investment returns over the past 5 years were less than the assumed 7.0% rate of return (see page B-4). This loss was compounded by unfavorable retiree mortality experiences and larger salary increases than expected, but was largely offset by more non-vested withdrawals than expected. Year-to-year experience deviations are expected in the operation of a pension fund because of the variability of the economy and individual member actions. Please refer to pages B-6, B-12, C-10 and C-11 for additional experience information.

Comment B: In continuing with the time lag that was instituted in the 2005 actuarial valuation with regard to contributions, the contribution rate determined by the December 31, 2019 valuation should be applied to the fiscal year beginning January 1, 2021.

Comment C: The derivation of the funding value of assets (page B-4) incorporates a 20% "corridor." A 20% market value corridor means that the funding value of assets may not be more than 120% of the market value of assets nor less than 80% of the market value of assets. The ratio of funding value of assets to market value of assets was roughly 101% this year, so the corridor had no effect.

The funding value of assets currently exceeds the market value of assets by approximately \$23,000. If unrecognized losses are not offset by future investment gains, there will be upward pressure on computed contribution rates in future valuations.

Comment D: Beginning with the December 31, 2017 valuation, a 2.00% administrative expense load was added to the normal cost.

Comment E: Valuation assets totaled \$4,506,864 for the December 31, 2019 actuarial valuation. These assets were used in financing actuarial accrued liabilities totaling \$6,628,402, leaving an unfunded amount of \$2,121,538. Based upon the valuation assets, annual contributions to the City of Ishpeming Policemen and Firemen Retirement System have been computed to be 46.84% of active member payroll as shown on page A-2. If the market value of assets were used to determine the employer contribution rates, the contribution rate would have been 47.15%.

Comment F: The Board adopted a 25-year closed amortization for the 2014 valuation affecting the fiscal year 2016 and later contributions. As of the December 31, 2019 valuation, there are 20 years remaining in the amortization of the Unfunded Actuarial Accrued Liability (UAAL). Adoption of the closed amortization increased the rate at which the System's funded ratio trends toward 100% and also ensures that the UAAL would be expected to be paid off at the end of the amortization period.

Comment G: Based upon the valuation assets, the funded ratio of the System was computed to be 68.0% as of December 31, 2018. If the market value of assets were used to determine the funded ratio, the result would have been 67.6%.

Comments and Conclusion (Concluded)

Comment H: Both forward-looking asset return and inflation expectations have declined significantly in the past few years. Based on the current asset allocation, the 7.0% assumed rate of investment return is reasonable. However, if expectations continue to decline the Board may need to review the assumed rate of return.

Conclusion: The City's annual contributions for pensions to the City of Ishpeming Policemen and Firemen Retirement System have been computed to be 46.84% percent of active member payroll as shown on page A-2. It is the actuary's opinion that the contribution rates recommended are sufficient to meet the System's financial objective.

Risk Measures - Risks Associated with Measuring the Accrued Liability and Actuarially Determined Contribution

The determination of the accrued liability and the actuarially determined contribution 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 and the actuarially determined contribution 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 System'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:

1. **Investment Risk** – actual investment returns may differ from the expected returns;
2. **Asset/Liability Mismatch Risk** – 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;
3. **Contribution Risk** – actual contributions may differ from expected future contributions. For example, actual contributions may not be made in accordance with the plan's funding policy or material changes may occur in the anticipated number of covered employees, covered payroll, or other relevant contribution base;
4. **Salary and Payroll Risk** – actual salaries and total payroll may differ from expected, resulting in actual future accrued liability and contributions differing from expected;
5. **Longevity Risk** – members may live longer or shorter than expected and receive pensions for a period of time other than assumed; and
6. **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.

The computed contribution shown on page A-2 may be considered as a minimum contribution rate that complies with the Board's funding policy. The timely receipt of the actuarially determined contributions is critical to support the financial health of the plan. Users of this report should be aware that contributions made at the actuarially determined rate do not necessarily guarantee benefit security.



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:

	<u>2019</u>	<u>2018</u>
Ratio of the market value of assets to total payroll	8.70	8.22
Ratio of actuarial accrued liability to payroll	12.86	13.76
Ratio of actives to retirees and beneficiaries	0.45	0.41
Ratio of net cash flow to market value of assets	(6.6)%	(6.4)%
Duration of the actuarial accrued liability	15.07	14.84

Ratio of Market Value of Assets to 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. The ratio of liability to payroll may also be used as a measure of sensitivity of the liability itself. For example, if the actuarial accrued liability is 2.5 times the payroll, a change in liability 2% other than assumed would equal 5% of payroll. A higher (lower) or increasing (decreasing) level of this maturity measure generally indicates a higher (lower) or increasing (decreasing) volatility in liability (and also plan sponsor contributions) as a percentage of payroll.

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 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.

Duration of Actuarial Accrued Liability

The duration of the actuarial accrued liability may be used to approximate the sensitivity to a 1% change in the assumed rate of return. For example, duration of 10 indicates that the liability would increase approximately 10% if the assumed rate of return were lowered 1%.

Additional Risk Assessment

Additional risk assessment is outside the scope of the annual actuarial valuation. Additional assessment may include scenario tests, sensitivity tests, stochastic modeling, stress tests, and a comparison of the present value of accrued benefits at low-risk discount rates with the actuarial accrued liability.

Actuarial Balance Sheet - December 31, 2019

Present Resources and Expected Future Resources

A. Valuation assets:	
1. Net assets from System's financial statements (market value)	\$4,483,501
2. Valuation adjustment	<u>23,363</u>
3. Valuation assets	4,506,864
B. Actuarial present value of expected future employer contributions:	
1. For normal costs	1,270,538
2. For unfunded actuarial accrued liabilities	<u>2,121,538</u>
3. Total	3,392,076
C. Actuarial present value of expected future member contributions	<u>370,488</u>
D. Total actuarial present value of present and expected future resources	<u><u>\$8,269,428</u></u>

Actuarial Present Value of Expected Future Benefit Payments and Reserves

A. To retirees and beneficiaries	\$5,291,375
B. To vested terminated members	582,262
C. To present active members:	
1. Allocated to service rendered prior to valuation date	754,765
2. Allocated to service likely to be rendered after valuation date	<u>1,641,026</u>
3. Total	2,395,791
D. Total actuarial present value of expected future benefit payments	8,269,428
E. Reserves:	
1. Allocated to retirants and beneficiaries	none
2. Unallocated investment income	<u>none</u>
3. Total	none
F. Total actuarial present value of expected future benefit payments and reserves	<u><u>\$8,269,428</u></u>

Derivation of Actuarial Gain (Loss) Year Ended December 31, 2019

Actual experience will usually not coincide exactly with assumed experience. It is expected that gains and losses will cancel each other over a period of years, but sizable year-to-year fluctuations can occur. Detail on the derivation of the experience gain (loss) is shown below, along with a year-by-year comparative schedule.

(1) UAAL* at start of year	\$ 2,078,268
(2) Employer normal cost from last valuation	92,347
(3) Actual employer contributions	229,122
(4) Interest accrual: $(1) \times .07 + [(2) - (3)] \times .035$	140,692
(5) Expected UAAL before changes: $(1) + (2) - (3) + (4)$	2,082,185
(6) Change from benefit changes	0
(7) Change from revised actuarial assumptions or methods	0
(8) Expected UAAL after changes: $(5) + (6) + (7)$	2,082,185
(9) Actual UAAL at end of year	2,121,538
(10) Gain (loss): $(8) - (9)$	(39,353)
(11) Gain (loss) as percent of actuarial accrued liabilities at start of year (\$6,688,702)	(0.6)%

* *Unfunded Actuarial Accrued Liability.*

Year Ended December 31	As % of Beginning Accrued Liabilities
2010	1.0 %
2011	(5.3)
2012	(2.8)
2013	3.4
2014	5.0
2015	0.0
2016	1.0
2017	(2.9)
2018	(4.5)
2019	(0.6)

SECTION B

SUMMARY OF BENEFIT PROVISIONS AND VALUATION DATA SUBMITTED BY THE RETIREMENT SYSTEM

Brief Summary of Act 345 Benefit Provisions Evaluated (December 31, 2019)

Eligibility	Amount
SERVICE RETIREMENT	
Age 50 with 25 or more years of service or age 60 regardless of service.	Straight life pension equals 2.5% of 3 year Average Final Compensation (AFC) times first 25 years of service plus 1% of AFC times years of service in excess of 25 years.
DEFERRED RETIREMENT	
10 or more years of service.	Computed as service retirement but based upon service, AFC and benefit in effect at termination. Benefit begins at date retirement would have occurred had member remained in employment.
DEATH AFTER RETIREMENT SURVIVOR'S PENSION	
Payable to a surviving spouse, if any, upon the death of a retired member who was receiving a straight life pension which was effective July 1, 1975 or later.	Spouse's pension equals 60% of the straight life pension the deceased retirant was receiving.
NON-DUTY DEATH-IN-SERVICE SURVIVOR'S PENSION	
Payable to a surviving spouse, if any, upon death of a member with 20 or more years of service (10 years required for fire members).	Accrued straight life pension actuarially reduced in accordance with an Option I election.
DUTY DEATH-IN-SERVICE SURVIVOR'S PENSION	
Payable upon the expiration of worker's compensation to the survivors of a member who died in the line of duty.	Same amount that was paid by worker's compensation.
NON-DUTY DISABILITY	
Payable upon the total and permanent disability of a member with 5 or more years of service.	To Age 55: 1.5% of AFC times years of service. At Age 55: Same as Service Retirement Pension.
DUTY DISABILITY	
Payable upon the total and permanent disability of a member in the line of duty.	To Age 55: 50% of AFC. At Age 55: Same as Service Retirement Pension with service credit from date of disability to age 55.
MEMBER CONTRIBUTIONS	
	5% of pay.



Reported Fund Balance (Market Value)

Reserves	Reported Fund Balance Dec. 31	
	2019	2018
Reserve for Employees' Contributions	\$ 1,133,512	\$ 1,109,398
Reserve for Employer Contributions	3,371,766	3,142,644
Reserve for Retired Benefit Payments	-	-
Reserve for Undistributed Investment Income	<u>(21,777)</u>	<u>(256,881)</u>
Total Fund Balance	\$ 4,483,501	\$ 3,995,161

Valuation assets are equal to reported market value of assets, except that 20% of the difference between the actual investment earnings and the assumed earnings are recognized each year. The valuation assets are not allowed to deviate from the market value of assets by more than 20%. Such spreading reduces the fluctuation in the City's computed contribution rate, which might otherwise be caused by market value fluctuations. The derivation of valuation assets is shown on page B-4. The valuation assets as of December 31, 2019 total \$4,506,864.

Reserves for	Valuation Assets Applied to Actuarial Accrued Liabilities for			
	Active Members	Retirees & Beneficiaries	Contingency Reserve	Totals
Employees' Contributions	\$ 1,133,512		\$	\$ 1,133,512
Employer Contributions	(1,941,386)	\$ 5,313,152		3,371,766
Retired Benefit Payments				-
Undistributed Investment Income		(21,777)		(21,777)
Valuation Asset Adjustment	<u>23,363</u>			<u>23,363</u>
Total	\$ (784,511)	\$ 5,291,375	\$	\$ 4,506,864



Summary of Current Asset Information Reported for Valuation

Assets

	December 31, 2019	December 31, 2018
	Market Value	Market Value
Cash & Equivalents	\$ 105,523	\$ 50,215
Short-term Investments	0	0
Stocks & Other Equities	3,159,651	2,796,262
Bonds	1,162,192	1,019,483
Receivables	0	0
Other Assets	89,417	129,201
Total Assets	4,516,783	3,995,161
Less Accounts Payable	33,282	0
Net Assets Available for Benefits	\$4,483,501	\$3,995,161

Revenues and Expenses

	2019	2018
Balance - January 1,	\$3,995,161	\$4,701,687
Revenues		
Employees' Contributions	24,114	24,981
Employer Contributions	229,122	178,625
Investment Income	753,628	(380,208)
Miscellaneous	0	0
Expenditures		
Benefit Payments	482,243	485,291
Health Insurance Premiums	0	0
Refunds of Member Contributions	26,280	0
Administrative Expenses	10,001	19,633
Miscellaneous	0	25,000
Balance - December 31,	\$4,483,501	\$3,995,161

Derivation of Valuation Assets

Valuation Date December 31:	2017	2018	2019	2020	2021	2022	2023
A. Valuation Assets Beginning of Year	\$4,917,986	\$4,874,238	\$4,610,434				
B. Market Value End of Year	4,701,687	3,995,161	4,483,501				
C. Market Value Beginning of Year	4,420,761	4,701,687	3,995,161				
D. Non-Investment Net Cash Flow	(280,819)	(301,318)	(265,288)				
E. Investment Return:							
E1. Market Total: B-C-D	561,745	(405,208)	753,628				
E2. Assumed Rate	7.00%	7.00%	7.00%				
E3. Amount for Immediate Recognition	334,541	330,769	313,550				
E4. Amount for Phased-In Recognition	227,204	(735,977)	440,078				
F. Phased-In Recognition of Investment Return:							
F1. Current Year: 0.2xE4	45,441	(147,195)	88,016				
F2. First Prior Year	(24,720)	45,441	(147,195)	\$ 88,016			
F3. Second Prior Year	(113,373)	(24,720)	45,441	(147,195)	\$ 88,016		
F4. Third Prior Year	(53,407)	(113,373)	(24,720)	45,441	(147,195)	\$ 88,016	
F5. Fourth Prior Year	<u>48,589</u>	<u>(53,408)</u>	<u>(113,374)</u>	<u>(24,719)</u>	<u>45,440</u>	<u>(147,197)</u>	\$ 88,014
F6. Total Recognized Investment Gain	(97,470)	(293,255)	(151,832)	(38,457)	(13,739)	(59,181)	88,014
G. Valuation							
G1. Preliminary Valuation Assets: A+D+E3+F6	4,874,238	4,610,434	4,506,864				
G2. Upper Corridor Limit=120%*B	5,642,024	4,794,193	5,380,201				
G3. Lower Corridor Limit=80%*B	3,761,350	3,196,129	3,586,801				
G4. Valuation Assets	4,874,238	4,610,434	4,506,864				
H. Difference Between Market & Funding Values	(172,551)	(615,273)	(23,363)	15,094	28,833	88,014	-
I. Recognized Rate of Return	5.0%	0.8%	3.6%				
J. Market Rate of Return	13.1%	(8.9)%	19.5%				
K. Ratio of Funding Value to Market Value	103.7%	115.4%	100.5%				

The Valuation Assets recognizes assumed investment return (line E3) fully each year. Differences between actual and assumed investment return (Line E4) are phased-in over a closed 5-year period. During periods when investment performance exceeds the assumed rate, Funding Value of Assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, Funding Value of Assets will tend to be greater than market value. If assumed rates are exactly realized for 4 consecutive years, funding value will become equal to market value.

Asset Information Reported for Valuation Comparative Statement

Year Ended Dec. 31	Assets Beginning of Year	Employee Contrib.	Employer Contrib.	Investment Income	Misc. Income	Retirement Benefits	Contrib. Refunds	Misc./Admin. Expenses	Assets Year-End
2000	\$ 5,027,564	\$ 37,820	\$ 70,240	\$ 119,318	\$ 0	\$ 180,463	\$ 3,663	\$ 64,253 &	\$ 5,006,563
2001	5,027,564	41,801	58,053	101,132	0	244,549	13,116	85,815 &	4,885,070
2002	4,885,070	41,982	60,232	(117,206)	0	240,552	7,606	122,421 &	4,499,499
2003	4,499,499	45,741	106,478	664,369	0	241,407	4,142	108,955 &	4,961,583
2004	4,961,583	38,872	106,478	411,091	0	249,509	8,830	25,283	5,234,402
2005	5,234,402	39,937	103,643	258,901	0	268,294	4,869	45,130	5,318,590
2006	5,318,590	59,249	126,033	481,731	0	380,845	26,484	35,942	5,542,332
2007	5,542,332	21,870	94,165	319,362	0	396,845	0	30,262	5,550,622
2008	5,550,622	24,121	108,895	(1,480,009)	0	375,944	14,571	39,354	3,773,760
2009	3,773,760	25,100	113,460	942,040	0	390,335	25,669	31,764	4,406,592
2010	4,406,592	23,839	139,448	504,645	0	406,611	25,090	13,370	4,629,453
2011	4,629,453	23,236	160,724	(93,163)	0	406,611	29,023	45,173	4,239,443
2012	4,239,443	27,581	149,207	612,920	0	401,270	0	38,622	4,589,259
2013	4,589,259	87,061	158,948	590,701	0	394,338	0	38,805	4,992,826
2014	4,992,826	22,745	201,791	101,472	0	430,902	0	39,761	4,848,171
2015	4,848,171	23,844	199,322	(187,392)	0	412,006	3,163	42,723	4,426,053
2016	4,426,053	26,124	188,906	254,015	0	411,793	19,786	42,758	4,420,761
2017	4,420,761	24,927	163,490	586,745	0	457,439	0	36,797	4,701,687
2018	4,701,687	24,981	178,625	(380,208)	0	485,291	0	44,633	3,995,161
2019	3,995,161	24,114	229,122	753,628	0	482,243	26,280	10,001	4,483,501

& Includes health insurance premiums for retired members.



Retirees and Beneficiaries Added to and Removed from Rolls Comparative Statement

Year Ended Dec. 31	Added to Rolls			Removed from Rolls			Rolls End of Year		% Incr. Annual Benefits	Average Annual Benefit	Annual Benefits as a % of Active Pays	Active Members Per Retired Member
	No.	Annual Benefits	*	No.	Annual Benefits	*	No.	Annual Benefits				
2000							15	\$ 176,370	0.0	\$ 11,758	24.3 %	1.3
2001	3	72,886		1	\$ 4,266		17	244,990	38.9	14,411	30.7	1.2
2002				1	9,936		16	235,054	(4.1)	14,691	27.9	1.3
2003	1	10,862					17	245,916	4.6	14,466	32.6	1.0
2004		3,603					17	249,519	1.5	14,678	32.4	1.0
2005	1	30,921			10		18	280,430	12.4	15,579	36.7	0.9
2006	4	100,415					22	380,845	35.8	17,311	83.6	0.5
2007							22	380,845	0.0	17,311	80.6	0.5
2008	1	8,012		2	14,547		21	374,310	(1.7)	17,824	83.2	0.4
2009	1	32,301					22	406,611	8.6	18,482	82.9	0.5
2010							22	406,611	0.0	18,482	92.2	0.4
2011							22	406,611	0.0	18,482	99.8	0.4
2012				1	8,012		21	398,599	(2.0)	18,981	83.8	0.4
2013	1	37,783					22	436,382	9.5	19,836	89.5	0.4
2014	2	18,814		3	38,930		21	416,266	(4.6)	19,822	90.0	0.4
2015				1	4,473		20	411,793	(1.1)	20,590	89.7	0.5
2016	2	46,422		1	13,466		21	444,749	8.0	21,179	104.9	0.4
2017	2	36,418		0	0		23	481,167	8.2	20,920	101.2	0.4
2018	0	0		1	4,440		22	476,727	(0.9)	21,669	98.1	0.4
2019	0	0		2	8,095		20	468,632	(1.7)	23,432	90.9	0.5

* Includes benefit adjustments.

Retirees and Beneficiaries - December 31, 2019

By Type of Benefits Being Paid

Type of Benefits Being Paid	No.	Annual Benefits Being Paid	Average Annual Benefits
Age and Service Benefits			
Straight life benefit – automatic			
60% survivor benefit to surviving spouse	15	\$378,017	\$25,201
100% survivor benefit to surviving spouse	1	38,343	38,343
Survivor beneficiary of deceased retiree	<u>1</u>	<u>10,940</u>	<u>10,940</u>
Total age and service benefits	17	427,300	25,135
Casualty Benefits			
Duty disability – joint and survivor	1	25,378	25,378
Disability – survivor beneficiary	<u>2</u>	<u>15,954</u>	<u>7,977</u>
Total casualty benefits	<u>3</u>	<u>41,332</u>	<u>13,777</u>
Total Benefits Being Paid	20	\$468,632	\$23,432

Retirees and Beneficiaries - December 31, 2019

Tabulated by Attained Ages

Attained Ages	Age and Service		Disability		Survivor		Totals	
	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits	No.	Annual Benefits
49			1	\$ 25,378			1	\$ 25,378
58	2	\$ 76,125					2	76,125
60	1	23,829					1	23,829
61					1	\$ 10,940	1	10,940
62	2	28,627					2	28,627
63	1	40,767					1	40,767
66	2	39,095					2	39,095
69	1	25,563					1	25,563
70	1	32,301					1	32,301
71	2	44,128			1	8,080	3	52,208
74	2	42,728			1	7,874	3	50,602
76	1	34,199					1	34,199
80	1	28,998					1	28,998
Totals	16	\$ 416,360	1	\$ 25,378	3	\$ 26,894	20	\$468,632

Vested Terminated Members - December 31, 2019

Tabulated by Attained Ages

Attained Ages	No.	Estimated Annual Benefits
45	1	\$ 6,717
46	1	5,749
47	1	20,133
51	1	25,223
Total	4	\$ 57,822

Active Members Included in Valuation

Valuation	Vested		Valuation	Active Member Averages			Avg. % Inc. Pay
Date Dec. 31	Active Members	Term. Members		Age	Service	Pay	
2000	19	3	\$ 725,201	39.1	9.9	\$ 38,168	0.1 %
2001	20	2	799,178	36.3	6.7	39,959	4.7
2002	20	2	841,057	37.0	8.1	42,053	5.2
2003	17	1	753,650	40.1	10.4	44,332	5.4
2004	17	1	770,263	40.9	11.2	45,310	2.2
2005	17	1	765,143	40.9	11.3	45,008	(0.7)
2006	10	3	455,750	38.6	10.8	45,575	1.3
2007*	10	4	472,266	38.0	10.7	47,227	3.6
2008	9	4	450,111	40.2	12.8	50,012	5.9
2009	10	3	490,598	36.3	10.0	49,060	(1.9)
2010	9	3	441,036	37.3	10.9	49,004	(0.1)
2011	8	4	407,599	36.8	10.5	50,950	4.0
2012	9	4	475,834	37.6	10.4	52,870	3.8
2013	9	3	487,529	38.6	11.4	54,170	2.5
2014	9	4	462,485	38.1	10.7	51,387	(5.1)
2015	9	5	458,896	37.4	9.3	50,988	(0.8)
2016	8	5	424,035	35.4	7.0	53,004	4.0
2017	9	4	475,382	33.0	4.9	52,820	(0.3)
2018	9	4	486,037	34.0	5.9	54,004	2.2
2019	9	4	515,441	31.5	5.3	57,271	6.0

* Fire Department was terminated as of 1/1/2006.

Additions to and Removals from Active Membership

Actual and Expected Numbers

Year Ended Dec. 31	Number Added During Year		Normal Retirement		Disability Retirement		Death-in-Service		Other Terminations		Active Members End of Year
	A	E	A	E	A	E	A	E	A	E	
2005	1	1	1	0.4	0	0.1	0	0.0	0	0.3	17
2006	2	9	4	0.4	0	0.1	0	0.0	5	0.3	10
2007	1	1	0	0.3	0	0.1	0	0.0	1	0.3	10
2008	0	1	0	0.0	0	0.0	0	0.0	1	0.3	9
2009	2	1	1	1.0	0	0.0	0	0.0	0	0.2	10
2010	0	1	0	0.0	0	0.0	0	0.0	1	0.4	9
2011	0	1	0	0.4	0	0.0	0	0.0	1	0.3	8
2012	1	0	0	0.4	0	0.0	0	0.0	0	0.3	9
2013	0	1	0	0.4	0	0.0	0	0.0	0	0.3	9
2014	1	1	0	0.4	0	0.0	0	0.0	1	0.2	9
2015	2	2	0	0.4	0	0.0	0	0.0	2	0.3	9
2016	1	2	1	0.4	0	0.0	0	0.0	1	0.4	8
2017	2	1	0	0.0	1	0.0	0	0.0	0	0.3	9
2018	0	0	0	0.0	0	0.0	0	0.0	0	0.5	9
2019	3	3	0	0.0	0	0.0	0	0.0	3	0.4	9
5-Yr. Totals	8	8	1	0.8	1	0.0	0	0.0	6	1.9	
10-Yr. Totals	10	12	1	2.4	1	0.0	0	0.0	9	3.4	

A represents actual number.

E represents expected number based on assumptions outlined in Section C.

Active Members - December 31, 2019

By Attained Age and Years of Service

Attained Ages	Years of Service to Valuation Date							Total	
	0-4	5-9	10-14	15-19	20-24	25-29	30 Plus	No.	Valuation Payroll
20-24	1							1	
25-29	3							3	
30-34	2							2	
35-39			2					2	
40-44			1					1	
45-49									
Totals	6		3					9	\$ 515,441

While not used in the financial computations, the following group averages are computed and shown because of their general interest.

Age: 31.5 years

Service: 5.3 years

Annual Pay: \$57,271

SECTION C

**FINANCIAL PRINCIPLES, ACTUARIAL VALUATION PROCESS,
ACTUARIAL COST METHODS, ACTUARIAL ASSUMPTIONS AND
DEFINITIONS OF TECHNICAL TERMS**

Basic Financial Principles and Operation of the Retirement System

Benefit Promises Made Which Must Be Paid For. A retirement program is an orderly means of handing out, keeping track of, and financing pension promises to a group of employees. As each member of the retirement program acquires a unit of service credit the member is, in effect, handed an “IOU” which reads: “The Retirement System promises to pay you one unit of retirement benefits, payments in cash commencing when you retire.”

The principal related financial question is: When shall the money required to cover the “IOU” be contributed? This year, when the benefit of the member’s service is received? Or, some future year when the “IOU” becomes a cash demand?

The Constitution of the State of Michigan is directed to the question:

“Financial benefits arising on account of service rendered in each fiscal year shall be funded during that year and such funding shall not be used for financing unfunded accrued liabilities.”

This Retirement System meets this requirement by having as its ***financial objective the establishment and receipt of contributions, expressed as percents of active member payroll, which will remain approximately level*** from year to year and will not have to be increased for future generations of taxpayers.

Translated into actuarial terminology, a level percent-of-payroll contributions objective means that the contribution rate must be at least:

Normal Cost (the present value of future benefits assigned to members’ service being rendered in the current year)

... plus ...

Interest on the Unfunded Actuarial Accrued Liability (the difference between the actuarial accrued liability and current system assets).

The accumulation of invested assets ***is a by-product of level percent-of-payroll contributions, not the objective***. Investment income becomes the third major contributor to the retirement program, and the amount is directly related to the amount of contributions and investment performance.

If contributions to the retirement program are less than the preceding amount, the difference, ***plus investment earnings not realized thereon***, will have to be contributed at some later time (or benefits will have to be reduced) to satisfy the fundamental fiscal equation under which all retirement programs must operate:

$$B = C + I - E$$

The aggregate amount of Benefit payments to any group of members and their beneficiaries cannot exceed the sum of:

The aggregate amount of Contributions received on behalf of the group

... plus ...

Investment earnings on contributions received and not required for immediate cash payments of benefits

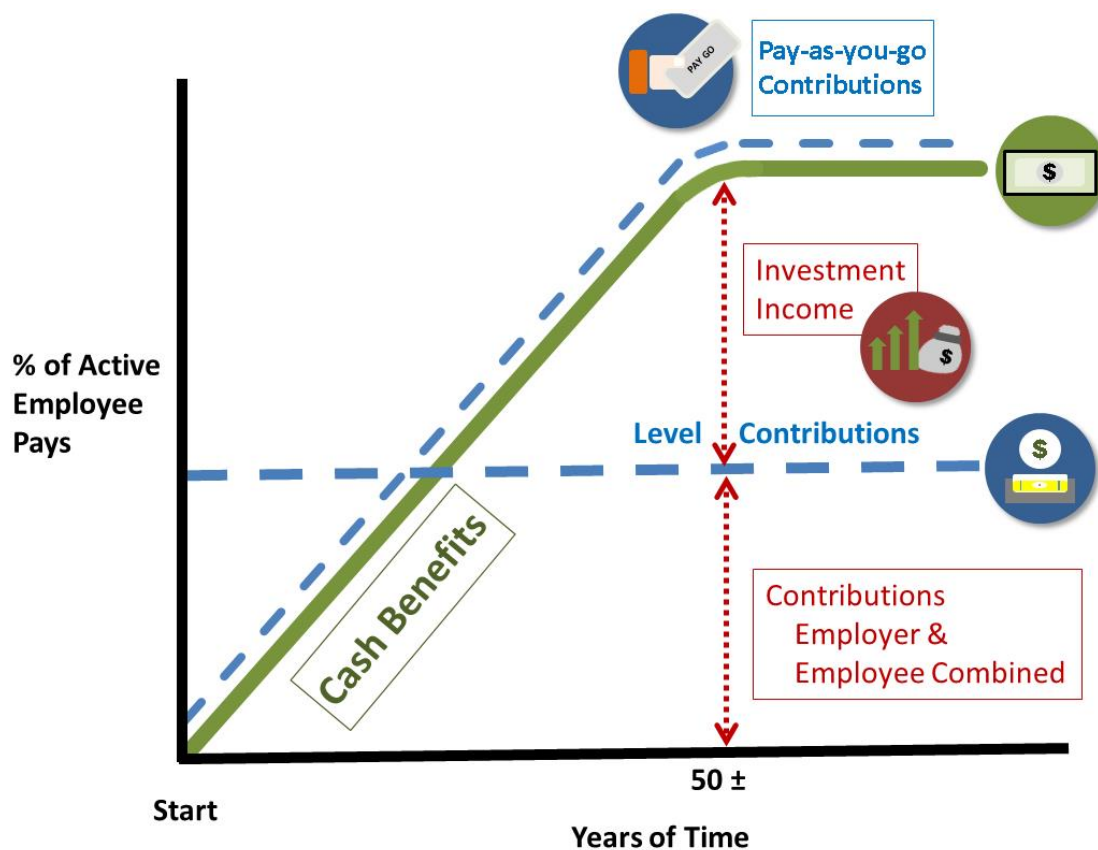
... minus ...

The Expenses of operating the program.

There are retirement programs designed to defer the bulk of contributions far into the future. The present contribution rate for such systems is ***artificially low***. The fact that the contribution rate is destined to increase relentlessly to a much higher level, is often ignored.

This method of financing is prohibited in Michigan by the State constitution.

Computed Contribution Rate Needed To Finance Benefits. From a given schedule of benefits and from the data furnished, the actuary calculates the contribution rate ***by means of an actuarial valuation*** - the technique of assigning monetary values to the risks assumed in operating a retirement program.



CASH BENEFITS LINE. This relentlessly increasing line is the fundamental reality of retirement plan financing. It happens each time a new benefit is added for future retirements (and happens regardless of the design for contributing for benefits).

LEVEL CONTRIBUTION LINE. Determining the level contribution line requires detailed assumptions concerning a variety of experiences in future decades, including:

- **Economic Risk Areas**
 - Rates of investment return
 - Rates of pay increase
 - Changes in active member group size
- **Non-Economic Risk Areas**
 - Ages at actual retirement
 - Rates of mortality
 - Rates of withdrawal of active members (turnover)
 - Rates of disability

Actuarial Valuation Process

The financing diagram on the previous page shows the relationship between the two fundamentally different philosophies of paying for retirement benefits: the method where contributions match cash benefit payments (or barely exceed cash benefit payments, as in the Federal Social Security program) which is an increasing contribution method; and the **level contribution method** which equalizes contributions between the generations.

The actuarial valuation is the mathematical process by which the level contribution rate is determined, and the flow of activity constituting the valuation may be summarized as follows:

A. **Covered Person Data**, furnished by plan administrator.

Retired lives now receiving benefits
Former employees with vested benefits not yet payable
Active employees

B. + **Asset data** (cash & investments), furnished by plan administrator.

C. + **Assumptions concerning future financial experience in various risk areas**, which are established by the Retirement Board after consulting with the actuary.

D. + **The funding method** for employer contributions (the long-term, planned pattern for employer contributions).

E. + **Mathematically combining the assumptions, the funding method, and the data.**

F. = Determination of:

Plan financial position
and/or New Employer Contribution Rate

Actuarial Cost Methods Used for the Valuation

Age and Service and Casualty Benefits. Normal cost and the allocation of actuarial present values between service rendered before and after the valuation date were determined using an individual entry-age actuarial cost method having the following characteristics:

- (i) The annual normal costs for each individual active member, payable from the member's date of employment to the projected date of retirement, are sufficient to accumulate the actuarial present value of the member's benefit at the time of retirement; and
- (ii) each annual normal cost is a constant percentage of the member's year-by-year projected covered pay.

Amortization of Unfunded Actuarial Accrued Liabilities. Unfunded actuarial accrued liabilities are amortized by level percent-of-payroll contributions (principal and interest combined) over a closed period of 20 years.

Active member payroll was assumed to increase 3.5% per year for the purpose of determining the level percent contributions.

Financing of the Unfunded Actuarial Accrued Liabilities Calculated Using an Inflation Assumption of 3.50% and an Investment Return Assumption of 7.00% Compounded Annually

**Level % of Payroll Amortization:
Closed Amortization 20-Year Period**

Year	Estimated Covered Payroll	Unfunded Actuarial Accrued Liability	Annual Contributions		UAAL as % of Payroll
			Dollars	% of Payroll	
1	\$ 533,481	\$2,121,538	\$ 147,721	27.69 %	398 %
2	552,153	2,117,213	152,891	27.69	383
3	571,479	2,107,236	158,242	27.69	369
4	591,480	2,091,024	163,781	27.69	354
5	612,182	2,067,947	169,513	27.69	338
6	633,609	2,037,323	175,446	27.69	322
7	655,785	1,998,419	181,587	27.69	305
8	678,737	1,950,437	187,942	27.69	287
9	702,493	1,892,522	194,591	27.70	269
10	727,080	1,823,674	201,329	27.69	251
11	752,528	1,743,035	208,450	27.70	232
12	778,867	1,649,384	215,746	27.70	212
13	806,127	1,541,628	223,217	27.69	191
14	834,342	1,418,601	231,029	27.69	170
15	863,543	1,278,879	239,115	27.69	148
16	893,767	1,121,011	247,484	27.69	125
17	925,049	943,433	256,146	27.69	102
18	957,426	744,464	265,111	27.69	78
19	990,936	522,291	274,489	27.70	53
20	1,025,619	274,863	284,199	27.71	27

Actuarial Assumptions in the Valuation Process

The actuary calculates contribution requirements and actuarial present values for a retirement system by applying actuarial assumptions to the benefit provisions and people information of the system, using the actuarial cost methods described on page C-5.

The principal areas of risk which require assumptions about future experience are:

- (i) long-term rates of investment return to be generated by the assets of the System
- (ii) patterns of pay increases to members
- (iii) rates of mortality among members, retirees and beneficiaries
- (iv) rates of withdrawal of active members
- (v) rates of disability among active members
- (vi) the age patterns of actual retirements

In making a valuation, the actuary calculates the monetary effect of each assumption for as long as a present covered person survives - - - a period of time which can be as long as a century.

The employer contribution rate has been computed to remain level from year-to-year so long as benefits and the basic experience and make-up of members do not change. Examples of favorable experience, which would tend to reduce the employer contribution rate are:

- (1) Investment returns in excess of 7.0% per year.
- (2) Member non-vested terminations at a higher rate than outlined on page C-12.
- (3) Mortality among retirees and beneficiaries at a higher rate than indicated by the RP-2014 Mortality table using Projection Scale MP-2015.

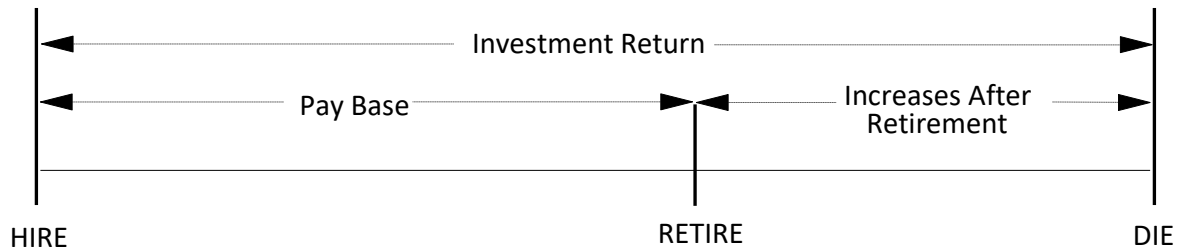
Examples of unfavorable experience, which would tend to increase the employer contribution rate are:

- (1) Pay increases in excess of the rates outlined on page C-10.
 - (2) An increase in the rate of retirement over the rates outlined on page C-13.
 - (3) A pattern of hiring employees at older ages than in the past.
-

Actual experience of the System will not coincide exactly with assumed experience, regardless of the choice of the assumptions, the skill of the actuary or the precision of the calculations. Each valuation provides a complete recalculation of assumed future experience and takes into account all past differences between assumed and actual experience. The result is a continual series of adjustments (usually small) to the computed contribution rate.

From time-to-time one or more of the assumptions is modified to reflect experience trends (but not random or temporary year-to-year fluctuations).

Relationship of Economic Assumptions In Computing Contributions to a Retirement System



Investment Return

An increase in this assumption reduces computed contributions. The assumption operates over all parts of an employee's lifetime.

Pay Base

An increase in this assumption increases computed contributions. However, a 1% increase in this assumption, coupled with a 1% increase in Investment Return reduces computed contributions. This is because the Pay Base assumption operates only over an employee's working lifetime, while the Investment Return assumption operates over the employee's entire lifetime, and therefore has a greater effect.

Increases After Retirement

An increase in this element increases computed contributions.

If Investment Return, Pay Base, and Increases After Retirement are each increased by equal amounts, computed contributions remain the same (except in plans using Final Average Pay as a factor in computing benefits; the multi-year average used for Final Average Pay causes computed contributions to decrease slightly).

If Investment Return and Pay Base are increased by equal amounts, with no change in Increases After Retirement, computed contributions decrease – sometimes significantly. The decreases represent the projected devaluation of an employee's benefits following retirement.

Actuarial Assumptions Used for the Valuation

Investment Return (net of investment expenses). 7.0% per year, compounded annually. This rate consists of a real rate of return of 3.5% a year plus a long-term rate of inflation of 3.5% a year.

This assumption is used to equate the value of payments due at different points in time and was first used for the December 31, 2015 valuation. Approximate rates of investment return based on the actuarial value of assets, for the purpose of comparisons with assumed rates, are shown below. Actual increases in average active member pay are also shown for comparative purposes.

	Year Ended December 31					December 31, 2019	
	2019	2018	2017	2016	2015	3-Year Average	5-Year Average
Rate of Investment Return	3.6%	0.8%	5.0%	5.1%	3.7%	3.1%	3.6%
Increase in Average Pay	6.0%	2.2%	(0.3)%	4.0%	(0.8)%	2.6%	2.2%

The nominal rate of return was computed using the approximate formula $i = I \text{ divided by } 1/2 (A + B - I)$, where I is actual investment income net of expenses, A is the beginning of year asset value, and B is the end of year asset value.

These rates of return should not be used for measurement of an investment advisor's performance or for comparisons with other systems -- ***to do so will mislead.***

Pay Projections. These assumptions are used to project current pays to those upon which benefits will be based. The assumptions were first used for the December 31, 2015 valuation.

Sample Ages	Annual Rate of Pay Increase for Sample Ages		
	Base (Economic)	Merit and Longevity	Total
20	3.5 %	3.8 %	7.3 %
25	3.5	3.1	6.6
30	3.5	2.7	6.2
35	3.5	2.4	5.9
40	3.5	2.1	5.6
45	3.5	1.7	5.2
50	3.5	1.1	4.6
55	3.5	0.7	4.2

If the active population remains stationary, the total active member payroll will increase 3.5% annually, the base portion of the individual pay increase assumptions. This increasing payroll was recognized in amortizing unfunded actuarial accrued liabilities.

Changes actually experienced in average pay and total payroll have been as follows:

Increase in	Year Ended December 31					December 31, 2019	
	2019	2018	2017	2016	2015	3-Year Average	5-Year Average
Average pay	6.0%	2.2%	(0.3)%	4.0%	(0.8)%	2.6%	2.2%
Total payroll	6.0%	2.2%	12.1%	(7.6)%	(0.8)%	6.7%	2.2%

Mortality Table. This assumption is used to measure the probabilities of members dying before retirement and the probabilities of each benefit payment being made after retirement. These tables were first used for the December 31, 2016 valuation.

- Pre-Retirement: RP-2014 Employee Mortality Tables
- Healthy Post-Retirement: RP-2014 Healthy Annuitant Mortality Tables
- Disabled Retirement: RP-2014 Disabled Mortality Tables

The tables described above were adjusted backwards to 2006 with the MP-2014 scale. A base year of 2006 with future mortality improvements using scale MP-2015 was used. Additional margin for future mortality improvements are included in the projection scale.

Sample Ages in 2019	Healthy Post-Retirement Future Life Expectancy (Years)*	
	Men	Women
50	35.33	37.91
55	30.52	32.96
60	25.92	28.15
65	21.51	23.52
70	17.33	19.11
75	13.47	15.01
80	10.05	11.34

* Based on retirements in 2019. Retirements in future years will reflect improvements in life expectancy.

It is assumed that 50% of deaths before retirement are duty related.

Rates of separation from active membership. The rates do not apply to members eligible to retire and do not include separation on account of death or disability. This assumption measures the probabilities of members remaining in employment.

Sample Ages	Years of Service	Percent Separating Within Next Year
ALL	0	12.00 %
	1	9.00
	2	7.00
	3	5.00
	4	4.50
25	5 & Over	4.50
30		3.90
35		2.30
40		0.90
45		0.50
50		0.50
55		0.50
60		0.50

The rates were first used for the December 31, 1976 valuation.

Rates of Disability. These assumptions represent the probabilities of active members becoming disabled.

Sample Ages	Percent Becoming Disabled Within Next Year
20	0.10 %
25	0.10
30	0.07
35	0.12
40	0.28
45	0.51
50	0.81
55	1.13

It is assumed that 20% of disabilities before retirement are duty related. These rates were first used for the December 31, 1985 valuation.

Rates of Retirement. These rates are used to measure the probabilities of an eligible member retiring during the next year.

Retirement Ages	Percents of Eligible Active Members Retiring Within Next Year
50	35 %
51	35
52	35
53	35
54	35
55	35
56	35
57	35
58	35
59	35
60	100

A member was assumed to be eligible for retirement after attaining age 50 with 25 or more years of service, or, after attaining age 60.

These rates were first used for the December 31, 2003 valuation.

Unused Sick-Leave and Vacation Time. In recognition of the inclusion of lump sum payments in the computation of average final compensation, benefits were projected to increase by the factor 1.035.

Active Member Group Size. The number of active members was assumed to remain constant. This assumption is unchanged from previous valuations.

Summary of Assumptions Used December 31, 2019

Pensions in an Inflationary Environment

Value of \$1,000/month Retirement Benefit to an Individual Who Retires at Age 50 in an Environment of 2.75% Price Inflation

<u>Age</u>	<u>Value</u>
50	\$1,000
51	973
52	947
53	922
54	897
55	873
60	762
65	666
70	582
75	508
80	443
85	386

The life expectancy of a 50-year-old male retiree is age 85. The life expectancy for a 50-year-old female retiree is age 88. Half of the people will outlive their life expectancy. The effects of even moderate amounts of inflation can be significant for those who live to an advanced age.

Miscellaneous and Technical Assumptions

Marriage Assumption:	90% of males and 90% of females are assumed to be married for purposes of Death-in-Service benefits. 90% of members are assumed to be married for death-after-retirement benefits. (Actual data is used after retirement.)
Pay Increase Timing:	Beginning of (Fiscal) year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date.
Decrement Timing:	Decrements of all types are assumed to occur mid-year.
Eligibility Testing:	Eligibility for benefits is determined based upon the age nearest birthday and service nearest whole year on the date the decrement is assumed to occur.
Benefit Service:	Exact fractional service is used to determine the amount of benefit payable.
Decrement Operation:	Disability and withdrawal do not operate during retirement eligibility.
Normal Form of Benefit:	The assumed normal form of benefit is the 60% Joint and Survivor form.
Incidence of Contributions:	Contributions are assumed to be received continuously throughout the year based upon the computed percent of payroll shown in this report, and the actual payroll payable at the time contributions are made. New entrant normal cost contributions are applied to the funding of new entrant benefits.
Member Contributions:	Accumulated contribution balances are credited with 2% interest annually.
Miscellaneous Adjustments:	The calculated normal retirement liabilities and normal costs were increased by 3.5% to account for the inclusion of unused sick leave and vacation time in the calculation of AFC.
Administrative Expenses:	Assumed administrative expenses are added to the Normal Cost, and were 2.0% of payroll in the December 31, 2019 valuation.

Definitions of Technical Terms

Accrued Service. Service credited under the system, which was rendered before the date of the actuarial valuation.

Actuarial Accrued Liability. The difference between the actuarial present value of system benefits and the actuarial present value of future normal costs. Also referred to as “past service liability.”

Actuarial Assumptions. Estimates of future experience with respect to rates of mortality, disability, turnover, retirement, rate or rates of investment income and salary increases. Decrement assumptions (rates of mortality, disability, turnover and retirement) are generally based on past experience, often modified for projected changes in conditions. Economic assumptions (salary increases and investment income) consist of an underlying rate in an inflation-free environment plus a provision for a long-term average rate of inflation.

Actuarial Cost Method. A mathematical budgeting procedure for allocating the dollar amount of the “actuarial present value of future benefits” between future normal costs and actuarial accrued liability. Sometimes referred to as the “actuarial funding method.”

Actuarial Equivalent. One series of payments is said to be actuarially equivalent to another series of payments if the two series have the same actuarial present value.

Actuarial Gain (Loss). The difference between actual unfunded actuarial accrued liabilities and anticipated unfunded actuarial accrued liabilities -- during the period between two valuation dates. It is a measurement of the difference between actual and expected experience.

Actuarial Present Value. The amount of funds currently required to provide a payment or series of payments in the future. It is determined by discounting future payments at predetermined rates of interest, and by probabilities of payments.

Amortization. Paying off an interest-discounted amount with periodic payments of interest and (generally) principal -- as opposed to paying off with a lump sum payment.

Normal Cost. The portion of the actuarial present value of future benefits that is assigned to the current year by the actuarial cost method. Sometimes referred to as “current service cost.”

Unfunded Actuarial Accrued Liabilities. The difference between actuarial accrued liabilities and valuation assets. Sometimes referred to as “unfunded past service liability” or “unfunded supplemental present value.”

Most retirement systems have unfunded actuarial accrued liabilities. They arise each time new benefits are added and each time an actuarial loss occurs.

The existence of unfunded actuarial accrued liabilities is not in itself bad, any more than a mortgage on a house is bad. Unfunded actuarial accrued liabilities do not represent a debt that is payable today. What is important is the ability to amortize the unfunded actuarial accrued liabilities and the trend in their amount (after due allowance for devaluation of the dollar).

Valuation Assets. Also referred to as actuarial value of assets, funding value of assets, or smoothed market value of assets.

Valuation assets recognize assumed investment return fully each year. Differences between actual and assumed investment return are phased-in over a closed 5-year period. During periods when investment performance exceeds the assumed rate, valuation assets will tend to be less than market value. During periods when investment performance is less than the assumed rate, valuation assets will tend to be greater than market value. If assumed rates are exactly realized for 4 consecutive years, valuation assets will become equal to market value.



Appendix D: Pension Obligation Bond Financial Analysis



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County of Marquette, State of Michigan
Limited Tax General Obligation Pension Obligation Bonds, Series 2021
(Federally Taxable)
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Preliminary - Subject to Change

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SOURCES AND USES OF FUNDS

City of Ishpeming
County of Marquette, State of Michigan
Limited Tax General Obligation Pension Obligation Bonds, Series 2021
(Federally Taxable)
Payment Schedules Assuming Market Rates and 12/31/2019 Market Value of Assets
Preliminary - Subject to Change

Dated Date 09/02/2021
Delivery Date 09/02/2021

Sources:

Bond Proceeds:	
Par Amount	9,880,000.00
	9,880,000.00

Uses:

Project Fund Deposits:	
Deposit to Pension Fund	9,621,803.00
Delivery Date Expenses:	
Cost of Issuance	125,000.00
Underwriter's Discount	64,220.00
Bond Insurance	64,115.64
	253,335.64
Other Uses of Funds:	
Additional Proceeds	4,861.36
	9,880,000.00

Notes:

Cost of Issuance and Underwriter's Discount are estimates only
Assumes use of Bond Insurance estimated at 50 bps total debt service
Assumes current insured rates +50 bps as of May 11, 2021

BOND DEBT SERVICE

City of Ishpeming
County of Marquette, State of Michigan
Limited Tax General Obligation Pension Obligation Bonds, Series 2021
(Federally Taxable)
Payment Schedules Assuming Market Rates and 12/31/2019 Market Value of Assets
Preliminary - Subject to Change

Period Ending	Principal	Coupon	Interest	Debt Service	Annual Debt Service
05/01/2022	410,000	0.776%	172,172.94	582,172.94	
11/01/2022			128,079.20	128,079.20	710,252.14
05/01/2023	460,000	1.006%	128,079.20	588,079.20	
11/01/2023			125,765.40	125,765.40	713,844.60
05/01/2024	465,000	1.583%	125,765.40	590,765.40	
11/01/2024			122,084.93	122,084.93	712,850.33
05/01/2025	470,000	1.583%	122,084.93	592,084.93	
11/01/2025			118,364.88	118,364.88	710,449.81
05/01/2026	480,000	2.203%	118,364.88	598,364.88	
11/01/2026			113,077.68	113,077.68	711,442.56
05/01/2027	490,000	2.153%	113,077.68	603,077.68	
11/01/2027			107,802.83	107,802.83	710,880.51
05/01/2028	505,000	2.675%	107,802.83	612,802.83	
11/01/2028			101,048.45	101,048.45	713,851.28
05/01/2029	515,000	2.525%	101,048.45	616,048.45	
11/01/2029			94,546.58	94,546.58	710,595.03
05/01/2030	530,000	2.625%	94,546.58	624,546.58	
11/01/2030			87,590.33	87,590.33	712,136.91
05/01/2031	545,000	2.725%	87,590.33	632,590.33	
11/01/2031			80,164.70	80,164.70	712,755.03
05/01/2032	560,000	2.825%	80,164.70	640,164.70	
11/01/2032			72,254.70	72,254.70	712,419.40
05/01/2033	575,000	2.925%	72,254.70	647,254.70	
11/01/2033			63,845.33	63,845.33	711,100.03
05/01/2034	595,000	3.025%	63,845.33	658,845.33	
11/01/2034			54,845.95	54,845.95	713,691.28
05/01/2035	615,000	3.125%	54,845.95	669,845.95	
11/01/2035			45,236.58	45,236.58	715,082.53
05/01/2036	635,000	3.225%	45,236.58	680,236.58	
11/01/2036			34,997.20	34,997.20	715,233.78
05/01/2037	655,000	3.448%	34,997.20	689,997.20	
11/01/2037			23,705.00	23,705.00	713,702.20
05/01/2038	675,000	3.448%	23,705.00	698,705.00	
11/01/2038			12,068.00	12,068.00	710,773.00
05/01/2039	700,000	3.448%	12,068.00	712,068.00	
11/01/2039					712,068.00
	9,880,000		2,943,128.42	12,823,128.42	12,823,128.42



BOND PRICING

City of Ishpeming
County of Marquette, State of Michigan
Limited Tax General Obligation Pension Obligation Bonds, Series 2021
(Federally Taxable)
Payment Schedules Assuming Market Rates and 12/31/2019 Market Value of Assets
Preliminary - Subject to Change

Bond Component	Maturity Date	Amount	Rate	Yield	Price
Taxable Serial Bonds:					
	05/01/2022	410,000	0.776%	0.776%	100.000
	05/01/2023	460,000	1.006%	1.006%	100.000
	05/01/2024	465,000	1.583%	1.583%	100.000
	05/01/2025	470,000	1.583%	1.583%	100.000
	05/01/2026	480,000	2.203%	2.203%	100.000
	05/01/2027	490,000	2.153%	2.153%	100.000
	05/01/2028	505,000	2.675%	2.675%	100.000
	05/01/2029	515,000	2.525%	2.525%	100.000
	05/01/2030	530,000	2.625%	2.625%	100.000
	05/01/2031	545,000	2.725%	2.725%	100.000
	05/01/2032	560,000	2.825%	2.825%	100.000
	05/01/2033	575,000	2.925%	2.925%	100.000
	05/01/2034	595,000	3.025%	3.025%	100.000
	05/01/2035	615,000	3.125%	3.125%	100.000
	05/01/2036	635,000	3.225%	3.225%	100.000
		7,850,000			
2039 Term Bond:					
	05/01/2037	655,000	3.448%	3.448%	100.000
	05/01/2038	675,000	3.448%	3.448%	100.000
	05/01/2039	700,000	3.448%	3.448%	100.000
		2,030,000			
		9,880,000			

Dated Date	09/02/2021	
Delivery Date	09/02/2021	
First Coupon	05/01/2022	
Par Amount	9,880,000.00	
Original Issue Discount		
Production	9,880,000.00	100.000000%
Underwriter's Discount	(64,220.00)	(0.650000%)
Purchase Price	9,815,780.00	99.350000%
Accrued Interest		
Net Proceeds	9,815,780.00	

BOND SUMMARY STATISTICS

City of Ishpeming
County of Marquette, State of Michigan
Limited Tax General Obligation Pension Obligation Bonds, Series 2021
(Federally Taxable)
Payment Schedules Assuming Market Rates and 12/31/2019 Market Value of Assets
Preliminary - Subject to Change

Dated Date	09/02/2021
Delivery Date	09/02/2021
Last Maturity	05/01/2039
Arbitrage Yield	3.053582%
True Interest Cost (TIC)	3.053710%
Net Interest Cost (NIC)	3.069217%
All-In TIC	3.289347%
Average Coupon	3.003676%
Average Life (years)	9.917
Weighted Average Maturity (years)	9.917
Duration of Issue (years)	8.418
Par Amount	9,880,000.00
Bond Proceeds	9,880,000.00
Total Interest	2,943,128.42
Net Interest	3,007,348.42
Bond Years from Dated Date	97,984,222.22
Bond Years from Delivery Date	97,984,222.22
Total Debt Service	12,823,128.42
Maximum Annual Debt Service	715,233.78
Average Annual Debt Service	725,951.60
Underwriter's Fees (per \$1000)	
Average Takedown	
Other Fee	6.500000
Total Underwriter's Discount	6.500000
Bid Price	99.350000

Bond Component	Par Value	Price	Average Coupon	Average Life	PV of 1 bp change
Taxable Serial Bonds	7,850,000.00	100.000	2.769%	8.167	5,510.75
2039 Term Bond	2,030,000.00	100.000	3.448%	16.686	2,659.30
	9,880,000.00			9.917	8,170.05

	TIC	All-In TIC	Arbitrage Yield
Par Value	9,880,000.00	9,880,000.00	9,880,000.00
+ Accrued Interest			
+ Premium (Discount)			
- Underwriter's Discount	(64,220.00)	(64,220.00)	
- Cost of Issuance Expense		(125,000.00)	
- Other Amounts		(64,115.64)	(64,115.64)
Target Value	9,815,780.00	9,626,664.36	9,815,884.36
Target Date	09/02/2021	09/02/2021	09/02/2021
Yield	3.053710%	3.289347%	3.053582%

PROOF OF ARBITRAGE YIELD

City of Ishpeming
County of Marquette, State of Michigan
Limited Tax General Obligation Pension Obligation Bonds, Series 2021
(Federally Taxable)
Payment Schedules Assuming Market Rates and 12/31/2019 Market Value of Assets
Preliminary - Subject to Change

Date	Debt Service	Present Value to 09/02/2021 @ 3.0535818216%
05/01/2022	582,172.94	570,577.13
11/01/2022	128,079.20	123,640.37
05/01/2023	588,079.20	559,160.97
11/01/2023	125,765.40	117,782.71
05/01/2024	590,765.40	544,947.62
11/01/2024	122,084.93	110,922.87
05/01/2025	592,084.93	529,861.54
11/01/2025	118,364.88	104,332.74
05/01/2026	598,364.88	519,497.15
11/01/2026	113,077.68	96,697.07
05/01/2027	603,077.68	507,959.41
11/01/2027	107,802.83	89,434.54
05/01/2028	612,802.83	500,743.36
11/01/2028	101,048.45	81,328.63
05/01/2029	616,048.45	488,368.89
11/01/2029	94,546.58	73,824.12
05/01/2030	624,546.58	480,326.60
11/01/2030	87,590.33	66,350.97
05/01/2031	632,590.33	471,990.26
11/01/2031	80,164.70	58,913.25
05/01/2032	640,164.70	463,383.84
11/01/2032	72,254.70	51,515.11
05/01/2033	647,254.70	454,530.53
11/01/2033	63,845.33	44,160.74
05/01/2034	658,845.33	448,859.07
11/01/2034	54,845.95	36,803.61
05/01/2035	669,845.95	442,731.22
11/01/2035	45,236.58	29,449.26
05/01/2036	680,236.58	436,178.12
11/01/2036	34,997.20	22,103.27
05/01/2037	689,997.20	429,229.84
11/01/2037	23,705.00	14,524.52
05/01/2038	698,705.00	421,672.33
11/01/2038	12,068.00	7,173.58
05/01/2039	712,068.00	416,909.13
	12,823,128.42	9,815,884.36

Proceeds Summary

Delivery date	09/02/2021
Par Value	9,880,000.00
Arbitrage expenses	(64,115.64)
Target for yield calculation	9,815,884.36



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www.pfm.com

City of Ishpeming
Limited Tax General Obligation Pension Obligation Bonds
Series 2021
(Federally Taxable)

Pension Analysis - Market Rates with 7.35% Discount Rate - Assuming Market Value of Assets as of 12-31-2019											
Year Ending 12/31	UAL Payment (a)	1-May Interest Payment	1-May Principal Payment	Estimated Interest Rate	1-Nov Interest Payment	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$952,007 UAL Remaining After Bonding (d)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 3.05% (e)
2021	\$822,000	\$0	\$0		\$0	-	\$616,500	\$18,502	\$635,002	\$186,998	\$185,148
2022	847,000	172,173	410,000	0.78%	128,079	\$710,252	--	76,259	786,511	60,489	58,116
2023	872,000	128,079	460,000	1.01%	125,765	713,845	--	78,510	792,355	79,645	74,253
2024	898,000	125,765	465,000	1.58%	122,085	712,850	--	80,851	793,701	104,299	94,356
2025	925,000	122,085	470,000	1.58%	118,365	710,450	--	83,282	793,732	131,268	115,236
2026	953,000	118,365	480,000	2.20%	113,078	711,443	--	85,803	797,245	155,755	132,681
2027	982,000	113,078	490,000	2.15%	107,803	710,881	--	88,414	799,294	182,706	151,027
2028	1,010,000	107,803	505,000	2.68%	101,048	713,851	--	90,935	804,786	205,214	164,607
2029	1,040,000	101,048	515,000	2.53%	94,547	710,595	--	93,636	804,231	235,769	183,512
2030	1,070,000	94,547	530,000	2.63%	87,590	712,137	--	96,337	808,474	261,526	197,528
2031	1,110,000	87,590	545,000	2.73%	80,165	712,755	--	99,938	812,693	297,307	217,899
2032	1,140,000	80,165	560,000	2.83%	72,255	712,419	--	102,639	815,059	324,941	231,096
2033	1,170,000	72,255	575,000	2.93%	63,845	711,100	--	105,340	816,440	353,560	243,999
2034	1,210,000	63,845	595,000	3.03%	54,846	713,691	--	108,942	822,633	387,367	259,409
2035	1,240,000	54,846	615,000	3.13%	45,237	715,083	--	111,643	826,725	413,275	268,558
2036	1,280,000	45,237	635,000	3.23%	34,997	715,234	--	115,244	830,478	449,522	283,457
2037	1,320,000	34,997	655,000	3.45%	23,705	713,702	--	118,845	832,548	487,452	298,267
2038	1,360,000	23,705	675,000	3.45%	12,068	710,773	--	122,447	833,220	526,780	312,780
2039	1,400,000	12,068	700,000	3.45%	--	712,068	--	126,048	838,116	561,884	323,737
2040	--	--	--	--	--	--	--	--	--	--	--
	\$20,649,000	\$1,557,651	\$9,880,000		\$1,385,478	\$12,823,128	\$616,500	\$1,803,615	\$15,243,243	\$5,405,757	\$3,795,666

(a) Based on GRS Letter dated March 2, 2021;

assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS

(b) Estimate only based on estimated interest rates as of 5/11/2021

plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service)

(c) Assumes 9 months of UAL payments will be made prior to the bonds being sold

(d) Assumes \$9,621,803 payment towards UAL, leaving 9.00% of UAL payments remaining unfunded.

(e) Represents Arbitrage Yield (including bond insurance)

UAL Funded with Bond Proceeds: \$9,621,803

Estimated Bond Amount: \$9,880,000

All-In TIC: 3.283%

NPV Savings as % of Principal: **38.42%**



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SOURCES AND USES OF FUNDS

City of Ishpeming
County of Marquette, State of Michigan
Limited Tax General Obligation Pension Obligation Bonds, Series 2021
(Federally Taxable)
Payment Schedules Assuming Market Rates and 12/31/2019 Actuarial Value of Assets
Preliminary - Subject to Change

Dated Date 09/02/2021
Delivery Date 09/02/2021

Sources:

Bond Proceeds:	
Par Amount	9,765,000.00
	<hr/>
	9,765,000.00

Uses:

Project Fund Deposits:	
Deposit to Pension Fund	9,510,225.10
Delivery Date Expenses:	
Cost of Issuance	125,000.00
Underwriter's Discount	63,472.50
Bond Insurance	<hr/>
	63,359.24
	251,831.74
Other Uses of Funds:	
Additional Proceeds	2,943.16
	<hr/>
	9,765,000.00

Notes:

Cost of Issuance and Underwriter's Discount are estimates only
Assumes use of Bond Insurance estimated at 50 bps total debt service
Assumes current insured rates +50 bps as of May 11, 2021

BOND DEBT SERVICE

City of Ishpeming
County of Marquette, State of Michigan
Limited Tax General Obligation Pension Obligation Bonds, Series 2021
(Federally Taxable)
Payment Schedules Assuming Market Rates and 12/31/2019 Actuarial Value of Assets
Preliminary - Subject to Change

Period Ending	Principal	Coupon	Interest	Debt Service	Annual Debt Service
05/01/2022	405,000	0.776%	170,128.37	575,128.37	
11/01/2022			126,558.75	126,558.75	701,687.12
05/01/2023	455,000	1.006%	126,558.75	581,558.75	
11/01/2023			124,270.10	124,270.10	705,828.85
05/01/2024	460,000	1.583%	124,270.10	584,270.10	
11/01/2024			120,629.20	120,629.20	704,899.30
05/01/2025	465,000	1.583%	120,629.20	585,629.20	
11/01/2025			116,948.73	116,948.73	702,577.93
05/01/2026	475,000	2.203%	116,948.73	591,948.73	
11/01/2026			111,716.60	111,716.60	703,665.33
05/01/2027	485,000	2.153%	111,716.60	596,716.60	
11/01/2027			106,495.58	106,495.58	703,212.18
05/01/2028	500,000	2.675%	106,495.58	606,495.58	
11/01/2028			99,808.08	99,808.08	706,303.66
05/01/2029	510,000	2.525%	99,808.08	609,808.08	
11/01/2029			93,369.33	93,369.33	703,177.41
05/01/2030	525,000	2.625%	93,369.33	618,369.33	
11/01/2030			86,478.70	86,478.70	704,848.03
05/01/2031	540,000	2.725%	86,478.70	626,478.70	
11/01/2031			79,121.20	79,121.20	705,599.90
05/01/2032	555,000	2.825%	79,121.20	634,121.20	
11/01/2032			71,281.83	71,281.83	705,403.03
05/01/2033	570,000	2.925%	71,281.83	641,281.83	
11/01/2033			62,945.58	62,945.58	704,227.41
05/01/2034	585,000	3.025%	62,945.58	647,945.58	
11/01/2034			54,097.45	54,097.45	702,043.03
05/01/2035	605,000	3.125%	54,097.45	659,097.45	
11/01/2035			44,644.33	44,644.33	703,741.78
05/01/2036	625,000	3.225%	44,644.33	669,644.33	
11/01/2036			34,566.20	34,566.20	704,210.53
05/01/2037	645,000	3.448%	34,566.20	679,566.20	
11/01/2037			23,446.40	23,446.40	703,012.60
05/01/2038	665,000	3.448%	23,446.40	688,446.40	
11/01/2038			11,981.80	11,981.80	700,428.20
05/01/2039	695,000	3.448%	11,981.80	706,981.80	
11/01/2039					706,981.80
	9,765,000		2,906,848.09	12,671,848.09	12,671,848.09

BOND PRICING

City of Ishpeming
County of Marquette, State of Michigan
Limited Tax General Obligation Pension Obligation Bonds, Series 2021
(Federally Taxable)
Payment Schedules Assuming Market Rates and 12/31/2019 Actuarial Value of Assets
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Bond Component	Maturity Date	Amount	Rate	Yield	Price
Taxable Serial Bonds:					
	05/01/2022	405,000	0.776%	0.776%	100.000
	05/01/2023	455,000	1.006%	1.006%	100.000
	05/01/2024	460,000	1.583%	1.583%	100.000
	05/01/2025	465,000	1.583%	1.583%	100.000
	05/01/2026	475,000	2.203%	2.203%	100.000
	05/01/2027	485,000	2.153%	2.153%	100.000
	05/01/2028	500,000	2.675%	2.675%	100.000
	05/01/2029	510,000	2.525%	2.525%	100.000
	05/01/2030	525,000	2.625%	2.625%	100.000
	05/01/2031	540,000	2.725%	2.725%	100.000
	05/01/2032	555,000	2.825%	2.825%	100.000
	05/01/2033	570,000	2.925%	2.925%	100.000
	05/01/2034	585,000	3.025%	3.025%	100.000
	05/01/2035	605,000	3.125%	3.125%	100.000
	05/01/2036	625,000	3.225%	3.225%	100.000
		7,760,000			
2039 Term Bond:					
	05/01/2037	645,000	3.448%	3.448%	100.000
	05/01/2038	665,000	3.448%	3.448%	100.000
	05/01/2039	695,000	3.448%	3.448%	100.000
		2,005,000			
		9,765,000			

Dated Date	09/02/2021	
Delivery Date	09/02/2021	
First Coupon	05/01/2022	
Par Amount	9,765,000.00	
Original Issue Discount		
Production	9,765,000.00	100.000000%
Underwriter's Discount	(63,472.50)	(0.650000%)
Purchase Price	9,701,527.50	99.350000%
Accrued Interest		
Net Proceeds	9,701,527.50	

BOND SUMMARY STATISTICS

City of Ishpeming
County of Marquette, State of Michigan
Limited Tax General Obligation Pension Obligation Bonds, Series 2021
(Federally Taxable)
Payment Schedules Assuming Market Rates and 12/31/2019 Actuarial Value of Assets
Preliminary - Subject to Change

Dated Date	09/02/2021
Delivery Date	09/02/2021
Last Maturity	05/01/2039
Arbitrage Yield	3.053062%
True Interest Cost (TIC)	3.053203%
Net Interest Cost (NIC)	3.068739%
All-In TIC	3.290789%
Average Coupon	3.003163%
Average Life (years)	9.912
Weighted Average Maturity (years)	9.912
Duration of Issue (years)	8.414
Par Amount	9,765,000.00
Bond Proceeds	9,765,000.00
Total Interest	2,906,848.09
Net Interest	2,970,320.59
Bond Years from Dated Date	96,792,875.00
Bond Years from Delivery Date	96,792,875.00
Total Debt Service	12,671,848.09
Maximum Annual Debt Service	706,981.80
Average Annual Debt Service	717,387.22
Underwriter's Fees (per \$1000)	
Average Takedown	
Other Fee	6.500000
Total Underwriter's Discount	6.500000
Bid Price	99.350000

Bond Component	Par Value	Price	Average Coupon	Average Life	PV of 1 bp change
Taxable Serial Bonds	7,760,000.00	100.000	2.768%	8.161	5,444.45
2039 Term Bond	2,005,000.00	100.000	3.448%	16.689	2,626.55
	9,765,000.00			9.912	8,071.00

	TIC	All-In TIC	Arbitrage Yield
Par Value	9,765,000.00	9,765,000.00	9,765,000.00
+ Accrued Interest			
+ Premium (Discount)			
- Underwriter's Discount	(63,472.50)	(63,472.50)	
- Cost of Issuance Expense		(125,000.00)	
- Other Amounts		(63,359.24)	(63,359.24)
Target Value	9,701,527.50	9,513,168.26	9,701,640.76
Target Date	09/02/2021	09/02/2021	09/02/2021
Yield	3.053203%	3.290789%	3.053062%

PROOF OF ARBITRAGE YIELD

City of Ishpeming
County of Marquette, State of Michigan
Limited Tax General Obligation Pension Obligation Bonds, Series 2021
(Federally Taxable)
Payment Schedules Assuming Market Rates and 12/31/2019 Actuarial Value of Assets
Preliminary - Subject to Change

Date	Debt Service	Present Value to 09/02/2021 @ 3.0530622636%
05/01/2022	575,128.37	563,674.79
11/01/2022	126,558.75	122,173.34
05/01/2023	581,558.75	552,965.86
11/01/2023	124,270.10	116,383.61
05/01/2024	584,270.10	538,963.42
11/01/2024	120,629.20	109,602.01
05/01/2025	585,629.20	524,094.09
11/01/2025	116,948.73	103,086.67
05/01/2026	591,948.73	513,938.95
11/01/2026	111,716.60	95,535.68
05/01/2027	596,716.60	502,616.18
11/01/2027	106,495.58	88,352.81
05/01/2028	606,495.58	495,606.38
11/01/2028	99,808.08	80,333.26
05/01/2029	609,808.08	483,440.83
11/01/2029	93,369.33	72,907.94
05/01/2030	618,369.33	475,596.88
11/01/2030	86,478.70	65,511.97
05/01/2031	626,478.70	467,453.34
11/01/2031	79,121.20	58,149.41
05/01/2032	634,121.20	459,034.30
11/01/2032	71,281.83	50,824.39
05/01/2033	641,281.83	450,363.00
11/01/2033	62,945.58	43,541.11
05/01/2034	647,945.58	441,461.88
11/01/2034	54,097.45	36,303.79
05/01/2035	659,097.45	435,657.51
11/01/2035	44,644.33	29,065.80
05/01/2036	669,644.33	429,418.43
11/01/2036	34,566.20	21,832.76
05/01/2037	679,566.20	422,774.86
11/01/2037	23,446.40	14,367.26
05/01/2038	688,446.40	415,516.64
11/01/2038	11,981.80	7,122.96
05/01/2039	706,981.80	413,968.63
	12,671,848.09	9,701,640.76

Proceeds Summary

Delivery date	09/02/2021
Par Value	9,765,000.00
Arbitrage expenses	(63,359.24)
Target for yield calculation	9,701,640.76



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City of Ishpeming
Limited Tax General Obligation Pension Obligation Bonds
Series 2021
(Federally Taxable)

Pension Analysis - Market Rates with 7.35% Discount Rate - Assuming Actuarial Value of Assets as of 12-31-2019											
Year Ending 12/31	UAL Payment (a)	1-May Interest Payment	1-May Principal Payment	Estimated Interest Rate	1-Nov Interest Payment	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$952,007 UAL Remaining After Bonding (d)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 3.05% (e)
2021	\$813,000	\$0	\$0		\$0	-	\$609,750	\$18,495	\$628,245	\$184,755	\$182,928
2022	837,000	170,128	405,000	0.78%	126,559	\$701,687	--	76,163	777,850	59,150	56,830
2023	863,000	126,559	455,000	1.01%	124,270	705,829	--	78,528	784,357	78,643	73,320
2024	888,000	124,270	460,000	1.58%	120,629	704,899	--	80,803	785,703	102,297	92,548
2025	915,000	120,629	465,000	1.58%	116,949	702,578	--	83,260	785,838	129,162	113,390
2026	942,000	116,949	475,000	2.20%	111,717	703,665	--	85,717	789,382	152,618	130,012
2027	971,000	111,717	485,000	2.15%	106,496	703,212	--	88,356	791,568	179,432	148,326
2028	1,000,000	106,496	500,000	2.68%	99,808	706,304	--	90,995	797,298	202,702	162,597
2029	1,030,000	99,808	510,000	2.53%	93,369	703,177	--	93,724	796,902	233,098	181,440
2030	1,060,000	93,369	525,000	2.63%	86,479	704,848	--	96,454	801,302	258,698	195,401
2031	1,090,000	86,479	540,000	2.73%	79,121	705,600	--	99,184	804,784	285,216	209,049
2032	1,130,000	79,121	555,000	2.83%	71,282	705,403	--	102,824	808,227	321,773	228,856
2033	1,160,000	71,282	570,000	2.93%	62,946	704,227	--	105,554	809,781	350,219	241,708
2034	1,190,000	62,946	585,000	3.03%	54,097	702,043	--	108,284	810,327	379,673	254,273
2035	1,230,000	54,097	605,000	3.13%	44,644	703,742	--	111,923	815,665	414,335	269,266
2036	1,270,000	44,644	625,000	3.23%	34,566	704,211	--	115,563	819,774	450,226	283,923
2037	1,300,000	34,566	645,000	3.45%	23,446	703,013	--	118,293	821,306	478,694	292,932
2038	1,340,000	23,446	665,000	3.45%	11,982	700,428	--	121,933	822,361	517,639	307,379
2039	1,380,000	11,982	695,000	3.45%	--	706,982	--	125,573	832,554	547,446	315,448
2040	--	--	--	--	--	--	--	--	--	--	--
	\$20,409,000	\$1,538,488	\$9,765,000		\$1,368,360	\$12,671,848	\$609,750	\$1,801,625	\$15,083,223	\$5,325,777	\$3,739,625

(a) Based on GRS Letter dated March 2, 2021;

assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS

(b) Estimate only based on estimated interest rates as of 5/11/2021

plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service)

(c) Assumes 9 months of UAL payments will be made prior to the bonds being sold

(d) Assumes \$9,510,225 payment towards UAL, leaving 9.10% of UAL payments remaining unfunded.

(e) Represents Arbitrage Yield (including bond insurance)

UAL Funded with Bond Proceeds: \$9,510,225

Estimated Bond Amount: \$9,765,000

All-In TIC: 3.287%

NPV Savings as % of Principal: **38.30%**



Appendix E: Comparisons of the Annual Unfunded Actuarial Accrued Liability Amortization to Estimated Bond Payments at Various Rates of Return



**City of Ishpeming
Limited Tax General Obligation Pension Obligation Bonds
Series 2021
(Federally Taxable)**

**Summary of Structuring
Alternatives
Using Market Value of Assets**

NPV Savings	Current Bond Interest Rates - 0.50%		Current Bond Interest Rates*		Current Bond Interest Rates + 0.50%	
	NPV Savings \$	NPV Savings %	NPV Savings \$	NPV Savings %	NPV Savings \$	NPV Savings %
Expected Rate of Return (7.35%)	\$4,443,352	45.00%	\$3,795,666	38.42%	\$3,193,994	32.33%
Exp. Rate of Return less 100 bps (6.35%)	\$3,270,830	33.12%	\$2,678,620	27.11%	\$2,128,866	21.55%
Exp. Rate of Return less 200 bps (5.35%)	\$3,044,893	30.83%	\$2,463,398	24.93%	\$1,923,668	19.47%

**Current Interest Rates reflect market conditions as of May 11, 2021 plus 0.50%; assumes use of bond insurance*

- Schedules based on market value of assets



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City of Ishpeming
Limited Tax General Obligation Pension Obligation Bonds
Series 2021
(Federally Taxable)

Pension Analysis - Market Rates with 7.35% Discount Rate - Assuming Market Value of Assets as of 12-31-2019											
Year Ending 12/31	UAL Payment (a)	1-May Interest Payment	1-May Principal Payment	Estimated Interest Rate	1-Nov Interest Payment	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$952,007 UAL Remaining After Bonding (d)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 3.05% (e)
2021	\$822,000	\$0	\$0		\$0	-	\$616,500	\$18,502	\$635,002	\$186,998	\$185,148
2022	847,000	172,173	410,000	0.78%	128,079	\$710,252	--	76,259	786,511	60,489	58,116
2023	872,000	128,079	460,000	1.01%	125,765	713,845	--	78,510	792,355	79,645	74,253
2024	898,000	125,765	465,000	1.58%	122,085	712,850	--	80,851	793,701	104,299	94,356
2025	925,000	122,085	470,000	1.58%	118,365	710,450	--	83,282	793,732	131,268	115,236
2026	953,000	118,365	480,000	2.20%	113,078	711,443	--	85,803	797,245	155,755	132,681
2027	982,000	113,078	490,000	2.15%	107,803	710,881	--	88,414	799,294	182,706	151,027
2028	1,010,000	107,803	505,000	2.68%	101,048	713,851	--	90,935	804,786	205,214	164,607
2029	1,040,000	101,048	515,000	2.53%	94,547	710,595	--	93,636	804,231	235,769	183,512
2030	1,070,000	94,547	530,000	2.63%	87,590	712,137	--	96,337	808,474	261,526	197,528
2031	1,110,000	87,590	545,000	2.73%	80,165	712,755	--	99,938	812,693	297,307	217,899
2032	1,140,000	80,165	560,000	2.83%	72,255	712,419	--	102,639	815,059	324,941	231,096
2033	1,170,000	72,255	575,000	2.93%	63,845	711,100	--	105,340	816,440	353,560	243,999
2034	1,210,000	63,845	595,000	3.03%	54,846	713,691	--	108,942	822,633	387,367	259,409
2035	1,240,000	54,846	615,000	3.13%	45,237	715,083	--	111,643	826,725	413,275	268,558
2036	1,280,000	45,237	635,000	3.23%	34,997	715,234	--	115,244	830,478	449,522	283,457
2037	1,320,000	34,997	655,000	3.45%	23,705	713,702	--	118,845	832,548	487,452	298,267
2038	1,360,000	23,705	675,000	3.45%	12,068	710,773	--	122,447	833,220	526,780	312,780
2039	1,400,000	12,068	700,000	3.45%	--	712,068	--	126,048	838,116	561,884	323,737
2040	--	--	--	--	--	--	--	--	--	--	--
	\$20,649,000	\$1,557,651	\$9,880,000		\$1,385,478	\$12,823,128	\$616,500	\$1,803,615	\$15,243,243	\$5,405,757	\$3,795,666

(a) Based on GRS Letter dated March 2, 2021;

assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS

(b) Estimate only based on estimated interest rates as of 5/11/2021

plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service)

(c) Assumes 9 months of UAL payments will be made prior to the bonds being sold

(d) Assumes \$9,621,803 payment towards UAL, leaving 9.00% of UAL payments remaining unfunded.

(e) Represents Arbitrage Yield (including bond insurance)

UAL Funded with Bond Proceeds: \$9,621,803

Estimated Bond Amount: \$9,880,000

All-In TIC: 3.283%

NPV Savings as % of Principal: **38.42%**



City of Ishpeming
Limited Tax General Obligation Pension Obligation Bonds
Series 2021
(Federally Taxable)

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Pension Analysis - Market Rates with 6.35% Discount Rate - Assuming Market Value of Assets as of 12-31-2019											
Year Ending 12/31	UAL Payment (a)	1-May Interest Payment	1-May Principal Payment	Estimated Interest Rate	1-Nov Interest Payment	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$3,389,775 UAL Remaining After Bonding (d)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 3.05% (e)
2021	\$928,000	\$0	\$0		\$0	\$0	\$696,000	\$60,441	\$756,441	\$171,559	\$169,862
2022	956,000	172,173	410,000	0.78%	128,079	710,252	--	249,057	959,309	(3,309)	(3,179)
2023	985,000	128,079	460,000	1.01%	125,765	713,845	--	256,612	970,457	14,543	13,559
2024	1,010,000	125,765	465,000	1.58%	122,085	712,850	--	263,125	975,975	34,025	30,781
2025	1,040,000	122,085	470,000	1.58%	118,365	710,450	--	270,941	981,390	58,610	51,451
2026	1,080,000	118,365	480,000	2.20%	113,078	711,443	--	281,361	992,804	87,196	74,278
2027	1,110,000	113,078	490,000	2.15%	107,803	710,881	--	289,177	1,000,058	109,942	90,880
2028	1,140,000	107,803	505,000	2.68%	101,048	713,851	--	296,993	1,010,844	129,156	103,599
2029	1,180,000	101,048	515,000	2.53%	94,547	710,595	--	307,413	1,018,008	161,992	126,087
2030	1,210,000	94,547	530,000	2.63%	87,590	712,137	--	315,229	1,027,366	182,634	137,942
2031	1,250,000	87,590	545,000	2.73%	80,165	712,755	--	325,650	1,038,405	211,595	155,080
2032	1,280,000	80,165	560,000	2.83%	72,255	712,419	--	333,465	1,045,885	234,115	166,501
2033	1,320,000	72,255	575,000	2.93%	63,845	711,100	--	343,886	1,054,986	265,014	182,891
2034	1,360,000	63,845	595,000	3.03%	54,846	713,691	--	354,307	1,067,998	292,002	195,545
2035	1,400,000	54,846	615,000	3.13%	45,237	715,083	--	364,728	1,079,810	320,190	208,068
2036	1,450,000	45,237	635,000	3.23%	34,997	715,234	--	377,754	1,092,988	357,012	225,122
2037	1,490,000	34,997	655,000	3.45%	23,705	713,702	--	388,175	1,101,877	388,123	237,488
2038	1,530,000	23,705	675,000	3.45%	12,068	710,773	--	398,595	1,109,368	420,632	249,753
2039	1,580,000	12,068	700,000	3.45%	--	712,068	--	411,621	1,123,689	456,311	262,910
2040	--	--	--	--	--	--	--	--	--	--	--
	\$23,299,000	\$1,557,651	\$9,880,000		\$1,385,478	\$12,823,128	\$696,000	\$5,888,531	\$19,407,659	\$3,891,341	\$2,678,620

(a) Based on GRS Letter dated March 2, 2021;
assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS

(b) Estimate only based on estimated interest rates as of 5/11/2021
plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service)

(c) Assumes 9 months of UAL payments will be made prior to the bonds being sold

(d) Assumes \$9,621,803 payment towards UAL, leaving 26.05% of UAL payments remaining unfunded (6.35% liability is estimated, subject to chage).

(e) Represents Arbitrage Yield (including bond insurance)

UAL Funded with Bond Proceeds: \$9,621,803
Estimated Bond Amount: \$9,880,000
All-In TIC: 3.283%
NPV Savings as % of Principal: **27.11%**



City of Ishpeming
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Pension Analysis - Market Rates with 5.35% Discount Rate - Assuming Market Value of Assets as of 12-31-2019											
Year Ending 12/31	UAL Payment (a)	1-May Interest Payment	1-May Principal Payment	Estimated Interest Rate	1-Nov Interest Payment	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$5,248,163 UAL Remaining After Bonding (e)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 3.05% (e)
2021	\$1,040,000	\$0	\$0		\$0	\$0	\$780,000	\$91,764	\$871,764	\$168,236	\$166,572
2022	1,070,000	172,173	410,000	0.78%	128,079	710,252	--	377,643	1,087,895	(17,895)	(17,193)
2023	1,110,000	128,079	460,000	1.01%	125,765	713,845	--	391,760	1,105,605	4,395	4,098
2024	1,140,000	125,765	465,000	1.58%	122,085	712,850	--	402,348	1,115,199	24,801	22,437
2025	1,170,000	122,085	470,000	1.58%	118,365	710,450	--	412,936	1,123,386	46,614	40,921
2026	1,210,000	118,365	480,000	2.20%	113,078	711,443	--	427,054	1,138,496	71,504	60,911
2027	1,240,000	113,078	490,000	2.15%	107,803	710,881	--	437,642	1,148,523	91,477	75,617
2028	1,280,000	107,803	505,000	2.68%	101,048	713,851	--	451,760	1,165,611	114,389	91,754
2029	1,320,000	101,048	515,000	2.53%	94,547	710,595	--	465,877	1,176,472	143,528	111,716
2030	1,360,000	94,547	530,000	2.63%	87,590	712,137	--	479,994	1,192,131	167,869	126,790
2031	1,400,000	87,590	545,000	2.73%	80,165	712,755	--	494,112	1,206,867	193,133	141,549
2032	1,440,000	80,165	560,000	2.83%	72,255	712,419	--	508,229	1,220,649	219,351	156,001
2033	1,490,000	72,255	575,000	2.93%	63,845	711,100	--	525,876	1,236,976	253,024	174,617
2034	1,530,000	63,845	595,000	3.03%	54,846	713,691	--	539,994	1,253,685	276,315	185,040
2035	1,580,000	54,846	615,000	3.13%	45,237	715,083	--	557,641	1,272,723	307,277	199,677
2036	1,620,000	45,237	635,000	3.23%	34,997	715,234	--	571,758	1,286,992	333,008	209,986
2037	1,670,000	34,997	655,000	3.45%	23,705	713,702	--	589,405	1,303,107	366,893	224,498
2038	1,720,000	23,705	675,000	3.45%	12,068	710,773	--	607,052	1,317,825	402,175	238,795
2039	1,770,000	12,068	700,000	3.45%	--	712,068	--	624,699	1,336,767	433,233	249,614
2040	--	--	--	--	--	--	--	--	--	--	--
	\$26,160,000	\$1,557,651	\$9,880,000		\$1,385,478	\$12,823,128	\$780,000	\$8,957,544	\$22,560,672	\$3,599,328	\$2,463,398

(a) Based on GRS Letter dated March 2, 2021;
assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS

(b) Estimate only based on estimated interest rates as of 5/11/2021
plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service)

(c) Assumes 9 months of UAL payments will be made prior to the bonds being sold

(d) Assumes \$9,621,803 payment towards UAL, leaving 35.29% of UAL payments remaining unfunded.

(e) Represents Arbitrage Yield (including bond insurance)

UAL Funded with Bond Proceeds: \$9,621,803
Estimated Bond Amount: \$9,880,000
All-In TIC: 3.283%
NPV Savings as % of Principal: **24.93%**



City of Ishpeming
Limited Tax General Obligation Pension Obligation Bonds
Series 2021
(Federally Taxable)

555 Briarwood Circle
Suite 333
Ann Arbor, MI 48108

734-994-9700
734-994-9710 fax
www.pfm.com

Pension Analysis - Market Rates +50 bps with 7.35% Discount Rate - Assuming Market Value of Assets as of 12-31-2019											
Year Ending 12/31	UAL Payment (a)	1-May Interest Payment	1-May Principal Payment	Estimated Interest Rate	1-Nov Interest Payment	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$952,007 UAL Remaining After Bonding (d)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 3.56% (e)
2021	\$822,000	\$0	\$0		\$0	-	\$616,500	\$18,502	\$635,002	\$186,998	\$184,846
2022	847,000	206,249	385,000	1.28%	152,878	\$744,127	--	76,259	820,386	26,614	25,402
2023	872,000	152,878	440,000	1.51%	149,565	742,442	--	78,510	820,952	51,048	47,047
2024	898,000	149,565	450,000	2.08%	144,878	744,442	--	80,851	825,293	72,707	64,702
2025	925,000	144,878	460,000	2.08%	140,087	744,965	--	83,282	828,247	96,753	83,139
2026	953,000	140,087	470,000	2.70%	133,735	743,822	--	85,803	829,625	123,375	102,366
2027	982,000	133,735	480,000	2.65%	127,368	741,103	--	88,414	829,516	152,484	122,164
2028	1,010,000	127,368	495,000	3.18%	119,510	741,877	--	90,935	832,812	177,188	137,071
2029	1,040,000	119,510	510,000	3.03%	111,796	741,305	--	93,636	834,941	205,059	153,172
2030	1,070,000	111,796	525,000	3.13%	103,593	740,389	--	96,337	836,725	233,275	168,252
2031	1,110,000	103,593	545,000	3.23%	94,805	743,397	--	99,938	843,335	266,665	185,716
2032	1,140,000	94,805	560,000	3.33%	85,495	740,299	--	102,639	842,938	297,062	199,766
2033	1,170,000	85,495	580,000	3.43%	75,562	741,057	--	105,340	846,397	323,603	210,125
2034	1,210,000	75,562	600,000	3.53%	64,987	740,549	--	108,942	849,491	360,509	226,034
2035	1,240,000	64,987	625,000	3.63%	53,659	743,646	--	111,643	855,289	384,711	232,907
2036	1,280,000	53,659	650,000	3.73%	41,553	745,212	--	115,244	860,456	419,544	245,255
2037	1,320,000	41,553	675,000	3.95%	28,228	744,781	--	118,845	863,626	456,374	257,603
2038	1,360,000	28,228	700,000	3.95%	14,410	742,638	--	122,447	865,085	494,915	269,744
2039	1,400,000	14,410	730,000	3.95%	--	744,410	--	126,048	870,458	529,542	278,684
2040	--	--	--	--	--	--	--	--	--	--	--
	\$20,649,000	\$1,848,355	\$9,880,000		\$1,642,106	\$13,370,462	\$616,500	\$1,803,615	\$15,790,576	\$4,858,424	\$3,193,994

(a) Based on GRS Letter dated March 2, 2021;

assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS

(b) Estimate only based on estimated interest rates as of 5/11/2021

plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service)

(c) Assumes 9 months of UAL payments will be made prior to the bonds being sold

(d) Assumes \$9,621,803 payment towards UAL, leaving 9.00% of UAL payments remaining unfunded.

(e) Represents Arbitrage Yield (including bond insurance)

UAL Funded with Bond Proceeds: \$9,621,803

Estimated Bond Amount: \$9,880,000

All-In TIC: 3.801%

NPV Savings as % of Principal: **32.33%**



City of Ishpeming
Limited Tax General Obligation Pension Obligation Bonds
Series 2021
(Federally Taxable)

555 Briarwood Circle
Suite 333
Ann Arbor, MI 48108

734-994-9700
734-994-9710 fax
www.pfm.com

Pension Analysis - Market Rates +50 bps with 6.35% Discount Rate - Assuming Market Value of Assets as of 12-31-2019											
Year Ending 12/31	UAL Payment (a)	1-May Interest Payment	1-May Principal Payment	Estimated Interest Rate	1-Nov Interest Payment	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$3,389,775 UAL Remaining After Bonding (d)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 3.56% (e)
2021	\$928,000	\$0	\$0		\$0	\$0	\$696,000	\$60,441	\$756,441	\$171,559	\$169,585
2022	956,000	206,249	385,000	1.28%	152,878	744,127	--	249,057	993,184	(37,184)	(35,491)
2023	985,000	152,878	440,000	1.51%	149,565	742,442	--	256,612	999,054	(14,054)	(12,953)
2024	1,010,000	149,565	450,000	2.08%	144,878	744,442	--	263,125	1,007,568	2,432	2,165
2025	1,040,000	144,878	460,000	2.08%	140,087	744,965	--	270,941	1,015,905	24,095	20,704
2026	1,080,000	140,087	470,000	2.70%	133,735	743,822	--	281,361	1,025,183	54,817	45,482
2027	1,110,000	133,735	480,000	2.65%	127,368	741,103	--	289,177	1,030,280	79,720	63,869
2028	1,140,000	127,368	495,000	3.18%	119,510	741,877	--	296,993	1,038,870	101,130	78,233
2029	1,180,000	119,510	510,000	3.03%	111,796	741,305	--	307,413	1,048,719	131,281	98,063
2030	1,210,000	111,796	525,000	3.13%	103,593	740,389	--	315,229	1,055,618	154,382	111,350
2031	1,250,000	103,593	545,000	3.23%	94,805	743,397	--	325,650	1,069,047	180,953	126,023
2032	1,280,000	94,805	560,000	3.33%	85,495	740,299	--	333,465	1,073,765	206,235	138,688
2033	1,320,000	85,495	580,000	3.43%	75,562	741,057	--	343,886	1,084,943	235,057	152,630
2034	1,360,000	75,562	600,000	3.53%	64,987	740,549	--	354,307	1,094,856	265,144	166,241
2035	1,400,000	64,987	625,000	3.63%	53,659	743,646	--	364,728	1,108,374	291,626	176,553
2036	1,450,000	53,659	650,000	3.73%	41,553	745,212	--	377,754	1,122,965	327,035	191,176
2037	1,490,000	41,553	675,000	3.95%	28,228	744,781	--	388,175	1,132,956	357,044	201,536
2038	1,530,000	28,228	700,000	3.95%	14,410	742,638	--	398,595	1,141,234	388,766	211,890
2039	1,580,000	14,410	730,000	3.95%	--	744,410	--	411,621	1,156,032	423,968	223,124
2040	--	--	--	--	--	--	--	--	--	--	--
	\$23,299,000	\$1,848,355	\$9,880,000		\$1,642,106	\$13,370,462	\$696,000	\$5,888,531	\$19,954,993	\$3,344,007	\$2,128,866

(a) Based on GRS Letter dated March 2, 2021;
assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS

(b) Estimate only based on estimated interest rates as of 5/11/2021
plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service)

(c) Assumes 9 months of UAL payments will be made prior to the bonds being sold

(d) Assumes \$9,621,803 payment towards UAL, leaving 26.05% of UAL payments remaining unfunded (6.35% liability is estimated, subject to chage).

(e) Represents Arbitrage Yield (including bond insurance)

UAL Funded with Bond Proceeds: \$9,621,803
Estimated Bond Amount: \$9,880,000
All-In TIC: 3.801%
NPV Savings as % of Principal: **21.55%**



City of Ishpeming
Limited Tax General Obligation Pension Obligation Bonds
Series 2021
(Federally Taxable)

555 Briarwood Circle
Suite 333
Ann Arbor, MI 48108

734-994-9700
734-994-9710 fax
www.pfm.com

Pension Analysis - Market Rates +50 bps with 5.35% Discount Rate - Assuming Market Value of Assets as of 12-31-2019											
Year Ending 12/31	UAL Payment (a)	1-May Interest Payment	1-May Principal Payment	Estimated Interest Rate	1-Nov Interest Payment	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$5,248,163 UAL Remaining After Bonding (e)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 3.56% (e)
2021	\$1,040,000	\$0	\$0		\$0	\$0	\$780,000	\$91,764	\$871,764	\$168,236	\$166,300
2022	1,070,000	206,249	385,000	1.28%	152,878	744,127	--	377,643	1,121,770	(51,770)	(49,413)
2023	1,110,000	152,878	440,000	1.51%	149,565	742,442	--	391,760	1,134,203	(24,203)	(22,306)
2024	1,140,000	149,565	450,000	2.08%	144,878	744,442	--	402,348	1,146,791	(6,791)	(6,043)
2025	1,170,000	144,878	460,000	2.08%	140,087	744,965	--	412,936	1,157,901	12,099	10,396
2026	1,210,000	140,087	470,000	2.70%	133,735	743,822	--	427,054	1,170,876	39,124	32,462
2027	1,240,000	133,735	480,000	2.65%	127,368	741,103	--	437,642	1,178,745	61,255	49,075
2028	1,280,000	127,368	495,000	3.18%	119,510	741,877	--	451,760	1,193,637	86,363	66,810
2029	1,320,000	119,510	510,000	3.03%	111,796	741,305	--	465,877	1,207,182	112,818	84,271
2030	1,360,000	111,796	525,000	3.13%	103,593	740,389	--	479,994	1,220,383	139,617	100,700
2031	1,400,000	103,593	545,000	3.23%	94,805	743,397	--	494,112	1,237,509	162,491	113,165
2032	1,440,000	94,805	560,000	3.33%	85,495	740,299	--	508,229	1,248,529	191,471	128,759
2033	1,490,000	85,495	580,000	3.43%	75,562	741,057	--	525,876	1,266,933	223,067	144,844
2034	1,530,000	75,562	600,000	3.53%	64,987	740,549	--	539,994	1,280,543	249,457	156,406
2035	1,580,000	64,987	625,000	3.63%	53,659	743,646	--	557,641	1,301,287	278,713	168,735
2036	1,620,000	53,659	650,000	3.73%	41,553	745,212	--	571,758	1,316,970	303,030	177,143
2037	1,670,000	41,553	675,000	3.95%	28,228	744,781	--	589,405	1,334,186	335,814	189,552
2038	1,720,000	28,228	700,000	3.95%	14,410	742,638	--	607,052	1,349,690	370,310	201,830
2039	1,770,000	14,410	730,000	3.95%	--	744,410	--	624,699	1,369,109	400,891	210,979
2040	--	--	--	--	--	--	--	--	--	--	--
	\$26,160,000	\$1,848,355	\$9,880,000		\$1,642,106	\$13,370,462	\$780,000	\$8,957,544	\$23,108,006	\$3,051,994	\$1,923,668

(a) Based on GRS Letter dated March 2, 2021;
assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS

(b) Estimate only based on estimated interest rates as of 5/11/2021
plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service)

(c) Assumes 9 months of UAL payments will be made prior to the bonds being sold

(d) Assumes \$9,621,803 payment towards UAL, leaving 35.29% of UAL payments remaining unfunded.

(e) Represents Arbitrage Yield (including bond insurance)

UAL Funded with Bond Proceeds: \$9,621,803
Estimated Bond Amount: \$9,880,000
All-In TIC: 3.804%
NPV Savings as % of Principal: **19.47%**



City of Ishpeming
Limited Tax General Obligation Pension Obligation Bonds
Series 2021
(Federally Taxable)

555 Briarwood Circle
Suite 333
Ann Arbor, MI 48108

734-994-9700
734-994-9710 fax
www.pfm.com

Pension Analysis - Market Rates less 50 bps with 7.35% Discount Rate - Assuming Market Value of Assets as of 12-31-2019											
Year Ending 12/31	UAL Payment (a)	1-May Interest Payment	1-May Principal Payment	Estimated Interest Rate	1-Nov Interest Payment	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$952,007 UAL Remaining After Bonding (d)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 2.54% (e)
2021	\$822,000	\$0	\$0		\$0	-	\$616,500	\$18,502	\$635,002	\$186,998	\$185,452
2022	847,000	137,967	440,000	0.28%	103,301	\$681,267	--	76,259	757,526	89,474	86,533
2023	872,000	103,301	475,000	0.51%	102,099	680,400	--	78,510	758,910	113,090	106,660
2024	898,000	102,099	480,000	1.08%	99,500	681,599	--	80,851	762,449	135,551	124,672
2025	925,000	99,500	485,000	1.08%	96,873	681,373	--	83,282	764,655	160,345	143,819
2026	953,000	96,873	495,000	1.70%	92,658	684,532	--	85,803	770,335	182,665	159,775
2027	982,000	92,658	500,000	1.65%	88,526	681,184	--	88,414	769,598	212,402	181,176
2028	1,010,000	88,526	510,000	2.18%	82,980	681,506	--	90,935	772,440	237,560	197,609
2029	1,040,000	82,980	520,000	2.03%	77,715	680,694	--	93,636	774,330	265,670	215,510
2030	1,070,000	77,715	535,000	2.13%	72,030	684,745	--	96,337	781,082	288,918	228,556
2031	1,110,000	72,030	545,000	2.23%	65,967	682,998	--	99,938	782,936	327,064	252,315
2032	1,140,000	65,967	555,000	2.33%	59,515	680,483	--	102,639	783,122	356,878	268,485
2033	1,170,000	59,515	570,000	2.43%	52,604	682,119	--	105,340	787,460	382,540	280,653
2034	1,210,000	52,604	585,000	2.53%	45,218	682,823	--	108,942	791,764	418,236	299,230
2035	1,240,000	45,218	600,000	2.63%	37,343	682,562	--	111,643	794,205	445,795	311,036
2036	1,280,000	37,343	615,000	2.73%	28,964	681,308	--	115,244	796,552	483,448	328,940
2037	1,320,000	28,964	635,000	2.95%	19,604	683,568	--	118,845	802,414	517,586	343,432
2038	1,360,000	19,604	655,000	2.95%	9,950	684,554	--	122,447	807,001	552,999	357,828
2039	1,400,000	9,950	675,000	2.95%	--	684,950	--	126,048	810,998	589,002	371,671
2040	--	--	--	--	--	--	--	--	--	--	--
	\$20,649,000	\$1,272,815	\$9,875,000		\$1,134,848	\$12,282,663	\$616,500	\$1,803,615	\$14,702,778	\$5,946,222	\$4,443,352

(a) Based on GRS Letter dated March 2, 2021;
assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS

(b) Estimate only based on estimated interest rates as of 5/11/2021
plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service)

(c) Assumes 9 months of UAL payments will be made prior to the bonds being sold

(d) Assumes \$9,621,803 payment towards UAL, leaving 9.00% of UAL payments remaining unfunded.

(e) Represents Arbitrage Yield (including bond insurance)

UAL Funded with Bond Proceeds: \$9,621,803
Estimated Bond Amount: \$9,875,000
All-In TIC: 2.772%
NPV Savings as % of Principal: **45.00%**



City of Ishpeming
Limited Tax General Obligation Pension Obligation Bonds
Series 2021
(Federally Taxable)

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Pension Analysis - Market Rates less 50 bps with 6.35% Discount Rate - Assuming Market Value of Assets as of 12-31-2019											
Year Ending 12/31	UAL Payment (a)	1-May Interest Payment	1-May Principal Payment	Estimated Interest Rate	1-Nov Interest Payment	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$3,389,775 UAL Remaining After Bonding (d)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 2.54% (e)
2021	\$928,000	\$0	\$0		\$0	\$0	\$696,000	\$60,441	\$756,441	\$171,559	\$170,141
2022	956,000	137,967	440,000	0.28%	103,301	681,267	--	249,057	930,324	25,676	24,832
2023	985,000	103,301	475,000	0.51%	102,099	680,400	--	256,612	937,012	47,988	45,260
2024	1,010,000	102,099	480,000	1.08%	99,500	681,599	--	263,125	944,724	65,276	60,038
2025	1,040,000	99,500	485,000	1.08%	96,873	681,373	--	270,941	952,314	87,686	78,649
2026	1,080,000	96,873	495,000	1.70%	92,658	684,532	--	281,361	965,893	114,107	99,807
2027	1,110,000	92,658	500,000	1.65%	88,526	681,184	--	289,177	970,362	139,638	119,110
2028	1,140,000	88,526	510,000	2.18%	82,980	681,506	--	296,993	978,498	161,502	134,342
2029	1,180,000	82,980	520,000	2.03%	77,715	680,694	--	307,413	988,108	191,892	155,662
2030	1,210,000	77,715	535,000	2.13%	72,030	684,745	--	315,229	999,974	210,026	166,146
2031	1,250,000	72,030	545,000	2.23%	65,967	682,998	--	325,650	1,008,647	241,353	186,192
2032	1,280,000	65,967	555,000	2.33%	59,515	680,483	--	333,465	1,013,948	266,052	200,155
2033	1,320,000	59,515	570,000	2.43%	52,604	682,119	--	343,886	1,026,006	293,994	215,691
2034	1,360,000	52,604	585,000	2.53%	45,218	682,823	--	354,307	1,037,130	322,870	231,000
2035	1,400,000	45,218	600,000	2.63%	37,343	682,562	--	364,728	1,047,290	352,710	246,090
2036	1,450,000	37,343	615,000	2.73%	28,964	681,308	--	377,754	1,059,061	390,939	265,996
2037	1,490,000	28,964	635,000	2.95%	19,604	683,568	--	388,175	1,071,743	418,257	277,525
2038	1,530,000	19,604	655,000	2.95%	9,950	684,554	--	398,595	1,083,149	446,851	289,143
2039	1,580,000	9,950	675,000	2.95%	--	684,950	--	411,621	1,096,571	483,429	305,052
2040	--	--	--	--	--	--	--	--	--	--	--
	\$23,299,000	\$1,272,815	\$9,875,000		\$1,134,848	\$12,282,663	\$696,000	\$5,888,531	\$18,867,194	\$4,431,806	\$3,270,830

(a) Based on GRS Letter dated March 2, 2021;

assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS

(b) Estimate only based on estimated interest rates as of 5/11/2021

plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service)

(c) Assumes 9 months of UAL payments will be made prior to the bonds being sold

(d) Assumes \$9,621,803 payment towards UAL, leaving 26.05% of UAL payments remaining unfunded (6.35% liability is estimated, subject to chage).

(e) Represents Arbitrage Yield (including bond insurance)

UAL Funded with Bond Proceeds: \$9,621,803

Estimated Bond Amount: \$9,875,000

All-In TIC: 2.772%

NPV Savings as % of Principal: **33.12%**



City of Ishpeming
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(Federally Taxable)

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Pension Analysis - Market Rates less 50 bps with 5.35% Discount Rate - Assuming Market Value of Assets as of 12-31-2019											
Year Ending 12/31	UAL Payment (a)	1-May Interest Payment	1-May Principal Payment	Estimated Interest Rate	1-Nov Interest Payment	Estimated Bond Payments (b)	UAL Payments Already Made (c)	Payments Related to \$5,248,163 UAL Remaining After Bonding (e)	Estimated Bond Payments and UAL Payment	Difference	Present Value @ 2.54% (e)
2021	\$1,040,000	\$0	\$0		\$0	\$0	\$780,000	\$91,764	\$871,764	\$168,236	\$166,845
2022	1,070,000	137,967	440,000	0.28%	103,301	681,267	--	377,643	1,058,910	11,090	10,726
2023	1,110,000	103,301	475,000	0.51%	102,099	680,400	--	391,760	1,072,160	37,840	35,689
2024	1,140,000	102,099	480,000	1.08%	99,500	681,599	--	402,348	1,083,947	56,053	51,555
2025	1,170,000	99,500	485,000	1.08%	96,873	681,373	--	412,936	1,094,309	75,691	67,889
2026	1,210,000	96,873	495,000	1.70%	92,658	684,532	--	427,054	1,111,586	98,414	86,081
2027	1,240,000	92,658	500,000	1.65%	88,526	681,184	--	437,642	1,118,826	121,174	103,360
2028	1,280,000	88,526	510,000	2.18%	82,980	681,506	--	451,760	1,133,265	146,735	122,058
2029	1,320,000	82,980	520,000	2.03%	77,715	680,694	--	465,877	1,146,571	173,429	140,685
2030	1,360,000	77,715	535,000	2.13%	72,030	684,745	--	479,994	1,164,740	195,260	154,466
2031	1,400,000	72,030	545,000	2.23%	65,967	682,998	--	494,112	1,177,110	222,890	171,949
2032	1,440,000	65,967	555,000	2.33%	59,515	680,483	--	508,229	1,188,712	251,288	189,048
2033	1,490,000	59,515	570,000	2.43%	52,604	682,119	--	525,876	1,207,996	282,004	206,894
2034	1,530,000	52,604	585,000	2.53%	45,218	682,823	--	539,994	1,222,816	307,184	219,777
2035	1,580,000	45,218	600,000	2.63%	37,343	682,562	--	557,641	1,240,203	339,797	237,080
2036	1,620,000	37,343	615,000	2.73%	28,964	681,308	--	571,758	1,253,066	366,934	249,663
2037	1,670,000	28,964	635,000	2.95%	19,604	683,568	--	589,405	1,272,973	397,027	263,438
2038	1,720,000	19,604	655,000	2.95%	9,950	684,554	--	607,052	1,291,606	428,394	277,200
2039	1,770,000	9,950	675,000	2.95%	--	684,950	--	624,699	1,309,648	460,352	290,490
2040	--	--	--	--	--	--	--	--	--	--	--
	\$26,160,000	\$1,272,815	\$9,875,000		\$1,134,848	\$12,282,663	\$780,000	\$8,957,544	\$22,020,207	\$4,139,793	\$3,044,893

(a) Based on GRS Letter dated March 2, 2021;
assumes 2020 adopted demographic assumptions - DOES NOT INCLUDE NORMAL COSTS

(b) Estimate only based on estimated interest rates as of 5/11/2021
plus .50% buffer and use of bond insurance (est. @ 50 bps Total Debt Service)

(c) Assumes 9 months of UAL payments will be made prior to the bonds being sold

(d) Assumes \$9,621,803 payment towards UAL, leaving 35.29% of UAL payments remaining unfunded.

(e) Represents Arbitrage Yield (including bond insurance)

UAL Funded with Bond Proceeds: \$9,621,803
Estimated Bond Amount: \$9,875,000
All-In TIC: 2.775%
NPV Savings as % of Principal: **30.83%**



Appendix F: City of Ishpeming Credit Rating Report

RatingsDirect®

Ishpeming, MI General Obligation Bond Rating Lowered To 'A' On Reduced Reserves And Liquidity

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CHICAGO (Standard & Poor's) Sept. 5, 2013--Standard & Poor's Ratings Services lowered its rating on Ishpeming, Mich.'s series 2011 capital improvement bonds to 'A' from 'A+'. The outlook is stable.

"The lower rating reflects a significant draw on reserves and diminished liquidity," said Standard & Poor's credit analyst Katilyn Pulcher.

The rating reflects our view of the city's:

- Access to the Marquette economy, which serves as a regional center in Michigan's Upper Peninsula;
- Adequate incomes and wealth; and
- Low-to-moderate debt burden.

The city's significantly smaller operating fund balance, viewed both as percentage of expenditures and nominally, offsets the above strengths.

The bonds are limited-tax general obligations of Ishpeming.

In our opinion, the city's financial position rapidly deteriorated in 2012. Ishpeming reported a general fund deficit of \$287,000 in fiscal 2012 (Dec. 31), bringing its available (combined assigned and unassigned) fund balance to \$172,000, or 5.3% of expenditures, which we consider good, albeit a substantial decline from the \$426,000 fund balance at fiscal year-end 2011. At year-end 2012, the city reported \$0 in cash and investments in its general

fund, down from \$234,000 the year before. In addition, the entire general fund balance was composed of receivables and amounts due from other funds. According to new management, prior management had not allocated tax receipts from the tax collection account (its fiduciary funds) to the general and other funds at year-end, which led to that cash position and amounts due from other funds. We understand this has since been rectified and that the city currently holds approximately \$250,000 in cash in the general fund. We also understand that approximately \$1.7 million of the \$2.1 million due to the general fund from other funds at year-end 2012 has since been paid back.

City officials budgeted for a \$17,000 general fund surplus in 2013 and expect to end the year on target. To achieve this goal, the city cut four staff positions through attrition, instituted a hiring freeze, and cut expenditures across all departments. Looking ahead to 2014, management anticipates predictable expenses, because all of its unions are in year one of their three-year contracts, and budgeting for a small operating surplus.

Ishpeming, home to an estimated 6,334 residents, covers approximately nine square miles of Marquette County in the central portion of Michigan's Upper Peninsula. It is approximately 15 miles west of Marquette, the county seat.

"The stable outlook reflects our expectation that we will not change the rating within the two-year outlook horizon," added Ms. Pulcher, "given our anticipation that Ishpeming will report at least balanced operations in fiscal years 2013 and 2014. However, If the city is unable to achieve balanced operations and substantially draws on its reserves again, we could lower the rating."

RELATED CRITERIA AND RESEARCH

- USPF Criteria: GO Debt, Oct. 12, 2006
- USPF Criteria: Key General Obligation Ratio Credit Ranges - Analysis Vs. Reality, April 2, 2008
- USPF Criteria: Financial Management Assessment, June 27, 2006

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