



MUNICIPAL EMPLOYEES' RETIREMENT SYSTEM OF MICHIGAN

Summary of Actuarial Assumptions and Actuarial Funding Method
as of December 31, 2015

Actuarial Assumptions

To calculate MERS contribution requirements, assumptions are made about future events that could affect the amount and timing of benefits to be paid and the assets to be accumulated. The economic and demographic assumptions include:

- An assumed rate of investment return that is used to discount liabilities and project what plan assets will earn.
- A mortality table projecting the number of members who will die before retirement and the duration of benefit payments after retirement.
- Assumed retirement rates projecting when members will retire and commence receiving retirement benefits.
- A set of withdrawal and disability rates to estimate the number of members who will leave the work force before retirement.
- Assumed rates of pay increase to project member compensation in future years.

The actuarial assumptions that will be used in connection with the December 31, 2015 Actuarial Valuation are changed from the December 31, 2014 valuation assumptions. The actuarial assumptions that will be used in the December 31, 2015 Valuation are summarized below and on the following pages.

Interest Rate

Funding plan benefits involves the accumulation of assets to pay benefits in the future. These assets are invested and the net rate of investment earnings is a significant factor in determining the contributions required to support the ultimate cost of benefits. For the 2015 actuarial valuation, the long-term investment yield is assumed to be 7.75% annually, net of administrative and investment expenses. This assumption will be first used for the December 31, 2015 actuarial valuations.

Pay Increases

Because benefits are based on a member's final average compensation (FAC), it is necessary to make an assumption with respect to each member's estimated pay progression. The pay increase assumption used in the actuarial valuation projects annual pay increases of 3.75% plus a percentage based on an age-related scale to reflect merit, longevity and promotional pay increases.

The pay increase assumption for selected ages is shown below. The 3.75% wage inflation assumption will be first used for the December 31, 2015 actuarial valuations. The merit and longevity pay increase assumption will be first used for the December 31, 2015 actuarial valuations.

Age	Base (Wage Inflation)	Merit and Longevity	Total Percentage Increase in Pay
20	3.75%	11.00%	14.75%
25	3.75	7.20	10.95
30	3.75	3.10	6.85
35	3.75	1.90	5.65
40	3.75	1.20	4.95
45	3.75	0.81	4.56
50	3.75	0.52	4.27
55	3.75	0.30	4.05
60	3.75	0.00	3.75

Inflation

Although no specific price inflation assumption is needed for this valuation, the assumed long-term annual rate of price inflation is 2.5%.

Payroll Growth

For divisions that are open to new hires, the number of active members is projected to remain constant, and the total payroll is projected to increase 3.75% annually. This assumption will be first used for the December 31, 2015 actuarial valuations.

Increase in Final Average Compensation (FAC)

The 2009-2013 and two previous experience studies determined that for some retirees of some municipalities, the actual FAC at retirement was larger than would be expected based on reported annual pays and FAC's for the years just before retirement. Some possible sources for the differences are:

- Lump sum payments for unused paid time off. Unused sick leave payouts have been excluded from FAC since the mid 1970s. However, since that time it has become popular to combine sick and vacation time into paid time off, which is included in the FAC. Consequently, the lump sums that are includible in FAC have grown over the years.
- Extra overtime pay during the final year of employment. Our studies only reflect any increase in overtime during the final year, not any increase that occurs during the full 3 or more year averaging period.

We analyzed the variation among municipalities. The amount of unexpected FAC increase varies quite a bit between municipalities. Some municipalities show no sign of FAC loading, while other municipalities show increases above the average increase. This is presumably the result of different personnel policies among municipalities.

The Retirement Board adopted new FAC assumptions that will be first used for the December 31, 2015 annual actuarial valuation. These assumptions reflect an FAC load of 0% to 12% for each municipality, based on the municipality's experience. The FAC increase assumption(s) for your municipality will be shown in your annual actuarial valuation report. Note that for divisions that adopted Sick Leave in FAC (SLIF), the assumption is developed individually for each division, based on the specific SLIF provision and/or past experience.

Withdrawal Rates

The withdrawal rates are used to estimate the number of employees at each age that are expected to terminate employment before qualifying for retirement benefits. The withdrawal rates do not apply to members eligible to retire, and do not include separation on account of death or disability. The assumed rates of withdrawal applied in the current valuation are based on years of service, and scaled up or down according to each division's experience.

Sample rates of withdrawal from active employment, before application of the scaling factor, are shown below. These rates will be first used for the December 31, 2015 actuarial valuations.

The base withdrawal rates (see the table below) are multiplied by the scaling factor to obtain the assumed withdrawal rates. The scaling factor for each division will be shown in your actuarial valuation report.

Sample Years of Service	% of Active Members Withdrawing Within the Next Year
0	19.60%
1	16.30
2	13.30
3	10.50
4	8.60
5	6.90
10	4.60
15	3.40
20	2.60
25	2.20
30 and over	2.20

Retirement Rates

A schedule of retirement rates is used to measure the probability of eligible members retiring during the next year. The retirement rates for Normal Retirement are determined by each member's replacement index at the time of retirement. The replacement index is defined as the approximate percentage of the member's pay (after reducing for their member contributions) that will be replaced by the member's benefit at retirement. The index is calculated as:

$$\text{Replacement Index} = 100 \times \text{Accrued Benefit} \div [\text{Pay less Member Contributions}]$$

The assumed retirement percentage is 100% at the later of age 70 or a member's age on the valuation date.

Retirement rates for Early (reduced) Retirement are determined by the member's age at early retirement.

The Normal Retirement rates below will be first used for the December 31, 2015 actuarial valuations. The Early Retirement rates will be first used for the December 31, 2015 actuarial valuations.

Normal Retirement

Sample Replacement Index	Percent of Eligible Active Members Retiring Within the Next Year
5	8.0%
10	12.0
15	16.0
20	19.0
25	19.5
30	19.5
35	19.5
40	20.0
45	21.0
50	21.0
55	21.0
60	24.0
65	24.0
70	25.0
75	28.0
80	33.0
85	36.0
90	41.0
95	46.0
100+	50.0

Early Retirement – Reduced Benefit

Age	Percent of Eligible Active Members Retiring Within the Next Year
50	2.0%
51	2.0
52	3.3
53	3.8
54	5.6
55	4.3
56	4.2
57	4.1
58	5.0
59	6.2

Disability Rates

Disability rates are used in the valuation to estimate the incidence of member disability in future years.

The assumed rates of disablement at various ages are shown below. These rates will be first used for the December 31, 2015 actuarial valuations.

Sample Ages	Percent Becoming Disabled Within the Next Year
20	0.02%
25	0.02
30	0.02
35	0.05
40	0.08
45	0.20
50	0.29
55	0.38
60	0.39
65	0.39

Eighty percent (80%) of the disabilities are assumed to be non-duty and 20% of the disabilities are assumed to be duty related. For those plans which have adopted disability provision D-2, 40% of the disabilities are assumed to be non-duty and 60% are assumed to be duty related.

Mortality Table

In estimating the amount of the reserves required at the time of retirement to pay a member's benefit for the remainder of their lifetime, it is necessary to make an assumption with respect to the probability of surviving to retirement and the life expectancy after retirement.

The mortality table used to project the mortality experience of plan members is a 50% Male - 50% Female blend of the following tables:

1. The RP-2014 Healthy Annuitant Mortality Tables, with rates multiplied by 105%
2. The RP-2014 Employee Mortality Tables
3. The RP-2014 Juvenile Mortality Tables

For ages 0-17 use the rates in Table 3, for ages 18-49 use the rates in Table 2, for ages 70 and older use the rates in Table 1, and for ages 50-69 blend Table 2 and Table 1 as follows:

- a. Age 50, use 60% of Table 2 and 40% of Table 1.
- b. Age 51, use 57% of Table 2 and 43% of Table 1.
- c. Etc. ...
- d. Age 69, use 3% of Table 2 and 97% of Table 1.

For disabled retirees, use a mortality table consisting of a 50% Male – 50% Female blend of the RP-2014 Disabled Retiree Mortality Tables. These mortality tables will be first used for the December 31, 2015 actuarial valuations.

Ninety percent (90%) of active member deaths are assumed to be non-duty deaths and 10% of the deaths are assumed to be duty related.

Possible future mortality improvements are reflected in the mortality assumption. The mortality assumptions include a 10% margin for future mortality improvements, relative to the actual mortality experience seen in the 2000-2013 Experience Study.

The life expectancies and mortality rates projected for **non-disabled** members are shown below for selected ages:

Age	Expected Years of Life Remaining	Mortality Rates
50	33.74	0.23%
55	29.18	0.37
60	24.79	0.58
65	20.59	0.95
70	16.66	1.56
75	13.07	2.51
80	9.85	4.18

The life expectancies and mortality rates projected for **disabled** members are shown below for selected ages:

Age	Expected Years of Life Remaining	Mortality Rates
50	24.87	1.62%
55	21.91	1.89
60	18.97	2.18
65	16.04	2.63
70	13.19	3.43
75	10.54	4.77
80	8.18	6.88

Miscellaneous and Technical Assumptions

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| Loads | - Vesting liabilities are increased by 2% to reflect the value of the potential survivor benefit payable in case of death during the benefit deferral period. |
| Marriage Assumptions | - Seventy percent (70%) of males and 70% of females are assumed to be married for purposes of death-in-service benefits. Male spouses are assumed to be three years older than female spouses. |
| Pay Increase Timing | - Beginning of valuation year. This is equivalent to assuming that reported pays represent amounts paid to members during the year ended on the valuation date. |
| Pay Adjustment | - None. |
| Decrement Timing | - Decrements of all types are assumed to occur mid-year. |
| Future Service | - Members are assumed to earn 1.0 years of service in each future 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. Benefit service is the service used in the benefit formula. |
| Eligibility Service | - The larger of reported Eligibility Service and reported Vesting Service was used as eligibility service in the valuation. Eligibility service is the service used to meet the conditions for retirement, and is generally equal to or larger than benefit service. |
| Decrement Relativity | - Decrement rates are used directly from the experience study, without adjustment for multiple decrement table effects. |
| Decrement Operation | - Disability and withdrawal do not operate during retirement eligibility. |
| Normal Form of Payment | - Future retiring members are assumed to elect the Straight Life form of payment. |
| 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. |

- Maximum Compensation - The dollar compensation limits under Section 401(a)(17) of the Internal Revenue Code are projected to increase 3.75% annually. No member or employer contributions are projected to be made on the portion of any member's annual compensation in excess of the IRC Section 401(a)(17) limit for the year.
- Maximum Benefit - The dollar benefit limitations under Section 415 of the Internal Revenue Code are projected to increase 3.75% annually. Employee divisions 02, 20-29 (Police), 05 and 50-59 (Fire) are presumed eligible for the public safety benefit limits. No benefits in excess of the IRC 415 limits are projected to be paid, except as provided under the Qualified Excess Benefit Arrangement.
- Member Contribution Interest - The interest rate credited on member contributions is the one-year Treasury Bill rate as of December 31, determined annually. The long-term rate assumed in the valuation is 3%, which is consistent with the 2.5% price inflation assumption.
- DROP+ Assumptions - Each eligible member is assumed to make the DROP+ election with the most valuable combination of lump sum and reduced monthly benefit.
- The retirement probabilities shown earlier are used for members who are *not* covered by Benefit Program DROP+. For those covered by Benefit Program DROP+, it is assumed that retirement will be delayed long enough to become eligible for at least 4 years' worth of DROP+ lump sum.
- Data Adjustments - The gender was not reported for a small number of active members. These active members were assumed to be male.

Actuarial Funding Method

The Retirement Board has adopted funding methodology for the Retirement System to achieve the following major objectives:

- Develop level required contribution rates as a percentage of payroll (for divisions that are open to new hires);
- Finance benefits earned by present employees on a current basis;
- Accumulate assets to enhance members' benefit security;
- Produce investment earnings on accumulated assets to help meet future benefit costs;
- Make it possible to estimate the long-term actuarial cost of proposed amendments to System provisions; and
- Assist in maintaining the Retirement System's long-term financial viability.

The basic funding objective is a level pattern of cost as a percentage of pay throughout each member's working lifetime. The funding method used in this actuarial valuation – the entry age normal cost method – was first used for the December 31, 1993 actuarial valuations and is intended to:

- (i) Meet this funding objective; and
- (ii) Result in a relatively level long-term contribution requirement as a percentage of pay.

Under the entry age normal cost method, the total actuarially-determined contribution requirement is equal to the sum of the normal cost plus the payment required to fund the unfunded actuarial accrued liability over a period of years. Funding or amortizing the unfunded actuarial accrued liability includes a payment toward the liability (principal) plus a payment to reflect the time value of money (interest).

Normal Cost

In general terms, the normal cost is the cost of benefit rights accruing on the basis of current service. Technically, the normal cost rate is the level percentage-of-pay contribution required each year, with respect to each member, to accumulate over their projected working lifetime the reserves needed to meet the cost of earned benefits. The normal cost represents the ultimate cost of the Retirement System, if the unfunded liability is paid up and the actual experience of the System conforms to the assumptions.

Actuarial Accrued Liability

The total actuarial present value of future benefits is computed using the valuation's actuarial assumptions. Subtracting the present value of future normal costs results in the actuarial accrued liability.

The total actuarial accrued liability essentially represents the amount that would have been accumulated as of a given valuation date, if:

- (i) Contributions sufficient to meet the normal costs of the Retirement System had been made each year in the past;
- (ii) Benefit provisions had always been the same as current benefit provisions; and
- (iii) Actual past experience had always conformed to current actuarial assumptions.

If assets equaled the total accrued liability, there would be no unfunded liability and future contribution requirements would consist solely of the calculated normal cost rates.

Amortization of Unfunded Actuarial Accrued Liability

The unfunded accrued liability as of December 31, 2015 will be projected to the beginning of the fiscal year for which employer contributions are being calculated (fiscal year beginning in 2017). This will allow the 2015 valuation to take into account the expected future contributions that are based on past valuations. This projection process will result in more stable computed contribution rates, and was first used for the December 31, 2004 actuarial valuations.

The projected unfunded accrued liability is then amortized over the appropriate period for each division to determine the amortization payment. For divisions that will have no new hires this is the dollar amortization payment. For divisions that are open to new hires this payment is divided by the projected fiscal year payroll to determine the amortization payment as a percentage of active member payroll. For purposes of determining the amortization payment, payments will be projected to increase 3.75% a year.

The standard amortization period to fund the unfunded liability will be 23 years for positive unfunded liabilities in the 2015 valuation. This period will be reduced by one year in each successive annual valuation, until the unfunded liability is paid off. Section 20m of Act No. 314 of the Public Acts of 1965 as amended (MCL 38.1140m) requires that the amortization period not exceed 30 years.

The standard amortization period for negative unfunded liabilities is 10 years, with the 10 year period reestablished with each annual actuarial valuation.

For divisions that are closed to new hires, and the new hires are not covered by MERS Defined Benefit Plan or Hybrid Plan provisions (in a linked division), the amortization period is shortened in order to ensure adequate funding of the closed division. The employer has two amortization options. Under Amortization Option A, the otherwise applicable MERS-wide standard amortization period for positive unfunded liabilities in effect in the valuation year in which the division is closed is decreased annually by 2 years until the period reaches 6 or 5 years. Each year thereafter the amortization period decreases one year each valuation year until the unfunded liability is paid off. Under Amortization Option B, the amortization period is decreased annually by 2 years until the period reaches 16 or 15 years. Each year thereafter the amortization period decreases one year each valuation year until the unfunded liability is paid off. In addition, the minimum contribution requirement for a closed division is equal to the excess of three years of annual retiree benefit payments over the current market value of assets. An employer that elected Amortization Option A may later change to Amortization Option B.

Amortization periods that are shorter than the above standard periods may be elected by a municipality (but not shorter than 5 years for negative unfunded liabilities), and some municipalities have done so.

Open Divisions and Closed Divisions

Open divisions will include the future new hires within an employee classification (bargaining unit). Rehired members will also become members of the open division. Members transferred to the employee classification will also become members of the open division, unless the Alternate Transfer Provision is adopted by the municipality. In the latter case, each transferring member is given a choice of entering the open division or a closed division within the employee classification (if there are still active members in the closed division, and the closed division is of the same type - defined benefit, hybrid, or defined contribution - as the division from which the member transferred).

There may also be one or more divisions within the employee classification that no longer accept new hires. These are generally referred to as closed divisions, but in some situations are linked to the open division with the new hires (for actuarial valuation purposes - see Linked Divisions below). Note that a division is also treated like a closed division if the division has no active members reported as of the valuation date.

Linked Divisions

The closed division funding policy was adopted by the Retirement Board (Amended Amortization Policy for Closed Divisions Within Open Municipalities, as revised by the Retirement Board on November 13, 2014). The purpose is to ensure that a defined benefit division that is closed to new hires does not run out of money. Funding the unfunded liabilities over the MERS standard amortization period will often deplete a closed division's assets before the death of the last participant in the division. Assets cannot be shared between the closed defined benefit division and a defined contribution plan covering the new hires, or a non-MERS defined benefit plan covering the new hires, even if the employees are part of the same employee classification (bargaining unit).

However, if the new hires, transfers and rehires are covered by a new tier of benefits in the MERS Defined Benefit Plan (including the defined benefit portion of the MERS Hybrid Plan), there can be a sharing of employer assets between the defined benefit division with no new hires (with the old benefit structure) and the defined benefit or hybrid division covering the new hires within the same employee classification. The employer can avoid the required more rapid amortization of the unfunded liabilities by putting new hires into a MERS Defined Benefit Plan or MERS Hybrid Plan division, instead of a defined contribution plan or non-MERS defined benefit plan.

If a division with no new hires is "linked" to an open MERS Defined Benefit Plan or MERS Hybrid Plan division, both of the linked divisions will use the standard open division funding policy.

Asset Valuation Method

The actuarial value of assets is determined on the basis of a method that calculates expected investment income at the valuation rate of return and adds a portion of the difference between the expected investment income and actual investment income earned on a market value basis. The difference in investment income between expected return and market return will be recognized over a 5-year period at the rate of 20% per year. This asset valuation method will be first adopted for the December 31, 2015 valuation, and is applied as follows:

Actuarial Value equals:

- (i) Actuarial value of assets from the previous actuarial valuation; plus
- (ii) Aggregate employer and member contributions since the last valuation; minus
- (iii) Benefit payments and refunds of member contributions since the last valuation; plus
- (iv) Estimated investment income at the valuation interest rate; plus
- (v) Portion of gain (loss) recognized in the current valuation.

For the above purpose, gain (loss) is defined as the excess during the period of the investment return on the market value of assets over the expected investment income. The portion recognized in the valuation for years beginning January 1, 2016 is 20% of the current year's gain (loss) plus 20% of the gain (loss) from each of the 4 preceding years. The cumulative difference between the market value and valuation assets as of December 31, 2015 is recognized over 4 years.