

# TEACHER RETIREMENT SYSTEM OF MONTANA

Report of an Actuarial Audit  
April 30, 2020





April 30, 2020

Teachers' Retirement Board  
State of Montana  
1500 Sixth Avenue  
Helena, MT 59620-0139

Members of the Board:

Gabriel, Roeder, Smith & Company (GRS) is pleased to present this report of an actuarial audit of the July 1, 2019 actuarial valuation of the Teachers' Retirement System of Montana (MTRS). We are grateful to the MTRS staff and Cavanaugh Macdonald Consulting, the retained actuary, for their cooperation throughout the actuarial audit process.

This actuarial audit involves an independent verification and analysis of the assumptions, procedures, methods, and conclusions used by the retained actuary for MTRS, in the actuarial valuations of MTRS as of July 1, 2019, to ensure that the conclusions are reasonable and conform to the appropriate Standards of Practice as promulgated by the Actuarial Standards Board.

The scope of our actuarial audit focused on the primary actuarial valuation prepared for MTRS. The scope excluded a full replication, actuarial work related to compliance with GASB Statements 67 and 68, and any valuation versions based on a different guaranteed annual benefit adjustment (GABA) percentage.

GRS is pleased to report to the Board, in our professional opinion, the July 1, 2019 actuarial valuation prepared by the retained actuary provides a fair and reasonable assessment of the financial position of MTRS.

Throughout this report we make a number of suggestions for ways to improve the work product. We hope that the retained actuary and MTRS find these items helpful. Thank you for the opportunity to work on this assignment.

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Mr. Falls is independent of the plan sponsor. He is an Enrolled Actuary, a Fellow of the Society of Actuaries, and a Member of the American Academy of Actuaries, and meets the Qualification Standards of the American Academy of Actuaries. Finally, the undersigned is experienced in performing valuations for large public retirement systems.

Respectfully submitted,  
Gabriel, Roeder, Smith & Company

A handwritten signature in black ink that reads "R. Ryan Falls". The signature is written in a cursive style with a large, stylized "R" and "F".

R. Ryan Falls, FSA, EA, MAAA  
Senior Consultant



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# SECTION I

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## EXECUTIVE SUMMARY

# Executive Summary

The Teachers' Retirement System of Montana (MTRS) engaged Gabriel, Roeder, Smith & Company (GRS) for an actuarial audit of the recent actuarial valuation prepared for MTRS. The scope excluded a full replication, actuarial work related to compliance with GASB Statements 67 and 68, and any valuation versions based on a different guaranteed annual benefit adjustment (GABA) percentage.

The scope of this actuarial audit includes the following:

- Review and analyze the results of the actuarial valuation as of July 1, 2019, including an evaluation of the data used, for reasonableness and consistency as well as a review of the mathematical calculations for completeness and accuracy, based on a detailed review of a representative sample of the current plan participants.
- Evaluate the actuarial cost method and the actuarial asset valuation method in use and whether other methods may be more appropriate for MTRS.
- Review the demographic and economic actuarial assumptions for consistency, reasonableness and compatibility. Such assumptions shall include, but are not limited to: mortality, retirement and separation rates, levels of pay adjustments, rates of investment return, inflation, and disability rates.
- Confirm that the actuarial valuations are performed by qualified actuaries and assess the adherence to Actuarial Standards of Practice (ASOPs) published by the Actuarial Standards Board.

## ***Summary of Findings***

Based on our review of the census data, experience study documents, liability calculations for a sample of members, and the actuarial valuation reports, we believe the July 1, 2019 actuarial valuation of MTRS is reasonable, based on appropriate assumptions and methods, and the reports generally comply with the Actuarial Standards of Practice.

It should be noted that that we reasonably matched the liability calculations for a sample of member test lives and, therefore, infer that the valuation results are reasonable based on this sample. A more definitive statement of the reasonableness of the valuation results would require a full replication valuation because the sampling does not preclude the possibility of large differences in valuation results resulting from a full replication valuation.

We offer the following recommendations based on the valuation methods and assumptions used by the retained actuary in the July 1, 2019 actuarial valuation of MTRS.

## **Actuarial Assumptions**

1. As part of the next actuarial experience study, we recommend that the retained actuary consider the applicability and appropriateness of a "generational" mortality assumption to eliminate the need to periodically update the "static" mortality assumption to include margin for future mortality improvement.



2. As part of the next actuarial experience study, we recommend that the retained actuary closely review the behavior of active members in their first year of eligibility to confirm there is sufficient evidence to anticipate a lower rate of retirements in the first year of eligibility and to explore the potential causes of this behavior.
3. In order to mitigate the reoccurring actuarial losses generated by the key demographic assumptions, we recommend that the retained actuary explore the sources of the demographic losses and consider an amount-weighted approach during the next actuarial experience study.

### **Actuarial Methods and Funding Policy**

4. We believe that the actuarial methods and funding policy are reasonable for MTRS and appropriately applied.

### **Actuarial Valuation Results**

5. The retained actuary should consider preparing an open group projection along with future actuarial valuations to explore the impact of future Tier Two members on the estimated funding period.
6. We recommend that MTRS and the retained actuary review the data and procedures for including Family Law Orders (FLOs) into the actuarial valuation and ensure that the liability calculations are as reasonable as possible.

### **Content of Valuation Report**

7. In order to improve the ability of the report to communicate the assumptions, methods and plan provisions incorporated into the actuarial valuation of MTRS, we recommend that the retained actuary incorporate the noted enhancements to future actuarial valuation reports.

## SECTION II

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### GENERAL ACTUARIAL AUDIT PROCEDURE



# General Actuarial Audit Procedure

At the commencement of this engagement, GRS requested the information necessary to thoroughly review the work product of the retained actuary. Specifically, GRS received and reviewed the following items:

- Actuarial valuation report as of July 1, 2019,
- Actuarial Experience Study for the five-year period ending July 1, 2017,
- Montana Public Retirement Plans Investment Policy, most recently revised April 14, 2020,
- A preliminary set of census data for plan participants and beneficiaries as of July 1, 2019 originally provided by MTRS to the retained actuary for the actuarial valuation,
- A final set of census data for plan participants and beneficiaries as of July 1, 2019 used by the retained actuary for the actuarial valuation, and
- Detailed liability calculations from the retained actuary for a sampling of 25 members as of July 1, 2019.

In performing our review, we:

- Reviewed member handbooks and applicable statutes to understand the benefits provided by MTRS,
- Reviewed the appropriateness of the actuarial assumptions and methods,
- Reviewed actuarial valuation reports, and
- Reviewed the detailed liability calculation of the sample lives, to ensure that the calculations were consistent with the stated plan provisions, actuarial methods and assumptions.

The actuarial audit findings, which follow, are based on our review of this information and subsequent correspondence with the retained actuary for clarification and further documentation.

## ***Key Actuarial Concepts***

An actuarial valuation is a detailed statistical simulation of the future operation of a retirement plan using the set of actuarial assumptions adopted by the governing board. It is designed to simulate all of the dynamics of such a retirement plan for each current participant of the plan, including:

- Accrual of future service,
- Changes in compensation,
- Leaving the plan through retirement, disability, withdrawal, or death, and
- Determination of and payment of benefits from the plan.

This simulated dynamic is applied to each active member in the plan and results in a set of expected future benefit payments for that member. Discounting those future payments for the likelihood of survival at the assumed rate of investment return produces the Total Present Value of Plan Benefits (TPV) for that participant. The actuarial cost method will allocate this TPV between the participant's past service (actuarial accrued liability) and future service (future normal costs).

We believe that an actuarial audit should not focus on finding differences in actuarial processes and procedures utilized by the consulting actuary and the auditing actuary. Rather, our intent is to identify and suggest improvements to the process and procedures utilized by MTRS's retained actuary. In performing this actuarial audit, we attempted to limit our discussions regarding opinion differences and focus our attention on the accuracy of the calculations of the liability and costs, completeness and reliability of reporting, and compliance with the Actuarial Standards of Practice that apply to the work performed by MTRS's retained actuary

These key actuarial concepts will be discussed in more detail throughout this report.

### ***Actuarial Qualifications***

The July 1, 2019 actuarial valuation report for MTRS was signed by Mr. Todd B. Green, ASA, FCA, MAAA. Based on the information provided by the online actuarial directory sponsored by the Society of Actuaries, Mr. Green has attained the actuarial credentials noted on the signature line of the actuarial valuation report and is compliant with Society of Actuaries Continuing Professional Development requirement.

## **SECTION III**

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### **ACTUARIAL ASSUMPTIONS**

# Actuarial Assumptions

## Overview

For any pension plan, actuarial assumptions are selected that are intended to provide reasonable estimates of future expected events, such as retirement, turnover, and mortality. These assumptions, along with an actuarial cost method, the employee census data, and the plan's provisions are used to determine the actuarial liabilities and the overall actuarially determined funding requirements for the plan. The true cost to the plan over time will be the actual benefit payments and expenses required by the plan's provisions for the participant group under the plan. To the extent the actual experience deviates from the assumptions, experience gains and losses will occur. These gains (losses) then serve to reduce (increase) future actuarially determined contributions and increase (reduce) the funded ratio. The actuarial assumptions should be individually reasonable and consistent in the aggregate, and should be reviewed periodically to ensure that they remain appropriate.

The Actuarial Standards Board ("ASB") provides guidance on establishing actuarial assumptions for a retirement program through the following Actuarial Standards of Practices (ASOP):

- (1) ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*
- (2) ASOP No. 23, *Data Quality*
- (3) ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*
- (4) ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*
- (5) ASOP No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations*

We generally reviewed the application of the ASOPs applicable on the valuation date of the July 1, 2019 actuarial valuation report. Subsequent changes to the ASOPs will have to be reflected in future actuarial valuation reports.

The actuarial valuation report for MTRS contains descriptions of the actuarial assumptions which were used in the actuarial valuation as of July 1, 2019. Additionally, the retained actuary published an actuarial experience study report, dated May 3, 2018. We conducted a thorough review of these documents in order to assess the reasonableness of the assumptions used in the actuarial valuation.

Actuarial assumptions for the valuation of retirement programs are of two types: (i) demographic assumptions, and (ii) economic assumptions. We have assessed the reasonableness of both types as part of this actuarial audit.

## ***Demographic Assumptions***

### **General**

These assumptions simulate the movement of participants into and out of plan coverage and between status types. Key demographic assumptions are:

- turnover among active members,
- retirement patterns among active members, and
- healthy retiree mortality.

In addition, there are a number of other demographic assumptions with less substantial impact on the results of the process, such as:

- disability incidence and mortality among disabled benefit recipients,
- mortality among active members,
- percent of active members who are married and the relationship of the ages of participants and spouses, and
- benefit elections upon retirement or termination.

Demographic assumptions for retirement programs are normally established by statistical studies of recent actual experience, called experience studies. Such studies underlie the assumptions used in the valuations.

Once it is determined whether or not an assumption needs adjustment, setting the new assumption depends upon the extent to which the current experience is an indicator of the long-term future. The measurement of experience is normally affected by simply counting occurrences of an event. For example, in reviewing retirement patterns, an actuary might count the number of actual retirees among males aged 50 with 20 years of service. These retirements would be compared against the number of total people in that group to generate a raw rate of retirement for that group.

- Full credibility may be given to the current experience. Under this approach the new assumptions are set very close to recent experience.
- Alternatively, the recent experience might be given only partial credibility. Thus, the new assumptions may be set by blending the recent experience with the prior assumption.
- If recent experience is believed to be atypical of the future, such knowledge is taken into account.
- Finally, it may be determined that the size of the plan does not provide a large enough sample to make the data credible. In such cases, the experience of the plan may be disregarded and the assumption is set based upon industry standards for similar groups.

Actuarial Standards of Practice (ASOP) No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, applies to actuaries when they are selecting demographic assumptions. In accordance with ASOP No. 35, an actuary should identify the types of demographic assumptions to use for a specific measurement. In doing so, the actuary should determine the following:

- a) The purpose and nature of the measurement;
- b) The plan provisions or benefits and factors that will affect the timing and value of any potential benefit payments;
- c) The characteristics of the obligation to be measured (such as measurement period, pattern of plan payments over time, open or closed group, and volatility);
- d) The contingencies that give rise to benefits or result in loss of benefits;
- e) The significance of each assumption; and
- f) The characteristics of the covered group.

Not every contingency requires a separate assumption. For example, for a plan that is expected to provide benefits of equal value to employees who voluntarily terminate employment, become disabled, or retire, the actuary may use an assumption that reflects some or all of the above contingencies in combination rather than selecting a separate assumption for each.

### **Observations on Assumptions**

Overall, it appears that the current demographic assumptions are reasonable. Below, we offer general observations and considerations for the retained actuary based on our experiences with similar plans.

#### ***Healthy Post-Retirement Mortality***

The most important demographic assumption is post-retirement mortality because this assumption is a predictor of how long pension payments will be made. The stated post-retirement mortality assumption is based on the RP-2000 Healthy Mortality tables with mortality improvements projected to 2022 using projection scale BB. The stated assumption also outlines a few other minor adjustments that were made to the base tables in order to provide an assumption that was more appropriate based on the actual experience of MTRS.

#### **Mortality Improvement for Healthy Annuitants**

The current assumption applies mortality improvements to a published set of mortality tables for a fixed number of years (e.g., 22 years) and the resulting set of mortality rates is used for every future year in the valuation projection. This approach is referred to as a “static” mortality projection. Since this approach does not assume continuing mortality improvement beyond the fixed number of years at the valuation date, the assumption must include a margin of conservatism to allow for future improvements in mortality rates. As long as the mortality of MTRS annuitants continues to improve, this margin will periodically need to be reestablished.

The need for this periodic adjustment can be seen through the past three experience studies. As you can see in the following table, the mortality assumption established at the time of each experience study was expected to provide margin for future mortality improvement. When this assumption was reevaluated as part of the subsequent actuarial experience study (approximately four years later), the previous margin had generally been reduced, especially for females, based on the actual plan experience.

| <b>Year of Experience Study</b> | <b>Margin on Recommended Mortality Assumption</b> | <b>Margin Remaining at Subsequent Study (four years later)</b> |
|---------------------------------|---|--|
| 2009                            | 13% for males and 9% for females                  | -1% for males and -3% for females                              |
| 2013                            | 17% for males and 11% for females                 | 23% for males and 6% for females                               |
| 2017                            | 22% for males and 22% for females                 | TBD  |

As a result, the mortality assumption was generally updated in each study to provide additional margin for future mortality improvement. If the same level of actual mortality improvement continues to occur over the next four years, then it is likely that the mortality assumption will need to be updated during the next experience study to, once again, provide margin for future mortality improvement.

The proposed mortality assumptions in the past two actuarial experience studies were each reasonable based on the experience and were established in accordance with ASOP No. 35. However, the actuarial liabilities will increase each time that the mortality assumption is updated to add margin for future mortality improvement.

The other commonly accepted approach to incorporating mortality improvement into an actuarial valuation of a pension plan is referred to as “generational” mortality projection. A generational mortality projection does not build in a margin up front, but the mortality is assumed to improve every future year in the valuation projection. Since this form of mortality projection assumes continual mortality improvements, there should be no need to periodically reestablish margin for future mortality improvements in the mortality assumption. It should be noted that there may still be times when minor adjustments to the mortality assumption are necessary due to changes in the plan’s mortality experience.

As part of the next actuarial experience study, we recommend that the retained actuary consider the applicability and appropriateness of a “generational” mortality assumption to reduce the need to periodically update the “static” mortality assumption to include margin for future mortality improvement.

If MTRS continues with the “static” mortality approach following future experience studies, we recommend that the future assumptions incorporate more margin for future mortality improvement between the ages of 60 and 74. In the most recent experience study, there was no margin built in for these ages.

***Observations on Other Pertinent Assumptions***

*Retirement* – Members are eligible to retire with a reduced benefit at age 50 (age 55, if hired after July 1, 2013). Additionally, members are eligible to retire with an unreduced benefit at age 60 or 25 years of service (age 60 or age 55 with 25 years of service, if hired after July 1, 2013). The rates at which participants are assumed to retire are based on the member’s age with a separate rate established for the member’s first year of retirement eligibility. Separate rates were also established for general employees and university employees. The current assumption was developed to be consistent with the actual experience over the most recent experience study period.

It is common to observe unique retirement behavior in the first year an active member is eligible to retire. Most frequently, experience shows that members have a higher likelihood of retiring if it is their first year of retirement eligibility than if they first became eligible in prior years. The current assumption for MTRS indicates that, at many ages, a member is less likely to retire at a given age if it is their first year of

retirement. This assumption is somewhat contrary to common industry trends but it could be supported by plan experience.

Overall, we believe that the current retirement assumption is reasonable for the MTRS membership. As part of the next actuarial experience study, we recommend that the retained actuary closely review the behavior of active members in their first year of eligibility to confirm there is sufficient evidence to anticipate a lower rate of retirements in the first year of eligibility and to explore the potential causes of this behavior.

*Pre-Retirement Mortality* – The current pre-retirement mortality assumption for active members is based on the same assumption as the healthy annuitants. Due to the relatively low number of pre-retirement deaths, this is a common approach to this assumption. The current assumption for pre-retirement mortality is reasonable for this purpose.

*Disability Incidence* – The current assumption for disability incidence is based on a member’s age. The rate of disability incidence is studied during each actuarial experience study but very little retirement plan experience generally exists in order to set a reasonable assumption based on actual retirement plan experience. The current assumption for disability incidence is reasonable for this purpose.

### **Reoccurring Demographic Losses in Valuation**

The retained actuary provides a three-year summary of Historical Actuarial Gains and Losses each year in the actuarial valuation report. After looking at historical actuarial valuation reports, we noted that MTRS has realized actuarial losses every year for the past nine years for each of the following demographic assumptions: retirement, termination, and postretirement mortality. Over this nine-year period, the total actuarial loss from these three sources has averaged approximately \$33 million per year.

In general, the actuarial assumptions are not expected to correctly predict behavior in every year. However, a reasonable set of assumptions should generate actuarial gains in some years and actuarial losses in other years, with an average close to zero. If the actuarial assumptions are systematically generating actuarial losses each year in the actuarial valuation then the plan will continue to have unexpected increases in the UAAL and it will take longer to eliminate the UAAL than expected. As a result, the reoccurring losses on the three key demographic assumptions should be reviewed.

The recommended demographic assumptions resulting from the most recent actuarial experience study were “headcount-weighted” which is a reasonable procedure. In light of the reoccurring actuarial losses, the retained actuary may want to review the plan experience based on an “amount-weighted” approach. For mortality, selecting an assumption based on a headcount-weighting is consistent with estimating expected deaths. However, selecting an assumption based on amount-weighting is consistent with minimizing gains and losses associated with expected deaths. By weighting the data by annuity amounts, more weight is given to members who have larger annuities (and thus have larger liabilities). The amount-weighted procedure can also be applied to the retirement and termination experience by applying weights associated with pay or liabilities. The RP-2000 mortality table, which is the base mortality assumption for MTRS, was actually developed as an amount-weighted table.

In order to mitigate the reoccurring actuarial losses generated by the key demographic assumptions, we recommend that the retained actuary explore the sources of the demographic losses and consider an amount-weighted approach during the next actuarial experience study.





## ***Economic Assumptions***

### **General**

Economic assumptions simulate the impact of economic forces on the amounts and values of future benefits. Key economic assumptions are the assumed rate of investment return and assumed rates of future salary increase. All economic assumptions are built upon an underlying inflation assumption.

ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, applies to actuaries when they are selecting economic assumptions. ASOP No. 27 states that each economic assumption selected by the actuary should be reasonable. For this purpose, an assumption is reasonable if it has the following characteristics:

- a) It is appropriate for the purpose of the measurement;
- b) It reflects the actuary's professional judgment;
- c) It takes into account historical and current economic data that is relevant as of the measurement date;
- d) It reflects the actuary's estimate of future experience, the actuary's observation of the estimates inherent in market data, or a combination thereof; and
- e) It has no significant bias (i.e., it is not significantly optimistic or pessimistic), except when provisions for adverse deviation or plan provisions that are difficult to measure are included and disclosed, or when alternative assumptions are used for the assessment of risk.

Additionally, ASOP No. 27 states that communications regarding actuarial reports subject to this standard should contain the following:

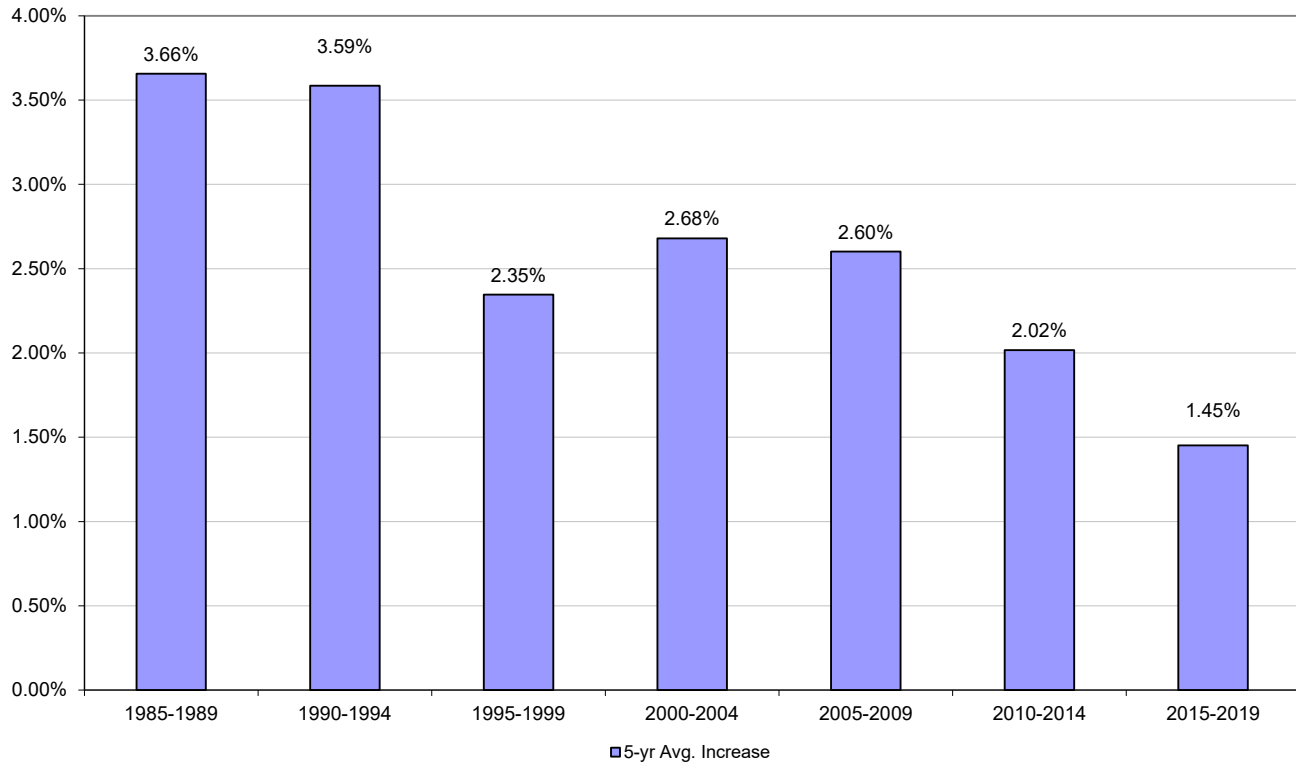
- a) A description of each significant assumption used in the measurement and whether the assumption represents an estimate of future experience, and
- b) A description of the information and analysis used in selecting each economic assumption that has a significant effect on the measurement.

### **Inflation**

By "inflation," we mean price inflation, as measured by annual increases in the Consumer Price Index (CPI). This inflation assumption underlies most of the other economic assumptions. It primarily impacts investment return, salary increases, and payroll growth. The current annual inflation assumption for MTRS is 2.50%.

The chart on the next page shows the average annual inflation in each of the ten consecutive five-year periods over the last fifty years:

**Average Annual Inflation  
CPI-U, Five-Year Averages Ending June 30**



Source: Bureau of Labor Statistics, CPI-U, all items, not seasonally adjusted

The table below shows the average inflation over various periods, ending June 2019:

| Periods Ending June 2019          | Average Annual Increase in CPI-U |
|-----------------------------------|----------------------------------|
| Last five (5) years               | 1.45%                            |
| Last ten (10) years               | 1.73%                            |
| Last fifteen (15) years           | 2.02%                            |
| Last twenty (20) years            | 2.19%                            |
| Last thirty (25) years            | 2.22%                            |
| Last thirty (30) years            | 2.44%                            |
| Since 1913 (first available year) | 3.11%                            |

Source: Bureau of Labor Statistics, CPI-U, all items, not seasonally adjusted

As you can see, inflation has been relatively low over the last thirty years.

Most of the investment consulting firms, in setting their capital market assumptions, currently assume that inflation will be 2.50%, or less. We examined the 2019 capital market assumption sets for 14 investment consulting firms and the average assumption for inflation was 2.18%, with a range of 1.70% to 2.50%. It should be noted that the majority of these investment consulting firms set their assumptions based on approximately a ten-year outlook.

There are also many other organizations that determine forward-looking expectations for inflation based various market indicators. A summary of these expectations can be found in the following table:

| <b>Forward-Looking Price Inflation Forecasts<sup>a</sup></b> |       |
|--|-------|
| <b>Congressional Budget Office<sup>b</sup></b>               |       |
| 5-Year Annual Average  | 2.46% |
| 10-Year Annual Average                                       | 2.38% |
| <b>Federal Reserve Bank of Philadelphia<sup>c</sup></b>      |       |
| 5-Year Annual Average  | 2.10% |
| 10-Year Annual Average                                       | 2.20% |
| <b>Federal Reserve Bank of Cleveland<sup>d</sup></b>         |       |
| 10-Year Expectation  | 1.68% |
| 20-Year Expectation  | 1.89% |
| 30-Year Expectation  | 2.05% |
| <b>Federal Reserve Bank of St. Louis<sup>e</sup></b>         |       |
| 10-Year Breakeven Inflation                                  | 1.74% |
| 20-Year Breakeven Inflation                                  | 1.77% |
| 30-Year Breakeven Inflation                                  | 1.78% |
| <b>U.S. Department of the Treasury<sup>f</sup></b>           |       |
| 10-Year Breakeven Inflation                                  | 1.70% |
| 20-Year Breakeven Inflation                                  | 1.74% |
| 30-Year Breakeven Inflation                                  | 1.90% |
| 50-Year Breakeven Inflation                                  | 1.94% |
| 100-Year Breakeven Inflation                                 | 1.97% |
| <b>Social Security Trustees<sup>g</sup></b>                  |       |
| Ultimate Intermediate Assumption                             | 2.60% |

<sup>a</sup>Version 2019-06-30 by Gabriel, Roeder, Smith & Company.

<sup>b</sup>*The Budget and Economic Outlook: 2019 to 2029*, Release Date: January 2019, Consumer Price Index (CPI-U), Percentage Change from Fourth Quarter to Fourth Quarter, 5-Year Annual Average (2019 - 2023), 10-Year Annual Average (2019 - 2028).

<sup>c</sup>*Second Quarter 2019 Survey of Professional Forecasters*, Release Date: May 10, 2019, Headline CPI, 5-Year Annual Average (2019 - 2023), 10-Year Annual Average (2019 - 2028).

<sup>d</sup>Inflation Expectations, Model output date: June 1, 2019.

<sup>e</sup>The breakeven inflation rate represents a measure of expected inflation derived from X-Year Treasury Constant Maturity Securities and X-Year Treasury Inflation-Indexed Constant Maturity Securities. Observation date: June 2019.

<sup>f</sup>*The Treasury Breakeven Inflation (TBI) Curve*, Monthly Average Rates, June 2019.

<sup>g</sup>*The 2019 Annual Report of The Board of Trustees of The Federal Old-Age And Survivors Insurance and Federal Disability Insurance Trust Funds*, April 25, 2019, Long-range (75-year) assumptions, Intermediate, Consumer Price Index (CPI-W), for 2021 and later.

The current explicit inflation assumption for MTRS is 2.50% which was lowered from 3.25% as part of the most recent experience study. Many economists forecast inflation rates at, or below, the current 2.50% assumption. We consider this assumption to be reasonable for MTRS but we recommend that the retained actuary monitor this assumption closely. If actual inflation remains at the current low levels then the retained actuary may need to consider recommending a further change to this assumption in the next experience study.

### **Administrative and Investment-Related Expenses**

Since the trust fund pays investment and administrative expenses from plan assets, it is necessary to incorporate the expected expenses into the actuarial valuation. Plan expenses may be explicitly assumed as a direct increase to the annual normal cost or implicitly assumed by developing an investment return assumption as a net return after payment of plan expenses. The current actuarial valuation includes an explicit expense assumption for administrative expenses in the normal cost and implicit expense assumption for investment expenses. We believe that these are appropriate methods for the actuarial valuation of MTRS.

Based on the actual administrative expenses and actual payroll from the past few years, the current assumption of 0.36% of payroll seems reasonable for the administrative expenses.

The following section will analyze how the investment expenses are incorporated into the investment return assumption.

### **Investment Return**

The investment return assumption is one of the principal assumptions in any actuarial valuation. It is used to discount future expected benefit payments to the valuation date to determine the liabilities of the retirement plan. Even a small change to this assumption can produce significant changes to the liabilities and contribution rates.

MTRS participates in the Consolidated Asset Pension Pool (CAPP) that is overseen by the Montana Board of Investments. This Pool is responsible for investing the State funds, including the public retirement plans in accordance with state law and the state constitution. The investment policy statement for the Program indicates that it seeks to generate long term investment performance that will exceed an annual target rate of return of 7.65%, net of expenses.

The current investment return assumption for MTRS is 7.50% which is consistent with the objective of the Unified Investment Program. We have analyzed the assumption based on a 2.50% inflation assumption plus an annual real rate of return of 5.00%, net of investment expenses paid from the trust.

We believe an appropriate approach to reviewing an investment return assumption is to determine the median expected portfolio return given the retirement plan's target allocation and a given set of capital market assumptions. Per the Target Allocation stated in the MTRS CAFR for the 2019 fiscal year, the target asset allocation for MTRS is:

| Asset Class                 | Target      |
|-----------------------------|-------------|
| Domestic Equity             | 35%         |
| International Equity        | 18%         |
| Private Equity              | 10%         |
| Natural Resources           | 3%          |
| Core Real Estate            | 7%          |
| TIPS                        | 3%          |
| Intermediate Duration Bonds | 19%         |
| High Yield Bonds            | 3%          |
| Cash                        | 2%          |
| <b>Total</b>                | <b>100%</b> |

Because GRS is a benefits consulting firm and does not develop or maintain its own capital market assumptions, we reviewed assumptions developed and published by the following investment consulting firms:

- JP Morgan
- NEPC
- Callan
- Mercer
- Wilshire
- Meketa
- Marquette
- RV Kuhns
- Blackrock
- BNY Mellon
- Aon
- Cambridge
- VOYA
- Verus

These investment consulting firms issue reports that describe their capital market assumptions, which include their estimates of expected returns, volatility, and correlations. While these assumptions are developed based upon historical analysis, many of these firms also incorporate forward looking adjustments to better reflect near-term expectations.

Given the current strategic target asset allocation set for MTRS and the investment firms' capital market assumptions for 2019, the development of the average nominal return, net of investment expenses paid from the trust, is provided in the table below:

| Investment Consultant | Investment Consultant Expected Nominal Return | Investment Consultant Inflation Assumption | Expected Real Return (2)–(3) | Actuary Inflation Assumption | Expected Nominal Return (4)+(5) | Standard Deviation of Expected Return (1-Year) |
|-----------------------|---|--|------------------------------|------------------------------|---------------------------------|--|
| (1)                   | (2)   | (3)  | (4)                          | (5)                          | (6)                             | (7)  |
| 1                     | 5.62%   | 2.20%                                      | 3.42%                        | 2.50%                        | 5.92%                           | 11.98%   |
| 2                     | 6.51%   | 2.50%                                      | 4.01%                        | 2.50%                        | 6.51%                           | 12.41%   |
| 3                     | 6.76%   | 2.50%                                      | 4.26%                        | 2.50%                        | 6.76%                           | 12.98%   |
| 4                     | 6.49%   | 2.20%                                      | 4.29%                        | 2.50%                        | 6.79%                           | 10.04%   |
| 5                     | 6.75%   | 2.00%                                      | 4.75%                        | 2.50%                        | 7.25%                           | 11.12%   |
| 6                     | 7.27%   | 2.21%                                      | 5.06%                        | 2.50%                        | 7.56%                           | 13.42%   |
| 7                     | 7.29%   | 2.25%                                      | 5.04%                        | 2.50%                        | 7.54%                           | 12.99%   |
| 8                     | 7.60%   | 2.26%                                      | 5.34%                        | 2.50%                        | 7.84%                           | 14.30%   |
| 9                     | 7.11%   | 2.00%                                      | 5.11%                        | 2.50%                        | 7.61%                           | 12.33%   |
| 10                    | 7.54%   | 2.31%                                      | 5.23%                        | 2.50%                        | 7.73%                           | 12.60%   |
| 11                    | 7.92%   | 2.30%                                      | 5.62%                        | 2.50%                        | 8.12%                           | 12.09%   |
| 12                    | 7.91%   | 2.15%                                      | 5.76%                        | 2.50%                        | 8.26%                           | 12.59%   |
| 13                    | 7.73%   | 1.70%                                      | 6.03%                        | 2.50%                        | 8.53%                           | 12.86%   |
| 14                    | 7.95%   | 2.00%                                      | 5.95%                        | 2.50%                        | 8.45%                           | 11.28%   |
| <b>Average</b>        | <b>7.17%</b>                                  | <b>2.18%</b>                               | <b>4.99%</b>                 | <b>2.50%</b>                 | <b>7.49%</b>                    | <b>12.36%</b>                                  |

We determined, for each firm, the expected nominal return rate based on MTRS’s target allocation and then subtracted that investment consulting firm’s expected inflation to arrive at their expected real return in column (4). Then we added back MTRS’s current 2.50% inflation to arrive at an expected nominal return net of investment expenses. As the table shows, the resulting average arithmetic one-year return of the eight firms is 7.49%.

The forward-looking capital market assumptions and return forecasts developed by investment consulting firms already reflect expected investment expenses. Their return estimates for core investments (i.e., fixed income, equities, and real estate) are generally based on anticipated returns produced by passive index funds that are net of investment related fees. Investment return expectations for the alternative asset class such as private equity and hedge funds are also net of investment expenses. Therefore, we did not make any additional adjustments to account for investment related expenses. This analysis also assumes that investment managers will generate enough alpha to at least cover the cost of the active management. No additional alpha for active management has been considered.

In addition to examining the expected one-year return, it is important to review anticipated volatility of the investment portfolio and understand the range of long-term net returns that could be expected to be produced by the investment portfolio. Therefore, the following table provides the 40<sup>th</sup>, 50<sup>th</sup>, and 60<sup>th</sup> percentiles of the 20-year geometric average of the expected nominal return, net of investment expenses paid from the trust, as well as the probability of exceeding the current 7.50% assumption.

| Investment Consultant | Distribution of 20-Year Average Geometric Net Nominal Return |              |              | Probability of exceeding 7.50% |
|-----------------------|--|--------------|--------------|--------------------------------|
|                       | 40th   | 50th         | 60th         |                                |
| (1)                   | (2)  | (3)          | (4)          | (5)                            |
| 1                     | 4.58%  | 5.25%        | 5.92%        | 20%                            |
| 2                     | 5.10%  | 5.79%        | 6.49%        | 27%                            |
| 3                     | 5.25%  | 5.98%        | 6.71%        | 30%                            |
| 4                     | 5.76%  | 6.32%        | 6.89%        | 30%                            |
| 5                     | 6.06%  | 6.68%        | 7.31%        | 37%                            |
| 6                     | 5.98%  | 6.73%        | 7.49%        | 40%                            |
| 7                     | 6.04%  | 6.76%        | 7.49%        | 40%                            |
| 8                     | 6.11%  | 6.90%        | 7.71%        | 43%                            |
| 9                     | 6.22%  | 6.91%        | 7.60%        | 41%                            |
| 10                    | 6.30%  | 7.01%        | 7.71%        | 43%                            |
| 11                    | 6.77%  | 7.45%        | 8.13%        | 49%                            |
| 12                    | 6.84%  | 7.54%        | 8.25%        | 51%                            |
| 13                    | 7.05%  | 7.77%        | 8.50%        | 54%                            |
| 14                    | 7.23%  | 7.86%        | 8.50%        | 56%                            |
| <b>Average</b>        | <b>6.09%</b>   | <b>6.78%</b> | <b>7.48%</b> | <b>40%</b>                     |

The table above shows that the resulting 20-year geometric average of the expected nominal return is 6.78%. Additionally, the table above documents that the average probability of exceeding the current 7.50% investment return assumption over a 20-year period is 40%.

As a point of reference, the Public Funds Survey published in April 2020 of 130 large public retirement systems reflects the nominal assumption in use, or announced for use, as of the date of the survey. The average investment return assumption for responding systems was 7.25%.

The current investment return assumption is reasonable for this purpose. At the next experience study, the Board may want to consider an investment return assumption that has closer to a 50% chance of being met over a 20-year period in order to increase the likelihood that the investment goals are being met.

### **Earnings Progression**

Generally, assumed rates of pay increase are constructed as the total of three main components:

- Price Inflation – currently 2.50%
- Economic Productivity Increases (base pay increases above price inflation) – currently 0.75%
- Merit, Promotion, and Longevity – This portion of the salary increase assumption reflects components such as merit and promotional increases as well as “step” increases and longevity pay. This portion of the assumption varies based on member’s service and is not related to inflation.

In the context of a typical employer pay scale, pay levels are set for various employment grades, or “steps”. In general, this pay scale is adjusted as follows:

- The inflation and economic productivity assumptions, collectively referred to as wage inflation, reflect the overall increases of the entire pay scale, and
- The Merit, Promotion, and Longevity increase assumption reflects movement of members through the pay scale.

The current earnings progression assumption is reasonable and appropriate for this purpose.

### ***Summary***

The set of actuarial assumptions and methods, taken in combination, is reasonable and generally established in accordance with ASOP No. 27, Selection of Economic Assumptions for Measuring Pension Obligations, and ASOP No. 35, Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations.

We have the following recommendations regarding the actuarial assumptions:

- As part of the next actuarial experience study, we recommend that the retained actuary consider the applicability and appropriateness of a “generational” mortality assumption to eliminate the need to periodically update the “static” mortality assumption to include margin for future mortality improvement.
- As part of the next actuarial experience study, we recommend that the retained actuary closely review the behavior of active members in their first year of eligibility to confirm there is sufficient evidence to anticipate a lower rate of retirements in the first year of eligibility and to explore the potential causes of this behavior.
- In order to mitigate the reoccurring actuarial losses generated by the key demographic assumptions, we recommend that the retained actuary explore the sources of the demographic losses and consider an amount-weighted approach during the next actuarial experience study.



## **SECTION IV**

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### **ACTUARIAL METHODS AND FUNDING POLICY**

# Actuarial Methods and Funding Policy

The ultimate cost of the retirement program administered by MTRS is equal to the benefits paid plus the expenses related to operating MTRS. This cost is funded through contributions to MTRS plus the investment return on accumulated contributions which are not immediately needed to pay benefits or expenses. The projected level and timing of the contributions needed to fund the ultimate cost are determined by the actuarial assumptions, plan provisions, participant characteristics, investment experience, and the actuarial cost method.

## ***Actuarial Cost Methods***

An actuarial cost method is a mathematical process for allocating the dollar amount of the total present value of plan benefits (TPV) between future normal costs and actuarial accrued liability (AAL). The retained actuary uses the Entry Age Normal actuarial cost method (EAN Method), characterized by:

- (1) Normal Cost – the level percent of payroll contribution, paid from each participant’s date of hire to date of retirement, which will accumulate enough assets at retirement to fund the participant’s projected benefits from retirement to death.
- (2) Actuarial Accrued Liability – the assets which would have accumulated to date had contributions been made at the level of the normal cost since the date of the first benefit accrual, if all actuarial assumptions had been exactly realized, and there had been no benefit changes.

The EAN Method is the most prevalent funding method in the public sector. It is appropriate for the public sector because it produces costs that remain stable as a percentage of payroll over time, resulting in intergenerational equity for taxpayers. Therefore, the retained actuary’s stated methods for allocating the liabilities of MTRS are certainly in line with national trends.

We have reviewed the retained actuary’s application of the Entry Age Normal actuarial cost method and we believe that the method is reasonable and appropriately applied.

## ***Asset Valuation Method***

The market value of assets can experience significant short-term swings, which can cause large fluctuations in the development of the actuarially determined contributions required to fund the retirement systems. Thus, many systems use an asset valuation method which dampens these short-term volatilities to achieve more stability in the employer contribution. A good asset valuation method places values on a retirement plan’s assets which are related to the current market value, but which will also produce a smoother pattern of costs.

ASOP No. 44, Selection and Use of Asset Valuation Methods for Pension Valuations, provides a framework for the determination of the actuarial value of assets (AVA), emphasizing that the method should: (1) bear a reasonable relationship to the market value of assets (MVA), (2) recognize investment gains and losses over an appropriate time period, and (3) avoid systematic bias that would overstate or understate the AVA in comparison to MVA.

The actuarial valuation of MTRS currently utilizes a smoothed asset valuation method that immediately recognizes income equal to the expected return on market value of assets, based on the assumed valuation interest rate (7.50%). Differences between the assumed investment return and the actual market investment return are recognized over a four-year period. Further, the AVA cannot exceed 120% or be less than 80% of the market value of assets. This current method was first adopted for the July 1, 2007 actuarial valuation.

The smoothing method used for the actuarial valuation of MTRS is common among public employee retirement systems. We feel that this method complies with ASOP No. 44. Additionally, this method is reasonable and appropriately applied for the valuation.

### ***Funding Policy***

In light of the current challenges facing public retirement systems, these systems need to have a sound, written funding policy to secure member benefits and mitigate the risks to the plan sponsor.

There have been reports issued by actuaries, governmental associations, and others to assist with the development of guidelines for funding policies, including:

- Report from the Pension Funding Task Force 2013 (convened by the Center for State and Local Government Excellence), titled “Pension Funding: A Guide for Elected Officials”;
- GFOA Best Practice, titled “Core Elements of a Pension Funding Policy”; and
- Report in 2014 from the Conference of Consulting Actuaries Public Plans Community, titled “Actuarial Funding Policies and Practices for Public Pension Plans”.

Developing a clear, written funding policy can help decision makers understand the tradeoffs related to reaching specified goals and document the reasoning that underlies the decisions. Through this process, decision-makers can come to a better understanding of the principles and practices that help sustain benefits over the long-term.

### **Current Contribution Rates**

The member, employer and State contribution rates are generally established by Title 19, Chapter 20, Part 6 of the Montana Code Annotated. For the fiscal year ending June 30, 2019, the statutory levels of contributions are the following:

- Member contribution of 8.15% of payroll,
- Employer contribution of 11.46% of payroll (increasing annually by 0.10% until reaching 11.96%),
- \$25 million contribution from the State, and
- University supplemental contributions of 4.72% of payroll for members of the Optional Retirement Plan.

Based on the results of the July 1, 2019 actuarial valuation, these statutory contribution levels are sufficient to amortize the unfunded actuarial accrued liability of MTRS within 29 years.

## **Formal Written Policy**

In May 2002, the MTRS Board adopted the first version of their Funding and Benefits Policy. As part of the Policy itself, this Policy is reviewed by the Board at least every two years.

The most recent version of the Policy, adopted May 13, 2016, is a very well-written and thorough policy that directs the Board of MTRS on how to manage the retirement plan “in a manner that best maintains the long-term stability of the retirement fund through a systematic and disciplined accumulation of resources for the purpose of paying promised benefits to plan participants over their lifetimes.”

For example, the Policy includes the following policies pertaining to actuarial funding and benefits modifications:

- Regularly scheduled actuarial valuations and experience studies, and
- Periodic review of the supplemental employer contribution rate, including adjustments recommended to the Legislature as needed to eliminate the past service liability by July 1, 2033.

The Board’s Funding and Benefit Policy is a thorough document that thoughtfully monitors the health of MTRS from many perspectives. We believe that this funding policy continues to serve as a model to other retirement systems.

### ***Summary***

We believe that the actuarial methods and funding policy are reasonable for MTRS and appropriately applied.

## **SECTION V**

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### **ACTUARIAL VALUATION RESULTS**

# Actuarial Valuation Results

## ***Benefits***

Every employer is different and every employer's retirement plan is different. Each employer has a set of workforce and financial needs that dictate the type of retirement benefit that is most appropriate for their employees. Additionally, the amount of resources available to allocate to the retirement plan will dictate the level of benefits provided by the retirement plan. Regardless of the reasons for the benefit design, the employer must understand the liability and contribution requirements associated with the benefits promised. As a result, the actuarial valuation and the resulting funding policy contribution must properly reflect the benefit structure of the retirement plan.

In general, the benefits promised by MTRS were reasonably incorporated in the actuarial valuation of MTRS.

## ***Data***

As part of our actuarial audit, we received a preliminary set of census data for plan participants and beneficiaries as of July 1, 2019 originally provided by MTRS to the retained actuary for the actuarial valuation. Additionally, we received a final set of census data for plan participants and beneficiaries as of July 1, 2019 used by the retained actuary for the actuarial valuation.

We used this data, along with the census summaries included in the valuation report, to review the valuation data process. In total, we believe that the final valuation data used by the retained actuary is reasonable and valid for its purpose.

## ***Actuarial Valuation Results***

### **Calculation of the Amortization Period**

MTRS is scheduled to receive contributions from the following primary sources for the fiscal year ending June 30, 2020:

- Member contributions of 8.15% of payroll,
- Employer contributions of 11.56% of payroll (increasing annually by 0.10% until reaching 11.96%),
- \$25 million contribution from the State, and
- University supplemental contributions of 4.72% of payroll for members of the Optional Retirement Plan.

Portions of these contributions are considered "supplemental" and can change over time based on factors such as the funded level of MTRS and the discretion of the Board.

The July 1, 2019 actuarial valuation indicates that the amortization period of MTRS is 29 years. We were able to replicate this calculation and we believe that it is an appropriate representation of the amortization period of MTRS based on the stated assumptions.



The retained actuary notes that the effective funding period is less because future members will have a lower normal cost which will translate to a larger portion of the contributions available to amortize the UAAL in the future. The impact of the lower normal cost can be captured using an “open group projection”. In an open group projection, the demographic assumptions are applied to the current active members (many of which are Tier One members hired before July 1, 2013) and any members that are assumed to leave employment are replaced one-for-one with new members. Over time, this results in the change of the membership to mostly members hired on or after July 1, 2013 (with the less expensive benefit structure) and incorporates the fact that the normal cost rate will trend down over time. The projection is built to assume no gains or losses on the actuarial accrued liability or the actuarial value of assets.

The retained actuary should consider preparing an open group projection along with future actuarial valuations to explore the impact of future Tier Two members on the estimated funding period.

### **Review of Sample Liability Calculations**

As part of the actuarial audit, we requested sample member calculations from the retained actuary to ensure that the retained actuary valued the correct benefit levels, used the correct assumptions, and calculated the liabilities correctly on an individual basis.

Generally accepted actuarial standards and practices provide actuaries with the basic mathematics and framework for calculating the actuarial results. When it comes to applying those actuarial standards to complex calculations, differences may exist due to individual opinion on the best way to make those complex calculations or other differences may occur due to nuances in the valuation software programming. This may lead to differences in the calculated results, but these differences should not be material.

**Active Participants.** At the onset of the review, we requested that the retained actuary provide sample liability calculations for 12 active members with enough detail to verify the calculation of liability for member. The retained actuary provided all of the information requested.

In order to review the liability calculations, we used the census data provided for the valuation, utilized the appropriate benefit provisions, and applied the actuarial assumptions and methods summarized in the valuation report. We were able to closely match the liability calculated by the retained actuary for the July 1, 2019 actuarial valuation. Below is a summary of our replication:

| <i>Sum of 12 active members reviewed</i> | <b>Present Value of Future Benefits</b> | <b>Actuarial Accrued Liability</b> | <b>Normal Cost</b> |
|--|---|------------------------------------|--------------------|
| July 1, 2019 Actuarial Valuation         | \$1,873,557                             | \$1,403,223                        | \$71,718           |
| GRS Replication                          | 1,864,038                               | 1,403,848                          | 70,042             |
| Difference                               | -0.5%                                   | 0.0%                               | -2.3%              |

Based on our review, we believe the liability determination of active participants was reasonable and appropriately determined.

**Terminated Members and Annuitants.** At the onset of the review, we requested that the retained actuary provide sample liability calculations for 13 terminated members and annuitants with enough detail to verify the calculation of liability for member. This request included four service retirements, two disability



retirements, three survivors, two vested terminations, and two non-vested terminations maintaining a contribution balance in the plan. The retained actuary provided all of the information we requested regarding the terminated members and annuitants.

In order to review the liability calculations, we used the census data provided for the valuation, utilized the appropriate benefit provisions, and applied the actuarial assumptions and methods summarized in the valuation report. With one exception, we were able to closely match the liability calculated by the retained actuary for the July 1, 2019 actuarial valuation.

Our sample included a service retirement who had a portion of their benefit assigned to an alternate payee through a Family Law Order, or FLO, which is similar to a Qualified Domestic Relations Order. These annuitants are discussed further in the following section.

Below is a summary of our replication, excluding the benefit split through a FLO:

| <i>Sum of 11 inactive members reviewed (excludes FLO)</i> | <b>Present Value of Future Benefits</b> |
|---|---|
| July 1, 2019 Actuarial Valuation                          | \$760,534                               |
| GRS Replication   | 758,846                                 |
| Difference  | 0.2%                                    |

### **Recognition of Family Law Orders**

The manner in which benefits are assigned to an alternate payee can vary from case to case. As a result, it can sometimes be a challenge to ensure that the specific details of the Order are being reflected precisely in the actuarial valuation. In the case of the annuitants included in our sample, the alternate payee was assigned essentially the entire monthly benefit at retirement and the retiree is only receiving the accumulated GABA increases on the original benefit. The July 1, 2019 actuarial valuation included a combined liability of \$118,466 for these two annuitants. In our replication, we calculated a combined liability of \$98,711 for a difference of \$19,755. This difference is generally outside our tolerance for replication. However, because of the communication challenges and the low occurrence of FLOs, we do not believe this is a major issue. We recommend that MTRS and the retained actuary review the data and procedures for including FLOs into the actuarial valuation and ensure that the liability calculations are as reasonable as possible.

Based on our review, the liability determination of the terminated members and annuitants was reasonable and consistent with the stated assumptions and methods.



## ***Summary***

We believe that the valuation results were developed in a reasonable manner. In the next actuarial valuation, the retained actuary should consider the following enhancements:

- The retained actuary should consider preparing an open group projection along with future actuarial valuations to explore the impact of future Tier Two members on the estimated funding period.
- We recommend that MTRS and the retained actuary review the data and procedures for including FLOs into the actuarial valuation and ensure that the liability calculations are as reasonable as possible.

## **SECTION VI**

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### **CONTENT OF THE VALUATION REPORT**

## Content of the Valuation Report

ASOP No. 4, Measuring Pension Obligations and Determining Pension Plan Costs, and ASOP No. 41, Actuarial Communications, provide guidance for measuring pension obligations and communicating the results. These Standards list specific elements to be included, either directly or by references to prior communication, in pension actuarial communications. The pertinent items that should be included in an actuarial valuation report on a pension plan should include:

- The name of the person or firm retaining the actuary and the purposes that the communication is intended to serve.
- A statement as to the effective date of the calculations, the date as of which the participant and financial information were compiled, and the sources and adequacy of such information.
- An outline of the benefits being discussed or valued and of any significant benefits not included in the actuarial determinations.
- A summary of the participant information, separated into significant categories such as active, retired, and terminated with future benefits payable. Actuaries are encouraged to include a detailed display of the characteristics of each category and reconciliation with prior reported data.
- A description of the actuarial assumptions, the cost method and the asset valuation method used. Changes in assumptions and methods from those used in previous communications should be stated and their effects noted. If the actuary expects that the long-term trend of costs resulting from the continued use of present assumptions and methods would result in a significantly increased or decreased cost basis, this should also be communicated.
- A summary of asset information and derivation of the actuarial value of assets. Actuaries are encouraged to include an asset summary by category of investment and reconciliation with prior reported assets showing total contributions, benefits, investment return, and any other reconciliation items.
- A statement of the findings, conclusions, or recommendations necessary to satisfy the purpose of the communication and a summary of the actuarial determinations upon which these are based. The communication should include applicable actuarial information regarding financial reporting. Actuaries are encouraged to include derivation of the items underlying these actuarial determinations.
- A disclosure of any facts which, if not disclosed, might reasonably be expected to lead to an incomplete understanding of the communication.

We have reviewed the actuarial valuation report prepared by the retained actuary and we have noted a few modifications to the report that would allow the report to adhere more closely with ASOP Nos. 4 and 41.

### **Estimation of Actual Investment Returns**

Since the MTRS trust fund pays expenses (both investment and administrative) in addition to member benefits and refunds, the actuarial valuation must incorporate an assumption about how these expenses will be paid. The current investment return assumption for MTRS is that the fund is expected to return 7.50% after paying for all investment expenses. The administrative expenses for MTRS are not incorporated into the investment return assumption but they are explicitly assumed to be 0.36% of payroll each year. This set of procedures for anticipating expenses is the most common approach for the actuarial valuation of public employee retirement plans.



In multiple sections of the actuarial valuation report, the retained actuary calculates the estimated actual investment return for past years. This estimated rate of return on plan assets can be used for many purposes by MTRS (e.g., evaluation of investment advisors, comparison to benchmarks, etc). In the context of the actuarial valuation report, this return estimate is generally used as a comparison to the valuation assumption for investment returns. As a result, it is helpful for the estimated return in the actuarial valuation report to be calculated in a manner consistent with the investment return assumption.

In the Summary of Findings (Section 1), the Investment Experience section states “the market assets earned 5.69% net of investment and operating expenses”. Similarly, the footnote of the History of Investment Returns (Table 4) states that the investment returns “are net of investment expenses and administrative expenses”. We recommend that the retained actuary review the calculation of the estimated actual investment return to ensure that it is calculated in a manner consistent with the investment return assumption. Further, we recommend that the retained actuary review the description of the estimated return in these sections to ensure the descriptions are consistent with the procedures.

**Risk Considerations (Section 7)** – Section 7 of the July 1, 2019 actuarial valuation report, titled “Risk Considerations” was added to the report in response to the recently adopted ASOP No. 51, *Assessment and Disclosure of Risk in Measuring Pension Obligations*. We would like to commend the retained actuary on a very thorough and informative discussion of the risks applicable to MTRS. We hope the Board finds this discussion to be a valuable insight into the long-term sustainability of MTRS.

One discussion in this Section, titled “Historical Cash Flows”, includes a table calculating the Net Cash Flow Percent. The “Net Cash Flow” presented in this table is the contributions received minus the benefits paid and the administrative expenses. Similar net cash flow amounts are also presented in Table 3 and Table 10 of the actuarial valuation report; however, the “Pension and OPEB Expenses” are included with the outflows. We recommend that the retained actuary tabulate the Net Cash Flows in Section 7 in a similar manner as the other cash flow summaries in the report for consistency.

### **Appendix A, Actuarial Procedures and Assumptions**

The presentation of actuarial methods and assumptions is generally complete and understandable. The methods described in this section are reasonable and appropriate for public retirement plans.

We do have the following suggestions to improve the overall communication of the valuation assumptions.

**Mortality among contributing members, service retired members, and beneficiaries (Table A-5, Item II.D.)** – We were not able to exactly replicate the sample mortality rates presented in Table A-5. The retained actuary indicates that the rates were “adjusted for partial credibility”. However, there is no further discussion of this adjustment in the actuarial valuation report or the actuarial experience study report. We recommend that the retained actuary consider including a more detailed description of the credibility adjustments in the next actuarial valuation report and/or actuarial experience study report.

**Other terminations of employment (Table A-6, Item II.F.)** – This assumption describes how members are expected to leave active service for reasons other than retirement, disability, or death. The description of the termination assumption in the actuarial valuation report indicates the assumed rate of termination based on a member’s service, from one year of service to 24 years of service. Since it is possible for Tier 2



members to work for more than 24 years prior to reaching retirement eligibility, we recommend that the retained actuary expand the description to indicate how the assumption applies to active members with more than 24 years of service while not eligible to retire. We believe that it may be informative to also indicate how the assumption applies to active members who have zero years of service.

### ***Summary***

In general, the actuarial valuation report complied with the applicable Actuarial Standards of Practice. In order to improve the ability of the report to communicate the assumptions, methods and plan provisions incorporated into the actuarial valuation, we recommend that the retained actuary incorporate the noted enhancements in future actuarial valuation reports.

## **SECTION VII**

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### **FINAL REMARKS**

## Final Remarks

The auditing actuarial firm, Gabriel, Roeder, Smith & Company (GRS), is independent of the retained actuarial firm. The auditing actuaries are not aware of any conflict of interest that would impair the objectivity of this work.

We have presented many suggestions for areas where we believe the product can be improved. The retained actuary has access to information and a long history of retirement plans similar to MTRS. We understand that the retained actuary may agree with some of our recommendations, while rejecting others. We ask that the retained actuary and MTRS consider our recommendations carefully. We hope that the retained actuary and MTRS find these suggestions useful.

