

MONTANA PUBLIC EMPLOYEES' RETIREMENT BOARD

TITLE: ACTUARIAL VALUATION ASSUMPTIONS AND METHODS

POLICY: BOARD Admin 09

EFFECTIVE DATE: July 1, 2017

- I. **POLICY AND OBJECTIVES.** The objectives of this policy are to adopt appropriate actuarial assumptions, methods, and factors to conduct the annual actuarial valuations of the various defined benefit retirement systems and to determine actuarial equivalency for benefits paid and actuarial cost for service purchased within each system.
- II. **APPLICABILITY.** This policy applies to all defined benefit retirement systems administered by the Board.
- III. **UNIVERSAL ASSUMPTIONS FOR ACTUARIAL VALUATIONS.** Based on the 2017 experience study, the Board adopts the following actuarial assumptions and methods for all defined benefit retirement systems it administers:
 - A. Net investment earnings assumption – 7.65%;
 - B. General wage increase assumption – 3.50%;
 - C. Adopted price inflation – 2.75%;
 - D. Assumed interest on member contributions – 2.75%;
 - E. Actuarial cost method – entry age cost;
 - F. Asset valuation method – 4-year smoothed market;
 - G. Probability of marriage assumption – 100% of all non-retired members are assumed to be married. Male spouses are assumed to be three years older than female spouses for all systems except JRS. Male spouses are assumed to be four years older than female spouses in the JRS; and
 - H. Mortality assumption among contributing members, terminated vested members, service retired members and beneficiaries: RP-2000 Combined Employee and Annuitant Healthy Mortality Table projected to 2020 with scale BB, set back one year for males. Mortality assumption among disabled members: RP-2000 Combined Healthy Male and Female Mortality tables with no projections.

IV. SYSTEM-SPECIFIC ACTUARIAL VALUATION ASSUMPTIONS. The Board adopts the following system-specific actuarial valuation assumptions:

A. Public Employees' Retirement System

1. Merit salary increase assumptions:

Years of Service	Annual Increase
0-1	4.8%
1-2	3.8%
2-3	2.8%
3-4	2.0%
4-5	1.4%
5-6	0.8%
6-7	0.4%
7-8	0.0%
8 & Over	0.00%

2. Annual retirement rate assumptions:

Age	30+ Years Service and Age 60 with 25 Years	Other Retirements
<50	10%	0%
50-54	10%	3%
55	15%	3%
56	15%	4%
57	15%	5%
58	15%	5%
59	15%	6%
60	15%	8%
61	15%	15%
62	25%	25%
63	15%	15%
64	15%	15%
65	30%	30%
66	30%	30%
67	25%	25%
68	25%	25%
69	25%	25%
70+	100%	100%

3. Annual rate of disablement assumptions:

Age	Rate
22	0.0%
27	0.01%
32	0.01%
37	0.04%
42	0.10%
47	0.13%
52	0.25%
57	0.36%
60	0.00%
62	0.00%

4. Annual rate of other employment termination assumptions:

Service	Rate
0-1	30%
1-2	22.5%
2-3	15%
3-4	12.5%
4-6	10%
6-7	8%
7-11	6%
11-15	4%
15 +	2%

No terminations are assumed after age 50 with 5 years of service for either male or female.

5. Probability of electing a refund of member contributions upon termination assumptions:

Age at Termination	Non-vested	Vested
Under 35	100%	60%
35-39	100%	50%
40-44	100%	45%
45-49	100%	35%
50+	100%	30%

B. Judges' Retirement System

1. Merit salary increase assumptions – 0% for all years of service.
2. Annual retirement rate assumptions:

Age	Rate
60	15%
61-64	5%
65	15%
66-69	5%
70+	100%

Vested terminations are assumed to retire at their earliest unreduced eligibility.

3. Annual rate of disablement assumptions:

Age	Rate
22	0.0%
27	0.0%
32	0.01%
37	0.04%
42	0.10%
47	0.13%
52	0.25%
57	0.36%
60	0.0%
62	0.0%

10% of disabilities are assumed to be duty-related and 90% are assumed to be non-duty related.

4. Annual rate of other employment terminations assumptions for all members – 0% for all years of service.
5. Probability of electing a refund of member contributions upon termination assumptions:

Age at Termination	Non-vested	Vested
Under 35	100%	70%
35-39	100%	60%
40-44	100%	50%
45-49	100%	40%
50+	100%	0%

C. Highway Patrol Officers' Retirement System

1. Merit salary increase assumptions:

Years of Service	Annual Increase
0-1	6.3%
1-2	4.7%
2-3	3.5%
3-4	2.7%
4-5	2.0%
5-6	1.4%
6-7	0.9%
7-8	0.5%
8-9	0.2%
9+	0.0%

2. Annual retirement rate assumptions:

Age	With 20 Years of Service
<50	12%
50-54	16%
55-59	20%
60+	100%

Vested terminations are assumed to retire at their earliest unreduced eligibility.

3. Annual rate of disablement assumptions:

Age	Rate
22	0.0%
27	0.10%
32	0.10%
37	0.10%
42	0.40%
47	0.40%
52	0.40%
57	0.40%
62	0.00%

Seventy-five percent of all disabilities are assumed to be duty-related.

4. Annual rate of other employment terminations assumptions for all members:

Service	Rate
0-1	12%
1-4	7.5%
4-10	5%
10-15	3%
15+	1%

5. Probability of electing a refund of member contributions upon termination assumptions:

Age at Termination	Non-vested	Vested
Under 35	100%	40%
35-39	100%	40%
40-44	100%	40%
45-49	100%	30%
50+	100%	-

6. Seventy percent of deaths are assumed to be duty related.
7. DROP account assumptions: DROP accounts are assumed to earn the actuarial rate of return. 15% of all active members are assumed to elect to enter the DROP for each of the first six years following DROP eligibility. These members are assumed to elect to participate in the DROP plan for five years or until age 60 if earlier. Members who have elected to participate in the DROP are assumed to remain in the DROP until the end of the DROP period elected, unless they die or become disabled while in the DROP.

D. Sheriffs' Retirement System

1. Merit salary increase assumptions:

Years of Service	Annual Increase
0-1	6.3%
1-2	4.7%
2-3	3.5%
3-4	2.7%
4-5	2.0%
5-6	1.4%
6-7	0.9%

7-8	0.5%
8-9	0.2%
9+	0.0%

2. Annual retirement rate assumptions:

Age	With 20 Years of Service
<55	10%
55-59	15%
60-64	20%
65+	100%

Vested terminations are assumed to retire at their earliest unreduced eligibility.

3. Annual rate of disablement assumptions:

Age	Rate
22	0.0%
27	0.10%
32	0.10%
37	0.10%
42	0.40%
47	0.40%
52	0.40%
57	0.40%
62	0.00%

Seventy-five percent of all disabilities are assumed to be duty related.

4. Annual rate of other employment termination assumptions for all members:

Service	Rate
0-1	25%
1-2	17%
2-3	15%
3-4	13%
4-5	11%
5-8	9%
8-11	5%
11-15	4%
15+	3%

5. Probability of electing a refund of member contributions upon termination assumptions:

Age at Termination	Non-vested	Vested
Under 35	100%	70%
35-39	100%	60%
40-44	100%	50%
45-49	100%	40%
50+	100%	-

6. Ten percent of all member deaths are assumed to be duty-related.

E. Game Wardens' and Peace Officers' Retirement System

1. Merit salary increase assumptions:

Years of Service	Annual Increase
0-1	6.3%
1-2	4.7%
2-3	3.5%
3-4	2.7%
4-5	2.0%
5-6	1.4%
6-7	0.9%
7-8	0.5%
8-9	0.2%
9+	0.0

2. Annual retirement rate assumptions:

Age	Age 55 with 5 Years of Service	Age 55 with 20 Years of Service
<50	N/A	0%
50-54	N/A	15%
55	15%	25%
56-59	5%	25%
60-61	15%	15%
62	40%	40%
63-64	15%	15%
65+	100%	100%

Vested terminations are assumed to retire at their earliest unreduced eligibility.

3. Annual rate of disablement assumptions:

Age	Rate
22	0.0%
27	0.10%
32	0.10%
37	0.10%
42	0.40%
47	0.40%
52	0.40%
57	0.40%
62	0.00%

Seventy-five percent of all disabilities are assumed to be duty-related.

4. Annual rate of other employment termination assumptions for all members:

Service	Rate
0-1	27%
1-2	22.5%
2-3	18%
3-5	13%
5-10	7.5%
10-15	4%
15-20	3%
20+	2%

5. Probability of electing a refund of member contributions upon termination assumptions:

Age at Termination	Non-vested	Vested
Under 35	100%	70%
35-39	100%	60%
40-44	100%	50%
45-49	100%	40%
50+	100%	-

6. Ten percent of all member deaths are assumed to be duty-related.

F. Municipal Police Officers' Retirement System

1. Merit salary increase assumptions:

Years of Service	Annual Increase
0-1	6.6%
1-2	4.9%
2-3	3.7%
3-4	2.8%
4-5	2.1%
5-6	1.5%
6-7	1.0%
7-8	0.6%
8-9	0.2%
9+	0.0%

2. Annual retirement rate assumptions:

Age	Less than 20 Years of Service	20 or More Years of Service
<50	0%	12%
50-54	0%	15%
55-61	0%	20%
62-64	0%	100%
65+	100%	100%

Vested terminations are assumed to retire at their earliest unreduced eligibility.

3. Annual rate of disablement assumptions:

Age	Rate
22	0.0%
27	0.25%
32	0.25%
37	0.50%
42	0.50%
47	0.50%
52	0.50%
57	0.50%
62	0.00%

4. Annual rate of other employment termination assumptions for all members:

Service	Rate
0-1	16%
1-2	13%
2-3	11%
3-4	9%
4-8	7%
8-10	5%
10+	2%

5. Probability of electing a refund of member contributions upon termination assumptions:

Age at Termination	Non-vested	Vested
Under 35	100%	60%
35-39	100%	10%
40-44	100%	10%
45-49	100%	10%
50+	100%	-

6. DROP account assumptions: DROP accounts are assumed to earn the actuarial rate of return. 15% of all active members are assumed to elect to enter the DROP for each of the first six years following DROP eligibility. These members are assumed to elect to participate in the DROP plan for five years or until age 60 if earlier. Members who have elected to participate in the DROP are assumed to remain in the DROP until the end of the DROP period elected, unless they die or become disabled while in the DROP.

G. Firefighters' Unified Retirement System

1. Merit salary increase assumptions:

Years of Service	Annual Increase
0-1	6.3%
1-2	4.7%
2-3	3.5%
3-4	2.7%
4-5	2.0%
5-6	1.4%
6-7	0.9%

7-8	0.5%
8-9	0.2%
9+	0.0%

2. Annual retirement rate assumptions:

Age	With 20 Years of Service
<50	5%
50-54	10%
55-59	25%
60-62	50%
63+	100%

Vested terminations are assumed to retire at their earliest unreduced eligibility.

3. Annual rate of disablement assumptions:

Age	Rate
22	0.0%
27	0.10%
32	0.10%
37	0.10%
42	0.50%
47	0.50%
52	0.50%
57	0.50%
62	0.00%

4. Annual rate of other employment termination assumptions for all members:

Service	Rate
0-4	4.25%
4-7	3%
7-11	2%
11+	1%

5. Probability of electing a refund of member contributions upon termination assumptions:

Age at Termination	Non-vested	Vested
Under 35	100%	50%
35-39	100%	20%
40-44	100%	20%
45-49	100%	20%
50+	100%	-

H. Volunteer Firefighters' Compensation Act

1. Annual retirement rate assumptions:

Age	10-19 Years Service	20 Years service
<55	0%	0%
55-59	0%	40%
60-69	20%	40%
70+	100%	100%

All vested terminated members are assumed to retire when first eligible for an unreduced benefit.

2. Annual rate of other employment termination assumptions:

Service	Rate
0-6	30%
6-8	25%
8-9	21%
9-10	17%
10-26	13%
26+	10%

V. SYSTEM-SPECIFIC ACTUARIALLY EQUIVALENT AND ACTUARIAL COST FACTORS.

The Board adopts the following appended tables:

A. **Public Employees' Retirement System**

Early Retirement Factors

1. [TABLE](#): Actuarially Equivalent Early Retirement Factors for PERS members hired prior to July 1, 2007
2. [TABLE](#): Actuarially Equivalent Early Retirement for PERS members hired on or after July 1, 2007 and prior to July 1, 2013
3. [TABLE](#): Actuarially Equivalent Early Retirement Factors for PERS members hired on or after July 1, 2013

Actuarial Cost Service Purchase Factors

4. [TABLE](#): Actuarial Cost for Service Purchase for PERS members hired prior to July 1, 2011 and receiving 3% GABA
5. [TABLE](#): Actuarial Cost for Service Purchase for PERS members hired prior to July 1, 2011 and receiving 1.5% GABA
6. [TABLE](#): Actuarial Cost for Service Purchase for PERS members hired after July 1, 2011 and receiving 1.5% GABA
7. [TABLE](#): Actuarial Cost for Service Purchase for PERS members hired after July 1, 2011 and receiving 0%-1.5% GABA

Optional Service Retirement Benefit Factors

Option 2

8. [TABLE](#): PERS members hired prior to July 1, 2007
9. [TABLE](#): PERS members hired on or after July 1, 2007 and prior to July 1, 2013
10. [TABLE](#): PERS members hired on or after July 1, 2013

Option 3

11. [TABLE](#): PERS members hired prior to July 1, 2007
12. [TABLE](#): PERS members hired on or after July 1, 2007 and prior to July 1, 2013
13. [TABLE](#): PERS members hired on or after July 1, 2013

Option 4

14. [TABLE](#): PERS members hired prior to July 1, 2007
15. [TABLE](#): PERS members hired on or after July 1, 2007 and prior to July 1, 2013
16. [TABLE](#): PERS members hired after on or after July 1, 2013

Money Purchase Benefit

17. [TABLE](#): Money Purchase Factor Table for PERS members hired prior to July 1, 2007
18. [TABLE](#): Money Purchase Factor Table PERS members hired on or after July 1, 2007 and prior to July 1, 2013
19. [TABLE](#): Money Purchase Factor Table PERS members hired on or after July 1, 2013

Death Benefit Factors

Death Annuity

20. [TABLE](#): Optional Non-Increasing Death Annuity (No GABA)

Survivorship Benefit

21. [TABLE](#): Survivorship Benefit for PERS members hired prior to July 1, 2011 and receiving a 3% GABA
22. [TABLE](#): Survivorship Benefit for PERS members hired prior to July 1, 2011 and receiving a 1.5% GABA
23. [TABLE](#): Survivorship Benefit for PERS members hired on or after July 1, 2011 and receiving a 1.5% GABA
24. [TABLE](#): Survivorship Benefit for PERS members hired on or after July 1, 2011 and receiving a 0-1.5% GABA

B. Judges' Retirement System

Involuntary Retirement Factors

- 25. [TABLE](#): Actuarially Equivalent Factors for JRS members involuntarily removed from service after completing 5 years of membership service but before reaching normal retirement age or discontinued from service after completing 12 years of service credit but before reaching normal retirement age – 3% GABA
- 26. [TABLE](#): Actuarially Equivalent Factors for JRS members involuntarily removed from service after completing 5 years of membership service but before reaching normal retirement age or discontinued from service after completing 12 years of service credit but before reaching normal retirement age – NO GABA – 3.5% Salary Inflation

Actuarial Cost Service Purchase Factors

- 27. [TABLE](#): Actuarial Cost for Service Purchase for JRS members receiving 3% GABA; and
- 28. [TABLE](#): Actuarial Cost for Service Purchase for JRS members with no GABA Coverage – 3.5% Salary Inflation.

Optional Service Retirement Benefit Factors

Option 2

- 29. [TABLE](#): JRS members receiving 3% GABA; and
- 30. [TABLE](#): JRS members with no GABA Coverage – 3.5% Salary Inflation.

Option 3

- 31. [TABLE](#): JRS members receiving 3% GABA; and
- 32. [TABLE](#): JRS members with no GABA Coverage – 3.5% Salary Inflation.

Option 4

- 33. [TABLE](#): JRS members receiving 3% GABA; and
- 34. [TABLE](#): JRS members with no GABA Coverage – 3.5% Salary Inflation.

Non-duty related Disability Factors

- 35. [TABLE:](#) JRS members receiving 3% GABA; and
- 36. [TABLE:](#) JRS members with no GABA Coverage – 3.5% Salary Inflation.

Death Benefit Factors

- 37. [TABLE:](#) Death from Other than Employment Survivorship Benefit – GABA 3%
- 38. [TABLE:](#) Death from Other than Employment Survivorship Benefit – NO GABA – 3.5% Salary Inflation

C. Highway Patrol Officers’ Retirement System

Early Retirement Factors

- 39. [TABLE:](#) Actuarially Equivalent Early Retirement Factors For HPORS members hired prior to July 1, 2013
- 40. [TABLE:](#) Actuarially Equivalent Early Retirement Factors For HPORS members hired prior to July 1, 2013 and not electing GABA – 3.5% salary inflation
- 41. [TABLE:](#) Actuarially Equivalent Early Retirement Factors for HPORS members hired on or after July 1, 2013

Actuarial Cost Service Purchase Factors

- 42. [TABLE:](#) Actuarial Cost for Service Purchase for HPORS members hired prior to July 1, 2013
- 43. [TABLE:](#) Actuarial Cost for Service Purchase for HPORS members hired prior to July 1, 2013 and not electing GABA – 3.5% salary inflation
- 44. [TABLE:](#) Actuarial Cost for Service Purchases for HPORS members hired on or after July 1, 2013

Non-duty related Disability Factors

- 45. [TABLE:](#) HPORS members hired prior to July 1, 2013
- 46. [TABLE:](#) HPORS members hired prior to July 1, 2013 and not receiving GABA – 3.5% salary inflation

47. [TABLE](#): HPORS members hired on or after July 1, 2013

Non-Duty Death Survivorship Benefit Factors

48. [TABLE](#): HPORS members hired prior to July 1, 2013

49. [TABLE](#): HPORS members hired prior to July 1, 2013 and not receiving GABA – 3.5% salary inflation

50. [TABLE](#): HPORS members hired on or after July 1, 2013

D. Sheriffs' Retirement System

Early Retirement Factors

51. [TABLE](#): Actuarially Equivalent Early Retirement Factors for SRS members hired prior to July 1, 2007

52. [TABLE](#): Actuarially Equivalent Early Retirement Factors for SRS members hired on or after July 1, 2007

Actuarial Cost Service Purchase Factors

53. [TABLE](#): Actuarial Cost for Service Purchase for SRS members hired prior to July 1, 2007

54. [TABLE](#): Actuarial Cost for Service Purchase for SRS members hired on or after July 1, 2007 and prior to July 1, 2011

55. [TABLE](#): Actuarial Cost for Service Purchase for SRS members hired on or after July 1, 2011

Optional Service Retirement Benefit Factors

Option 2

56. [TABLE](#): SRS members hired prior to July 1, 2007

57. [TABLE](#): SRS members hired on or after July 1, 2007

Option 3

58. [TABLE](#): SRS members hired prior to July 1, 2007

59. [TABLE](#): SRS members hired on or after July 1, 2007

Option 4

60. [TABLE](#): SRS members hired prior to July 1, 2007

61. [TABLE](#): SRS members hired on or after July 1, 2007

Non-duty related Disability Factors

62. [TABLE](#): SRS members hired prior to July 1, 2007

63. [TABLE](#): SRS members hired on or after July 1, 2007

Death Benefit Factors

64. [TABLE](#): Death Before Retirement Benefit for SRS members hired prior to July 1, 2007

65. [TABLE](#): Death Before Retirement Benefit for SRS members hired on or after July 1, 2007

E. Game Wardens' and Peace Officers' Retirement System

Actuarial Cost Service Purchase Factors

66. [TABLE](#): Actuarial Cost for Service Purchase for GWPORS members hired prior to July 1, 2007

67. [TABLE](#): Actuarial Cost for Service Purchase for GWPORS members hired on or after July 1, 2007 and prior to July 1, 2011

68. [TABLE](#): Actuarial Cost for Service Purchase for GWPORS members hired on or after July 1, 2011

Optional Service Retirement Benefit Factors

Option 2

69. [TABLE](#): GWPORS members hired prior to July 1, 2007

70. [TABLE](#): GWPORS members hired on or after July 1, 2007

Option 3

- 71. [TABLE](#): GWPORS members hired prior to July 1, 2007
- 72. [TABLE](#): GWPORS members hired on or after July 1, 2007

Option 4

- 73. [TABLE](#): GWPORS members hired prior to July 1, 2007
- 74. [TABLE](#): GWPORS members hired on or after July 1, 2007

Non-Duty Related Disability Factors

- 75. [TABLE](#): GWPORS members hired prior to July 1, 2007
- 76. [TABLE](#): GWPORS members hired on or after July 1, 2007

Death Benefit Factors

- 77. [TABLE](#): Death Before Retirement Benefit of GWPORS members hired prior to July 1, 2007
- 78. [TABLE](#): Death Before Retirement Benefit of GWPORS members hired on or after July 1, 2007

F. Municipal Police Officers' Retirement System

Actuarial Cost Service Purchase Factors

- 79. [TABLE](#): Actuarial Cost for Service Purchase for MPORS members hired prior to July 1, 1997 and electing to be covered by GABA
- 80. [TABLE](#): Actuarial Cost for Service Purchase for MPORS members hired prior to July 1, 1997 and not receiving GABA – 3.5% salary inflation
- 81. [TABLE](#): Actuarial Cost for Service Purchase for MPORS members hired on or after July 1, 1997

G. Firefighters' Unified Retirement System

Actuarial Cost Service Purchase Factors

82. [TABLE](#): Actuarial Cost for Service Purchase for FURS members hired prior to July 1, 1997 and electing to be covered by GABA
83. [TABLE](#): Actuarial Cost for Service Purchase for FURS members hired prior to July 1, 1997 and not receiving GABA – 3.5% salary inflation
84. [TABLE](#): Actuarial Cost for Service Purchase for FURS members hired on or after July 1, 1997

VI. CROSS REFERENCE GUIDE

The following laws, rules or policies may contain provisions that pertain to the actuarial valuation assumptions relied on by the Board. The list should not be considered exhaustive - other policies may apply.

Article VIII, § 15, Montana Constitution
§ 19-2-403, MCA

VII. HISTORY

Board Admin 09 Actuarial Assumptions and Methods
Originally Approved February 14, 2008
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