



June 30, 2016

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Mr. Sam Watts  
Policy Development Analyst  
State of North Carolina  
Department of State Treasurer  
Retirement Systems Division  
3200 Atlantic Avenue  
Raleigh, NC 27604

## **Re: Additional Factors**

Dear Mr. Watts:

As discussed in our letter of June 10, we have prepared our recommendation for the factors to be used for converting the transferred balances of law enforcement officers from the Supplemental Retirement Income Plan of North Carolina (the 401(k) Plan) to the Teachers' and Employees' Retirement System (TSERS) or the Local Governmental Employees' Retirement System (LGERS). We have also prepared our recommendations for the factors used to determine the total annuity values for earnable allowances for service and disability retirements. Additionally, we have prepared our recommendations for the factors used to determine the amount of funds necessary to transfer between systems when a member transfers their service between systems and the full actuarial cost of service purchases in the North Carolina Firefighters' and Rescue Squad Workers' Pension Fund.

## **401KEE Factors**

The 401KEE factors should be applied to the portion of the transferred 401(k) balances attributable to employee contributions, including investments earnings on these employee contributions. The factors are based on an annual interest rate of 7.25%, an annual increase in post-retirement benefits of 4%, and the assumption that if the employee dies before receiving monthly benefits equal to the employee's transferred employee contributions, including investment earnings, the balance will be paid as a death benefit to the employee's beneficiaries. The factors are also based on the mortality tables described below, weighted based on the active law enforcement officer headcounts for the December 31, 2014 TSERS and LGERS valuations. In order to include the effects of generational mortality improvement using projection scale MP-2015 (as proposed in the experience study prepared as of December 31, 2014), the mortality rates are projected to the year 2034 such that the single life annuity using that year's rates is closest to the single life annuity produced by the valuation assumptions, which include fully generational mortality improvement and a discount rate of 7.25%.

Employee Group	Weight	Mortality Table
TSERS Law Enforcement Officers (male)	13%	RP-2014 mortality table for male retirees, rates projected to year 2034
TSERS Law Enforcement Officers (female)	1%	RP-2014 mortality table for female retirees, rates projected to year 2034
LGERS Law Enforcement Officers (male)	76%	RP-2014 mortality table for male retirees, rates multiplied by 104% for all ages, rates projected to year 2034
LGERS Law Enforcement Officers (female)	10%	RP-2014 mortality table for female retirees, rates multiplied by 104% for all ages, rates projected to year 2034

#### 401KER Factors

The 401KER factors should be applied to the portion of the transferred 401(k) balances attributable to employer contributions, including investments earnings on these employer contributions. The factors are based on an annual interest rate of 7.25% and an annual increase in post-retirement benefits of 4%. The factors are also based on the same mortality assumption as described above and used for the 401KEE factors.

#### Service and Disability Factors

The Service and Disability factors are used to determine the total annuity value for earnable allowances for service retirements and disability retirements, respectively. The factors are based on an annual interest rate of 7.25% and the mortality assumption used for the payment option factors described in our letter entitled "Payment Option Factors" dated June 30, 2016.

#### Transfer Reserve Factor Table

The transfer reserve factor tables are used to determine the amount of funds necessary to transfer between systems when a member transfers their service between systems. For the transfer reserve factors to be actuarially neutral, they should be based on the mortality and interest rate assumptions used in the valuation of the pension plans. The attached tables are based on an annual interest rate of 7.25% and are based on the mortality assumption used for the payment option factors described in our letter entitled "Payment Option Factors" dated June 30, 2016.

Finally, the factors also include an adjustment to account for the future increases in salary that the member will earn prior to their retirement. The salary adjustment is based on the weighted average of the salary increase assumptions used in the experience investigation prepared as of December 31, 2014 for TSERS and LGERS, and adopted by the Board of Trustees on January 21, 2016. The salary assumptions

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described above are identical to the assumptions used to determine the salary factors for the full actuarial cost factors in our letter entitled "Full Actuarial Cost Factors" dated June 30, 2016.

The table provided is based on the member's age at transfer. This is identical to the method for the current tables. In the future, more refined factors could be obtained by using a two-dimensional table based on the member's age at transfer and the member's age at earliest retirement eligibility.

### Fire and Rescue FAC Multipliers

The Fire and Rescue FAC Multipliers are used to determine the full actuarial cost of service purchases in the North Carolina Firefighters' and Rescue Squad Workers' Pension Fund as described in G.S. 58-86-45(a1). For these service purchases to be actuarially neutral, they should be based on the accrual rate and the mortality and interest rate assumptions used in the valuation of the Firefighters' and Rescue Squad Workers' Pension Fund. The attached tables are based on an annual interest rate of 7.25% and mortality based on 15% RP-2014 for female healthy retirees and 85% RP-2014 for male healthy retirees. In order to include the effects of generational mortality improvement using projection scale MP-2015 (as proposed in the experience study prepared as of December 31, 2014), the mortality rates are projected to a future year such that the single life annuity using that year's rates is closest to the single life annuity produced by the valuation assumptions, which include fully generational mortality improvement and a discount rate of 7.25%.

The table provided is based on the member's age at the time of service purchase. The "Cost per Year" column provides the cost for each year of service purchased. Similarly, the "Cost per Month" column provides the cost for each month of service purchased. Finally, the "Maximum Cost" column provides the maximum total cost of any service purchase.

The undersigned are Members of the American Academy of Actuaries and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

If you have any questions or need additional assistance, please let us know.

Very truly yours,

A handwritten signature in blue ink that reads "Michael A. Ribble".

Michael A. Ribble, FSA, EA, MAAA  
Principal, Consulting Actuary

A handwritten signature in blue ink that reads "Larry Langer".

Larry Langer, ASA, EA, MAAA  
Principal, Consulting Actuary

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**North Carolina Retirement Systems**

**Administration Factors based on Experience Study at December 31, 2014**

**Annuity Factors**

Age	Service	Disability	401KEE	401KER
30	13.8932	12.7377	25.9217	25.8697
31	13.8642	12.6741	25.7238	25.6694
32	13.8334	12.6085	25.5203	25.4630
33	13.8005	12.5407	25.3114	25.2504
34	13.7653	12.4706	25.0978	25.0314
35	13.7278	12.3980	24.8794	24.8059
36	13.6878	12.3225	24.6427	24.5736
37	13.6449	12.2435	24.4126	24.3342
38	13.5992	12.1608	24.1777	24.0876
39	13.5502	12.0743	23.9380	23.8334
40	13.4979	11.9844	23.6938	23.5715
41	13.4420	11.8916	23.4452	23.3019
42	13.3824	11.7966	23.1923	23.0244
43	13.3189	11.7006	22.9354	22.7388
44	13.2512	11.6049	22.6388	22.4453
45	13.1792	11.5112	22.3701	22.1436
46	13.1027	11.4212	22.0977	21.8339
47	13.0214	11.3296	21.8218	21.5159
48	12.9351	11.2359	21.5428	21.1897
49	12.8434	11.1401	21.2608	20.8552
50	12.7462	11.0422	20.9143	20.5121
51	12.6574	10.9425	20.6307	20.1973
52	12.5641	10.8411	20.3435	19.8768
53	12.4659	10.7380	20.0527	19.5507
54	12.3628	10.6332	19.7585	19.2191
55	12.2544	10.5265	19.3802	18.8821
56	12.1406	10.4175	19.0739	18.5395
57	12.0210	10.3056	18.7645	18.1914
58	11.8952	10.1902	18.4521	17.8375
59	11.7630	10.0703	18.1371	17.4776
60	11.6238	9.9454	17.7138	17.1115
61	11.4775	9.8147	17.3865	16.7391
62	11.3239	9.6778	17.0572	16.3601
63	11.1627	9.5343	16.7264	15.9746
64	10.9935	9.3840	16.2641	15.5827
65	10.8160	9.2268	15.9219	15.1845
66	10.6299	9.0628	15.5797	14.7802
67	10.4348	8.8920	15.2385	14.3701
68	10.2305	8.7146	14.7354	13.9545
69	10.0167	8.5309	14.3849	13.5339
70	9.7932	8.3413	14.0377	13.1088
71	9.5597	8.1459	13.6950	12.6797
72	9.3160	7.9454	13.1503	12.2470
73	9.0619	7.7401	12.8018	11.8115
74	8.7971	7.5307	12.4607	11.3736
75	8.5214	7.3175	11.8866	10.9341
76	8.2347	7.1013	11.5424	10.4937
77	7.9365	6.8825	11.2091	10.0532
78	7.6268	6.6618	10.8886	9.6138
79	7.3504	6.4399	10.2740	9.1765
80	7.0697	6.2173	9.9554	8.7425
81	6.7857	5.9947	9.6533	8.3130
82	6.4992	5.7725	9.0139	7.8894
83	6.2115	5.5514	8.7171	7.4730
84	5.9235	5.3318	8.4403	7.0653
85	5.6366	5.1142	7.7811	6.6674
86	5.3518	4.8991	7.5124	6.2808
87	5.0710	4.6873	7.2662	5.9071
88	4.7958	4.4795	6.5954	5.5481
89	4.5277	4.2763	6.3589	5.2049
90	4.2685	4.0784	6.1452	4.8796
91	4.0201	3.8868	5.9535	4.5739
92	3.7834	3.7015	5.2716	4.2879
93	3.5580	3.5226	5.0860	4.0202
94	3.3433	3.3495	4.9185	3.7688
95	3.1376	3.1816	4.7681	3.5310

North Carolina Retirement Systems  
Administration Factors based on Experience Study at December 31, 2014  
Transfer Reserve Factors

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Age	Males	Females
15	5.9854	6.1711
16	6.2020	6.3941
17	5.8988	6.1075
18	5.8513	6.0725
19	6.0634	6.2919
20	6.0111	6.2533
21	5.9554	6.2120
22	5.8961	6.1681
23	5.6378	5.9161
24	5.8429	6.1300
25	5.5977	5.8919
26	5.8013	6.1050
27	5.5682	5.8800
28	5.7705	6.0927
29	5.5488	5.8803
30	5.7505	6.0931
31	5.8198	6.1657
32	5.7408	6.1059
33	5.8251	6.1947
34	6.0361	6.4182
35	5.8362	6.2312
36	6.0478	6.4562
37	6.1590	6.5740
38	6.0650	6.5017
39	6.1878	6.6324
40	6.4116	6.8714
41	6.2220	6.6986
42	6.4473	6.9402
43	6.5978	7.1013
44	6.4849	7.0130
45	6.7204	7.2665
46	6.8876	7.4459
47	7.1360	7.7129
48	6.9421	7.5403
49	7.1937	7.8116
50	7.4522	8.0898
51	7.7313	8.3814
52	7.5453	8.2117
53	7.8319	8.5094
54	7.6938	8.3915
55	7.9852	8.6915
56	8.2840	8.9967
57	8.1345	8.8658
58	8.4389	9.1736
59	8.7249	9.4577
60	9.0641	9.7959
61	8.9007	9.6488
62	9.2178	9.9590
63	9.5406	10.2715
64	9.3664	10.1134
65	9.6921	10.4241
66	9.5093	10.2568
67	9.3185	10.0810
68	9.1018	9.8773
69	8.8948	9.6838
70	8.6962	9.4991
71	8.4556	9.2679
72	8.2233	9.0448
73	7.9978	8.8282
74	7.7627	8.5999
75	7.5034	8.3434
76	7.2073	8.0444
77	6.9713	7.8107
78	6.6462	7.4749
79	6.4216	7.2622
80	4.2429	5.1451

North Carolina Retirement Systems  
Administration Factors based on Experience Study at December 31, 2014  
Fire and Rescue FAC Multipliers

Age	Cost per Year Purchased	Cost per Month Purchased	Max Cost
15	72.09	6.01	1,441.80
16	77.33	6.44	1,546.60
17	82.95	6.91	1,659.00
18	88.98	7.42	1,779.60
19	95.44	7.95	1,908.80
20	102.39	8.53	2,047.80
21	109.84	9.15	2,196.80
22	117.83	9.82	2,356.60
23	126.41	10.53	2,528.20
24	135.62	11.30	2,712.40
25	145.50	12.13	2,910.00
26	156.09	13.01	3,121.80
27	167.46	13.96	3,349.20
28	179.65	14.97	3,593.00
29	192.73	16.06	3,854.60
30	206.77	17.23	4,135.40
31	221.83	18.49	4,436.60
32	237.98	19.83	4,759.60
33	255.32	21.28	5,106.40
34	273.93	22.83	5,478.60
35	293.89	24.49	5,877.80
36	315.31	26.28	6,306.20
37	338.30	28.19	6,766.00
38	362.97	30.25	7,259.40
39	389.45	32.45	7,789.00
40	417.86	34.82	8,357.20
41	448.35	37.36	8,967.00
42	481.09	40.09	9,621.80
43	516.23	43.02	10,324.60
44	553.96	46.16	11,079.20
45	594.48	49.54	11,889.60
46	638.01	53.17	12,760.20
47	684.78	57.07	13,695.60
48	735.04	61.25	14,700.80
49	789.07	65.76	15,781.40
50	847.17	70.60	16,943.40
51	911.16	75.93	18,223.20
52	980.23	81.69	19,604.60
53	1,054.81	87.90	21,096.20
54	1,135.38	94.62	22,707.60
55	1,222.48	101.87	24,449.60
56	1,210.42	100.87	24,208.40
57	1,197.87	99.82	23,957.40
58	1,184.78	98.73	23,695.60
59	1,171.12	97.59	23,422.40
60	1,156.86	96.41	23,137.20
61	1,141.96	95.16	22,839.20
62	1,126.39	93.87	22,527.80
63	1,110.12	92.51	22,202.40
64	1,093.13	91.09	21,862.60
65	1,075.41	89.62	21,508.20
66	1,056.93	88.08	21,138.60
67	1,037.68	86.47	20,753.60
68	1,017.66	84.81	20,353.20
69	996.87	83.07	19,937.40
70	975.30	81.28	19,506.00
71	952.98	79.42	19,059.60
72	929.90	77.49	18,598.00
73	906.08	75.51	18,121.60
74	881.54	73.46	17,630.80
75	856.29	71.36	17,125.80
76	830.39	69.20	16,607.80
77	803.85	66.99	16,077.00
78	776.76	64.73	15,535.20
79	749.16	62.43	14,983.20
80	721.16	60.10	14,423.20