MOCKENHAUPT
BENEFITS GROUP

ACTUARIAL VALUATION REPORT

for the

City of Pittsburgh

Firemen's Relief and Pension Fund

as of

January 1, 2015

Report Date: March 30, 2016

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Section One: Commentary and Actuarial Disclosures

At the request of the City of Pittsburgh, we have completed an actuarial valuation report for the City of Pittsburgh Firemen's Relief and Pension Fund as of January 1, 2015. This AVR is based upon participant data as of January 1, 2015 furnished to us by the City and upon asset information as of December 31, 2014 as provided by the City, Maher Duessel, CPAs and Gleason & Associates, PC.

Unless otherwise noted herein, this report has been completed in accordance with generally accepted actuarial principles and practices, and reflects our current understanding of applicable laws and regulatory requirements. This valuation was prepared to satisfy the funding and disclosure requirements of Act 205 of 1984. It also contains the cost components that may be used to compute the Plan's Minimum Municipal Obligation (MMO) in accordance with that law. The funded status measures in this AVR are not intended to be appropriate for assessing the sufficiency of plan assets to cover the estimated cost of settling the plan's benefit obligations. This valuation should be used for no other purpose than those outlined herein.

Future actuarial measurements may differ significantly from the current measurements presented in this report due to factors such as the following: plan experience differing from that anticipated by the economic or demographic assumptions; changes in economic or demographic assumptions; increases or decreases expected as part of the natural operation of the methodology used for these measurements (such as the end of an amortization period); and changes in plan provisions or applicable law.

One of the cost components of the Minimum Municipal Obligation is an amortization payment calculated according to specified rules of Act 205. The minimum amortization under Act 205 reflects the utilization of provisions of Act 82 of 1998 for which the City qualified. Under those provisions, the Unfunded Actuarial Accrued Liability as of January 1, 1998 is being amortized over 40 years calculated pursuant to special procedures described beginning on page 6. Bases for subsequent years are established according to the normal procedures of Act 205 of 1984 and amortized over various periods according to the source of the change in unfunded liability such as experience gains or losses, benefit changes, and assumption changes. These periods are not limited by average future service because the City qualifies for Distress Level II according to the requirements under Act 205 of 1984.

Because the Act 82 amortization methodology does not result in an actuarially appropriate funding level, this report also presents an actuarially recommended amortization payment based on a 30-year "fresh start" amortization payment commencing as of January 1, 2011 and additional amortization bases added thereafter according to the normal procedures of Act 205 of 1984. (See page 6 for additional information.)

The City's pension plan assets are aggregated into a single trust. An annual calculation is made to determine each Plan's portion of the assets. The receipts and disbursements for each Plan are added to the Plan's allocated value from the prior year. Then, the year's investment income is allocated proportionately to each Plan in accordance with procedures set forth in Act 205. As of December 31, 2014 the calculated market value of assets in the Firemen's Relief and Pension Fund is $220,913,824. Section Nine contains exhibits illustrating the calculation of this amount.

Section Nine also shows the development of the actuarial value of assets, which is determined by using the optional alternative asset smoothing method established in Act 44 of 2009. This method sets the actuarial value of assets equal to the greater of the prior asset value (adjusted for contributions and disbursements) increased at the actuarial assumed rate of interest less 1% and market value. This gives results that are biased relative to the market value. Due to this bias, this method does not comply with actuarial standards of practice. However, by the passage of Act 44 of 2009, this method is allowable for the determination of the Minimum Municipal Obligation. We have treated this method as a prescribed method selected by the Plan Sponsor. As of January 1, 2015, the actuarial value of assets is 103.3% of the market value of assets.

The City Controller obtained third-party advice from which he determined that the dedicated stream of revenue created by Ordinances 42 and 44 of 2010 can be recognized as a pension plan asset for purposes of the required actuarial report under Act 205 and the Board of Trustees of the Comprehensive Municipal Pension Trust Fund has unanimously directed us to combine the assets listed in the CAFR with the value of the revenue stream as determined by an independent accounting firm, Gleason & Associates. The value so provided is consistent with Paragraph 3.5 (Assets that are Difficult to Value) of ASOP 44, Selection and Use of Asset Valuation Methods for Pension Valuations. The Public Employee Retirement Commission (PERC) has accepted the Revised Actuarial Valuation Report as of January 1, 2011 and subsequent Actuarial Valuation Reports which included the present value of the revenue stream as a pension plan asset for Act 205 actuarial valuation purposes. The inclusion of the present value of this stream of dedicated future parking revenues does not imply that it necessarily qualifies as a pension plan asset under GAS accounting or for any other purpose.

2015 Results

Certain highlights of this actuarial valuation compared with the prior valuation are shown in Section Three. The use of pension bond proceeds to reduce the Unfunded Actuarial Accrued Liability has split the funding of the pension plan into actuarial costs and debt service. The actuarial costs consist of normal cost, administrative expense contributions and amortization payments to eliminate the remainder of the

Unfunded Actuarial Accrued Liability. The actuarial information used to develop contribution requirements according to the rules of Act 205 is shown in Section Five. Debt service payments repay the money borrowed and subsequently deposited into the plan. Information concerning the annual debt service is contained in Section Ten. The demographics of the Plan population are summarized in Section Eight.

The actuarial cost components as of January 1, 2015 compared to the prior year are as follows:

	Current Year 2015	Prior Year 2013
Normal Cost as a Percentage of Total W-2 Payroll	14.127%	14.256%
Expenses as a Percentage of Total W-2 Payroll	1.200%	1.200%
Minimum Amortization Payment	$14,255,417	$11,224,426
Actuarially Recommended Amortization Payment	$16,446,682	$14,829,383

The change in actuarial costs from valuation to valuation can be affected by changes in Plan provisions, assumption changes, and experience changes. Pension bonds were issued in March 1998. The debt service payment for 2015 is approximately $7.74 million.

The approximately $3 million increase in the amortization payment is the result of $1.9 million of experience gain payments (which reduce the total) expiring and a new experience loss payment of $1.1 million (explained in Experience Changes below) being added.

Assumption Changes

No assumption changes were made for this actuarial valuation. Act 205 requires that the City have an experience study prepared every four years. The last experience study was done in conjunction with the January 1, 2013 actuarial valuation. The purpose of the experience study is to compare the plan's actual experience with the valuation assumptions. This comparison can indicate that actuarial assumptions should be changed as was the case with the mortality assumption beginning in 2013. A summary of the actuarial assumptions used for this valuation can be found in Section Seven.

Benefit Changes

There were no benefit changes during the period from January 1, 2013 through January 1, 2015. The benefits provided are summarized in Section Four of this report.

Experience Changes

Plan experience during the year affects the Plan cost for the following year. Both the normal cost and the amortization payment can change.

Normal cost is the portion of the cost for active members allocated to the current year by the actuarial cost method. Unless Plan provisions or assumptions change, normal cost usually remains fairly stable, changing only moderately from year to year. The changes that do occur relate to changes in the age and service distribution of the participant group.

Generally, experience changes affect the current year's actuarial experience gain or loss to a greater degree than they affect normal cost. Since foresight can never be perfect, actuarial assumptions will not perfectly match the experience that actually develops from year to year. The determination and amortization of actuarial experience gains and losses provide the mechanism for correcting these gains and losses and maintaining the Plan's funding on a sound basis.

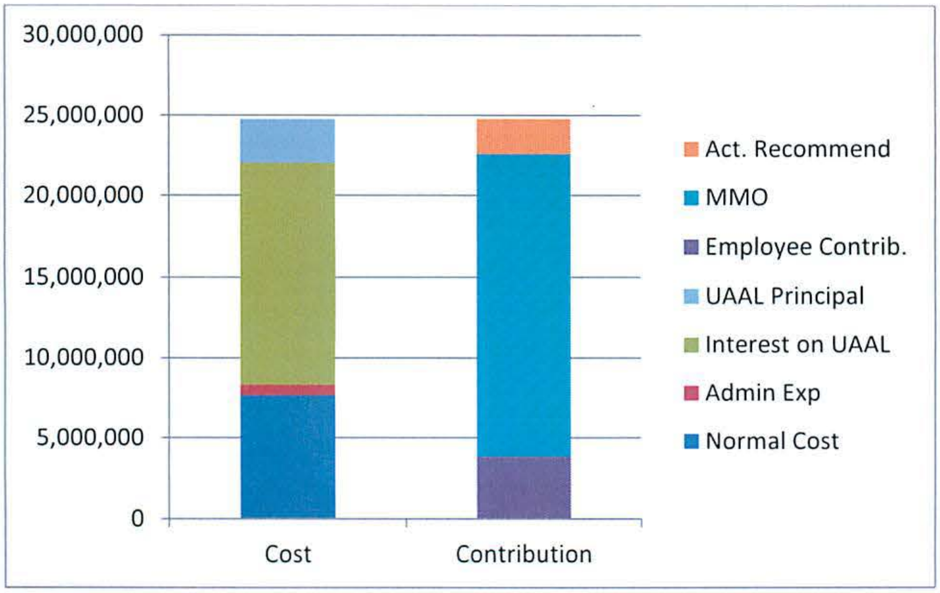
The actuarial experience gain or loss computed in the current valuation reflects differences since the prior valuation between actual experience and the experience anticipated by the actuarial assumptions. For bases established in 2009 and later, Act 205 requires the amortization of experience gains or losses over a 20-year period. An experience gain will reduce the total amortization payment and an experience loss will increase the payment.

Table 2 shows the development of the experience gain/loss under the minimum funding rules of Act 205 utilizing the methodology prescribed under Act 82 of 1998 (described later in this Section). Table 2b shows the development of the same unfunded actuarial accrued liability without regard to Act 82 of 1998.

For 2015, a new experience loss base of $12,132,298 has been established under the minimum funding rules of Act 205; a new experience loss base of $17,724,101 was established for the actuarially recommended contribution. The primary components of the experience gain/loss are as follows:

There was a loss of $4,524,964 due to return on the actuarial value of assets (AVA) that was less than the assumed 7.5% annual rate (under the Act 44 of 2009 smoothing method interest is credited on the AVA each year at a rate that is one percent less than the assumed interest rate of the plan). There was a very small demographic experience gain. The primary source of the demographic gain was salary increases that were, on average, less than the assumed 5.75% annual rate. The largest source of the experience loss was contributions that were less than required when not taking into account Act 82 (under the actuarially required contribution) and losses generated by the Act 82 amortization calculation when taking that calculation into account. A contribution loss occurs due to the advance budgeting process of Act 205 when costs increase from valuation to valuation and recognition of that increase is delayed. The City contributed more than the MMO in both 2013 and 2014.

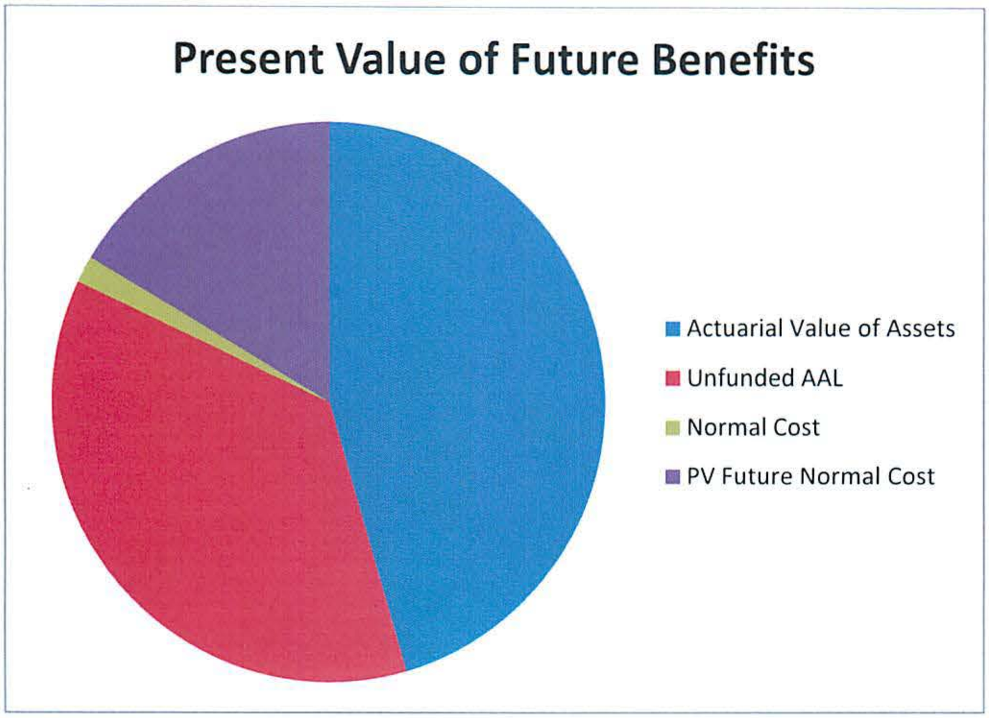
The following chart shows the annual cost components of the plan (normal cost, administrative expenses, interest on the unfunded actuarial accrued liability and principal on the unfunded actuarial accrued liability) compared to the annual contribution requirements. As you can see, the majority of the plan funding is going towards interest on the unfunded liability.



Funded Ratios

A measure of comparison between valuations is the plan's funded ratio, the actuarial value of assets divided by the actuarial accrued liability. This ratio is currently 55.5% (refer to Table 1). As of January 1, 2013, the corresponding ratio was 56.7% so the current valuation shows a decrease of 1.2%. The funded ratio based on the market value of assets is 53.8%.

The following chart shows the present value of all future benefits expected to be paid from the plan for all current participants. The area in blue represents the portion covered by the actuarial value of assets. The areas in blue and red represent the portion of benefits that are considered accrued under the actuarial cost method. The green portion represents the normal cost, or portion to be accrued in the current year. The purple section is the portion of benefits current participants are expected to accrue in the future. As you can see, this is a very mature plan.



Act 82 of 1998

Act 82 of 1998 has a significant impact on the minimum funding requirements. We believe that the procedure for determining amortization amounts in accordance with Act 82 no longer produces an actuarially appropriate funding level. The adoption of a funding policy based on the alternative Actuarially Recommended Amortization Payment in this report is highly recommended.

Act 82 allowed the City to change the minimum funding amortization schedule for its Unfunded Actuarial Accrued Liability because pension bond proceeds were deposited by the City into the pension plan during 1998 that changed the ratio of the Actuarial Value of Assets to the Actuarial Accrued Liability by more than 25 percent. Act 82 allowed the City to amortize the January 1, 1998 Unfunded Actuarial Accrued Liability, reduced by pension bond proceeds deposited during 1998, over a 40-year period using a special procedure that was mechanically complex but lowered the amortization payment from what it otherwise would have been. The annual amortization payment was calculated in several steps. An amortization payment was calculated that would eliminate the Unfunded Actuarial Accrued Liability net of 1998 bond proceeds over a 40-year period using a statutory interest rate of 8.75 percent. Next, the future value of these payments at the end of the 40-year period was calculated using 8.75 percent interest. Finally, an amortization payment was calculated using 10 percent interest that would have the same future value at the end of the 40-year period as the previous calculation. The 10 percent amortization amount became the amortization payment starting in 1998.

There are several drawbacks to this approach in the long-term. Under the Act 82 amortization schedule, the outstanding balance of Unfunded Actuarial Accrued Liability for the affected 1998 base actually grows for several years, extending the funding of obligations beyond normal payment periods. For example, the Unfunded Actuarial Accrued Liability for this special base has increased from $73,627,561 as of January 1, 1998 to $113,175,103 as of January 1, 2015 and doesn't start to decline until during the year 2024. Therefore, this amortization method does not maintain normal generational funding objectives.

Act 82 requires that valuations include a comparative interest rate tabulation. This annual tabulation compares the balance of the accumulated Act 82 amortization payments using the actual earnings of the fund during the year with the balance assuming a 10 percent rate of return. If the fund earns more than 10 percent during the year, there will be an experience gain. If the fund earns less than 10 percent, there will be an experience loss on the comparative interest rate balance. When this legislation was enacted in 1998, investment conditions were different, and an average 10 percent rate of return on a significant block of assets no longer seems reasonable. This balance grows over time and the losses from this source will tend to grow significantly. In fact, because benefits are being paid out as contributions are coming in, the comparative interest rate balance, which isn't adjusted for benefit payments, is now larger than the total market value of assets. This will likely lead to significant experience losses, an increasing pattern of amortization payments and a funding ratio which will still be well below 100% at the end of the 40-year period due to remaining balances on these losses.

By contrast, funding the plan on the basis of the actuarially recommended amortization payment is expected to result in a more level amortization schedule, that will result in higher contributions now but ultimately lower contributions, and will likely lead to a funding ratio much closer to 100% by the fixed target year.

Sensitivity Analysis

The actual costs of the plan will be determined by the experience of the plan over time. The present value of the projected liabilities shown in this (or any other) valuation of the plan are dependent upon the assumptions utilized. The assumed interest rate and assumed rates of retirement are two assumptions that have a significant impact on the expected costs of the plan. To highlight the effect of these assumptions on the calculated liabilities of the plan, we have included a sensitivity analysis at the end of Section Five.

Section Two: Certification

In the actuary's opinion, the actuarial assumptions used in the valuation are reasonably related to the experience of the Plan and to reasonable expectations. They represent the actuary's best estimate of anticipated experience under the Plan. To the best of our knowledge, the report is complete and accurate, based on the data outlined herein and the disclosures in Section One.

We will be happy to answer any questions concerning this report and provide further information as needed.

MOCKENHAUPT BENEFITS GROUP

I, David H. Stimpson, am a member of the American Academy of Actuaries and I meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Prepared and Certified by:

David H. Stimpson, E.A., F.C.A., M.A.A.A.
Vice President of Actuarial Services

Section Three: Valuation Highlights

Participant Count	**01/01/15**	**01/01/13**	**Change**
Total Active	611	584	27
Vested	161	148	13
Not Vested	450	436	14
Total In Payment Status	1,100	1,111	(11)
Retirement Benefits	553	555	(2)
Disability Benefits	234	230	4
Survivor Benefits	313	326	(13)
Deferred		1	(1)
Total	**1,711**	**1,696**	**15**

Average Monthly Benefit

In Payment Status			
Retirement Benefits	$ 3,051	$ 2,900	$ 151
Disability Benefits	$ 2,451	$ 2,274	$ 177
Survivor Benefits	$ 785	$ 726	$ 59
Deferred	$ 0	$ 3,551	$ (3,551)

Active Participant Averages

Hire Age	30.1	29.8	0.3
Attained Age	45.3	46.1	(0.8)
Normal Retirement Age	53.6	56.5	(2.9)
Assumed Future Service	17.0	16.0	1
Monthly Compensation	$7,327	$7,353	$(26)

Financial Data

Market Value of Assets	$220,913,824	$199,706,235	$21,207,589
Accumulated Employee Contributions	$38,893,264	$36,944,365	$1,948,899

Cost Components

Normal Cost as a percentage of total payroll	14.127%	14.256%	-0.129%
Expenses as a percentage of total payroll	1.200%	1.200%	0.000%
Total	15.327%	15.456%	-0.129%
Minimum Amortization Payment	$14,255,417	$11,224,426	$3,030,991
Actuarially Recommended Amortization Payment	$16,446,682	$14,829,383	$1,617,299

Section Four: Summary of Plan Provisions

Plan Year	Twelve-month period beginning January 1 and ending December 31
Plan Established	May 25, 1933
Principal Definitions	
Employee	Any uniformed employee of the City of Pittsburgh Bureau of Fire
Retirement Benefit Commencement Date	Assumed to be the first day of the month coincident with or next following eligibility for and election to retire
Service Increment	Additional monthly benefit of $20 for each completed year of service in excess of 20 years, excluding years of service after age 65 For members hired on or after January 1, 2005: Additional monthly benefit of $10 for each completed year of service in excess of 20 years, excluding years of service after age 65 (Payable only after age 50)
Service	Completed years of service calculated from date of hire through date of retirement or severance, plus periods of service purchased
Normal Form of Payment	Monthly pension benefit payable for life
Participation Requirements	
Entry Date	Date of hire
Compensation	Total wages excluding sick buyback and Dependent Partner Benefit pay. For members hired on or after January 1, 2005: total wages excluding longevity, sick buyback and Dependent Partner Benefit pay.
Average Compensation	Compensation averaged over the 36-month period prior to retirement or severance or any three calendar years, whichever produces the greatest average
Normal Retirement	
Eligibility	Later of age 50 or completion of 20 years of service
Members hired before January 1, 1976	Completion of 20 years of service
Monthly Benefit	Equal to 50% of average compensation plus service increment, if any
Late Retirement	
Eligibility	Employment beyond normal retirement
Amount of Benefit	Normal retirement benefit based upon average compensation as calculated at actual retirement

Disability

Eligibility

- Permanent disablement in line of duty *or*
- Permanent disablement (not in line of duty) after completing 10 years of service

Benefit Amount

- 50% of Average Compensation

Benefit Commencement Date

- First day of calendar month following determination of disablement *and*
- Continuing for the duration of disability prior to normal retirement date and life thereafter

Vesting

- If member completed 20 years of service, may collect normal retirement benefit based on average compensation at termination (providing terminated member continues contributions at rate in effect at termination)
- Benefit deferred to age 50

Death Benefits

Accidental Death

- Benefit plus return of member's accumulated contributions
- Benefit is equal to 50% of member's wages at death
- Payable for 500 weeks or until surviving spouse dies or remarries
- If no surviving spouse or unmarried children, dependent parents receive payments

- *Children Benefits*
  (No surviving spouse/ or discontinued payment to surviving spouse)

- Unmarried child under age 18 receives payments equal to 25% of payments to spouse
- Total payments to one family may not exceed 50% of member's wages at time of death
- $60 minimum monthly payment if only one child
- If maximum amount payable, divide equally among entitled children
- Payments terminate when child reaches age 18, dies, marries
- Payments may continue indefinitely to incompetent child

Death Prior to Retirement
Active service/ not accidental

- If so elected, spouse paid benefit equal to 50% of pension member would have received if retired on date of death
- No election, accumulated contributions without interest paid to beneficiary or estate

Death After Retirement

- If so elected, spouse paid benefit equal to 50% of pension member was receiving
- No surviving spouse, benefit may be paid to surviving children or dependent parents

Lump Sum Benefit

- Lump sum of $1,200 to beneficiary of any deceased member

Employee Contributions

- 6.5 percent of compensation plus $1 per month
- $1 per month ceases at age 65
- If surviving spouse benefit elected, add 1/2 percent of compensation

Section Five: Development of Contribution Requirements

Table 1: Normal Cost and Actuarial Accrued Liability

Normal Cost

Retirement Benefits	$5,207,806
Disability Benefits	2,167,462
Preretirement Death Benefits	171,774
Postretirement Death Benefits	2,528
Refunds of Contributions	98,238
Vested Withdrawal Benefits	25,749
Total	**$7,673,557**

Actuarial Accrued Liability

Actuarial Present Value of Benefits at Attained Age

	Deferred	In Payment	Active	All
Retirement Benefits	$0	$188,725,291	$173,915,107	$362,640,398
Disability Benefits	0	64,536,932	48,126,281	112,663,213
Survivor Benefits	0	21,289,732	0	21,289,732
Preretirement Death Benefits	0	0	2,733,913	2,733,913
Postretirement Death Benefits	0	0	76,360	76,360
Refunds of Contributions	0	0	940,558	940,558
Vested Withdrawal Benefits	0	0	497,829	497,829
Total	**$0**	**$274,551,955**	**$226,290,048**	**$500,842,003**

Actuarial Present Value of Future Normal Costs	**($90,123,250)**
Actuarial Accrued Liability	**$410,718,753**

Unfunded Actuarial Accrued Liability

Actuarial Accrued Liability	$410,718,753
Actuarial Value of Assets	(228,146,021)
Unfunded Actuarial Accrued Liability	**$182,572,732** *
Funded Ratio	**55.5%** *

* The unfunded actuarial accrued liability based on the market value of assets is $189,804,929 and the funded ratio based on the market value of assets is 53.8%

Table 2: Actuarial Experience (Gain) Loss Determination

Reconciliation of Funded Status

	2013	2014	
Unfunded Actuarial Accrued Liability as of January 1, 2013			$171,273,055
Normal Cost Assumed	$7,466,493	$7,805,774	15,272,267
Administrative Expenses Assumed	628,503	664,642	1,293,145
Interest Charged at Valuation Rate			28,549,434
Contributions Made			
- Municipality	$6,770,482	$7,593,100	
- State Aid Allocated	6,686,690	6,839,897	
- Employees	4,001,491	3,824,343	$(35,716,003)
Interest Credited at Valuation Rate			(2,728,487)
Special Adjustment Because of Higher Act 82 Interest Rate			(8,578,833)
Expected Unfunded Actuarial Accrued Liability Before Adjustments			$169,364,578
Experience from Investment Return			
- Comparative Interest Rate Amortization Tab. (Gain) Loss		$(4,718,474)	
- Other Investment Return (Gain) Loss		17,822,270	13,103,796
Experience (Gain) Loss from all Other Sources			104,358
Increase (Decrease) in Unfunded Actuarial Accrued Liability			
- Benefit Modifications for Actives		$ 0	
- Benefit Modifications for Retirees		0	
- Change in Actuarial Assumptions		0	0
Actual Unfunded Actuarial Accrued Liability			$182,572,732

Loss (Gain) to be Amortized

Experience (Gain) Loss from January 1, 2013		$13,208,154
Actuarially Required Contributions and Bond Proceeds with Interest	$37,368,634	
Actual Contributions with Interest	(38,444,490)	
Contribution (Gain) Loss		(1,075,856)
Loss (Gain) to be Amortized		$12,132,298

Comparative Interest Rate Amortization Tabulation

Balance Calculated Using Actual Investment Return	2013	2014	
Act 82 Amortization Balance at January 1	$151,446,098	$176,965,345	
Act 82 Amortization Payment	4,333,255	4,333,255	
Comparative Interest Rate Balance at January 1	$155,779,353	$181,298,600	
Actual Investment Return on Balance	21,185,992	16,679,471	
Actual Act 82 Amort. Balance at December 31	$176,965,345	$197,978,071	$197,978,071

Balance Calculated Using 10 Percent Investment Return	2013	2014	
Comparative Interest Rate Balance at January 1	155,779,353	$175,690,543	
Interest at 10 Percent	15,577,935	17,569,054	
Comparative Act 82 Amort. Bal. at December 31	$171,357,288	$193,259,597	$193,259,597

Comparative Interest Rate Amortization Tabulation (Gain) Loss $(4,718,474)

Table 2b: Analysis of Change in Unfunded Actuarial Accrued Liability

Reconciliation of Funded Status – Without Regard to Act 82

	2013	2014	
Unfunded Actuarial Accrued Liability as of January 1, 2013			$171,273,055
Normal Cost Assumed	$7,466,493	$7,805,774	15,272,267
Administrative Expenses Assumed	628,503	664,642	1,293,145
Interest Charged at Valuation Rate			28,549,434
Contributions Made			
- Municipality	$6,770,482	$7,593,100	
- State Aid Allocated	6,686,690	6,839,897	
- Employees	4,001,491	3,824,343	
			(35,716,003)
Interest Credited at Valuation Rate			(2,503,699)
Expected Unfunded Actuarial Accrued Liability Before Adjustments			$178,168,199
Change in Unfunded Actuarial Accrued Liability due to			
Experience Loss (Gain)			
- from Investment Return		$4,524,964	
- from all Other Sources		(120,431)	4,404,533
Benefit Modifications for Actives			0
Benefit Modifications for Retirees			0
Change in Actuarial Assumptions			0
Actual Unfunded Actuarial Accrued Liability			$182,572,732

Loss (Gain) to be Amortized

Experience (Gain) Loss from January 1, 2013		$4,404,533
Actuarially Required Contributions with Interest	$51,539,270	
Actual Contributions with Interest	(38,219,702)	
Contribution (Gain) Loss		13,319,568
Loss (Gain) to be Amortized		$17,724,101

Table 3: Amortization of Unfunded Actuarial Accrued Liability

Source	Original Amount	Year Est.	Target Year	Remaining Balance	Remaining Payments	Annual Amount
Initial	$73,627,561	1998	2037	$113,175,103	23	$4,333,255
Assumption Change	$ (2,712,163)	1998	2017	$ (728,388)	3	$ (260,551)
Experience Loss	14,852,702	2001	2015	1,633,868	1	1,633,868
Experience Loss	1,151,699	2002	2016	243,175	2	125,982
Investment Loss	18,857,549	2002	2032	15,242,746	18	1,460,878
Assumption Change	(17,287,129)	2003	2022	(10,202,126)	8	(1,620,259)
Ben. Mod. – Actives	957,341	2003	2022	564,983	8	89,728
Experience Gain	(1,201,890)	2003	2017	(365,546)	3	(130,759)
Investment Loss	27,829,106	2003	2032	23,287,698	18	2,231,914
Assumption Change	847,777	2005	2024	581,841	10	78,852
Experience Gain	(10,559,362)	2005	2019	(4,951,457)	5	(1,138,442)
Experience Loss	50,924,405	2007	2021	30,996,893	7	5,443,929
Assumption Change	(7,157,970)	2009	2028	(5,992,630)	14	(656,666)
Experience Loss	55,699,104	2009	2028	46,631,108	14	5,109,788
Experience Gain	(85,365,441)	2011	2030	(76,746,165)	16	(7,809,630)
Assumption Change	41,016,905	2013	2027	37,758,275	13	4,322,504
Experience Gain	(723,617)	2013	2032	(688,944)	18	(66,029)
Agg. Changes through Last Valuation	N/A	N/A	2023	$57,265,331	9	$8,815,107
Assumption Change	N/A					
Ben. Mod. – Actives	N/A					
Ben. Mod. – Retired	N/A					
Experience Loss	$12,132,298	2015	2034	$12,132,298	20	$1,107,055
Agg. Changes-2015	$12,132,298	2015	2034	$12,132,298	20	$1,107,055
Aggregate Changes	N/A	N/A	2024	$69,397,629	10	$9,922,162
Aggregate	N/A	N/A	2045	$182,572,732	31	$14,255,417

Details of the Calculation of Act 82 Payment

Act 82 Unfunded Actuarial Accrued Liability	$ 73,627,561
40-Year Amortization Payment	$ 6,138,285
Future Value at end of 40-Year period	$ 2,109,653,057
Payment to provide the same future value with 10% annual earnings	$ 4,333,255

Table 4: Municipal Contributions

Required Municipal Contributions (Reflecting Act 82 of 1998)

The Financial Requirement of the Plan is based on the Normal Cost Percentage and other components shown below. The Normal Cost Percentage is applied to the payroll of the members for the applicable fiscal year.

Normal Cost (Table 1)	$ 7,673,557
Total Annual Payroll	$ 54,317,512
Percentages for Budget	
• Normal Cost (Normal Cost divided by Total Annual Payroll)	14.127%
• Administrative Expense (as a % of Payroll)	1.200%
• Gross Normal Cost	15.327%
Net Amortization Payment (Table 3)	$ 14,255,417
Funding Adjustment	$ 0

Amortization Payment for Actuarially Recommended Contribution

See Section One for further explanation of the basis of this recommendation.

Source	Original Amount	Year Est.	Target Year	Remaining Balance	Remaining Payments	Annual Amount
Initial	$129,198,421	2011	2040	$ 123,824,758	26	$ 10,193,901
Experience Loss	3,429,949	2013	2032	3,265,598	18	312,978
Assumption Change	41,016,905	2013	2027	37,758,275	13	4,322,504
Experience Loss	17,724,101	2015	2034	17,724,101	20	1,617,299
Aggregate			2035	$ 182,572,732	21	$ 16,446,682

Table 5: Analysis of Sensitivity to Select Assumptions

The actual costs of the plan will be determined by the experience of the plan over time. The present value of the projected liabilities shown in this (or any other) valuation of the plan is dependent upon the assumptions utilized. The assumed interest rate and assumed rates of retirement are two assumptions that have a significant impact on the expected costs of the plan.

To highlight the effect of these assumptions, we have calculated the normal cost and projected liabilities of the plan assuming a one percent decrease and increase in the assumed interest rate and assuming that participants retire at twice the assumed rates.

Interest Rate Sensitivity

	1% Decrease	Current %	1% Increase
Interest Rate	6.5%	7.5%	8.5%
Normal Cost	$9,540,567	$7,673,557	$6,202,464
Actuarial Accrued Liability	$450,948,749	$410,718,753	$376,047,578
Actuarial Value of Assets	(228,146,021)	(228,146,021)	(228,146,021)
Unfunded Actuarial Accrued Liability	$222,802,728	$182,572,732	$147,901,557
Funded Ratio	50.6%	55.5%	60.7%

Retirement Assumption Sensitivity

	Current Retirement Rates	Double the Current Retirement Rates
Normal Cost	$7,673,557	$8,407,739
Actuarially Accrued Liability	$ 410,718,753	$ 422,944,059
Actuarial Value of Assets	(228,146,021)	(228,146,021)
Unfunded Actuarial Accrued Liability	$ 182,572,732	$ 194,798,038
Funded Ratio	55.5%	53.9%

Section Six: Accounting Information

Accumulated Plan Benefits		**01/01/15**	**01/01/13**
Assets at Market Value		**$220,913,824**	**$199,706,235**
Actuarial Present Value of Vested Benefits			
Retired	$ 274,551,955		
Deferred	0		
Employee Contributions	5,450,349		
Active	61,240,722		
Total		**$341,243,026**	**$322,709,275**
Unfunded Actuarial Present Value of Vested Benefits		**$120,329,202**	**$123,003,040**
Actuarial Present Value of Accrued Benefits			
Retired	$274,551,955		
Deferred	0		
Employee Contributions	508,983		
Active	109,391,034		
Total		**$384,451,972**	**$363,710,998**
Unfunded Actuarial Present Value of Accrued Benefits		**$163,538,148**	**$164,004,763**

Section Seven: Actuarial Basis of Valuation

Actuarial Assumptions: January 1, 2015

Economic

Interest Rate — 7.50% increase per year

This assumption represents the expected long-term rate of return, including inflation at 3.0%. It is based on the current investment policy of the plan and expected returns for the asset classes. This assumption was first adopted for the January 1, 2013 actuarial valuation report.

Salary Projection — 5.75% increase per year

Merit Increase 2.75% increase per year
Inflation 3.0% increase per year

This assumption represents expectations of future salary increases. Allowance is made not only for base rate changes but also for such factors as merit increases, longevity increases, and promotions, which may occur over a participant's career. This assumption is based on an analysis of past salary increases and expectations of future wage increases and inflation. This assumption was reaffirmed in the January 1, 2013 experience study.

Employee Characteristics

Mortality — RP-2000 Mortality Tables, with adjustments to reflect Pittsburgh Pension Plan mortality experience as confirmed by experience studies. The adjusted rates are based on the following:

Active Participants — RP-2000 Employee Mortality Rates projected with scale AA.

Retired/Term Vested Participants — RP-2000 Healthy Annuitant Mortality Rates adjusted by blue collar ratios, set forward one year and projected from 2005 with scale AA.

Disability Retirees — Same as Retired, but with ages set forward four years.

Surviving Beneficiaries — RP-2000 Healthy Annuitant Rates adjusted by ratios of female beneficiary experience to overall female RP-2000 Healthy Annuitant Mortality Rates (Appendix D of *RP-2000 Mortality Tables Report*), set forward one year, and projected from 2005 with scale AA

Sample Base Rates (Rounded):

Age	Active Male Participant	Male Regular Retiree	Male Disabled Retiree	Male Beneficiary
45	0.15%	0.19%	0.52%	0.20%
55	0.30%	0.77%	0.97%	0.86%
65	0.76%	1.82%	2.44%	1.91%
75	N/A	4.77%	6.41%	4.51%
85	N/A	12.64%	16.64%	12.81%

Age	Active Female Participant	Female Regular Retiree	Female Disabled Retiree	Female Beneficiary
45	0.11%	0.15%	0.22%	0.15%
55	0.25%	0.32%	0.55%	0.55%
65	0.58%	1.25%	1.68%	1.47%
75	N/A	3.38%	4.44%	3.31%
85	N/A	9.23%	12.48%	9.01%

Withdrawal

Sample rates:

Age	Rate
20	0.82%
25	0.79%
30	0.76%
35	0.70%
40	0.53%
45	0.27%
50	0.06%
55	0.00%

Disablement

Sample rates:

Age	Male	Female
30	0.14%	0.17%
40	0.33%	0.64%
50	1.00%	1.26%
60	2.97%	2.27%

Retirement Age

Percentage of employees eligible for retirement who retire at each age:

Age	Percentage
50	8
51	3
52	3
53	3
54	3
55	3
56	3
57	3
58	9
59	9
60	9
61	9
62	18
63	18
64	18
65	100

Duty Related Mortality	20% of deaths in active service are assumed to be duty related.
Duty Related Disability	50% of disabilities occurring during employment are assumed to occur in the line of duty.
Percentage Married	80% of male participants and 65% of female participants.
Spouse Age	Female spouses are assumed to be two years younger than male spouses.

Actuarial Basis of Valuation: Actuarial Cost Method

The actuarial costs of this Plan are determined under the Entry Age Normal Actuarial Cost Method as described in Act 205 of 1984. The total contribution (the financial requirements of the Pension Plan) is made up of three components: normal cost, administrative expense and amortization payment or funding adjustment.

Normal Cost

For each active participant covered by the Plan, normal cost is calculated to be the annual contribution necessary to completely fund the participant's pension by the participant's retirement age. Contributions are assumed to begin with the year of employment and to be a constant percentage of the participant's annual pay.

For the Plan, normal cost is expressed as a percentage of the total annual payroll of the participants used in budgeting of required contributions.

Administrative Expense

Estimated annual expense to be incurred by the fund for the contribution year for which the financial requirements are determined.

Actuarial Accrued Liability

Total actuarial present value of all future benefits less the actuarial present value of the future normal costs. The total unfunded actuarial accrued liability as of the valuation date is the actuarial accrued liability less the total value of all assets owned by the Plan.

Amortization Payment

Sum of the annual level amortization contribution requirements specified by the Act for the applicable portions of the unfunded actuarial accrued liability. The Plan's unfunded actuarial accrued liability was re-established in 1998. In the subsequent years, experience gains and losses, changes in benefit provisions, and changes in valuation assumptions would result in increases or decreases to the unfunded actuarial accrued liability. If the unfunded actuarial accrued liability is negative, the amortization payment is zero and a funding adjustment is created.

Section Eight: Demographic Summaries

Distribution of Active Members by Age and Service

Years of Service											
Age	**Number of People in Category**										
	1	**2**	**3**	**4-5**	**6-10**	**11-15**	**16-20**	**21-25**	**26-30**	**30+**	**Total by Age**
< 20	0	0	0	0	0	0	0	0	0	0	**0**
20-24	1	0	0	0	0	0	0	0	0	0	**1**
25-29	6	9	0	0	8	0	0	0	0	0	**23**
30-34	13	28	0	0	44	0	0	0	0	0	**85**
35-39	4	12	0	0	60	4	1	0	0	0	**81**
40-44	2	5	0	0	38	17	33	2	0	0	**97**
45-49	2	2	0	0	16	16	44	15	0	0	**95**
50-54	0	0	0	1	9	21	29	21	13	0	**94**
55-59	0	0	0	0	8	6	8	12	33	31	**98**
60-64	0	0	0	0	1	0	2	2	12	14	**31**
65+	0	0	0	0	0	0	0	2	1	3	**6**
Total	**28**	**56**	**0**	**1**	**184**	**64**	**117**	**54**	**59**	**48**	**611**

Age Distribution of Deferred Vested Participants

Persons Entitled to Deferred Benefits			
Age Group	Number of People	Total Annual Benefit	Average Annual Benefit
< 30	0	$ 0.00	$ 0.00
30-34	0	0.00	0.00
35-39	0	0.00	0.00
40-44	0	0.00	0.00
45-49	0	0.00	0.00
50-54	0	0.00	0.00
55-59	0	0.00	0.00
60-64	0	0.00	0.00
65-69	0	0.00	0.00
70-74	0	0.00	0.00
75-79	0	0.00	0.00
80-84	0	0.00	0.00
85+	0	0.00	0.00
Total	**0**	**$ 0.00**	**$ 0.00**

Age Distribution of Retired Participants

Regular Retirements			
Age Group	Number of People	Total Annual Benefit	Average Annual Benefit
< 30	0	$ 0.00	$ 0.00
30-34	0	0.00	0.00
35-39	0	0.00	0.00
40-44	0	0.00	0.00
45-49	0	0.00	0.00
50-54	8	379,694.52	47,461.82
55-59	43	1,982,017.08	46,093.42
60-64	116	4,807,640.76	41,445.18
65-69	163	6,598,997.28	40,484.65
70-74	61	2,294,914.44	37,621.55
75-79	56	1,834,539.00	32,759.63
80-84	44	1,126,912.68	25,611.65
85+	62	1,223,160.48	19,728.39
Total	**553**	**$20,247,876.24**	**$36,614.60**

Age Distribution of Retired Participants

Disability Retirements			
Age Group	Number of People	Total Annual Benefit	Average Annual Benefit
< 30	0	$ 0.00	$ 0.00
30-34	0	0.00	0.00
35-39	0	0.00	0.00
40-44	4	147,405.60	36,851.40
45-49	6	207,924.60	34,654.10
50-54	17	594,832.56	34,990.15
55-59	22	812,245.80	36,920.26
60-64	45	1,433,614.68	31,858.10
65-69	57	1,797,917.76	31,542.42
70-74	27	736,490.04	27,277.41
75-79	19	485,085.96	25,530.84
80-84	17	316,591.20	18,623.01
85+	20	350,199.96	17,510.00
Total	**234**	**$6,882,308.16**	**$29,411.57**

Age Distribution of Retired Participants

Survivors			
Age Group	Number of People	Total Annual Benefit	Average Annual Benefit
< 30	1	$10,250.76	$10,250.76
30-34	0	0.00	0.00
35-39	1	5,734.92	5,734.92
40-44	0	0.00	0.00
45-49	1	20,499.12	20,499.12
50-54	2	37,739.16	18,869.58
55-59	13	223,799.16	17,215.32
60-64	22	314,449.44	14,293.16
65-69	20	271,016.52	13,550.83
70-74	24	267,226.80	11,134.45
75-79	52	512,486.04	9,855.50
80-84	67	555,328.92	8,288.49
85+	110	728,761.20	6,625.10
Total	**313**	**$2,947,292.04**	**$9,416.27**

Age Distribution of Retired Participants

All Persons Receiving Benefits			
Age Group	**Number of People**	**Total Annual Benefit**	**Average Annual Benefit**
< 30	1	$ 10,250.76	$10,250.76
30-34	0	0.00	0.00
35-39	1	5,734.92	5,734.92
40-44	4	147,405.60	36,851.40
45-49	7	228,423.72	32,631.96
50-54	27	1,012,266.24	37,491.34
55-59	78	3,018,062.04	38,693.10
60-64	183	6,555,704.88	35,823.52
65-69	240	8,667,931.56	36,116.38
70-74	112	3,298,631.28	29,452.07
75-79	127	2,832,111.00	22,300.09
80-84	128	1,998,832.80	15,615.88
85+	192	2,302,121.64	11,990.22
Total	**1,100**	**$30,077,476.44**	**$27,343.16**

Demographic Data as of January 1, 2015

Changes in Plan Participation for Active Members

Active Members	**Number**
As of January 1, 2013	584
New Entrants	75
Transfer From Another Plan	9
Total	668
Separation from Active Service	
Separation with a Deferred Benefit	0
Separation without a Deferred Benefit	(3)
Disability	(18)
Death	(1)
Retirement with a Service Retirement Benefit	(35)
Total Separations	(57)
Data Adjustments	0
Active Members as of January 1, 2015	611

Changes in Plan Participants for Inactive Members and Survivors

	Deferred Vested	Regular Retirements	Disability Retirement	Survivors Child	Survivors Other	Total
As of January 1, 2013	1	555	230	1	325	1,112
New Benefit Recipients	(1)	36	18	1	29	83
Death	0	(38)	(15)	0	(43)	(96)
Other Cessation of Benefits	0	0	0	0	0	0
Net Data Adjustments	0	0	1	0	0	1
As of January 1, 2015	0	553	234	2	311	1,100

Section Nine: Plan Assets

Combined Municipal Pension Trust Fund Calendar Year 2013

Source of Asset Information

The assets of the Aggregated Trust for the City's pension plans are summarized in the following tables based on the information provided by the City and by Maher Duessel. As directed by the Trustees of the City of Pittsburgh Comprehensive Municipal Pension Trust Fund, the values represent a combination of the assets listed in the City's 2013 Comprehensive Annual Financial Report (CAFR) and the present value calculated by Gleason and Associates of the dedicated stream of revenues created by City Ordinances 42 & 44 of 2010. Assets are shown at market value.

Summary of Values for Aggregated Trust

	1/1/13	1/1/14
Invested Portfolio	$355,308,381	$392,505,338
Dedicated Funding from Parking Assets	252,251,944	258,658,681
Accrued Interest	534,057	495,748
Accrued Contributions	0	0
Due from City of Pittsburgh	688,949	0
Accrued Expenses and Other Payables	(2,660,148)	(2,659,393)
Market Value of Assets - Accrual Basis	$606,123,183	$649,000,374

Summary of Transactions for the Aggregated Trust

Balance as of January 1, 2013		$606,123,183
Contributions Toward Pension Liability		
- Policemen's	$16,898,594	
- Firemen's	17,458,663	
- Municipal	12,837,680	$47,194,936
Miscellaneous and Pass Through Items		3,413,168
Interest and Dividends		5,667,616
Net Appreciation (Decline) in Fair Value Of Investments		73,815,088
Payments to Participants		
- Policemen's	$33,139,329	
- Firemen's	29,288,384	
- Municipal	22,717,512	(85,145,225)
Expenses		(2,068,392)
Balance as of December 31, 2013		**$649,000,374**

Undivided Participation Calculation Calendar Year 2013 - Accrual Basis

	Policemen's	Firemen's	Municipal	Total
January 1, 2013 Market Value	$227,007,765	$199,706,235	$179,409,183	$606,123,183
Plan-Specific Contributions	18,181,423	17,764,846	14,598,432	50,544,700
Plan-Specific Distributions	(33,524,813)	(29,528,223)	(22,954,473)	(86,007,509)
Sub-Total	$211,664,375	$187,942,857	$171,053,142	$570,660,374
Sub-Total Percentages	37.09%	32.93%	29.98%	100.00%
Allocated Expenses	(447,345)	(397,171)	(361,591)	(1,206,108)
Allocated Investment Earnings	29,503,652	26,194,533	23,847,923	79,546,108
December 31, 2013 Market Value	$240,720,681	$213,740,219	$194,539,474	$649,000,374

Contributions and Distributions for 2013 - Accrual Basis

Plan-Specific Contributions	Policemen's	Firemen's	Municipal	Total
General Municipal Pension System State Aid	$6,578,550	$6,686,690	$4,758,184	$18,023,424
Member Contributions	3,670,456	4,001,491	3,257,867	10,929,813
City Contributions	6,649,588	6,770,482	4,821,629	18,241,699
Pass Through Contributions	1,282,829	296,750	1,741,118	3,320,697
Miscellaneous Income	0	9,433	19,634	29,067
Total Contributions	**$18,181,423**	**$17,764,846**	**$14,598,432**	**$ 50,544,700**

Plan-Specific Distributions				
Benefit Payments to Participants	$32,763,230	$29,201,972	$21,810,071	$83,775,273
Refunds to Participants	376,099	86,412	907,441	1,369,952
Administrative Expenses	385,484	239,839	236,961	862,284
Total Distributions	**$33,524,813**	**$29,528,223**	**$ 22,954,473**	**$86,007,509**

Combined Municipal Pension Trust Fund Calendar Year 2014

Source of Asset Information

The assets of the Aggregated Trust for the City's pension plans are summarized in the following tables based on the information provided by the City and by Maher Duessel. As directed by the Trustees of the City of Pittsburgh Comprehensive Municipal Pension Trust Fund, the values represent a combination of the assets listed in the City's 2014 Comprehensive Annual Financial Report (CAFR) and the present value calculated by Gleason and Associates of the dedicated stream of revenues created by City Ordinances 42 & 44 of 2010. Assets are shown at market value.

Summary of Values for the Aggregated Trust

	1/1/14	1/1/15
Invested Portfolio	$392,505,338	$394,224,222
Dedicated Funding from Parking Assets	258,658,681	278,702,580
Accrued Interest	495,748	502,471
Accrued Contributions	0	0
Due From City of Pittsburgh	0	0
Accrued Expenses and Other Payables	(2,659,393)	(2,661,230)
Market Value of Assets – Accrual Basis	$649,000,374	$670,768,043

Summary of Transactions for the Aggregated Trust

Balance as of January 1, 2014		$649,000,374
Contributions Toward Pension Liability		
-Policemen's	$17,757,137	
-Firemen's	18,257,340	
-Municipal	13,433,071	$49,447,548
Miscellaneous and Pass Through Items		3,451,063
Interest and Dividends		5,416,814
Net Appreciation (Decline) in Fair Value of Investments		52,831,293
Payments to Participants		
-Policemen's	$33,249,644	
-Firemen's	29,961,861	
-Municipal	24,182,938	(87,394,443)
Expenses		(1,984,606)
Balance as of December 31, 2014		**$670,768,043**

Undivided Participation Calculation Calendar Year 2014 - Accrual Basis

	Policemen's	Firemen's	Municipal	Total
January 1, 2014 Market Value	$240,720,681	$213,740,219	$194,539,474	$649,000,374
Plan-Specific Contributions	19,015,957	18,523,046	15,199,903	52,738,906
Plan-Specific Distributions	(33,612,436)	(30,214,219)	(24,432,098)	(88,258,753)
Sub-Total	$ 226,124,202	$ 202,049,046	$ 185,307,279	$ 613,480,527
Sub-Total Percentages	36.86%	32.93%	30.21%	100.00%
Allocated Expenses	(412,941)	(368,913)	(338,441)	(1,120,296)
Allocated Investment Earnings	21,529,119	19,233,692	17,645,001	58,407,812
December 31, 2014 Market Value	$247,240,380	$220,913,824	$202,613,838	$670,768,043

Contributions and Distributions for 2014 - Accrual Basis

Plan-Specific Contributions	Policemen's	Firemen's	Municipal	Total
General Municipal Pension System State Aid	$6,665,568	$6,839,897	$4,758,094	$18,263,559
Member Contributions	3,691,958	3,824,343	3,392,950	10,909,251
City Contributions	7,399,611	7,593,100	5,282,027	20,274,738
Pass Through Contributions	1,258,820	256,300	1,748,781	3,263,901
Miscellaneous Income	0	9,406	18,051	27,457
Total Contributions	**$19,015,957**	**$18,523,046**	**$15,199,903**	**$52,738,906**
Plan-Specific Distributions				
Benefit Payments to Participants	$32,994,914	$29,832,523	$23,627,122	$86,454,559
Refunds to Participants	254,730	129,338	555,816	939,884
Administrative Expenses	362,792	252,358	249,160	864,310
Total Distributions	**$33,612,436**	**$30,214,219**	**$24,432,098**	**$88,258,753**

Calculation of Actuarial Value of Assets

Description of Method

The Actuarial Value of Assets is the greater of the Market Value of Assets or the value determined by a Tabular Smoothing Method which takes the Actuarial Value of Assets from the prior valuation report and brings it forward using a specified interest rate. The Actuarial Value of Assets in the prior report, contributions by year, and annual disbursements are each credited with interest at a rate of one percent less than the prior valuation interest rate assumption. The value obtained through tabular smoothing is subject to a minimum of 80 percent and a maximum of 120 percent of the market value of assets.

Development of the Actuarial Value of Assets

Market Value of Assets at January 1, 2015	$220,913,824
Actuarial Value of Assets at January 1, 2013	$224,050,549
Contributions During 2013	17,755,413
Disbursements During 2013	(29,925,394)
Interest Credited During 2013	14,104,901
Tabular Smoothing Value of Assets at January 1, 2014	$225,985,469
Tabular Smoothing Value of Assets at January 1, 2014	$225,985,469
Contributions During 2014	18,513,640
Disbursements During 2014	(30,583,132)
Interest Credited During 2014	14,230,044
Tabular Smoothing Value of Assets at January 1, 2015	$228,146,021
Low Limit: 80% of Market Value	$176,731,060
High Limit: 120% of Market Value	$265,096,589
Actuarial Value of Assets at January 1, 2015	$228,146,021

Section Ten: Supplementary Exhibits for Plans Funded With Pension Bond Proceeds

Table 6: Unfunded Actuarial Accrued Liability Excluding Assets Arising from Pension Bond Proceeds

Assets Excluding Pension Bond Proceeds			
Assets Excluding Bond Proceeds at January 1, 2013			$113,400,134
Receipts	**2013**	**2014**	
Employer Contributions	$8,101,876	$8,218,619	
Employee Contributions	4,001,491	3,824,343	
State Aid	6,686,690	6,839,897	
Investment Income	991,648	941,117	
Net Appreciation	13,488,306	9,213,479	
Pass Through Contributions, Misc. Income	306,183	265,706	
Total Receipts			62,879,355
Disbursements			
Monthly Benefit Payments	$28,905,222	$29,576,223	
Refund of Employee Contributions	86,412	129,338	
Administrative Expenses	508,167	508,486	
Pass Through Payments	296,750	256,300	
Total Disbursements.			(60,266,899)
Assets Excluding Bond Proceeds at January 1, 2015			$116,012,589

Development of Actuarial Value of Assets Excluding Bond Proceeds

Market Value of Assets Excluding Bond Proceeds at January 1, 2015		$116,012,589
Actuarial Value of Assets Excluding Bond Proceeds at January 1, 2013		$120,803,586
Contributions During 2013		19,086,807
Disbursements During 2013		(29,796,551)
Interest Credited During 2013		7,397,970
Tabular Smoothing Value of Assets at January 1, 2014		$117,491,811
Tabular Smoothing Value of Assets at January 1, 2014		$117,491,811
Contributions During 2014		19,139,159
Disbursements During 2014		(30,470,347)
Interest Credited During 2014		7,181,565
Tabular Smoothing Value of Assets at January 1, 2015		$113,342,188
Low Limit	80 Percent of Market Value	$ 92,810,071
High Limit	120 Percent of Market Value	$ 139,215,107
Actuarial Value of Assets Excluding Bond Proceeds at January 1, 2015		**$ 116,012,589**

Unfunded Actuarial Accrued Liability Excluding Assets from Bond Proceeds

Actuarial Accrued Liability (Table 1)	$ 410,718,753
Actuarial Value of Assets Excluding Bond Proceeds at January 1, 2015	(116,012,589)
Adjusted Unfunded Actuarial Accrued Liability	$ 294,706,164

Table 7: Actuarial Experience (Gain) Loss Determination Excluding Assets Arising from Pension Bond Proceeds

Reconciliation of Funded Status

	2013	2014	
Unfunded Actuarial Accrued Liability as of January 1, 2013			$274,520,018
Normal Cost/Administrative Expenses Assumed	$ 8,094,996	$ 8,470,416	16,565,412
Interest Charged at Valuation Rate			44,617,243
Contributions Made			
- Municipality	$ 8,101,876	$ 8,218,619	
- State Aid Allocated	6,686,690	6,839,897	
- Employees	4,001,491	3,824,343	$(37,672,916)
Interest Credited at Valuation Rate			(2,828,341)
Special Adjustment Because of Higher Act 82 Interest Rate			(17,558,764)
Expected Unfunded Actuarial Accrued Liability Before Adjustments			$277,642,652
Experience from Investment Return			
- Comparative Int. Rate Amortization Tab. (Gain) Loss		$(9,657,555)	
- Other Investment Return (Gain) Loss		26,641,955	16,984,400
Experience (Gain) Loss from all Other Sources			79,112
Increase (Decrease) in Unfunded Actuarial Accrued Liability			
- Benefit Modifications for Actives		$0	
- Benefit Modifications for Retirees		0	
- Change in Actuarial Assumptions		0	0
Actual Unfunded Actuarial Accrued Liability			$294,706,164

Loss (Gain) to be Amortized

Experience (Gain) Loss from January 1, 2013		$17,063,512
Actuarially Required Contributions and Bond Proceeds w/Interest	$38,777,288	
Actual Contributions with Interest	(40,501,257)	
Contribution (Gain) Loss		(1,723,969)
Loss (Gain) to be Amortized		$15,339,543

Comparative Interest Rate Amortization Tabulation

Balance Calculated Using Actual Investment Return	2013	2014	
Act 82 Amortization Balance at January 1	$309,972,931	$362,204,556	
Act 82 Amortization Payment	8,869,108	8,869,108	
Comparative Interest Rate Balance at January 1	$318,842,039	$371,073,664	
Actual Investment Return on Balance	43,362,517	34,138,777	
Actual Act 82 Amort. Balance at December 31	$362,204,556	$405,212,441	$405,212,441
Balance Calculated Using 10 Percent Investment Return			
Comparative Interest Rate Balance at January 1	$318,842,039	$359,595,351	
Interest at 10 Percent	31,884,204	35,959,535	
Comparative Act 82 Amort. Balance at December 31	$350,726,243	$395,554,886	$395,554,886
Comparative Interest Rate Amortization Tabulation (Gain) Loss			$ (9,657,555)

Table 8: Amortization of Unfunded Actuarial Accrued Liability Excluding Assets Arising from Pension Bond Proceeds

Source	Original Amount	Year Est.	Target Year	Remaining Balance	Remaining Payments	Annual Amount
Initial	$150,697,522	1998	2037	$231,641,617	23	$8,869,108
Assumption Change	$(2,712,163)	1998	2017	$ (728,388)		$ (260,551)
Experience Loss	5,187,425	2001	2015	570,641		570,641
Experience Loss	12,280,996	2002	2016	263,817		136,676
Investment Loss	9,840,706	2002	2032	7,954,340		762,351
Assumption Change	(17,287,129)	2003	2022	(10,202,127)		(1,620,259)
Ben. Mod. - Actives	957,341	2003	2022	564,983		89,728
Experience Gain	(930,312)	2003	2017	(282,947)		(101,213)
Investment Loss	14,203,883	2003	2032	11,885,964		1,139,161
Assumption Change	847,777	2005	2024	581,841		78,852
Experience Loss	2,347,661	2005	2019	1,100,858		253,110
Experience Loss	52,958,493	2007	2021	32,235,010		5,661,377
Assumption Change	12,126,548	2009	2028	10,152,305		1,112,479
Experience Loss	31,000,351	2009	2028	25,953,392		2,843,945
Experience Gain	(83,074,123)	2011	2030	(74,686,199)		(7,600,009)
Assumption Change	41,016,905	2013	2027	37,758,275		4,322,504
Experience Loss	4,834,910	2013	2032	4,603,239		441,179
Agg. Changes through Last Valuation	N/A	N/A	2022	$47,725,004	8	$7,829,971
Assumption Change	N/A					
Ben. Mod. - Actives	N/A					
Ben. Mod. - Retired	N/A					
Experience Loss	$15,339,543	2015	2034	$15,339,543	20	$1,399,711
Agg. Changes -2015	N/A	N/A	2035	$15,339,543	21	$1,399,711
Aggregate Changes	N/A	N/A	2023	$63,064,547	9	$9,229,682
Aggregate	N/A	N/A		$294,706,164		$18,098,790

Details of the Calculation of Act 82 Payment

Act 82 Unfunded Actuarial Accrued Liability	$ 150,697,522
40-Year Amortization Payment	$ 12,563,560
Future Value at end of 40-Year period	$ 4,317,941,320
Payment to provide the same future value with 10% annual earnings	$ 8,869,108

Debt Service Schedule by Plan Year
Pension Bond Issue of March 10, 1998

	Date of Original Borrowing	Total Principal Borrowed	Total Principal to this Plan	Percentage to this Plan	Date of Refinancing
	3/10/98	$255,865,000.00	$77,782,960.48	30.1%	N/A
Plan Year	Required Principal Pymt.	Required Interest Pymt.	Annual Debt Service	Premium or Discount Amortized	Principal Balance at Valuation Date
1997					
1998		$2,531,176.79	$2,531,176.79		$77,782,960.48
1999	$ 304,000.00	5,053,765.57	5,357,765.57		77,782,960.48
2000	304,000.00	5,036,665.57	5,340,665.57		77,478,960.48
2001	304,000.00	5,019,474.37	5,323,474.37		77,174,960.48
2002	304,000.00	5,001,963.97	5,305,963.97		76,870,960.48
2003	304,000.00	4,984,316.77	5,288,316.77		76,566,960.48
2004	304,000.00	4,966,487.17	5,270,487.17		76,262,960.48
2005	761,520.00	4,934,627.98	5,696,147.98		75,958,960.48
2006	705,280.00	4,890,447.65	5,595,727.65		75,197,440.48
2007	747,840.00	4,846,303.81	5,594,143.81		74,492,160.48
2008	779,760.00	4,799,614.54	5,579,374.54		73,744,320.48
2009	842,080.01	4,746,261.58	5,588,341.59		72,964,560.48
2010	915,040.01	4,688,193.78	5,603,233.79		72,122,480.47
2011	981,920.01	4,628,913.78	5,610,833.79		71,207,440.46
2012	2,398,560.01	4,522,674.15	6,921,234.16		70,225,520.45
2013	3,339,440.02	4,341,092.29	7,680,532.31		67,826,960.44
2014	3,553,760.02	4,119,567.87	7,673,327.89		64,487,520.42
2015	3,865,360.02	3,878,446.47	7,743,806.49		60,933,760.40
2016	4,122,240.03	3,618,849.46	7,741,089.49		57,068,400.38
2017	5,546,480.03	3,304,616.06	8,851,096.09		52,946,160.35
2018	4,023,440.02	2,993,593.66	7,017,033.68		47,399,680.32
2019	6,089,120.04	2,661,890.89	8,751,010.93		43,376,240.30
2020	6,505,600.04	2,246,265.13	8,751,865.17		37,287,120.26
2021	6,949,440.04	1,802,248.81	8,751,688.85		30,781,520.22
2022	7,425,200.06	1,327,885.67	8,753,085.73		23,832,080.18
2023	7,932,880.06	821,069.03	8,753,949.09		16,406,880.12
2024	8,474,000.06	279,641.99	8,753,642.05		8,474,000.06

Section Eleven: Glossary

Accrued Benefit
The portion of the participant's retirement benefit that is attributable to service completed before the calculation date. The calculation typically uses actual service as of the calculation date and may involve other factors such as average pay at the determination date and projected service through the retirement eligibility date.

Act 205 of 1984
Municipal Pension Plan Funding Standard and Recovery Act of December 18, 1984, P.L. 1005, No. 205. The Act controls pension funding in Pennsylvania. This Act also provides for reporting of actuarial information and for a recovery program for qualifying municipalities.

Actuarial Accrued Liability
The portion of the actuarial cost assigned to prior years.

Actuarial Assumptions
Factors used by the actuary to forecast future events. These factors include items relating to future economic conditions, the survival of the participants and their beneficiaries, and the length of employment.

Actuarial Cost Method
A means of assigning costs to periods of employment. This method is used to determine a funding level that will provide sufficient assets to pay benefits for each participant upon retirement. Act 205 specifies that the entry age normal cost method, as described in the Act, should be used for this determination.

Actuarial Experience Gain or Loss
The effect on the actuarial accrued liability of differences between events as predicted by the actuarial assumptions and those that actually occurred. This difference can increase or decrease the contribution in future years.

Actuarial Present Value
The lump sum value that is equivalent to an expected series of future payments. This value is determined by using the actuarial assumptions. An actuarial present value, as of the valuation date, represents the amount of funds that would be sufficient to provide the series of payments, if experience precisely matches the actuarial assumptions.

Actuarial Value of Assets
The value of current plan assets which is used by the actuary to evaluate the current funding status and determine future funding requirements. Under Act 205, a corridor limitation requires that this value be between 80 and 120 percent of the fair market value of the assets.

Administrative Expenses
The average of expenses to administer the plan that is paid in the year preceding the most recent valuation and the anticipated expenses for the year following this valuation. The average is converted to a percentage of payroll and used as part of the Minimum Municipal Obligation calculation.

Amortization Payment
The annual payment required to eventually eliminate the unfunded actuarial accrued liability according to the schedule established in Act 205.

Funded Ratio
The actuarial value of assets divided by the actuarial accrued liability.

Funding Adjustment
Occurs when the actuarial value of assets exceeds the actuarial accrued liability; it is defined by Act 205 as 10 percent of the excess. This adjustment reduces the amount that must be contributed to the pension plan.

General Municipal Pension System State Aid
Annually municipalities receive a portion of the insurance premium tax levied on casualty insurance companies headquartered outside of Pennsylvania. If they have paid firefighters, they also receive a portion of the premium tax on out-of-state fire insurance companies. These taxes are distributed according to formulae contained in Act 205.

Minimum Municipal Obligation
The amount that must be contributed to a pension plan by a municipality for a given year. The calculation of this amount uses the normal cost, anticipated administrative expenses, amortization payment or funding adjustment, and anticipated employee contributions to determine a municipality's contribution requirement. General Municipal Pension System State Aid may be used to reduce the contribution.

Normal Cost
The actuarial cost assigned to a given year to pay for the portion of the anticipated benefit derived from service during that year.

Unfunded Actuarial Accrued Liability
The amount by which the actuarial accrued liability exceeds the actuarial value of assets. A valuation will identify the value of changes in the unfunded actuarial accrued liability that result from changes in plan benefits, actuarial assumptions, or actuarial gains and losses. A zero or negative unfunded actuarial accrued liability does not mean that no future contributions are required, only that the current accumulation of plan assets is deemed on or ahead of schedule.

Vesting
The participant's non-forfeitable right to receive a benefit, provided that the participant survives until benefit eligibility.