Memorandum

CITY OF DALLAS

DATE October 10, 2014

TO The Honorable Mayor and Members of the City Council

SUBJECT Actuarial Audits of the City of Dallas Pension Plans

The October 15th briefing agenda includes a briefing on the actuarial audits of the City of Dallas pension plans. The briefing materials are attached. The briefing will be presented by Jason Franken, Consulting Actuary and Principal with Foster & Foster Actuaries and Consultants.

Please let me know if you need additional information.

Jeanne Chipperfield
Chief Financial Officer

Attachment

c: A.C. Gonzalez, City Manager
Warren M.S. Ernst, City Attorney
Craig D. Kinton, City Auditor
Rosa A. Rios, City Secretary
Daniel F. Solis, Administrative Judge
Ryan S. Evans, First Assistant City Manager
Jill A. Jordan, P.E., Assistant City Manager
Forest E. Turner, Assistant City Manager
Joey Zapata, Assistant City Manager
Mark McDaniel, Assistant City Manager
Eric D. Campbell, Assistant City Manager
Sana Syed, Public Information Officer
Elsa Cantu, Assistant to the City Manager

ACTUARIAL AUDITS OF THE CITY OF DALLAS PENSION PLANS

FOSTER & FOSTER
ACTUARIES AND CONSULTANTS

Jason L. Franken, FSA, EA, MAAA

INTRODUCTION

- *Overview of Employees' Retirement Fund (ERF)*
  - Includes all eligible civilian employees
  - The legal authority is Chapter 40A of the City Code
  - 63% of the annual contribution is paid by the City, and 37% is paid by the employees
  - The City's contribution includes debt service on pension obligation bonds
  - Contributions are recalculated each year, per Chapter 40A
    - FY15 City's contribution will be 22.23% of employee's salary
      - 13.02% allocated to the ERF
      - 9.21% allocated to pension bond debt service
    - FY15 employees' contribution will be 13.06% of salary

INTRODUCTION

- *Overview of the Dallas Police and Fire Pension Plan*
  - Includes sworn Police and Fire employees
  - The legal authority is former Article 6243a-1 of the Revised Civil Statutes of Texas
  - As required by the State, the City contributes 27.5% of all salaries and wages; employees pay 8.5% of computation pay (salary, longevity and education pays)

- *Overview of the Dallas Police and Fire Pension Supplemental Plan*
  - Includes officials in the Fire and Police departments who hold a rank higher than the highest civil service rank
  - The legal authority is Subsection 35 of Chapter 11 of the Charter of the City of Dallas and ordinance 14084 of 1973
  - City's annual payment is the actuarially required contribution; $1.8 million for 2014

INTRODUCTION

- *Audit Requirement*
  - Section 802.1012(f) of the Texas Government Code requires the City to perform an audit of the actuarial valuations, studies and reports every five years
  - Contract with Foster & Foster to perform the actuarial audit
    - Included reviewing, analyzing and making recommendations regarding:
      - Benefit calculations
      - Assumptions
      - Methodology
    - Conducted a 5-year full replication of liability calculations for plan years 2008 -2012
    - Performed a review of selected assets
      - Foster & Foster subcontracted a review of the asset valuation methodologies for the Employees' Retirement Fund (ERF) to CliftonLarsonAllen (CLA)
      - Another firm was retained to provide the asset analysis for the Dallas Police and Fire Pension System (DPFP)

INTRODUCTION

- *Foster & Foster, Inc.*
  - National actuarial firm with offices in Fort Myers, FL and Oakbrook Terrace, IL
  - Provides actuarial services to over 300 public retirement programs across the country
  - Completes over 800 pension actuarial valuations per year
- *Jason Franken, FSA, EA, MAAA*
  - Fellow of the Society of Actuaries, Enrolled Actuary, Member of the American Academy of Actuaries
  - Over 17 years of pension consulting experience
  - Works out of the Illinois office

INTRODUCTION

- *Actuarial Valuation*
  - Annual measurement of pension liabilities and assets performed by actuaries retained by each fund
  - Actuaries use assumptions and various methods to determine the funded ratio, funding period and contribution requirements for the Employees' Retirement Fund (ERF)
  - Contributions to the Dallas Police and Fire Pension System (DPFP) are determined by statute
  - January 1 – December 31 plan year for all of the funds

RETIREMENT PLAN FOR THE EMPLOYEES' RETIREMENT FUND OF THE CITY OF DALLAS

SUMMARY - ERF

- *Data*
  - Findings:
    - Satisfies the Actuarial Standards of Practice (ASOPs)
    - Inconsistencies realized from one year to the next – result of more accurate data being collected

- *Replication of Results*
  - Findings:
    - Reasonable degree of tolerance
      - Most results are within 2% - 3%
    - Covered Payroll – small difference between covered payroll and the salary used in calculating liabilities
      - Difference is within a reasonable range

SUMMARY - ERF

- *Methods*
  - Findings:
    - Generally consistent with ASOPs
  - Recommendations:
    - Expand description of actuarial value of asset method
    - Funding period required to amortize unfunded liabilities – see slide 11 of this section for additional discussion

- *Valuation Report*
  - Findings:
    - Generally conform to ASOPs
  - Recommendations:
    - Display specifics for all inactive classifications
    - Disclose expected payroll figure utilized to determine normal cost rate as a percentage of payroll

SUMMARY - ERF

- *Assumptions*
  - Findings:
    - Generally conform to ASOPs
  - Recommendations:
    - Review the mortality tables being used and consider future mortality improvements
    - Payroll growth assumption – the inconsistencies in the experience are a result of reductions in force that occurred during the audited period; monitor experience going forward
- *Benefit Calculations*
  - Findings:
    - 100% joint & survivor annuity allowed only if 15+ years of service
  - Recommendations:
    - Review application of mortality table
    - Incorporate the COLA assumption in conversion to 100% joint & survivor optional benefit forms
    - 100% joint & survivor conversion factor based on 50% joint & survivor annuity rather than 10-year certain annuity

SUMMARY - ERF

- *Funding Period Calculation*
  - Findings:
    - The Fund actuary does not disclose the funding period in any of the reports we reviewed
      - Funding period is the number years for all future contributions to pay down the unfunded actuarial accrued liability (UAAL)
      - Only discloses the level of contributions necessary from the City to pay down the UAAL over exactly 30 years
    - Texas Pension Review Board (PRB) calculated an infinite funding period for the Employees' Retirement Fund in its April 2014 report
      - PRB performed calculation since it was not included in the report
      - Infinite period is a result of the City's contribution to the fund being significantly less than the 30-year funding cost due to the pension obligation bond payment
      - PRB's methodology likely does not incorporate future expected increases in the City's contribution to the Fund

SUMMARY - ERF

- *Funding Period Calculation (continued)*
  - Recommendations:
    - Foster & Foster calculated a funding period of 52.4 years as of 12/31/2012 based on the Fund's financial status on that date and expected future contributions
      - The methodology we used is not the only allowable approach; other methods will produce longer or shorter funding periods
    - We recommend the Fund actuary include this calculation in future reports so the PRB's number reflects as much information as possible

SUMMARY - ERF

- *Asset Review – Performed by CliftonLarsonAllen*

Objective #1 - Analyze alternative assets held during the five-year period ending December 31, 2012; this analysis should include assessment of the valuation methodologies, the appropriateness of the valuation methodologies, year-to-year consistency of valuation methodologies and the frequency of the valuations

Procedures:

- Gained an understanding of the types and nature of alternative investments
- Reviewed and performed walkthroughs of initial due diligence, monitoring and financial reporting policies and procedures
- Reviewed the audited statements of each of the alternative investment funds specifically noting the valuation methodology, audit opinion and audit firm

Results - The procedures provide evidence that the valuation methodologies utilized by ERF are in accordance with best practices and generally accepted accounting principles (GAAP)

SUMMARY - ERF

- *Asset Review – Performed by CliftonLarsonAllen*

Objective #2 - Confirm that assets are reported properly by each plan as of December 31, 2012

Procedures:

- Traced values from the custodial statements and audited manager statements to the amounts reported in the December 31, 2012 financial statements
- Using our understanding of the nature of the alternative investments we determined that the alternative investments were properly classified in the December 31, 2012 financial statements

Results - The procedures provide evidence that the alternative investments are properly reported by ERF as of December 31, 2012

SUMMARY - ERF

- *Asset Review – Performed by CliftonLarsonAllen*

Objective #3 - Analyze and benchmark the administrative and investment expenses paid by each plan for the year beginning January 1, 2012 and ending December 31, 2012

Procedures:

- Obtained financial statements for five other systems of similar size to ERF and benchmarked the investment and administrative expenses of ERF to those five systems

Results - The procedures performed revealed that ERF is comparable to the peer funds for both administrative expenses and investment expenses

CITY OF DALLAS
POLICE AND FIRE PENSION SYSTEMS

SUMMARY – DPFP

- *Data*
  - Findings:
    - Satisfies the Actuarial Standards of Practice (ASOPs)
- *Replication of Results*
  - Findings:
    - Reasonable degree of tolerance
      - Most results are within 2%

SUMMARY – DPFP

- *Methods*
  - Findings:
    - Generally consistent with ASOPs
  - Recommendations:
    - Update description of entry age normal cost method
    - Asset method change should have included additional disclosures – see page 31 of the written report located under Appendix 3 of this document for additional discussion
    - Consider additional disclosures for funding period calculation– see page 34 of the written report located under Appendix 3 of this document for additional discussion
    - Consider reflecting average pay for Supplemental Police & Fire Plan

SUMMARY – DPFP

- *Valuation Report*
  - Findings:
    - Generally conform to ASOPs
  - Recommendations:
    - Add additional disclosures regarding assumptions
    - Specify funding period calculation methodology and clarify method to normal cost
    - Update description of survivor benefits for post- 2011 hires
    - Add additional details to fully disclose the position of the plan

SUMMARY – DPFP

- *Assumptions*
  - Findings:
    - Generally conform to ASOPs
  - Recommendations:
    - Consider adjusting investment return assumption to reflect liquidity risk for DROP balances

- *Benefit Calculations*
  - Findings:
    - Calculations are handled appropriately

SUMMARY – DPFP

- *Change in Asset Method from 5 year to 10 year smoothing*
  - Findings:
    - Asset method changed effective with the January 1, 2013 valuation
      - Change to method satisfies Actuarial Standards of Practice but 10 year smoothing is less common than 5 year smoothing
      - Effects of method change:
        - Increased funded percentage from 68.16% to 78.12%
        - Decreased the funding period 19 years
        - Decreased 30-year funding cost by 7.10%
      - Fund Actuary disclosed effect of change on the funding period, change in 30-year funding cost and unfunded accrued liability in the body of the report.
  - Recommendations
    - Given the significance of the change, we believe there should have been additional disclosures:
      - Include change in the funded percentage
      - Provide results before and after the change in the summary of principal results and actuarial cost measures sections at the front of the report

SUMMARY – DPFP

- *Funding Period Calculation*
  - Findings:
    - Methodology for determining funding period calculation was changed effective January 1, 2011
    - New method reflects the ultimate normal cost rate (reflects benefits being earned by members hired after February 28, 2011) rather than normal cost rates actually accruing in the plan
      - As of January 1, 2013, only 438 active members out of 3,974 were accruing the ultimate normal cost rate
    - Texas Pension Review Board (PRB) Guidelines for Actuarial Soundness require funding the unfunded accrued liability over a level or declining percent of payroll. Using a single normal cost rate satisfies this requirement.
  - Recommendations:
    - Consider disclosing a funding period calculation based on normal cost rates currently accruing in the plan
      - Provides a more realistic funding period

SUMMARY REMARKS

- In general, actuarial valuations for all three plans conform to the ASOPs
- ERF asset valuations are based on best practices and conform to GAAP
- DPFP passed a motion to begin using a funding period calculation based on normal cost rates normally accruing to the Plan in order to provide a more realistic funding period
- Recommendations: ERF
  - Review and revise benefit calculation procedures for the ERF
  - Asset valuation methodologies for the ERF are in accordance with best practices and generally accepted accounting principles
- Recommendations: DPFP
  - Consider a decrease to the investment return assumption to the DPFP to reflect the potential liquidity risk
  - Disclose an amortization period based on the most realistic assumptions and methods
  - Provide clarification regarding the impact of future assumption and method changes

Next Steps

- Review and monitor plans' administrators implementation of the recommendations
- Work with the Plans' actuaries to determine the net pension liability and related note disclosures as required under GASB Statement 68 for FY 2015 Financial Statements

APPENDICES

- Appendix 1: Actuarial Audit Report and Responses for the Employees' Retirement Fund
- Appendix 2: Actuarial Audit Asset Review for the Employees' Retirement Fund
- Appendix 3: Actuarial Audit Report and Responses for the Dallas Police and Fire Pension Systems

Actuarial Audit of the 12/31/2008 – 12/31/2012 Valuations for the

Retirement Plan for the Employees' Retirement Fund of the

City of Dallas

Final Report in Accordance with Section 802.1012(f) of the Texas Government Code

October 15, 2014

FOSTER & FOSTER
ACTUARIES AND CONSULTANTS

FOSTER & FOSTER
ACTUARIES AND CONSULTANTS

October 15, 2014

Ms. Jeanne Chipperfield
Chief Financial Officer
City of Dallas
1500 Marilla St. Room 4DN
Dallas, TX 75201

Re: Retirement Plan for the Employees' Retirement Fund of the City of Dallas
Actuarial Audit 12/31/2008 – 12/31/2012 Valuation Reports

Dear Ms. Chipperfield:

The following report presents the results of the actuarial audit of the above referenced plan for the valuation years December 31, 2008 through December 31, 2012, as required by the Texas Government Code Section 802.1012.

An overview of our findings is included in the Summary of Findings and Recommendations section below. The balance of this Report presents details of the audit.

The recommendations provided in this report are intended to identify possible suggestions that might improve understanding of the actuarial services provided. Some comments may be viewed as personal preference; however, the intention was not to impose preferences, but to improve the actuarial functions.

This report has been prepared for use by the City and Board in their oversight role with regard to the Fund. It has been prepared using Foster and Foster, Inc. valuation systems in a manner that would be used by Foster & Foster to prepare a full actuarial valuation of the Fund. We recognize the many complex calculations involved in performing an actuarial valuation. Therefore, small differences between valuation systems can produce noticeable differences in the valuation results between two actuaries.

In preparing this report, we relied without audit on data furnished by the retirement system and the Fund Actuary, Gabriel Roeder Smith & Company. This data includes employee data, value of plan assets and other plan financial information. We have reviewed this data for reasonableness and for consistency with previously supplied information. If any of the information summarized in the report is inaccurate or incomplete, the results shown could be materially affected and this report may need to be revised.

The actuarial methods and assumptions, including discount rates, mortality tables and others identified in this report are those used by the Fund Actuary. They are either prescribed by statute or adopted by the Board and approved by the Board. These parties are responsible for selecting the plan's funding policy, actuarial valuation methods, asset valuation methods and assumptions. The complete methods and assumptions are summarized in the actuarial reports furnished by the Fund Actuary. We have included a description of most in the following report.

The replicated valuation results are only estimates of the Plans' financial condition as of single dates. The estimates can neither predict the future condition nor guarantee financial soundness. Actuarial valuations do not affect the ultimate costs of System benefits, only the timing of contributions. The valuation is based on one array of reasonable assumptions (individually and in the aggregate). Other assumption sets may also be

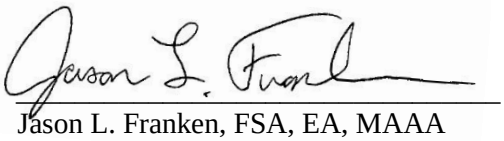
reasonable, and valuations based on those assumptions would be different and also correct. Determining results using alternative assumptions was not within the scope of the engagement.

Future actuarial measurements may differ significantly from the current measurements due to the following: plan experience that differs from the experience anticipated by the economic and demographic assumptions; changes in assumptions or methods; changes in plan provisions and applicable law. The potential range of future measurements was outside the scope of the assignment.

To the best of our knowledge, this report is complete and accurate and was prepared in accordance with generally accepted actuarial principles as prescribed by the American Academy of Actuaries. The undersigned is a member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

FOSTER & FOSTER INC.

By: 

Jason L. Franken, FSA, EA, MAAA

Retirement Plan for the Employees' Retirement Fund of the City of Dallas Actuarial Audit for 12/31/2008 – 12/31/2012 Valuation Reports

A. INTRODUCTION

Foster & Foster has been retained by the City of Dallas to satisfy the audit requirements of the Texas Government Code Section 802.1012. This audit report covers actuarial valuations for the years December 31, 2008 through December 31, 2012 for the Retirement Plan for the Employees' Retirement Fund of the City of Dallas

An actuarial valuation provides a best estimate of the System's liabilities and contribution levels at a particular point in time. This estimate helps ensure that current assets and future contribution requirements will be sufficient to provide benefits promised to members. Future liabilities are determined by applying a set of actuarial assumptions to project the occurrence, amount and timing of benefits that will become payable according to current plan provisions. The extent to which an actuarial valuation accurately measures a plan's liabilities and contribution levels depends on how well the actuarial assumptions predict future plan experience.

An actuarial audit provides assurance that the actuarial valuation work is being performed accurately and in accordance with generally accepted actuarial principles. In addition, the reviewing actuary can identify areas of improvement that may increase the value and understanding of the actuarial services provided to the retirement system.

As requested, we have replicated the valuation results corresponding to the December 31, 2008 to December 31, 2012 reports as performed by the Fund Actuary. In addition, this report discusses our findings and recommendations and details the processes we used to perform our review.

Please note that the contents displayed throughout the remainder of this report are in compliance and consistent with the Actuarial Standards of Practice described below.

Actuarial Standards of Practice

The Actuarial Standards Board has provided coordinated guidance through of a series of Actuarial Standards of Practice (ASOP) for measuring pension obligations and determining pension plan costs or contributions. The ASOPs that apply specifically to valuing pensions are as follows:

- ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*, which ties together the standards shown below, provides guidance on actuarial cost methods, and addresses overall considerations for measuring pension obligations and determining plan costs or contributions

- ASOP No. 23 *Data Quality*

- ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*

- ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*

- ASOP No. 41, *Actuarial Communications*

- ASOP No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations*

When applicable, further details of the ASOP associated with the reviewed actuarial assumption will be provided in the experience analysis, which is the basis for the remainder of the report.

B. SUMMARY OF FINDINGS AND RECOMMENDATIONS

In performing the review and replication of the actuarial valuations, we completed the following:

- Review of data used in the valuations as described in the previous section
- Assessment of the plan provisions to be valued
- An analysis of the actuarial assumptions to be applied
- A review of the reported value of plan assets as of the valuation date
- Preparation of the actuarial calculations
- Review of sample lives
- Summarizing the results

The above was completed in accordance with the requirements of Texas statutes and the Actuarial Standards of Practice.

Below is a summary of our key findings and proposed changes. The remainder of the document outlines our analysis and documents our recommendations.

Data – The data used for the Employees' Retirement Fund valuations was found to satisfy the Actuarial Standards of Practice. However, when screening the data elements from one year to the next, we recognized some inconsistencies in the data furnished. The specific inconsistencies are described in the Review of Data section of the report. We recommend that the Fund Actuary perform a detailed screen of all data components necessary to compute actuarial liabilities prior to completion of the valuation report.

Replication of Results – The calculations by the Fund Actuary were reasonably consistent with our own separate calculations. Foster & Foster was able to replicate the valuation results within a reasonable degree of tolerance. We have noted differences in calculations and methodologies in the Review and Replication of Valuation Results section. Specific recommendations regarding methods and assumptions are listed below.

Methods and assumptions – In general, we believe that the assumptions and methods employed the Fund Actuary are consistent with the Actuarial Standards of Practice. We are recommending the following to fully and fairly disclose the position of the Fund:

- Expand the description of the actuarial value of asset method to clearly state that the annual gain/loss determination is utilized by comparing actual market value of assets to an expected market asset value which is derived from the prior year actuarial asset amount.
- Calculate and properly disclose the funding period required to amortize the Unfunded Actuarial Accrued Liability in future valuation reports.

Valuation Report – Generally the report conforms to the Actuarial Standards of Practice. However, we are recommending additional documentation in the report to fully and fairly disclose the plan. See the Review of Valuation Report section for a complete list.

Assumptions – In general, the current assumptions conform to Actuarial Standards of Practice. The Fund Actuary currently has procedures in place to monitor ongoing experience versus plan assumptions. Below are some of the highlights that we have commented on as part of our review:

- We recommend the Fund Actuary consider implementing an assumption to account for projected future mortality improvements, or, at a minimum, remove the current set forward adjustments that are being utilized.
- The actual rates of withdrawal appear to be noticeably greater than expected in the first ten years of employment. We recommend the Fund Actuary continue to monitor this experience closely to determine if a reduction in the assumed rates is warranted.
- The covered payroll and active force of the plan have decreased over the audit period. We recommend that the Fund Actuary work alongside the Board to determine if a positive payroll growth assumption remains to be justifiable.

Benefit Calculation – We are recommending that the Board reviews certain aspects of the benefit calculations performed for individual members to ensure they comply with the pension statute. See the Review of Sample Benefit Calculation for the details of our recommendations.

C. AUDIT OF ACTUARIAL VALUATIONS FOR YEARS 2008 - 2012

The following pages detail the results of the actuarial audit.

1) Review of Data

The following discusses the completeness, quality and consistency of the data provided by the Fund Actuaries. The analysis includes an assessment of the actuaries' reconciliation of year over year data and data adjustment procedures. A complete assessment of the data process from receipt from the System through preparation of the valuation was not determined.

Actuarial Standard of Practice No. 23, *Data Quality*, provides guidance for determining if data is appropriate for its intended purpose and whether it is sufficiently reasonable, consistent and comprehensive.

While some data inconsistencies were apparent during our review, it is our opinion that the effect was immaterial on the overall liability calculations. Therefore, the data used in the 2008 – 2012 Employees' Retirement Fund valuations was generally found to satisfy the requirements of ASOP No. 23.

To validate the data, we completed the following:

- Data reconciliation - A year-over-year reconciliation of data over the studied period
- Data adequacy check - Verified the data included necessary components required to perform valuation calculations
- Data consistency check - Verified that year-over-year changes in data elements were reasonable.

Data Reconciliation

The year-over-year reconciliation of data indicated that the valuation data provided was generally consistent and appeared to include the necessary members.

For the reconciliation of data for all years reviewed, Active members that appeared in prior year's data, but not on the next year's data were not vested for the most part and assumed to be terminated without a vested benefit. Based on our analysis, we found that approximately 15% appeared to be vested and assumed to have received refunds. Given the relatively high employee contribution rates, combined with the fact that terminated vested members are required to defer commencement of pension benefits to age 60, we believe the results exemplified through our data analysis to be in a reasonable range.

It is possible that the Fund Actuary verified and confirmed that the vested members received refunds and have no further liability from the system. The valuation data received from the audit included only the members included in each year's valuation. The Fund Actuary should confirm that the members who dropped off the data from one year to the next are not due any future benefit from the system.

Retirees and survivors that appeared in a prior year's data, but not on the next year's data appeared to have deceased.

Data Adequacy

The valuation data used for the 2008 through 2012 actuarial valuations was found to include all data elements necessary to complete the valuations.

Data Consistency

We analyzed the year-over-year changes in various data elements used in the valuations. Namely, we compared salary increases, service increases, birth date changes, and gender code changes.

The year-over-year changes were generally within a reasonable range. However, there were a few instances of inconsistency that we feel need to be highlighted. It is important to point out that that it is our opinion that the data inconsistencies shown below have an insignificant impact to the overall liabilities of the Fund:

- 12-31-2008 to 12-31-2009: No inconsistencies of substance to mention
- 12-31-2009 to 12-31-2010: 1,525 inactive beneficiaries birth dates changed
- 12-31-2010 to 12-31-2011: No inconsistencies of substance to mention
- 12-31-2011 to 12-31-2012: 371 inactive gender codes changed, 330 inactive beneficiaries birth dates changed, and 715 inactive beneficiaries gender codes changed

Findings/Recommendations

The data used for the 2008 through 2012 Employees' Retirement Fund valuations was adequate and appeared to satisfy the applicable Actuarial Standards of Practice. However, we strongly recommend that the Fund Actuary perform a detailed screen of the valuation data from one year to the next to ensure that any inconsistencies similar to the ones shown above are resolved prior to completion of the annual valuation report.

2) Review and Replication of Valuation Results

The following section details the results of the review and replication of the valuation results for the Employees' Retirement Fund valuations for the years 2008 through 2012. The replication of actuarial valuations was completed independently from the work of the Fund Actuary. After completing the work we reviewed liabilities for select participants to verify and identify any key differences. In addition, we contacted the Fund Actuary to clarify methods.

The actuarial valuation process, while sophisticated in its calculation methodology, is an estimate of the financial value of benefits payable on contingent events, most of which occur many years into the future. As such, the estimates contain a considerable amount of uncertainty and variability. As actuaries, we recognize this fact and are comfortable that small differences in the results do not change the overall financial results portrayed in the valuation. Furthermore, the actuarial software used by different firms has implicit differences that create variances in valuation numbers. For these reasons, we have displayed the comparison of results in terms of percentage differences. In a replication audit, we generally expect to be within 1% to 2% for the calculation of present value of future benefits and within 4% to 5% for the calculation of actuarial accrued liability and normal cost. The wider band of acceptable differences for accrued liability and normal cost is due to various methods that can be used to allocate the present value of future benefits to past and future years of service.

The following pages include detailed exhibits which display the results of the annual valuation replications for the years 2008 through 2012. Included is a summary of the valuation results of the Fund Actuary, the valuation results completed by Foster & Foster and a comparison of the two sets of results.

As can be seen from the replication exhibits, Foster & Foster was able to match most of the key valuation results very close to or within the expected corridor previously stated above. The average differences over the five years studied between Foster & Foster's results when compared to the Fund Actuary, for the three most essential components of actuarial liability calculations, are as follows:

- Present Value of Future Benefits: 1.72%
- Actuarial Accrued Liability: 0.69%
- Total Normal Cost: 3.33%

Based on these results, it is our professional assessment that the Fund Actuary has consistently provided a reasonable valuation in regards to the financial position of the Retirement Plan for the Employees' Retirement Fund of the City of Dallas. With that said, however, there are areas in the remainder of this report where we have provided recommendations or other findings that we believe will contribute to enhancing the annual valuation product that is delivered to the Board of Trustees.

Note the following with regard to differences in the calculations:

- Covered payroll – The December 31, 2008 and December 31, 2009 valuations performed by the Fund Actuary reflected a covered payroll amount that equaled the gross pay for the calendar year ending on the valuation date, unless the gross pay is less than 90% of the member's rate of compensation. Beginning with the December 31, 2010 valuation, the methodology was updated to reflect a covered payroll figure that equaled the greater of the gross pay received for the calendar year ending on the valuation date and the member's then current rate of compensation.

On an individual basis, this covered payroll figure is used as the "beginning" salary as of the valuation date for purposes of projecting future benefits and future pay, and therefore is instrumental in determining the liability associated based on each individual's demographic information as of the valuation date. The Foster & Foster results presented in the replication exhibits use the same starting pay figure as the Fund Actuary, but reflect a covered payroll amount that incorporates a half-year adjustment for assumed salary increases in the calendar year following the valuation date. This approach was taken following correspondence with the Fund Actuary and review of the individual sample lives that were provided. We believe that our approach provides a covered payroll figure that is consistent with the methodology that is utilized for purposes of calculating the actuarial liability calculations, while the Fund Actuary's approach provides a small disconnect between the two. It is our recommendation that the Fund Actuary eliminate this disconnect in future valuations in order to present a covered payroll figure that matches the expected pay amount that is being used when projecting future benefits.

- Funding period required to amortize UAAL calculations – the Fund Actuary did not disclose the funding period in any of the valuation reports. See the Review of Methods and Procedures section for a detailed discussion regarding this issue.
- Asset calculations –we relied on the provided components used to determine the actuarial value of assets as provided in the actuarial reports. Using these values and the methodology supplied in the report, we were able to replicate the actuarial values of assets calculated by the Fund Actuary.

Retirement Plan for the Employees' Retirement Fund of the City of Dallas
December 31, 2012 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

	Fund Actuary	Foster & Foster	Comparison
1. Payroll Figures			
a. Covered Payroll	330,536,000	337,717,438	2.17%
b. Payroll under Assumed Retirement Age	N/A	335,004,892	
2. Actuarial Present Value of Future Salaries	N/A	3,157,805,485	
3. Actuarial Present Value of Future Benefits			
a. Active Members	1,539,845,000	1,559,304,476	1.26%
b. Benefit Recipients	2,250,533,000	2,267,123,077	0.74%
c. Other Inactive	86,052,000	85,798,705	-0.29%
d. Total	3,876,430,000	3,912,226,258	0.92%
4. Normal Cost	56,252,000	56,628,015	0.67%
as % of Expected Payroll	17.30%	17.07%	-1.33%
5. Actuarial Accrued Liability			
a. Active Members	1,181,771,000	1,176,609,610	-0.44%
b. Benefit Recipients	2,250,533,000	2,267,123,077	0.74%
c. Other Inactive	86,052,000	85,798,705	-0.29%
d. Total	3,518,356,000	3,529,531,392	0.32%
6. Actuarial Present Value of Future Normal Costs (3d - 5d)	358,074,000	382,694,867	
7. Actuarial Value of Assets	2,846,124,000	2,846,124,000	0.00%
8. Unfunded Actuarial Accrued Liability (UAAL) (5d - 7)	672,232,000	683,407,392	
9. Funded Ratio	80.9%	80.6%	
10. 30-Year Funding Cost			
a. Amortization Rate	12.85%	12.79%	
b. Normal Cost Rate	17.30%	17.07%	
c. Administrative Expenses	1.03%	0.99%	
d. Total	31.18%	30.85%	
11. Contribution Rates (Beginning 10/1/2013)			
a. Prior Adjusted Total Obligation Rate	32.08%	32.52%	
b. Actuarially Required Contribution Rate (10d)	31.18%	30.85%	
c. Pension Obligation Credit Rate	9.29%	9.09%	
d. Current Total Obligation Rate (11b + 11c)	40.47%	39.94%	
e. Current Adjusted Total Obligation Rate [1]	35.29%	35.77%	
f. Allocation of Contribution Rates			
i. Member (11e * 0.37)	13.06%	13.24%	
ii. City (11e * 0.63)	22.23%	22.53%	
12. City Contribution Margin over/(under) 30-Year Cost			
a. Total 30-Year Funding Cost (10d)	31.18%	30.85%	
b. Member Rate (11f (i))	13.06%	13.24%	
c. Required City 30-Year Funding Rate (11a - 11b)	18.12%	17.61%	
d. Actual City Rate (11 f (ii))	22.23%	22.53%	
e. City Portion Allocated to Pension Obligation Bond (11c)	9.29%	9.09%	
f. City Portion Allocated to 30-Year Cost (12d - 12e)	12.94%	13.44%	
g. City Margin over/(under) 30-Year Cost (12f - 12c)	-5.18%	-4.17%	
13. Funding period to amortize UAAL	N/A	52.4 years	

Retirement Plan for the Employees' Retirement Fund of the City of Dallas
December 31, 2012 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members			
Count	6,864	6,864	0.00%
Covered payroll	330,536,000	337,717,438	2.17%
Average annual payroll	48,155	49,201	2.17%
Inactive members			
Benefit Recipients	6,320	6,321	0.02%
Terminated with deferred benefits	722	722	0.00%
Other terminated	321	321	0.00%
Total	7,363	7,364	0.01%
Total annual retirement benefit	202,120,582	202,114,590	0.00%
Total annual health supplement	9,193,000	9,193,165	0.00%
Average annual benefit	33,436	33,429	-0.02%
Inactive members with refunds due			
Number	321	321	0.00%
Accumulated contribution balance	2,296,000	2,296,000	0.00%

Retirement Plan for the Employees' Retirement Fund of the City of Dallas
December 31, 2011 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

	Fund Actuary	Foster & Foster	Comparison
1. Payroll Figures			
a. Covered Payroll	309,682,000	316,297,128	2.14%
b. Payroll under Assumed Retirement Age	N/A	314,317,670	
2. Actuarial Present Value of Future Salaries	N/A	1,980,926,947	
3. Actuarial Present Value of Future Benefits			
a. Active Members	1,451,801,000	1,484,620,963	2.26%
b. Benefit Recipients	2,181,731,000	2,205,743,812	1.10%
c. Other Inactive	83,419,000	83,315,387	-0.12%
d. Total	3,716,951,000	3,773,680,162	1.53%
4. Normal Cost	51,587,000	53,209,032	3.14%
as % of Expected Payroll	17.09%	17.10%	0.06%
5. Actuarial Accrued Liability			
a. Active Members	1,126,502,000	1,123,275,410	-0.29%
b. Benefit Recipients	2,181,731,000	2,205,743,812	1.10%
c. Other Inactive	83,419,000	83,315,387	-0.12%
d. Total	3,391,652,000	3,412,334,609	0.61%
6. Actuarial Present Value of Future Normal Costs (3d - 5d)	325,299,000	361,345,553	
7. Actuarial Value of Assets	2,916,746,000	2,916,746,000	0.00%
8. Unfunded Actuarial Accrued Liability (UAAL) (5d - 7)	474,906,000	495,588,609	4.36%
9. Funded Ratio	86.0%	85.5%	
10. 30-Year Funding Cost			
a. Amortization Rate	9.69%	9.91%	
b. Normal Cost Rate	17.09%	17.10%	
c. Administrative Expenses	1.11%	1.10%	
d. Total	27.89%	28.11%	
11. Contribution Rates (Beginning 10/1/2013)			
a. Prior Adjusted Total Obligation Rate	29.16%	29.56%	
b. Actuarially Required Contribution Rate (10d)	27.89%	28.11%	
c. Pension Obligation Credit Rate	9.73%	9.52%	
d. Current Total Obligation Rate (11b + 11c)	37.62%	37.63%	
e. Current Adjusted Total Obligation Rate [1]	32.08%	32.52%	
f. Allocation of Contribution Rates			
i. Member (11e * 0.37)	11.87%	12.03%	
ii. City (11e * 0.63)	20.21%	20.49%	
12. City Contribution Margin over/(under) 30-Year Cost			
a. Total 30-Year Funding Cost (10d)	27.89%	28.11%	
b. Member Rate (11f (i))	11.87%	12.03%	
c. Required City 30-Year Funding Rate (11a - 11b)	16.02%	16.08%	
d. Actual City Rate (11 f (ii))	20.21%	20.49%	
e. City Portion Allocated to Pension Obligation Bond (11c)	9.73%	9.52%	
f. City Portion Allocated to 30-Year Cost (12d - 12e)	10.48%	10.97%	
g. City Margin over/(under) 30-Year Cost (12f - 12c)	-5.54%	-5.11%	
13. Funding period to amortize UAAL	N/A	Infinite	

Retirement Plan for the Employees' Retirement Fund of the City of Dallas
December 31, 2011 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members			
Count	6,745	6,745	0.00%
Covered payroll	309,682,000	316,297,128	2.14%
Average annual payroll	45,913	46,894	2.14%
Inactive members			
Benefit Recipients	6,199	6,199	0.00%
Terminated with deferred benefits	698	698	0.00%
Other terminated	349	349	0.00%
Total	7,246	7,246	0.00%
Total annual retirement benefit	193,851,170	193,851,056	0.00%
Total annual health supplement	9,066,000	9,065,640	0.00%
Average annual benefit	32,734	32,734	0.00%
Inactive members with refunds due			
Number	349	349	0.00%
Accumulated contribution balance	2,035,000	2,035,000	0.00%

Retirement Plan for the Employees' Retirement Fund of the City of Dallas
December 31, 2010 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

	Fund Actuary	Foster & Foster	Comparison
1. Payroll Figures			
a. Covered Payroll	322,374,000	329,357,699	2.17%
b. Payroll under Assumed Retirement Age	N/A	327,196,428	
2. Actuarial Present Value of Future Salaries	N/A	2,083,345,523	
3. Actuarial Present Value of Future Benefits			
a. Active Members	1,495,225,000	1,539,435,121	2.96%
b. Benefit Recipients	2,041,322,000	2,054,658,872	0.65%
c. Other Inactive	81,231,000	82,275,484	1.29%
d. Total	3,617,778,000	3,676,369,477	1.62%
4. Normal Cost	52,993,000	54,978,267	3.75%
as % of Expected Payroll	16.82%	16.97%	0.89%
5. Actuarial Accrued Liability			
a. Active Members	1,159,573,000	1,161,761,561	0.19%
b. Benefit Recipients	2,041,322,000	2,054,658,872	0.65%
c. Other Inactive	81,231,000	82,275,484	1.29%
d. Total	3,282,126,000	3,298,695,917	0.50%
6. Actuarial Present Value of Future Normal Costs (3d - 5d)	335,652,000	377,673,561	
7. Actuarial Value of Assets	3,027,439,000	3,027,439,000	0.00%
8. Unfunded Actuarial Accrued Liability (UAAL) (5d - 7)	254,687,000	271,256,917	
9. Funded Ratio	92.2%	91.8%	
10. 30-Year Funding Cost			
a. Amortization Rate	4.99%	5.21%	
b. Normal Cost Rate	16.82%	16.97%	
c. Administrative Expenses	1.00%	0.99%	
d. Total	22.81%	23.17%	
11. Contribution Rates (Beginning 10/1/2013)			
a. Prior Adjusted Total Obligation Rate	26.51%	26.98%	
b. Actuarially Required Contribution Rate (10d)	22.81%	23.17%	
c. Pension Obligation Credit Rate	9.18%	8.98%	
d. Current Total Obligation Rate (11b + 11c)	31.99%	32.15%	
e. Current Adjusted Total Obligation Rate [1]	29.16%	29.56%	
f. Allocation of Contribution Rates			
i. Member (11e * 0.37)	10.79%	10.94%	
ii. City (11e * 0.63)	18.37%	18.62%	
12. City Contribution Margin over/(under) 30-Year Cost			
a. Total 30-Year Funding Cost (10d)	22.81%	23.17%	
b. Member Rate (11f (i))	10.79%	10.94%	
c. Required City 30-Year Funding Rate (11a - 11b)	12.02%	12.23%	
d. Actual City Rate (11 f (ii))	18.37%	18.62%	
e. City Portion Allocated to Pension Obligation Bond (11c)	9.18%	8.98%	
f. City Portion Allocated to 30-Year Cost (12d - 12e)	9.19%	9.64%	
g. City Margin over/(under) 30-Year Cost (12f - 12c)	-2.83%	-2.59%	
13. Funding period to amortize UAAL	N/A	48.2 years	

Retirement Plan for the Employees' Retirement Fund of the City of Dallas
December 31, 2010 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members			
Count	7,034	7,034	0.00%
Covered payroll	322,374,000	329,357,699	2.17%
Average annual payroll	45,831	46,824	2.17%
Inactive members			
Benefit Recipients	5,993	5,993	0.00%
Terminated with deferred benefits	702	702	0.00%
Other terminated	409	409	0.00%
Total	7,104	7,104	0.00%
Total annual retirement benefit	179,730,384	179,730,431	0.00%
Total annual health supplement	8,741,000	8,740,762	0.00%
Average annual benefit	31,449	31,449	0.00%
Inactive members with refunds due			
Number	409	409	0.00%
Accumulated contribution balance	1,909,000	1,909,000	0.00%

Retirement Plan for the Employees' Retirement Fund of the City of Dallas
December 31, 2009 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

	Fund Actuary	Foster & Foster	Comparison
1. Payroll Figures			
a. Covered Payroll	364,237,000	372,049,034	2.14%
b. Payroll under Assumed Retirement Age	N/A	370,065,977	
2. Actuarial Present Value of Future Salaries	N/A	2,309,662,664	
3. Actuarial Present Value of Future Benefits			
a. Active Members	1,658,668,000	1,726,794,320	4.11%
b. Benefit Recipients	1,834,491,000	1,845,917,493	0.62%
c. Other Inactive	73,053,000	73,613,437	0.77%
d. Total	3,566,212,000	3,646,325,250	2.25%
4. Normal Cost	59,020,000	61,581,909	4.34%
as % of Expected Payroll	16.46%	16.81%	2.13%
5. Actuarial Accrued Liability			
a. Active Members	1,284,576,000	1,307,545,146	1.79%
b. Benefit Recipients	1,834,491,000	1,845,917,493	0.62%
c. Other Inactive	73,053,000	73,613,437	0.77%
d. Total	3,192,120,000	3,227,076,076	1.10%
6. Actuarial Present Value of Future Normal Costs (3d - 5d)	374,092,000	419,249,174	
7. Actuarial Value of Assets	3,031,652,000	3,031,652,000	0.00%
8. Unfunded Actuarial Accrued Liability (UAAL) (5d - 7)	160,468,000	195,424,076	
9. Funded Ratio	95.0%	93.9%	
10. 30-Year Funding Cost			
a. Amortization Rate	2.78%	3.32%	
b. Normal Cost Rate	16.46%	16.81%	
c. Administrative Expenses	0.91%	0.90%	
d. Total	20.15%	21.03%	
11. Contribution Rates (Beginning 10/1/2013)			
a. Prior Adjusted Total Obligation Rate	24.76%	24.98%	
b. Actuarially Required Contribution Rate (10d)	20.15%	21.03%	
c. Pension Obligation Credit Rate	8.11%	7.94%	
d. Current Total Obligation Rate (11b + 11c)	28.26%	28.97%	
e. Current Adjusted Total Obligation Rate [1]	26.51%	26.98%	
f. Allocation of Contribution Rates			
i. Member (11e * 0.37)	9.81%	9.98%	
ii. City (11e * 0.63)	16.70%	17.00%	
12. City Contribution Margin over/(under) 30-Year Cost			
a. Total 30-Year Funding Cost (10d)	20.15%	21.03%	
b. Member Rate (11f (i))	9.81%	9.98%	
c. Required City 30-Year Funding Rate (11a - 11b)	10.34%	11.05%	
d. Actual City Rate (11 f (ii))	16.70%	17.00%	
e. City Portion Allocated to Pension Obligation Bond (11c)	8.11%	7.94%	
f. City Portion Allocated to 30-Year Cost (12d - 12e)	8.59%	9.06%	
g. City Margin over/(under) 30-Year Cost (12f - 12c)	-1.75%	-1.99%	
13. Funding period to amortize UAAL	N/A	47.9 years	

Retirement Plan for the Employees' Retirement Fund of the City of Dallas
December 31, 2009 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members			
Count	7,654	7,654	0.00%
Covered payroll	364,237,000	372,049,034	2.14%
Average annual payroll	47,588	48,608	2.14%
Inactive members			
Benefit Recipients	5,706	5,706	0.00%
Terminated with deferred benefits	655	655	0.00%
Other terminated	564	564	0.00%
Total	6,925	6,925	0.00%
Total annual retirement benefit	165,826,328	165,850,404	0.01%
Total annual health supplement	8,317,000	8,317,332	0.00%
Average annual benefit	30,519	30,524	0.01%
Inactive members with refunds due			
Number	564	564	0.00%
Accumulated contribution balance	3,644,000	3,644,000	0.00%

Retirement Plan for the Employees' Retirement Fund of the City of Dallas
December 31, 2008 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

	Fund Actuary	Foster & Foster	Comparison
1. Payroll Figures			
a. Covered Payroll	378,021,000	387,108,263	2.40%
b. Payroll under Assumed Retirement Age	N/A	385,083,129	
2. Actuarial Present Value of Future Salaries	N/A	2,406,250,442	
3. Actuarial Present Value of Future Benefits			
a. Active Members	1,691,444,000	1,760,675,310	4.09%
b. Benefit Recipients	1,707,599,000	1,715,333,316	0.45%
c. Other Inactive	62,173,000	63,384,649	1.95%
d. Total	3,461,216,000	3,539,393,275	2.26%
4. Normal Cost	60,689,000	63,560,402	4.73%
as % of Expected Payroll	16.34%	16.67%	2.02%
5. Actuarial Accrued Liability			
a. Active Members	1,305,613,000	1,324,992,560	1.48%
b. Benefit Recipients	1,707,599,000	1,715,333,316	0.45%
c. Other Inactive	62,173,000	63,384,649	1.95%
d. Total	3,075,385,000	3,103,710,525	0.92%
6. Actuarial Present Value of Future Normal Costs (3d - 5d)	385,831,000	435,682,750	
7. Actuarial Value of Assets	2,957,506,000	2,957,506,000	0.00%
8. Unfunded Actuarial Accrued Liability (UAAL) (5d - 7)	117,879,000	146,204,525	
9. Funded Ratio	96.2%	95.3%	
10. 30-Year Funding Cost			
a. Amortization Rate	1.97%	2.39%	
b. Normal Cost Rate	16.34%	16.67%	
c. Administrative Expenses	0.86%	0.85%	
d. Total	19.17%	19.91%	
11. Contribution Rates (Beginning 10/1/2013)			
a. Prior Adjusted Total Obligation Rate	22.71%	22.71%	
b. Actuarially Required Contribution Rate (10d)	19.17%	19.91%	
c. Pension Obligation Credit Rate	7.64%	7.46%	
d. Current Total Obligation Rate (11b + 11c)	26.81%	27.37%	
e. Current Adjusted Total Obligation Rate [1]	24.76%	24.98%	
f. Allocation of Contribution Rates			
i. Member (11e * 0.37)	9.16%	9.24%	
ii. City (11e * 0.63)	15.60%	15.74%	
12. City Contribution Margin over/(under) 30-Year Cost			
a. Total 30-Year Funding Cost (10d)	19.17%	19.91%	
b. Member Rate (11f (i))	9.16%	9.24%	
c. Required City 30-Year Funding Rate (11a - 11b)	10.01%	10.67%	
d. Actual City Rate (11 f (ii))	15.60%	15.74%	
e. City Portion Allocated to Pension Obligation Bond (11c)	7.64%	7.46%	
f. City Portion Allocated to 30-Year Cost (12d - 12e)	7.96%	8.28%	
g. City Margin over/(under) 30-Year Cost (12f - 12c)	-2.05%	-2.39%	
13. Funding period to amortize UAAL	N/A	103.2 years	

Retirement Plan for the Employees' Retirement Fund of the City of Dallas
December 31, 2008 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members			
Count	8,371	8,371	0.00%
Covered payroll	378,021,000	387,108,263	2.40%
Average annual payroll	45,158	46,244	2.40%
Inactive members			
Benefit Recipients	5,476	5,476	0.00%
Terminated with deferred benefits	583	583	0.00%
Other terminated	509	509	0.00%
Total	6,568	6,568	0.00%
Total annual retirement benefit	154,692,846	154,692,852	0.00%
Total annual health supplement	7,988,000	7,988,304	0.00%
Average annual benefit	29,708	29,708	0.00%
Inactive members with refunds due			
Number	509	509	0.00%
Accumulated contribution balance	3,888,000	3,888,000	0.00%

As part of the replication process, Foster & Foster also reviewed liabilities for the following categories of participants in the Retirement Plan for the Employees' Retirement Fund:

- Active member vested, not eligible for service retirement
- Active member currently eligible for service retirement
- Active member hired in 2012, approximately 20 years of age
- Active member hired in 2012, approximately 44 years of age
- Three (3) service retirees
- Two (2) QDRO recipients
- Two (2) spousal beneficiaries
- Three (3) disabled retirees
- Three (3) deferred vested participants

For each of the sample lives the present value of future benefits, present value of future salaries and accrued liabilities mimicked the results seen for the population.

3) Review of Actuarial Methods and Procedures

The review of actuarial methods and procedures will determine if the actuarial cost method, actuarial asset valuation method and amortization method are reasonable and consistent with generally accepted actuarial practice and principles. A general discussion of methods is provided first, followed by specific observations and recommendations, if applicable.

Actuarial Cost Method

Actuarial Standard of Practice No. 4, *Measuring Pension Obligations*, states that an acceptable actuarial cost method meets the following criteria:

- Allocates costs over the period of time that benefits are earned; and
- Allocates costs on a basis that has a logical relationship to the plan's benefit formula

Current methodology - Liabilities and contributions for the Employees' Retirement Fund are calculated using the Individual Entry Age Normal Cost Method.

The objective under this method is to fund each member's benefits under the Plan as payments which are level as a percentage of salary, starting at original participation date and continuing until the assumed date of retirement, termination, disability or death.

At any given date, a liability is calculated equal to the contributions which would have been accumulated if the funding method had always been used, the current plan provisions always in place, and all assumptions had been precisely accurate. The difference between this liability and the value of assets is the unfunded accrued liability. Specifically, the components of this method are determined as follows:

- Normal cost – For each active member under the assumed retirement age, a normal cost is determined by applying to earnings the level percentage of salary which, if contributed each year

from date of entry into the Plan until the assumed retirement (termination, disability or death) date, is sufficient to provide the full value of the benefits expected to be payable.

- The present value of the future normal costs - Equals the total of the discounted values of all active members' normal cost, assuming they are paid from the valuation date until retirement (termination, disability or death) date.
- The present value of projected benefits is calculated as the value of all benefit payments expected to be paid to the Plan's current members, including active and retired members, beneficiaries and terminated members with vested rights.
- The accrued liability is the excess of the present value of projected benefits over the present value of future normal costs.
- The unfunded accrued liability is the excess of the accrued liability over the assets of the Fund. It represents the portion of the accrued liability which has not been funded by accumulated past contributions.

Findings and recommendations – The actuarial reports completed by the Fund Actuary describe and apply the Entry Age Normal cost method in a manner consistent with that described above.

Actuarial Asset Method

Actuarial Standard of Practice No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations*, outlines considerations and guidelines for selecting an appropriate asset valuation method. When selecting an actuarial asset valuation method other than market value, the actuary should "select an asset valuation method that is designed to produce actuarial values of assets that bear a reasonable relationship to the corresponding market values." Specifically, the method should include the following:

- Actuarial value of assets will be sometimes greater and sometimes less than corresponding market values.
- Method should be likely to produce actuarial values that satisfy both of the following:
    - Asset values fall within a reasonable range around corresponding market values
    - Differences between actuarial value of assets and market value are recognized within a reasonable period of time

  In lieu of the above, the criteria are satisfied if, in the actuary's professional judgment, the asset method either produces values within a sufficiently narrow range around market value or recognizes differences from market value in a sufficiently short period.

Current methodology – Based on the description in the December 31, 2012 actuarial valuation completed by the Fund Actuary, the actuarial asset value is determined by calculating the expected actuarial value of assets and incorporating an adjustment to recognize 20% of the investment gain/loss each year. Consistent with this definition, the development of the actuarial value of assets displayed in the valuation report calculates the expected investment earnings by multiplying the assumed rate of return (8.25%) by the prior year's actuarial value of assets, and includes an adjustment for the net cash flows (non-investment related) realized by the Fund during the year (contributions, benefit payments, administrative expenses, etc.). In our opinion, the methodology utilized in determining the annual gain/loss which is phased in over a five year period is not clearly stated in the report. The approach applied is to calculate an expected market asset value by adding the prior year's market value of assets with the non-investment

related cash flows and the expected investment return (based on the prior year actuarial asset value, as previously described). The resulting value is compared to the actual market value of assets in order to determine the gain or loss in that year. Once determined, 20% of the calculated gain/loss amounts for that year and each of the previous four years are added to determine the total recognized amount of applicable gains or losses. The final actuarial asset value utilized for valuation purposes is determined by adding the recognized gains (or subtracting recognized losses) to the previously calculated expected actuarial value of assets.

Over the course of the audit period, the Fund Actuary changed the asset method to phase investment gains and losses over a five-year period instead of the previously utilized three-year period, effective with the December 31, 2010 actuarial valuation. We believe that the approach utilized is reasonable and complies with the Actuarial Standards of Practice, as it spreads investments gains and losses consistently and systematically over a reasonable period of time.

Recommendations and findings – We recommend that the Fund Actuary expand their description of the actuarial value of asset method to clearly state that the annual gain/loss determination is utilized by comparing actual market value of assets to an expected market asset value which is derived from the prior year actuarial asset amount.

Amortization Methods

To help create pension costs that are smooth and predictable, plans can amortize the existing unfunded accrued liability, including changes to unfunded accrued liability due to gains and losses, assumption/method changes and plan changes. Amortization methods may be prescribed by law. ASOP No. 4 discusses guidelines for cost/contribution allocation procedures. In general, unfunded accrued liabilities should be recognized (1) over a reasonable time period and (2) in a rational and systematic way.

Current methodology – In 2005, the City of Dallas issued a series of Pension Obligation Bonds (POBs) which carried a maturity date equal to thirty years. Around the same time, the City Council along with the voters of Dallas approved a new funding process for the Employees' Retirement Fund, which commenced on October 1, 2005. The new funding process defines a "Current Adjusted Total Obligation Rate" which is re-determined annually based on various factors, and is contributed jointly by the City and participants. The City contribution rate is set as 63% of the Current Adjusted Total Obligation Rate, while the participants will make up the remaining 37%. The Current Adjusted Total Obligation Rate is a precise calculation, based on the following terms:

- Prior Adjusted Total Obligation Rate – Effective October 1, 2006, this amount will equal the Current Total Obligation Rate that was effective for the prior fiscal year
- Actuarially Required Contribution Rate (30-year funding cost) – An amount calculated in conjunction with each valuation report which is the amount necessary to fund the normal cost, expected administrative expenses and the 30-year amortization payment of the UAAL, expressed as a percentage of payroll
- Pension Obligation Bond Credit Rate – An amount determined by dividing the scheduled POB payment in a given fiscal year by the projected payroll for that corresponding fiscal year.
- Current Total Obligation Rate – The amount determined by adding the 30-year funding cost to the POB Credit Rate

In subsequent years following the fiscal year beginning on October 1, 2005, the Current Adjusted Total Obligation Rate will only change if the annual actuarial valuation results in a Current Total Obligation Rate which differs from the Prior Adjusted Total Obligation Rate by an amount greater than 3.0% of payroll. If the absolute value of the difference between the Current Total Obligation Rate and the Prior Adjusted Total Obligation Rate is more than 3.0% of payroll, then the resulting Current Adjusted Total Obligation Rate is determined by taking the average of the Prior Adjusted Total Obligation Rate and the Current Total Obligation Rate (subject to a minimum of 90% of the Prior Adjusted Total Obligation Rate and a maximum of 110% of the Prior Adjusted Total Obligation Rate).

As described above, the resulting Current Adjusted Total Obligation Rate is jointly contributed by the City (67%) and the participants (37%). Based on the most recent valuation report reviewed as part of the audit (December 31, 2012), the Fund Actuary determined the following key contribution rates for the Employees' Retirement Fund, effective with the fiscal year beginning October 1, 2013:

- 30-year funding cost – 31.18%
- POB Credit Rate – 9.29%
- Current Adjusted Total Obligation Rate – 35.29%
    - City Portion – 22.23%
    - Employee Portion – 13.06%

Once the above stated rates have been determined, the funding period calculation can be performed in order to approximate the time in years that will be required to amortize the existing UAAL. To determine the funding period, a portion of the scheduled contributions pay the normal cost and the remaining portion pays down the existing UAAL. The number of years required for the present value of all future amortization payments to be equal to the existing UAAL is the funding period.

Findings/Recommendations – In each of the valuation reports reviewed as part of the audit, the Fund Actuary did not disclose the funding period required to amortize the existing UAAL for the Employees' Retirement Fund. It is our belief that the funding period calculation should be an instrumental component to any actuarial valuation. The Texas Pension Review Board (PRB) recommends that a pension plan maintain a funding policy that results in a funding period not to exceed thirty years. Additionally, the PRB states that, at a minimum, the funding policy should result in a funding period not to exceed forty years. Therefore, we strongly recommend that the Fund Actuary properly disclose the funding period in future valuation reports.

Typically, the 30-year funding cost represents the level of contributions necessary from City and Employee sources in order to pay down the existing UAAL over a period of exactly thirty years. However, due to the issuance of the POB funds, a portion of the City's annual contribution rate is needed to pay off the scheduled debt service. For example, the rates shown above for the fiscal year beginning October 1, 2013 include a 22.23% City contribution rate, of which 9.29% is attributable to servicing the POB. Therefore, the total scheduled contributions into the Fund from City and Employee sources equals 12.94% (22.23-9.29) plus 13.06%, or 26.0%. As you can see, this is over 5.0% of payroll short of the calculated 30-year funding cost.

Again, we believe that the funding period calculation is an important measure of the financial position of the Fund that needs to be explicitly valued in conjunction with each annual valuation report. Based on the Foster & Foster results shown in the valuation replication exhibits, we calculated and included the funding period required to amortize the UAAL for each of the valuation years 2008 to 2012. Please keep in mind the funding period results are for illustrative purposes only, and do not reflect the actual contribution realized by the City and Employees.

- December 31, 2012: 52.4 years
- December 31, 2011: Infinite years
- December 31, 2010: 48.2 years
- December 31, 2009: 47.9 years
- December 31, 2008: 103.2 years

Note, the Texas PRB issued a report in April 2014 suggesting that the amortization period for the Fund as of December 31, 2012 was infinite. In our calculation, we accounted for the POB payment going away after 2035 leading to an increased payment to the Fund in 2036 and later. This increase in contributions results in the funding period being 52.4 years rather than infinite.

In summary, to fairly and accurately reflect the health of the plan, we recommend that the Fund Actuary disclose the funding period in future valuation reports.

4) Review of Valuation Report

ASOP No. 41, *Actuarial Communications*, provides guidance to actuaries regarding various types of actuarial communications, including the valuation report. Specifically: The actuary should state the actuarial findings, and identify the methods, procedures, assumptions, and data used by the actuary with sufficient clarity that another actuary qualified in the same practice area could make an objective appraisal of the reasonableness of the actuary's work as presented in the actuarial report.

Findings/Recommendations – The actuarial reports produced by the Fund Actuary for the valuation years December 31, 2008 through December 31, 2012 generally satisfy the requirements of ASOP No. 41. However, we recommend the Fund Actuary improve documentation of the following items in the report:

- Display breakdown of head counts, summary of data characteristics, and liabilities for all inactive classifications. Currently, the Fund Actuary only splits the inactive classifications between those currently in receipt of benefits, and those entitled to a future benefit from the Fund.
- Disclose the "expected payroll" dollar amount which is utilized in determining the Normal Cost rate as a percentage of payroll.
- Calculate and disclose the funding period required to amortize the UAAL.
- Improve description of the actuarial asset method to clarify how the investment gain/loss is calculated.

5) Review of Demographic Assumptions

ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, provides guidance to actuaries in selecting (including giving advice on selecting) demographic and other noneconomic assumptions for measuring obligations under defined benefit pension plans.

Over the following pages, the following demographic assumptions will be reviewed:

- Retirement Rates
- Withdrawal Rates
- Mortality Rates
- Disability Rates
- Other assumptions (e.g. percent married, form of payment chosen)

Generally, demographic assumptions are based on actual plan experience with additional considerations for current trends. ASOP No. 35 states "the actuary should use professional judgment to estimate possible future outcomes based on past experience and future expectations, and select assumptions based upon application of that professional judgment." ASOP No. 35 also states that "a reasonable assumption is one that is expected to appropriately model the contingency being measured and is not anticipated to produce significant cumulative actuarial gains or losses over the measurement period." Also, "the actuary should not give undue weight to past experience" particularly when recent rates of retirement or termination were largely attributable of a one-time work force reduction.

Note that actuarial assumptions reflect expected average experience over long periods of time. A change in actuarial assumptions generally results when experience over a period of years indicates a consistent pattern. Proposed changes to the demographic assumptions better reflect actual plan experience over the studied time period, with consideration for whether or not past patterns of experience are expected to continue in the future.

As a result of an experience study performed by the Fund Actuary, the Board approved numerous assumption changes in conjunction with the completion of the December 31, 2010 actuarial valuation report. Please note there were no additional changes to the actuarial assumptions in conjunction with the December 31, 2011 or December 31, 2012 valuation reports.

Mortality

Current assumptions –

1) Actives
    a. Males – RP2000 Healthy for males, set forward 4 years.
    b. Females – RP2000 Healthy for females, set back 5 years.

2) Benefit Recipients (non-disabled)
    a. Males – RP2000 Healthy for males, projected to 2007 using scale AA, set forward 2 years.
    b. Females – RP2000 Healthy for females.

3) Disabled Lives – RP2000 Disabled for males, set forward one year.

Comments – The assumed rates of mortality were changed in conjunction with the December 31, 2010 actuarial valuation. Therefore, there were only two years of mortality experience under the current assumptions realized during the audit period. For active participants, the actual number of deaths were 50% of what was expected over that two-year period. Overall retiree mortality experience was in line with the assumption for these two years. However, please note the inactive mortality experience table displayed in the Fund Actuary's valuation report excludes mortality experience for beneficiaries, QDRO recipients, and disabled participants. Also, it is important to keep in mind that the sample size created by the Employees' Retirement Fund is not big enough to warrant 100% credibility to actual experience. Mortality rates used to predict the timespan that pension benefits are expected to be paid should reflect studies performed on a much larger population base.

Findings/Recommendation – As supported by the Actuarial Standards of Practice, the current trend for general employee pension plans has been to project static mortality rates to account for future mortality improvements, with no further adjustment. As can be seen from the assumptions stated above, the mortality rates assumed for non-disabled male benefit recipients incorporate an adjustment for projected future mortality improvements to 2007. However, the resulting rates are then set forward 2 years, which has the effect of increasing the projected rates for all ages and partially offsetting the impact of applying the mortality improvement projection. Additionally, no other mortality assumptions utilized in the valuation include an adjustment to account for projected future mortality improvements. In fact, the

active male mortality is set forward four years, which produces increased assumed rates of mortality, contrary to the recent trend amongst the actuarial field.

We recommend that the Fund Actuary consider implementing an assumption to account for projected future mortality improvements, or, at a minimum, remove the current set forward adjustments that are being utilized.

Withdrawal

Current assumptions – The current rates utilized for assumed rates of withdrawal are based on a service-based table. The assumed rate of withdrawal in the first year of service is 21.0% for all active participants, grading down to 3.7% at 10 years of service and 1.4% for all years of service in excess of 19 years. Once an employee has attained retirement eligibility, the assumed rates of termination are no longer utilized.

Comments – Based on the experience from the time period 2006 to 2012, the actual withdrawal rates appear to be approximately 20% higher than the assumed rate in the first ten years of employment.

Findings/Recommendation – Overall, the assumed rates of withdrawal appear to be reasonable. However, the 2011 and 2012 experience in particular shows greater than expected rates of withdrawal for participants in their first ten years of employment. We recommend the Fund Actuary continue to monitor this experience closely to determine if a reduction in the rates at the beginning of a member's career is warranted.

Retirement

Current assumption – The assumed rates of retirement currently utilized appear to be very precise, based on a sex distinct age-based table prior to age 60 that incorporates higher rates of retirement in the first year eligible for male employees. At ages 60 and above, the rates of retirement continue to be sex distinct and are contingent on whether or not the employee has completed 18 years of service.

Comments – In light of the experience performed by the Fund Actuary, the retirement rate assumption was updated in the 2010 valuation. Specifically, the adopted rates for members retiring in their fifties were lowered slightly for males at first eligibility and increased for males beyond first eligibility. Additionally, the adopted rates for females were decreased for most ages.

Findings/Recommendation – We have no reason to doubt the reasonableness of the retirement rate assumptions currently utilized. However, we did note that the actual experience in the two years following the experience study is equal to or lower for each age group shown. Based on the Fund Actuary's reports, this experience was not a significant source of actuarial gain or loss for either year. We do not recommend any changes to the assumed rates of retirement.

Disability

Current assumptions – An age-based table of rates is currently utilized for the incidence of disability. 35% of disablements are assumed to be service-related. Additionally, there is a 0% assumption of disability for members who have over 10 years of service and are eligible for retirement.

Comments –The actual incidence of disability appears to be trending downward. Note, the total number of disablements over a 7 year period (2006 to 2012) is very small so a low weight of credibility should be placed on actual experience. We did not have specific enough data to analyze the appropriateness of the assumption related to the percentage of disablements that are service related.

Findings/Recommendation – The disability rates seem reasonable. We recommend the Fund Actuary continue to monitor disability experience and adjust if the incidence of disablement continues to decrease.

Percent Married/Assumed Form of Payment

Current assumptions/provisions – The plan's normal payment form of retirement benefits provided under Chapter 40A of the Dallas City Code is an unreduced 50% joint and contingent survivor benefit for married members, or a ten-year certain and life benefit for single members. For members who meet the normal or early retirement eligibility requirements, or those who terminate employment with at least 15 years of service, an actuarially equivalent benefit may be paid in the form of a 100% joint and survivor optional benefit form. The City Code defines the parameters for calculating actuarially equivalent benefits for healthy lives who have attained age 50 to be the 1984 Unisex Mortality Table, set back four years, at an interest rate equal to 10%, compounded annually.

Effective December 31, 2010, the assumption for marital status is that 75% of active male members and 50% of active female employees are assumed to be married at the time of benefit commencement. Prior to that date, it was assumed that 80% of all active members were married. Male spouses are assumed to be 3 years older than female spouses. Additionally, it is currently assumed that 60% of married active male members and 75% of married active female members will elect the normal form payment of a 50% joint and contingent survivor benefit. Taking into consideration these assumptions, as well as the subsidized optional form reduction factors inherent in the mandated definition of actuarially equivalence, the Fund Actuary states that all male employees are valued with a 30.5% joint and contingent survivor option, and all female employees are valued with a 15.0% joint and contingent survivor option.

Findings/Recommendations – In order to validate the usage of the 30.5% JS and 15.0% JS assumption for all active employees under the stated parameters, we performed an analysis and determined that these assumptions are reasonable and provide a fair assessment of the liabilities attributable to active employees of the Fund. Please see the Review of Benefit Calculations section of this report for a more detailed conversation about the factors utilized for purposes of calculating actuarially equivalent benefits.

6) Review of Economic Assumptions

ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*, provides guidance to actuaries in selecting (including giving advice on selecting) economic assumptions – primarily investment return, discount rate, and salary scale – for measuring obligations under defined benefit pension plans.

Throughout the remainder of this section, we have used the standards set forth in ASOP No. 27 as a guideline for reviewing the following economic actuarial assumptions:

- Inflation
- Payroll Growth
- Salary Increases
- Investment Return

Please keep in mind that ASOP No. 27 states that "the best an actuary can do is to use professional judgment to estimate possible future economic outcomes based on past experience and future expectations, and to select assumptions based upon that application of professional judgment."

Inflation

Current assumption – 3%

Findings/Recommendations – The inflation assumption estimates future annual price increases. In an actuarial valuation, this assumption is a building block for all economic assumptions. An inflation assumption of 3% is a fairly common assumption utilized in the financial sector. Over the 30-year period ending on December 31, 2012, the Consumer Price Index for All Urban Consumers (CPI-U) was 2.89%. The Fund Actuary should continue to monitor this assumption for reasonableness.

Payroll Growth

Current assumption – 3%

Findings/Recommendations – The payroll growth assumption is used to determine the amortization payment under the level percentage of payroll approach. Due to the adoption of the new funding process, the payroll growth assumption could have a direct impact on the City's contribution rates. Additionally, it impacts the 30-year funding cost and funding period. This assumption determines how the covered payroll will increase over time. Generally, this assumption is similar to the inflation assumption unless the actuary expects a lot of expansion in the work force. In the five years we examined, the covered payroll decreased by 1.66% per year and the active membership decreased by 3.30% per year. Given these trends and the role the assumption plays in determining the annual contribution rates, we recommend that the Fund Actuary work alongside the Board to determine if a positive payroll growth rate remains to be justifiable for the Fund.

Investment Return

The investment return assumption is critical in the actuarial valuation since it determines the portion of assets that will come from investment income rather than from City and member contributions. The ASOP requires that the investment return assumption fall within a best-estimate range of anticipated

future experience Therefore, the assumption should be set based on the long-term expectation of the plan as determined by the investment policy statement, target asset allocation and capital market assumptions.

Current assumption – 8.25%, net of investment expenses

Findings/Recommendations – The Fund's investment policy statement outlines the following target allocation:

Asset Class	Target Allocation
Domestic Equity	22.5%
Real Estate Securities	5.0%
Private Equity	5.0%
Master Limited Partnerships	5.0%
International Equity	27.5%
Global Equity	5.0%
Global Fixed Income	15.0%
High Yield Fixed Income	15.0%

In determining the investment return assumption, we determine the average rate of return the Fund expects to achieve based on the target allocation along with the corresponding capital market assumptions. Foster & Foster is an actuarial firm and we do not have the required expertise to produce our own capital market assumptions. As a result, we worked with The Bogdahn Group (Bogdahn), a full service registered investment advisory firm headquartered in Orlando, FL, to determine the Fund's expected return. The capital market assumptions provided by Bogdahn are based on an underlying inflation assumption of 3% (same as the Fund's assumption). The total expected gross return for the Fund, based on Bogdahn's assumptions, is 8.75%. The actuary discloses that this assumption is net of investment expenses only; administrative expenses are included as an addition to the normal cost. The investment expenses paid by the Fund during the 2012 fiscal year were approximately 60 basis points. If the gross expected return is reduced by the investment expenses, the result is an expected return of 8.15%.

The trend across the country over the past few years has been to lower the investment return assumption. According to an April 2013 survey of 126 large public pension funds across the country performed by the National Association of State Retirement Administrators (NASRA), over half of the funds surveyed have lowered their assumption since 2008. The average investment return assumption for these funds is 7.72% with over 90% of the funds using an assumption of 8.0% or less. While these results are interesting, the asset allocation for this Fund could be completely different than the surveyed funds so they are provided for informational purposes only.

Over the past 10 years, the average net-of-fee return is 8.62% but the average 16-year return is only 7.32%. During those 16 years, the annual net-of-fee return has exceeded 8.25% on 9 occasions and fallen short 7 times.

Based on all of our analysis, we believe the current assumption falls within the range of reasonable best-estimate range of anticipated future experience.

Salary Increase

Current assumption – Currently, the assumed rates of salary increases are a service-based table with rates decreasing from 7.0% in the first year of employment to 3.5% at 9 years of service. This assumption was set on December 31, 2010.

Findings/Recommendations – Recent pay increase experience based on data for the audit period indicates that the actual salary increases realized are consistent with the current assumption. Therefore, the service-based assumption table seems reasonable.

7) Qualifications of Fund Actuary

Current Actuaries

Lewis Ward and Mark R. Randall of GRS signed each of the valuation reports reviewed during the audit period.

Mr. Randall is an Enrolled Actuary, Fellow of the Conference of Consulting Actuaries, and a Member of the American Academy of Actuaries. These credentials are listed in the valuation reports and have been confirmed through the Society of Actuaries website.

Mr. Ward is listed as a consultant with no actuarial credentials specified. Again, this has been confirmed through the Society of Actuaries website.

Accordingly, we have no reason to challenge the qualifications of Mr. Ward and Mr. Randall.

D. REVIEW OF SAMPLE BENEFIT CALCULATIONS

As part of the audit process, we have been asked to verify the benefit amounts, along with the manner in which retirement benefit calculations are performed by the system. We were provided with ten unknown sample individual benefit calculations to review for this purpose.

Comments – The base pension formula to calculate an individual's accrued benefit at the time of retirement or termination of employment is defined as 2.75% of Average Monthly Earnings for each year of Credited Service, subject to a maximum benefit of 100% of Average Monthly Earnings. Average Monthly Earnings is computed as the average monthly salary over the individual's highest three consecutive years of earnings. For example, if an individual retires with 20 years of Credited Service and Average Monthly Earnings of $5,000, the monthly retirement benefit payable under the normal payment form is equal to $2,750 ($5,000 * 0.0275 * 20). As previously discussed, the plan's normal payment form of retirement benefits provided under Chapter 40A of the Dallas City Code is an unreduced 50% joint and contingent survivor benefit for married members, or a ten-year certain and life benefit for single members. For members who meet the normal or early retirement eligibility requirements, or those who terminate employment with at least 15 years of service, an actuarially equivalent benefit may be paid in the form of a 100% joint and survivor optional benefit form. The City Code defines the parameters for calculating actuarially equivalent benefits for healthy lives who have attained age 50 to be the 1984 Unisex Mortality Table, set back four years, at an interest rate equal to 10%, compounded annually.

Findings/Recommendations – Overall, we were able to match the individual accrued base pension calculations very closely for the samples provided. It is important to point out that two of the sample calculations provided were for vested, deferred members who had not completed 15 years of Credited Service prior to termination of employment. Based on our understanding of Section 40A-16 of the City Code, these individuals are not entitled to receive the joint and full survivor (100% JS) optional benefit form. However, the sample benefit calculations for these members calculated and displayed the 100% JS option as an acceptable benefit election. We were unable to confirm whether or not either deferred, vested member selected the 100% JS benefit form at the time that their benefits commenced.

Based on our review, we believe there are some areas for improvement in the manner that the 100% JS optional benefit form is calculated. We suggest that the Board review the following comments to decide if any of the noted improvements warrant a change in the methodology currently being utilized.

First, the definition of actuarial equivalence for purposes of computing optional forms defines the applicable mortality table to be the 1984 Unisex Mortality Table, set back four years. In our review, we were able to replicate the optional form factors by eliminating the four-year set back in the mortality table for the members. The factors we determined by incorporating a set-back of mortality rates for members and spouses were off by a small margin when compared to the ones represented in the sample benefit calculations. In the big picture, the difference between the two approaches is negligible. However, we recommend that the system's software director review the application of the mortality table to ensure that is consistent with the parameters defined in the City Code.

Second, we determined that the annuity factor values utilized to create the 100% JS optional form conversion factor do not incorporate the annual cost-of-living adjustment (COLA) that is assumed for valuation purposes. Typically, COLA increases should be recognized when determining the actuarial equivalent benefit for benefit calculation purposes. Therefore, we recommend the Board discuss this issue to determine if utilizing a COLA assumption to determine optional form conversion factors is appropriate for the Fund. If recognized, the inclusion of the COLA will generally yield a larger reduction in the conversion to the 100% JS optional benefit form, resulting in a smaller monthly benefit payable to the retiree.

Lastly, the sample benefit calculations provided show that the 100% JS conversion factor is calculated by taking the ratio of the ten-year certain and life annuity value to the 100% JS annuity value, regardless of marital status. The most common approach is to create optional form conversion factors based on the normal payment form. As previously stated, the normal payment form for married members is a 50% joint and contingent annuity, and a ten-year certain and life annuity for single members. If the 50% joint and contingent annuity value was used as the basis for determining the optional form conversion factor to the 100% JS benefit for married members, the ratio of the two annuity values would be closer to 1.0, thereby creating a smaller reduction in the conversion to the 100% JS optional benefit form. In this case, the result would be an increase to the monthly benefit payable to the retiree. Similar to the other items noted, we believe the Board should discuss this matter to determine if any change is warranted for purposes of completing benefit calculations.

Please keep in mind that the suggested improvements to the manner in which the optional form conversion factor is calculated will have an impact on the resulting 100% JS benefit amount for a given individual.

E. RESPONSE RECEIVED

Attached is the response received from the Board of Trustees of the Employee's Retirement Fund of the City of Dallas and its actuary after reviewing the preliminary draft audit report. The comments in the response have been incorporated into the final report, as appropriate, or included in the following attachments.

Employees' Retirement Fund
of the City of DALLAS

"Provide retirement and superior service to advance the financial security of our members"

MEMORANDUM

TO: Jeanne Chipperfield, Chief Financial Officer
Edward Scott, Controller

FROM: Carla D. Brewer, Chair, ERF Board of Trustees

SUBJECT: Dallas ERF Response to Actuarial Audit Required by Texas Govt Code 802.1012

DATE: August 19, 2014

This letter is the formal response from the Employees' Retirement Fund of the City of Dallas ("Dallas ERF") to the actuarial audit required by Texas Government Code Section 802.1012 for the valuation year ended December 31, 2012, which was expanded to also include the valuation years ended December 31, 2008 through December 31, 2011 and the asset audit that was conducted in conjunction with the actuarial audit.

State law requires the City of Dallas ("City") to conduct an actuarial audit on its pension funds every five years. The City actually chose a replication audit which is the most detailed type of audit because the third party actuary, Foster & Foster Actuaries and Consultants ("Foster & Foster"), takes the data and reruns a full valuation for every year for five years. The City also audited the assets of Dallas ERF. The asset audit was conducted by CliftonLarsonAllen. The scope of the asset audit included verification that assets are reported properly, review of valuation methodologies of the alternative assets, and review of the administrative/investment expenses.

The Board of the Dallas ERF ("Board") is pleased that the results of the audits confirm that the Dallas ERF is valuing assets in accordance with best practices and that the fund actuary has consistently provided a reasonable valuation in regards to the financial position of the Retirement Plan for the Employees' Retirement Fund of the City of Dallas.

Dallas ERF's actuary, Gabriel Roeder Smith & Company ("GRS"), provided a response to the individual findings and recommendations listed in the Foster & Foster actuarial audit report. We have attached the GRS response to the report.

The Board understands its fiduciary responsibilities and holds itself to the highest standards of care. The Board wishes to express its thanks to our professional service partners – Gabriel Roeder Smith & Co., Wilshire Associates (investment consultant), and Grant Thornton for their expert services and advice. The Board also expresses gratitude to the staff of Dallas ERF for their commitment to excellent management and customer service.

Attachment

cc: Dallas ERF Board of Trustees
Cheryl D. Alston, Dallas ERF Executive Director
A.C. Gonzalez, City Manager
Gary Lawson, Strasburger & Price LLP
Jason Franken, Foster & Foster

GRS
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Consultants & Actuaries
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469.524.0000 phone
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August 7, 2014

Ms. Cheryl Alston
Executive Director
Employees' Retirement Fund of the City of Dallas
600 North Pearl Street, Suite 2450
Dallas, TX 75201

Re: Response to Actuarial Audit of the Employees' Retirement Fund of the City of Dallas

Dear Cheryl:

Gabriel, Roeder, Smith & Company ("GRS") offers our comments below on the actuarial audit report prepared by Foster & Foster Actuaries and Consultants ("F&F"), dated July 25, 2014. The report provides F&F's actuarial audit, at the behest of the City of Dallas as required by Texas Government Code Section 802.1012, of the Employees' Retirement Fund of the City of Dallas (ERF).

General Comments

We are pleased with the results of the actuarial audit of ERF. We would like to quote the following passage from the *Summary of Findings and Recommendations* section of the actuarial audit report, in particular:

> **"Replication of Results – The calculations by the Fund Actuary were reasonably consistent with our own separate calculations. Foster & Foster was able to replicate the valuation results within a reasonable degree of tolerance.**

This statement should provide both ERF Staff and the Board with the confidence that the actuarial results they are receiving are both accurate and reasonable.

In the remainder of our letter, we will respond to specific recommendations made by F&F in its actuarial audit report.

Specific Recommendations

1) Review of Data - Findings/Recommendations:
The data used for the 2008 through 2012 Employees' Retirement Fund valuations was adequate and appeared to satisfy the applicable Actuarial Standards of Practice. However, we strongly recommend that the Fund Actuary perform a detailed screen of the valuation data from one year to

the next to ensure that any inconsistencies similar to the ones shown above are resolved prior to completion of the annual valuation report.

GRS Response: We reject the implication that the ERF data is not thoroughly screened. As ERF staff can attest by the number and type of data questions GRS asks ERF each year, GRS performs extensive data screenings of the data received from ERF each year including comparisons with the prior year's data.

There has been significant cleanup of the inactive data during the five-year study period. This resulted in hundreds of changes to the inactive data from one year to the next. However, most of these changes were changing the data from assumed beneficiary data (dates of birth and gender) to actual beneficiary data. These changes would not be expected to have a material impact on the results.

2) Review and Replication of Valuation Results - Findings/Recommendations
Item 2.a. - F&F recommended that GRS correct a small disconnect between the pays used for determining the actuarial liability and the covered payroll used in the determination of the contribution rates.

Item 2.b. – F&F recommended that GRS disclose a funding period in the actuarial valuation report.

GRS Response:
Item 2.a. – GRS will review our methodology and make any necessary changes.

Item 2.b. – A funding period can be misleading depending upon the funding policy of the entity. For example, some retirement systems use an open rolling 30-year funding period. In this type of funding policy the funding period is reset to 30 at each valuation. The funding period reported is 30 years because that is what the contribution rate was determined on, but because the funding period is always reset mathematically the actual funding period is never. Even though the systems funded ratio would be expected to continually improve, the unfunded liability would never be expected to be paid off unless actuarial gains occur.

Before the next valuation, we will discuss this issue with the ERF Staff (and Board) to determine whether to include this item in future reports.

3) Review of Valuation Report - Findings/Recommendations
F&F made several recommendations concerning the additional content to be included in the valuation report as well as some clarification of some descriptions.

GRS Response: With regards to the recommendations about content, GRS will discuss with ERF staff the recommendations and make a determination as whether or not to incorporate the suggestions into the report. We will expand the description of the actuarial value of assets method to make it clear how the calculation is performed.

4) Review of Actuarial Assumptions - Findings/Recommendations
F&F made one recommendation and had two other comments concerning the actuarial

assumptions. The recommendation was to improve the mortality assumption. The comments were with regard to the withdrawal (terminations) experience and the payroll growth rate experience during their five-year study period.

GRS Response: GRS has been monitoring the post-retirement mortality experience since the previous full experience study and has already discussed with the staff and the Board the likelihood that the assumption will need to be strengthened at the next full experience study.

With regards to the withdrawal and payroll growth rate experience, the five-year period reviewed by F&F included the severe economic turndown in 2008-2009. Different governmental entities handled the downturn in different ways depending upon how severely the budget of the entity was impacted. In the case of the City of Dallas, a reduction in force was implemented. This resulted in a significant increase in the number of terminations for short service employees. The drop in the number of covered employees also resulted in a significant drop in the covered payroll of the ERF. However, we believe these were temporary aberrations in the historical patterns of the ERF. We will continue to monitor the experience but do not expect to make significant changes to these assumptions.

5) Review of Sample Benefit Calculations - Findings/Recommendations

5.a. First, the definition of actuarial equivalence for purposes of computing optional forms defines the applicable mortality table to be the 1984 Unisex Mortality Table, set back four years. … However, we recommend that the system's software director review the application of the mortality table to ensure that is consistent with the parameters defined in the City Code.

5.b. Second, we determined that the annuity factor values utilized to create the 100% JS optional form conversion factor do not incorporate the annual cost-of-living adjustment (COLA) that is assumed for valuation purposes. Typically, COLA increases should be recognized when determining the actuarial equivalent benefit for benefit calculation purposes. Therefore, we recommend the Board discuss this issue to determine if utilizing a COLA assumption to determine optional form conversion factors is appropriate for the Fund.

5.c. Lastly, the sample benefit calculations provided show that the 100% JS conversion factor is calculated by taking the ratio of the ten-year certain and life annuity value to the 100% JS annuity value, regardless of marital status. The most common approach is to create optional form conversion factors based on the normal payment form. … Similar to the other items noted, we believe the Board should discuss this matter to determine if any change is warranted for purposes of completing benefit calculations.

GRS Response:

5.a. We will work with staff to research this issue and determine an appropriate response.

5.b. GRS concurs with the statement made by F&F that the factors do not reflect the automatic cost-of-living adjustment (COLA) that is part of the ERF benefits. When providing new optional forms of payment factors for clients with automatic COLA provisions we usually recommend the inclusion of the COLA in the determination of the factors. However, as the Board is aware just because the Board may desire to change something does not mean it is easy to accomplish. To

change the assumptions would require an amendment to Chapter 40-A which would require a vote of the citizens of the City of Dallas.

Furthermore, if this issue was going to be discussed by the Board for the possibility of taking it to the voters, we would have also suggested that the 10% interest rate and the outdated mortality tables as items that need to be addressed.

5.c. GRS concurs with F&F that it is unusual for a plan, with a fully subsidized joint and survivor form of payment for married participants, to use the single life form of payment as the basis for determining other joint and survivor options. GRS will work with staff to review the history and decision making process that led to the current conversion factors, and make any changes deemed appropriate.

If you have any questions or need any additional clarifying information with regard to our comments, please do not hesitate to contact either one of us.

Sincerely,

Lewis Ward

Mark R. Randall

Lewis Ward
Consultant

Mark R. Randall, MAAA, FCA, EA
Executive Vice President & Senior Consultant

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EMPLOYEES' RETIREMENT FUND OF THE CITY OF DALLAS

ACTUARIAL AUDIT – ASSET REVIEW
February 26, 2014

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CliftonLarsonAllen

Independent Accountants' Report

Jason Franken
Foster and Foster
One Oakbrook Terrace
Suite 720
Oakbrook Terrace, IL 60181

Dear Mr. Franken:

At your request and direction, we performed certain steps to review the valuation methodologies and reporting of alternative investments and benchmark administrative and investment expenses of the Employees' Retirement Fund of the City of Dallas (ERF). The procedures performed by us are discussed in the report. Any differences between the procedures set forth in this report and those set forth in the subcontractor agreement reflect modifications that were made at your request or discussed during the course of the engagement. The sufficiency of the procedures is solely your responsibility. Consequently, we make no representation regarding the sufficiency of the procedures described in this report either for the purpose for which this report has been requested or for any other purpose.

Our procedures did not include a complete evaluation of the operating effectiveness of ERF's internal controls. Our results are only related to the items specified in the project scope section of this report. Other matters of possible interest to you might not be specifically addressed, and the results obtained from our engagement should not be the sole basis for your analysis of ERF's internal controls. Our engagement was not designed and cannot be relied upon to disclose errors, fraud or illegal acts that might exist. Consequently, we make no representation regarding the sufficiency of the procedures performed. Further, this report should not supplant the additional procedures that should be undertaken in your evaluation of internal controls.

Our services consisted of consulting services, and do not constitute an audit, examination, review or compilation of historical financial information conducted in accordance with generally accepted auditing standards or with other standards established by the American Institute of Certified Public Accountants (AICPA). Accordingly, we are unable to express an opinion or any other form of assurance with respect to any historical financial information.

Our assistance was directed to those activities, operations areas and financial information that you identified as being of concern to you. In performing our services, we performed inquiries and analysis based on the information made available to us and we relied on the sufficiency, accuracy and reliability of information provided by ERF.

Accordingly, we do not express an opinion or any other form of assurance on financial statements, any other financial or non-financial information, management representations, operating controls and internal controls of ERF.

Clifton Larson Allen LLP

Baltimore, Maryland
February 26, 2014

EXECUTIVE SUMMARY

The purpose of this report is to provide our results regarding the Description of Services identified in the Subcontractor Agreement between CliftonLarsonAllen and Foster & Foster dated September 3, 2013. Those services as summarized below and described in detail in remainder of the report included a review of valuation methodologies, reporting of alternative investments and benchmarking of administrative and investment expenses.

The Employees' Retirement Fund of the City of Dallas (ERF) is a fiduciary fund of the City of Dallas as established by Chapter 40A of the Dallas City Code. The ERF is a single-employer defined benefit pension plan that provides retirement, disability and death benefits to its members, and is sponsored by the City of Dallas.

The ERF is governed by a seven member Board of Trustees. The powers and duties of the ERF board includes the power and duty to advise and implement an investment policy for each fund, diversify plan assets unless circumstances create a reason not to do so, make investment decisions under the discretion of the prudent investor rule, monitor investment performance, control investment expenses and avoid prohibited transactions.

The scope for which we were contracted included three objectives which are described herein as an asset review. The following report will be segmented by these three objectives. Our results for each objective are summarized below.

OBJECTIVE	DESCRIPTION	RESULTS
#1	Analyze alternative assets held during the five-year period ending December 31, 2012; this analysis should include assessment of the valuation methodologies, the appropriateness of the valuation methodologies, year-to-year consistency of valuation methodologies, and the frequency of the valuations.	Our procedures provide evidence that the valuation methodologies utilized by ERF are in accordance with best practices and generally accepted accounting principles.
#2	Confirm that assets are reported properly by each plan as of December 31, 2012.	Our procedures provide evidence that the alternative investments are properly reported by ERF as of December 31, 2012.
#3	Analyze and benchmark the administrative and investment expenses paid by each plan for the year beginning January 1, 2012 and ending December 31, 2012.	Our procedures performed revealed that ERF is comparable to the peer funds for both administrative expenses and investment expenses.

SUMMARY OF OBJECTIVES, PROCEDURES AND RESULTS

The objectives, procedures and results of our asset review of the ERF as outlined in the contract between Foster & Foster and the City of Dallas and the subcontractor agreement between Foster & Foster and CliftonLarsonAllen are as follows:

Objective 1

Description

Analyze alternative assets held during the five-year period ending December 31, 2012; this analysis should include assessment of the valuation methodologies, the appropriateness of the valuation methodologies, year-to-year consistency of valuation methodologies, and the frequency of the valuations.

Background

We interpreted alternative assets to mean alternative investments, which include but are not limited to investments in real estate funds, private equity funds, hedge funds and other investment vehicles for which the values are generally not readily determinable. Investors in these asset classes need to have more thorough and robust processes for determining the fair value of these investments than openly traded securities because they are generally not frequently traded and as such are hard to value. Moreover, a large part of their projected value is based on a terminal sales price, five to ten years into the future. Generally, the further into the future a sale the greater the uncertainty around input assumptions used to project a sales price. Though the determination of these fair values can be and often are outsourced to other entities, the reported valuation is ultimately the responsibility of ERF's management.

Best practices dictate that a thorough and robust process will include controls around initial due diligence, on-going monitoring and financial reporting. Initial due diligence controls will occur before the investment is made and the on-going monitoring and financial reporting controls will occur after the initial investment. Because these play such a significant part in valuing alternative investments, our assessment included an evaluation of management's controls in each of these stages.

We also evaluated the significance of alternative investments to the financial statements and how that impacts the nature and extent of ERF's valuation policies and procedures. As the size of this segment of the investment portfolio expands we generally expect the robustness of the procedures to expand as well.

We gained an understanding of the nature of the investment fund and the underlying investments. This is also critical in determining the extent of management's role in valuing alternative investments. For example, when valuing a real estate investment, the approach and extent of procedures required to determine fair value will vary depending on whether the fund has direct holdings in real estate or are invested in real estate through an openly trade REIT.

To address scenarios where a net asset value is available, which are frequent, FASB issued Accounting Standards Update (ASU) 2009-12 regarding the valuation of investments in certain entities that calculate net asset value per share (or its equivalent). This guidance provides a practical expedient to measure fair value of alternative investments using the net asset value per share or percentage ownership interest in an investment fund. To consider this methodology the underlying investments of the fund should be valued in accordance with fair value standards. This guidance is relevant for institutional investors such as ERF when valuing funds that meet this criterion. Though ERF reports under GASB, the practical expedient described above is considered a practice that is widely recognized and prevalent in state and local government reporting.

When reviewing a fund's financial statements and determining the fair value of a fund's underlying investments FASB's Accounting Standards Codification (ASC) 820 provides for a fair value hierarchy of level 1, 2 and 3, which is established depending on directness and reliability of fair value measurement inputs. Most private equity and private real estate investments are level 3 fair value measurements. This means that they involve measurement methodologies based on pricing models, discounted cash flow models and other similar techniques rather than quoted prices in active markets. Level 3 fair value measurements also involve assumptions and projections, which are not observable in the market and require significant professional judgment.

Procedure and Results

We began our analysis with a review of the portfolio as of December 31, 2012. The following table presents a summary of the asset allocation as presented in the December 31, 2012 statement of plan net assets:

Asset Class	Fair Value at 12/31/12 (000's)	% of Total Investments
International equities	809,243	27.8%
Domestic equities	887,888	30.5%
TOTAL EQUITIES	1,697,131	58.3%
U.S. and foreign government fixed income securities	187,518	6.4%
Domestic corporate fixed income securities	698,086	24.0%
TOTAL FIXED INCOME	885,604	30.4%
Commingled index funds	74,337	2.6%
Private equity	64,220	2.2%
Real estate	191,565	6.6%
TOTAL ALTERNATIVES	255,785	8.8%
TOTAL INVESTMENTS	2,912,857	

The focus of this objective will be on the valuation of the alternative investments which, as detailed above, comprise 8.8% of the investment portfolio with private equity and real estate representing 2.2% and 6.6%, respectively.

As noted in the background above, initial due diligence, on-going monitoring and financial reporting each have a critical role in the valuation process. As such, we inquired with management as to their processes for each of these stages of the oversight process. Based on inquiries and our review of policies and procedures we noted the following.

The process for hiring a new manager is initiated by the Board when determining the asset allocation. During the asset allocation study the Board updates the asset allocation based on input from various sources and based on the results determines how many and what type of new managers will need to be hired. Alternative asset managers will be added in accordance with the results of the asset allocation process. The basic process for investing in alternative assets is similar to the process for all other asset classes, though there are nuances that reflect the differences in these investments from investments in traditional public equity and fixed income. ERF begins the search by obtaining a list of managers from their general consultant, Wilshire, based on a minimum criteria established by the investment policy which includes a three to five year track record and a minimum size of assets under management. Wilshire will provide a list from their manager universe and will include assets under management, returns, information ratios and detailed write-ups on each manager meeting ERF's criteria. Next, ERF's staff will filter the list down to approximately ten to twelve funds based on the initial information provided by Wilshire. This list is then presented to the Board for their review and input. ERF then prepares a request for proposal (RFP) and targets the managers identified in the previous step. All new manager hires go through a RFP process. Upon receipt of the proposals, ERF staff reviews the responses and uses a scoring matrix to narrow the list to five or six managers. Again, this list is presented to the Board for their review and input. The Board can include or exclude managers at their discretion. ERF staff and members of the Board perform detailed initial due diligence visits on each of the five or six managers selected in this stage of the process. The due diligence visits include close scrutiny of the front, middle and back office processes, detailed discussions with various levels of management and staff, tours of the facilities including a walkthrough of the trading floor and other items deemed important to making a final selection. Upon completing their initial due diligence the staff and consultant make independent investment recommendations to the Board in a written report with supporting materials. The Board at a regularly scheduled or special meeting reviews the staff and consultant's investment report and recommendation and makes the final decision of whether or not to invest. The ERF also engages a specialized investment counsel to review and negotiate the terms and conditions of the investment documents. This is done to ensure that the investment objectives and documentation are based on the ERF's understanding of the investment and are on market terms. All managers have separate investment guidelines, which they are required to follow.

ERF's on-going monitoring requires a meeting with each investment manager at least once every two years. The meeting schedule is determined by the Board and focuses on the manager's performance and any changes in the firm or investment process. ERF will maintain telephone and face-to-face contact with each manager. Management also has update calls quarterly with

each manager to discuss the investment market, key changes to staff and compliance issues, if any. On-site monitoring visits need to be conducted at least once every two years. ERF sits on the valuation committee and attends annual meetings, if any, of each of its private equity and real estate managers. ERF staff also review monthly flash reports provided by the manager, custodian and Wilshire and compare performance across these three sources. Any unexpected changes or significant discrepancies are discussed in further detail with the custodial bank, managers and consultant to determine their cause. The Wilshire monthly reports are also provided to the Board for their review and comment.

In addition to the monthly flash reports the Board reviews the quarterly investment performance report provided by the ERF's investment consultant. And the investment consultant provides periodic updates when appropriate such as extreme outperformance or underperformance and personnel or organizational changes at the investment managers.

In addition to the multitude of initial due diligence and monitoring controls identified above, ERF's controls over financial reporting of alternative investments is multi-faceted. Management maintains a formal investment policy that is approved by the Board of Directors. They also obtain quarterly statements from the managers and agree them with amounts reported by the custodial bank and recorded in the G/L. Finally, management obtains and reviews annual audited financial statements from each of the alternative asset managers, compares the audited values to those reported by the managers and custodial bank for discrepancies, reviews the audit report to assure it is an unmodified opinion and the audit firm is reputable, and assure that the investments are reported at fair value.

We performed a detail of walkthrough of these processes on the investment in Credit Suisse Dallas ERF and confirmed that our understanding of the initial due diligence, ongoing monitoring and financial reporting processes documented above are occurring.

The procedures detailed above, describe the controls which allow ERF to get comfortable with and validate the valuations being reported by the managers. Next, we individually evaluate the valuation of each investment fund within ERF's private equity and real estate portfolios. We summarized these funds and their valuation methodologies as of December 31, 2012 in the schedule below.

Fund Name	Fair Value at 12/31/12 (000's)	Valuation Methodology
REAL ESTATE		
Invesco Core Real Estate	94,627	Net Asset Value
Heitman America Real Estate Trust	96,938	Net Asset Value
Total	191,565	
PRIVATE EQUITY		
Hamilton Lane Private Equity Fund VIII	726	Net Asset Value
Hamilton Lane Private Equity Fund VII (Series A)	13,482	Net Asset Value
Hamilton Lane Private Equity Fund VII (Series B)	8,346	Net Asset Value
Hamilton Lane Secondary Fund II	19,320	Net Asset Value
Hamilton Lane Secondary Fund III	4,318	Net Asset Value
Credit Suisse Dallas ERF	18,028	Net Asset Value
Total	64,220	

We corroborated that the above list is complete by reviewing the Northern Trust custodial statements, which are the "book of record" for investments, as of December 31, 2012.

We next obtained the most recent audited financial statements and unaudited manager statements of each fund. Through review of these documents we noted that each fund provides a net asset value as of December 31, 2012. Therefore, as prescribed by ASU 2009-12 described in the background section of this report, it is appropriate to use the practical expedient of net asset value to determine the valuation of all of ERF's alternative investments. Another requirement of using net asset value is that the funds are valued in accordance with AU 820. To evaluate compliance with AU 820 we reviewed the most recent audited financial statements of each fund and documented our review of each fund below.

Invesco Core Real Estate - USA LP

Invesco Core Real Estate is a perpetual life real estate investment fund. It uses the practical expedient for reporting NAV in accordance with ASU 2009-12 described in the background section of this report. For calculating NAV it uses the income approach, which is the most commonly used methodology for this purpose. This involves projecting income for 10 years into the future, discounting that stream to a present value and also projecting a discounted sales price at the end of that income stream. This methodology is compliant with AU 820 described in the background section of this report.

All real estate investments in the fund are externally valued on a quarterly basis by an independent licensed third-party appraiser. Newly acquired investments are carried at cost until an initial valuation is conducted. Redemptions can be made with a 45-day notice based on quarterly redemption procedures. Unaudited valuations are reported to ERF on a monthly and quarterly basis while audited financials are reported on an annual basis. The annual financial statements were audited by KPMG whom issued an unmodified opinion.

Heitman America Real Estate Trust LP

Heitman America Real Estate Trust is a perpetual life open-ended commingled real estate fund. Estimates of fair value are based on independent appraisals or in case of a new acquisition at cost plus capital expenditures, at the discretion of the General Partner. Prior to the first appraisal all acquired real estate is valued at cost plus capital expenditures but will join the independent annual valuation cycle within 12 months. However, a "value-added" property may be valued at cost plus subsequent capital improvements, at the discretion of the General Partner, till the completion of the value-added program. Outstanding redemption requests are met each quarter end as liquid assets permit. The fair value measurement is made in accordance with AU 820 by utilizing level 3 inputs. This means that the pricing inputs are not directly observable and are based on assumptions of the experienced professionals of the firm. Unaudited valuations are reported to ERF on a monthly and quarterly basis while audited financials are reported on an annual basis. The annual financial statements were audited by Deloitte & Touche whom issued an unmodified opinion. In their Independent Auditors Report, Deloitte & Touche observed that, management's fair value measurement is based on independent appraisals or internally prepared valuations, in the absence of readily determinable fair values. The auditors further observe that this is in accordance with the fund's valuation policy as described in Notes 1 and 2 to the consolidated financial statements. Therefore, their opinion is not modified with respect to this matter.

Hamilton Lane Funds

Hamilton Lane has a number of "fund-of-funds" operations it manages for clients. A private equity fund-of-funds collects investor capital in a pool and invests it in private equity funds. Hamilton Lane uses its knowledge as a private equity consultant to select funds for clients. It also has day-to-day management and oversight responsibility. It charges a fee for its service. The underlying funds in the Hamilton Lane fund-of funds do not report their NAV to ERF directly but to Hamilton Lane as the manager of managers. ERF is invested in Hamilton Lane Private Equity Fund VII and VIII. It is also invested in Hamilton Lane Secondary Fund II and III. See below for specific valuation methodologies of each.

Hamilton Lane Private Equity Fund VII

The fund was established in 2009 to invest in private equity managers. It has two series, A and B. Series A invests in funds primarily conducting their operations in the United States. Series B invests in funds primarily conducting their operations outside the United States. The fund will expire in 2023 but can be extended for four one-year periods with different preconditions. In accordance with ASU 2009-12 described in the background section of this report, as a practical expedient, the reporting entity estimates the fair value at the Net Asset Value reported by the investee entity. The funds primary source of income is gains and investment income recognized upon receipt of distributions from underlying funds. On the last day off each quarter, net profits or losses for the period are allocated to the capital accounts of each partner based on their respective commitments.

All of the fund's investments are considered level 3 values under the fair value hierarchy in accordance with AU 820 described in the background section of this report. The funds invest in buyouts, distressed debt, growth equity, secondary and venture capital. Each of these investment styles present different valuation challenges. Valuations are based on assumptions about the future made by the managers of the underlying funds. Unaudited valuations are reported to ERF on a monthly and quarterly basis while audited financials are reported on an annual basis. The annual financial statements were audited by Ernst & Young whom issued an unmodified opinion.

Hamilton Lane Private Equity Fund VIII

The fund was set up in 2012 to invest in private equity. The partnership will expire in 2026 and can be extended up to 4 one-year under different conditions. There are 3 different investment series namely, global, distressed/credit and emerging markets. Every limited partner specifies in the subscription agreement which series it wants to invest in otherwise 100% of the investment will be deemed to have been made in the global series. The fund uses the practical expedient for valuation purposes, in accordance with ASU 2009-12. It also classifies all investments as level 3, requiring informed assumptions by experts of various aspects of valuation, in accordance with AU 820. Unaudited valuations are reported to ERF on a monthly and quarterly basis while audited financials are reported on an annual basis. The annual financial statements were audited by Ernst & Young whom issued an unmodified opinion.

Hamilton Lane Secondary Fund II

The purpose of the fund is to acquire private equity investments through the secondary market. The fund will expire in 2019 and can be extended for up to two one-year terms. All of the fund's investments are considered level 3 investments under the ASC 820 hierarchy, described in the background section of this report, as of December 31, 2013. Unaudited valuations are reported to ERF on a monthly and quarterly basis and audited financials are reported on an annual basis. The annual financial statements were audited by Ernst & Young whom issued an unmodified opinion.

Hamilton Lane Secondary Fund III

The purpose of the fund is to acquire private equity investments through the secondary market. The limited partnership was formed in 2012 and will expire in 2023 and can be extended for up to two one-year terms. All of the fund's investments are considered level 3 investments under the ASC 820 hierarchy, described in the background section of this report, as of December 31, 2013. Unaudited valuations are reported to ERF on a monthly and quarterly basis while audited financials are reported on an annual basis. The annual financial statements were audited by Ernst & Young whom issued an unmodified opinion.

CS/Dallas ERF Partnership

The partnership was formed in 2011 to invest in pooled private equity investment funds that make investments in private equity, venture capital and special situations. The normal term of the partnership is 15 years. The partnership investments represent interest in non-redeemable closed end private investment funds. The assets of these funds are illiquid and do not have an active market price. Therefore, in accordance with AU 820 described in the background section of this report, the partnership classifies investments as level 3 investments requiring significant assumptions by its managers feeding into a fair value measurement. Unaudited valuations are reported to ERF on a monthly and quarterly basis while audited financials are reported on an annual basis. The annual financial statements were audited by PricewaterhouseCoopers whom issued an unmodified opinion.

Objective 2

Description

Confirm that assets are reported properly by each plan as of December 31, 2012.

Background

Before beginning an overview of this objective's background it is important to highlight three clarifying points related to Objective 2 that were discussed during the development of the scope of this engagement. First, the only assets that we examined as part of this objective will be alternative investment assets. Second, we agreed that confirmation of assets will not include independent external confirmation of the existence or valuation of assets. We relied on manager statements, audited financial statements and custodial bank reports to confirm proper reporting. Third, the determination of proper reporting of investment assets should in no way be construed as an independent auditor opinion on the financial statements in accordance with generally accepted auditing standards. With these qualifications we will proceed with a discussion of the background of Objective 2 as follows.

The Governmental Accounting Standards Board (GASB) is considered the source of generally accepted accounting principles (GAAP) for determining proper reporting of assets by a public retirement system. In particular, GASB standard no. 25 – *Financial Reporting for Defined Benefit Pension Plans and Note Disclosure for Defined Contribution Plans* prescribes reporting for public retirement systems like ERF. Critical guidance in GASB 25 related to reporting of investments includes:

- Paragraph 19 which states that "the statement of plan net assets should provide information about the fair value and composition of net assets".
- Paragraph 21 which states that "Plan assets should be subdivided in (a) major categories of assets held and (b) the principal components of the receivables and investment categories.
- Paragraph 24 which states that "Plan investments, whether equity or debt securities, real estate, or other investments (excluding insurance contracts), should be reported at their

> fair value at the reporting date. The fair value of an investment is the amount that the plan could reasonably expect to receive for it in a current sale between a willing buyer and a willing seller—that is, other than in a forced or liquidation sale. Fair value should be measured by the market price if there is an active market for the investment. If there is not an active market for an investment but there is an active market for similar investments, selling prices in that market may be helpful in estimating fair value. If a market price is not available, a forecast of expected cash flows may aid in estimating fair value, provided that the expected cash flows are discounted at a rate commensurate with the risk involved.

GASB 25 requires that investments be reported at fair value. It is also important to note that the principal components of investments are required to be presented in the statement of plan net assets. The illustration of the statement of plan net assets included in GASB 25 as well as industry standards for reporting investment assets interprets "principal components" of investments to be a presentation of investments by the various asset classes in which the retirement system is invested.

With this as our basis of evaluation we will proceed with a discussion of the procedures performed to assess objective 2 and the results of those procedures.

Procedures and Results

To evaluate whether investment assets were properly reported we obtained the custodial reports from Northern Trust, which is the "book of record" for investments, and validated the appropriate classification of the alternative investments based on the nature of the investments held as of December 31, 2012. We then traced the amounts reported by Northern Trust to the amounts reported in ERF's statement of plan net assets as of December 31, 2012.

We noted differences between Northern Trust and the statement of plan net assets which were due to the timing of the custodial bank's year end closing and the receipt of valuations for alternative investments. The values reported for alternative investments by the custodial bank are generally lagged which means they report a valuation from an earlier reporting period in their December 31, 2012 statements. For this reason we also obtained the December 31, 2012 manager statements and traced them to the values reported by ERF. ERF's process includes an update of the lagged valuations reported by the custodial bank to the actual valuations reported at December 31, 2012. We noted that the lagged alternative investment valuations as reported by Northern Trust are updated to the actual December 31, 2012 valuations reported by the managers.

Objective 3

Description

Analyze and benchmark the administrative and investment expenses paid by each plan for the year beginning January 1, 2012 and ending December 31, 2012.

Background

When evaluating benchmarking of pension systems it is important to note that there is a significant disparity between the expenses of operating retirement systems which on the surface appear similar in terms of asset size. Benchmarking can be flawed in that the universe data is often not an "apples-to-apples" comparison. When examining administrative expenses compared to peers there are a variety of factors that impact the comparability. It is nearly impossible to develop a true "apples-to-apples" comparison because controlling for all of these factors requires a great depth of information about each system being examined.

The financial resources required to handle the administrative functions for a public retirement system are dependent on many factors. Those with the greatest impact are:

- The number of participating members and retirees in the plan.
- Personnel cost (i.e. wages and benefits). These are one of the most significant drivers of administrative costs and are dependent upon the organizational structure and the number of FTE's required to administer the system under the established structure.
- Level of service provided to members and retirees.
- Majors projects (i.e. system implementation).

Similar to administrative costs, investment expenses are also difficult to achieve a perfect peer fund match for benchmarking purposes. Investment expenses are primarily a reflection of the investment choices of a pension system. In general, pension systems with a high return expectation have a greater allocation to alternative assets pushing up investment fees. However, higher or lower investment fees are not a guarantee of higher or lower returns but a reflection of return expectations. Most alternative investments have a management fee of between 1.50% - 2.00% of assets under management, and a significant share of returns generated. Most traditional equity or fixed income managers have fees between 0.25%-1.00% of assets under management and no share of returns generated. Therefore, the level of alternatives in a portfolio can be a significant contributor to differences in investment expenses. Nevertheless it should be borne in mind that higher fees are charged by alternative managers based on a higher net return expectation than traditional managers.

The decision to have active traditional managers versus passive traditional managers can be another significant contributor to investment expense differences. While most passive equity and fixed income managers charge between 0.01%-0.10%, active managers for the same asset classes mostly charge between 0.25%-1.00% of assets under management. Again, active managers are paid more on the expectation that they will generate a greater net return.

The timing of reporting can be another important factor in a difference in investment fees. GASB 25, footnote 12 states that, "plans are not required to include in the reported amount of investment expenses those investment-related costs that are not readily separable from (a) investment income (the income is reported net of related expenses) or (b) the general administrative expenses of the plan. As such, in situations where fees are netted from the net asset value of an investment rather than paid directly by the fund, the timing of reporting

investment expenses by managers and pension systems can result in significant differences in reported investment expenses.

Certain systems will have higher investment expenses based upon the number of managers utilized. Contracting with a greater number of investment managers means the commitments to each manager is smaller. If the commitments are smaller the average fee structure may be higher. Manager strategies and the frequency of rebalancing are also significant contributors to excess costs.

As described above and summarized below those characteristics with the greatest impact on the financial resources required to handle the investment functions for a public retirement system are:

- Number of separate trust funds managed
- Types of asset classes used
- Internal versus external management of assets
- Active versus passive strategies
- Division of labor between staff and outside consultants
- Revenue from securities lending to offset expenses
- Soft dollar arrangements, rebates, and commission recapture

Procedures and Results

We obtained administrative and investment expense information for five other systems, City of Dallas Police and Fire Pension System (FYE 12/31/12), City of Seattle Employees Retirement System (FYE 12/31/12), Baltimore City Fire Fighters and Police Officers Retirement System (FYE 6/30/12), Baltimore City Employees Retirement System (FYE 6/30/12) and the Houston Municipal Employees Pension System (FYE 6/30/12) and compared their administrative and investment expenses with the ERF. The systems were selected based upon similarity in size to the ERF. We obtained information on administrative and investment expenses from the Comprehensive Annual Financial Report (CAFR) of each of the 5 peer systems and performed a benchmark analysis of those funds to ERF's in order to measure where the ERF ranks in terms of total administrative and investment expenses. As highlighted next to each systems name above all year ends are not the same as ERF's year end of December 31, 2012. We believe different year ends will not impact our analysis because the analysis performed below utilizes ratios and assumptions which account for any variance that may occur from different reporting dates. It was also necessary to select different year ends because the majority of governmental retirement systems around the country have June 30 year ends which would have narrowed number of available systems for selection as peer funds.

Administrative Expenses

Based on the analysis below, ERF and the five peer funds selected had median administrative costs per member of $27.35 and the median cost as a % of investments was 19 basis points. Based on this analysis ERF is below both the median cost per member and as a % of investments.

Administrative expenses:	Employees Retirement Fund of the City of Dallas	Dallas Police and Fire Pension System	City of Seattle Employees Retirement System	Baltimore City Fire Fighters and Police Officers Retirement System	Baltimore City Employees Retirement System	Houston Municpal Employees Pension System
Per Active, Retired & Inactive Member (in $'s)	$24.22	$68.06	$20.72	$33.53	$17.41	$23.48
Investments (as %)	0.12%	0.17%	0.17%	0.16%	0.28%	0.27%

Investment Expenses

ERF's annual investment expenses are currently approximately $15.8 million. We calculated investment expenses in terms of basis points as it relates to the net assets under management. A basis point is equal to 1/100th of one percent (.01% equals 1 basis point). As noted in the chart above, ERF pays approximately 57 basis points to investment managers. This means they paid .57 of 1% of fund assets for investment expenses for the year ended December 31, 2012. The median investment expense for the six pension systems was 44.5 basis points. See chart below.

	Employees Retirement Fund of the City of Dallas	Dallas Police and Fire Pension System	City of Seattle Employees Retirement System	Baltimore City Fire Fighters and Police Officers Retirement System	Baltimore City Employees Retirement System	Houston Municpal Employees Pension System
Investment expense (in basis points)	57	78	37	34	52	33

Actuarial Audit of the 2009 – 2013 Valuations for the

City of Dallas Police and Fire Pension Systems

Final Report in Accordance with Section 802.1012(f) of the Texas Government Code

October 15, 2014

FOSTER & FOSTER
ACTUARIES AND CONSULTANTS

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ACTUARIES AND CONSULTANTS

October 15, 2014

Ms. Jeanne Chipperfield
Chief Financial Officer
City of Dallas
1500 Marilla St. Room 4DN
Dallas, TX 75201

Re: Dallas Police and Fire Pension Systems Actuarial Audit 2009 – 2013 Valuations

Dear Ms. Chipperfield:

The following report presents the results of the actuarial audit of the following plans for the valuation years January 1, 2009 through January 1, 2013, as required by the Texas Government Code Section 802.1012.

- Dallas Police and Fire Pension System
- Dallas Police and Fire Pension System – Supplemental Plan

An overview of our findings is included in the Summary of Findings and Recommendations section below. The balance of this Report presents details of the audit.

The recommendations provided in this report are intended to identify possible suggestions that might improve understanding of the actuarial services provided. Some comments may be viewed as personal preference; however, the intention was not impose preferences, but to improve the actuarial functions.

This report has been prepared for use by the City and Board in their oversight role with regard the Fund. It has been prepared using Foster and Foster, Inc. valuation systems in a manner that would be used by Foster & Foster to prepare a full actuarial valuation of the Fund. We recognize the many complex calculations involved in performing an actuarial valuation. Therefore, small differences between valuation systems can produce noticeable differences in the valuation results between two actuaries.

In preparing this report, we relied without audit on data furnished by the respective retirement systems and the Fund Actuary, Buck Consulting. This data includes employee data, value of plan assets and other plan financial information. We have reviewed this data for reasonableness and for consistency with previously supplied information. If any of the information summarized in the report is inaccurate or incomplete, the results shown could be materially affected and this report may need to be revised.

The actuarial methods and assumptions, including discount rates, mortality tables and others identified in this report are those used by the Fund Actuary. They are either prescribed by statute or adopted by the Board and approved by the Board. These parties are responsible for selecting the plan's funding policy, actuarial valuation methods, asset valuation methods and assumptions. The complete methods and assumptions are summarized in the actuarial reports furnished by the Fund Actuary. We have included a description of most in the following report.

The replicated valuation results are only estimates of the Plans' financial condition as of single dates. The estimates can neither predict the future condition nor guarantee financial soundness. Actuarial valuations do not affect the ultimate costs of System benefits, only the timing of contributions. The valuation is based on one array of reasonable assumptions (individually and in the aggregate). Other assumption sets may also be

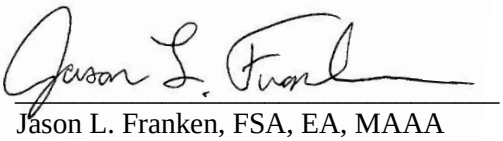
reasonable, and valuations based on those assumptions would be different and also correct. Determining results using alternative assumptions was not within the scope of the engagement.

Future actuarial measurements may differ significantly from the current measurements due to the following: plan experience that differs from the experience anticipated by the economic and demographic assumptions; changes in assumptions or methods; changes in plan provisions and applicable law. The potential range of future measurements was outside the scope of the assignment.

To the best of our knowledge, this report is complete and accurate and was prepared in accordance with generally accepted actuarial principles as prescribed by the American Academy of Actuaries. The undersigned is a member of the American Academy of Actuaries and meets the Qualification Standards of the American Academy of Actuaries to render the actuarial opinion contained herein.

Respectfully submitted,

FOSTER & FOSTER INC.

By: 

Jason L. Franken, FSA, EA, MAAA

City of Dallas Police and Fire Retirement Systems
Actuarial Audit for Valuation Years 2009 – 2013

A. INTRODUCTION

We have been retained by the City of Dallas to satisfy the audit requirements of the Texas Government Code Section 802.1012. This audit report covers actuarial valuations for the years January 1, 2009 through January 1, 2013 for the following retirement plans:

- Dallas Police and Fire Pension System (Police & Fire Plan)
- Dallas Police and Fire Pension System – Supplemental Plan (Supplemental Police & Fire Plan)

An actuarial valuation provides a best estimate of the System's liabilities and contribution levels at a particular point in time. This estimate helps ensure that current assets and future contribution requirements will be sufficient to provide benefits promised to members. Future liabilities are determined by applying a set of actuarial assumptions to project the occurrence, amount and timing of benefits that will become payable according to current plan provisions. The extent to which an actuarial valuation accurately measures a plan's liabilities and contribution levels depends on how well the actuarial assumptions predict future plan experience.

An actuarial audit provides assurance that the actuarial valuation work is being performed accurately and in accordance with generally accepted actuarial principles. In addition, the reviewing actuary can identify areas of improvement that may increase the value and understanding of the actuarial services provided to the retirement systems.

For each plan, each year's valuation has been replicated. In addition, this report discusses our findings and recommendations and details the processes we used to perform our review.

Please note that the contents displayed throughout the remainder of this report are in compliance and consistent with the Actuarial Standards of Practice described below.

Actuarial Standards of Practice

The Actuarial Standards Board has provided coordinated guidance through of a series of Actuarial Standards of Practice (ASOP) for measuring pension obligations and determining pension plan costs or contributions. The ASOPs that apply specifically to valuing pensions are as follows:

- ASOP No. 4, *Measuring Pension Obligations and Determining Pension Plan Costs or Contributions*, which ties together the standards shown below, provides guidance on actuarial cost methods, and addresses overall considerations for measuring pension obligations and determining plan costs or contributions

- ASOP No. 23 *Data Quality*

- ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations*

- ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*

- ASOP No. 41, *Actuarial Communications*
- ASOP No. 44, *Selection and Use of Asset Valuation Methods for Pension Valuations*

When applicable, further details of the ASOP associated with each topic will be provided in the audit.

B. SUMMARY OF FINDINGS AND RECOMMENDATIONS

In performing the review and replication of the actuarial valuations, we completed the following:

- Review of data used in the valuations as described in the previous section
- Assessment of the plan provisions to be valued
- Preparation of the actuarial calculations
- Review of sample lives
- A review of methods and procedures
- A review of the actuarial valuation report content
- An analysis of the actuarial assumptions applied
- Audit of benefit calculations
- Summarizing the results

The above was completed in accordance with the requirements of Texas statutes and the Actuarial Standards of Practice.

Below is a summary of our key findings and proposed changes. The remainder of the document outlines our analysis and documents our recommendations.

Data – The data used for the Police & Fire Plan and Supplemental Police & Fire Plan valuations was found to satisfy Actuarial Standards of Practice.

Replication of results – The calculations by the Fund Actuary were reasonably consistent with our own separate calculations. Foster & Foster was able to replicate the valuation results within a reasonable degree of tolerance. We have noted differences in calculations and methodologies in the Review and Replication of Results section. Specific recommendations regarding methods and assumptions are listed below.

Methods and assumptions – In general, we believe that the assumptions and methods employed by the Fund Actuary are consistent with statutes and Actuarial Standards of Practice. We are recommending the following to fully and fairly disclose the position of the plans:

- Update the description of the entry age normal cost method used to determine accrued liabilities and normal costs. The method actually used to determine normal costs differs slightly from the method as described in the report.
- Supplemental Police & Fire Plan pay data –To smooth out the fluctuations in plan pay and apply the pensionable pay in a consistent manner, we recommend the Fund Actuary reflect an average pay in the valuation for determining both the present value of future benefits and present value of future normal costs.
- The change in the asset method for the Police & Fire Plan should have included additional disclosures to fully illustrate the effect of the change.
- The Fund Actuary should consider disclosing the funding period based on a calculation using the normal cost rates actually accruing in the Police & Fire Plan.

Valuation Report – Generally the report conforms to applicable standards of practice. However, we are recommending additional documentation in the report to fully and fairly disclose the plan. See the Review of the Valuation Report section for a complete list.

Assumptions – In general, the current assumptions conform to Actuarial Standards of Practice. The Fund Actuary currently has procedures in place to monitor ongoing experience versus plan assumptions.

- In light of recent experience, a retirement rate assumption that recognizes separate rates for different populations could be necessary as experience under the new DROP provisions emerges.
- In addition, potential liquidity issues for fund assets due to DROP balances may warrant an adjustment to the investment return assumption.

Benefit Calculations – The review of the benefit calculations indicates that the calculations are performed according to the plan provisions.

C. AUDIT OF ACTUARIAL VALUATIONS FOR YEARS 2009 - 2013

The following pages detail the results of the actuarial audit.

1. Review of Data

The following discusses the completeness, quality and consistency of the data provided by the Fund Actuary. The analysis includes an assessment of the actuaries' reconciliation of year over year data and data adjustment procedures. A complete assessment of the data process from receipt from the System through preparation of the valuation was not determined.

Actuarial Standard of Practice No. 23 (ASOP No. 23), Data Quality provides guidance for determining if data is appropriate for its intended purpose and whether it is sufficiently reasonable, consistent and comprehensive.

The data used in the 2009 – 2013 Dallas Police and Fire Pension System plans was generally found to satisfy the requirements of ASOP No. 23.

To validate the data, we completed the following:

- Data reconciliation - A year-over-year reconciliation of data over the studied period
- Data adequacy check - Verified the data included necessary components required to perform valuation calculations
- Data consistency check - Verified that year-over-year changes in data elements were reasonable.

Data Reconciliation

The year-over-year reconciliation of data indicated that the valuation data provided was generally consistent and appeared to include the necessary members.

For the reconciliation of data for the Police & Fire Plan for years 2009 through 2012, Active members that appeared in prior year's data, but not on the next year's data were not vested for the most part and assumed to be terminated without a vested benefit. A handful appeared to be vested and assumed to have received refunds. Retirees and survivors that appeared in a prior year's data, but not on the next year's data appeared to have deceased. For the years 2012 to 2013, the number of members who appeared in the 2012 data, but did not appear on the 2013 data was greater than previous years. The Fund Actuary confirmed that the status of the members was verified with the client and that the members were handled appropriately in the valuation.

Supplemental Police & Fire Plan year-over-year reconciliations for years 2009 through 2013 were consistent. The members who appeared on prior year's data and dropped off the file appeared to be deceased.

Data Adequacy

The valuation data used for the 2009 through 2013 actuarial valuations was found to include all data elements necessary to complete the valuations.

Data Consistency

We analyzed the year-over-year changes in various data elements used in the valuations. Namely, we compared salary increases, service increases, benefit amounts and birth date changes.

The year-over-year changes were generally within a reasonable range. Data was consistent.

Service amounts on 2010 data benefit service years included additional year of service for members with hire dates in January. The additional service is unlikely to have a material effect on the 2010 valuation.

Findings and Recommendations

The data used for the 2009 through 2013 Dallas Police & Fire valuations was adequate and appeared to satisfy the applicable Actuarial Standards of Practice.

2. Review and Replication of Valuation Results

The following section details the results of the review and replication of the valuation results for the Dallas Police & Fire valuations for the years 2009 through 2013. The replication of actuarial valuations was completed independently from the work of the fund actuary. After completing the work we reviewed liabilities for select participants to verify and identify any key differences. In addition, we contacted the fund actuary to clarify methods.

The actuarial valuation process, while sophisticated in its calculation methodology, is an estimate of the financial value of benefits payable on contingent events, most of which occur many years into the future. As such, the estimates contain a considerable amount of uncertainty and variability. As actuaries, we recognize this fact and are comfortable that small differences in the results do not change the overall financial results portrayed in the valuation. Furthermore, the actuarial software used by different firms has implicit differences that create differences in valuation numbers. For these reasons, we have displayed the comparison of results in terms of percentage differences. In a replication audit, we generally expect to be within 1% to 2% for the calculation of present value of future benefits and within 4-5% for the calculation of actuarial accrued liability and normal cost. The wider band of acceptable differences for accrued liability and normal cost is due to various methods that can be used to allocate the present value of future benefits to past and future years of service.

The following pages detail the results of the replications of the Police & Fire Plan and Supplemental Police & Fire Plan valuations for the years 2009 through 2013. The results are based on assumptions as determined for the actuarial results completed by the Fund Actuary. These assumptions are discussed in sections following. The results are also based on plan provisions summarized in the respective valuation reports. The following is a summary of significant changes effective January 1, 2011:

- Benefits for members hired after February 28, 2011 were updated to reflect:
    - New accrual rates (2% for first 20 years of service; 2.5% for the next five years; 3.0% for service greater than 25 years)
    - Average computation pay based on 60-month average (was 36-month average)
    - Retirement eligibility at age 55 and 20 years of service
    - A death benefit for Qualified Survivor equal to the greater of 50% of the monthly pension accrued at the time of death or 25% of the member's average computation pay
    - No interest credited on the DROP balance
- Beginning with pay periods on or after October 1, 2011, Active DROP participants will contribute member contributions: 3% starting October 1, 2011; 6% for pay periods after October 1, 2012; and 8.5% for pay periods after October 1, 2012.

Included is a summary of the valuation results of the Fund Actuary, the valuation results completed by Foster & Foster and a comparison of the two sets of results.

Foster & Foster was able to replicate most of the key valuation results.

Note the following with regard to differences in the calculations:

- Covered payroll (Police & Fire Plan) – The January 1, 2009 through January 1, 2012 valuations performed by the Fund Actuary reflected a covered payroll amount that equaled the salary for the year preceding the valuation, adjusted with a half-year of salary scale, using simple interest. For the January 1, 2013 valuation, the methodology was updated to reflect an adjustment of a full-year of salary scale. This covered payroll amount is used to determine the member normal cost and the normal cost percentage. The Foster & Foster results reflect a covered payroll amount that reflects a full year adjustment for salary scale for all years of the valuation. Using a payroll that is only adjusted for a half-year of salary scale slightly understates the total normal cost, but not significantly. Therefore the previous method used by the Fund Actuary did not produce unreasonable results.
- Determination of normal cost – The Fund Actuary determined an average normal cost rate for the fund and then applied this percentage to the present value of future salaries in total. Foster & Foster determined normal cost for each active member individually, based on the entry age normal cost method, and summed the individual normal costs to determine the total normal cost. Note, this is the method the Fund Actuary describes in the report. In the end, the two methodologies develop normal costs that are not materially different.
- Funding period calculations (Police & Fire Plan) – the Fund Actuary and Foster & Foster used different methodologies to determine the funding period. See the Review of Methods and Procedures topic for a discussion of the methods used.
- Present value of future salaries (Police & Fire Plan) – Because of the normal cost methodology, the Fund Actuary includes a breakdown of present value of future salaries split by actives and active DROP. The active DROP portion includes the present value of future salaries while projected to be in DROP for members not yet in DROP. We have determined individual normal costs and do not need the present value of future salaries split in that fashion. Accordingly we display present value of future normal costs in total.
- Asset calculations – a review of the asset valuation process was not part of the scope of this project. Therefore, we relied on components used to determine the actuarial value of assets as provided in the actuarial reports. Using these values and the description of the methodology supplied in the report, we were able to replicate the actuarial values of assets calculated by the Fund Actuary.
- 30-year funding cost calculation (Police & Fire Plan) – to determine the 30-year amortization payment under GASB, the Fund Actuary reflected an interest rate compounded monthly. Foster & Foster adjusted the interest using interest compounded annually.
- Supplemental Police & Fire Plan pay data – The available pay data varied over the audit period. For some years a five-year pay history was used to calculate the present value of future benefits for others the most recent year's pay, adjusted with salary scale was used. In addition, the present value of future normal costs was determined using the most recent pay, adjusted with salary scale. The pay for this plan appears to exhibit wide variation from year to year. To smooth out the fluctuations in plan pay and apply the pensionable pay in a consistent manner, we recommend the Fund Actuary reflect an average pay in the valuation for determining both the present value of future benefits and present value of future normal costs.
- Supplemental Police & Fire Plan normal cost – The variations in normal cost from the results of the Fund Actuary and the results compiled by Foster & Foster are mainly due to the handling of the pay measures described in the bullet above.

Dallas Police and Fire Pension System - Police & Fire Plan
January 1, 2013 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

		Fund Actuary	Foster & Foster	Comparison
1.	Covered Payroll			
	a. Active members excluding DROP	227,581,470	228,138,741	0.24%
	b. DROP members	133,462,519	133,548,361	0.06%
	c. Total	361,043,989	361,687,102	0.18%
2.	Actuarial present value of future pay			
	a. Active members excluding DROP	2,800,679,183		
	b. DROP members	590,037,954		
	c. Total	3,390,717,137	3,414,232,625	0.69%
3.	Current contribution rates			
	a. City	27.50%	27.50%	
	b. Member	8.50%	8.50%	
	c. Total	36.00%	36.00%	
4.	Actuarial present value of future benefits	5,603,126,940	5,563,582,836	-0.71%
5.	Actuarial present value of future normal costs			
	a. Total	744,921,309	N/A	
	b. Member (3b x 2c)	285,808,555	N/A	
	c. City (5a - 5b)	459,112,754	N/A	
6.	Actuarial accrued liability (4 - 5a)	4,858,205,631	4,865,275,992	0.15%
7.	Actuarial value of assets	3,795,024,584	3,795,024,584	0.00%
8.	Unfunded actuarial accrued liability (UAAL) (6 - 7)	1,063,181,047	1,070,251,408	
9.	Normal Cost			
	a. Normal cost percentage (5a / 2c)	21.97%	N/A	
	b. Total normal cost (1c x 9a)	79,321,364	79,304,396	-0.02%
	c. Member normal cost (1a x 3b)	28,186,317	28,239,372	0.19%
	d. City normal cost (9b - 9c)	51,135,047	51,065,024	-0.14%
	e. City normal cost rate (9d / [1c x 1.11])	12.76%	12.72%	-0.31%
10.	30-year funding cost			
	a. City normal cost rate	12.76%	12.72%	-0.31%
	b. Amortization rate	15.59%	15.37%	-1.41%
	c. Total	28.35%	28.09%	-0.92%
11.	Margin over/(under) 30-year cost	-0.85%	-0.59%	
12.	Funding period to amortize UAAL	23	28	

Dallas Police and Fire Pension System - Police & Fire Plan
January 1, 2013 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members (exlcuding DROP)			
Count	3,974	3,974	0.00%
Covered payroll	227,581,470	228,138,741	0.24%
Average annual payroll	57,268	57,408	0.24%
Average age	36.63	36.64	0.03%
Average service	9.70	9.70	0.00%
Active members (current DROP)			
Count	1,426	1,426	0.00%
Covered payroll	133,462,519	133,548,361	0.06%
Average annual payroll	93,592	93,652	0.06%
Average age	54.14	54.15	0.02%
DROP account balance	432,840,550	432,840,550	0.00%
Inactive members			
Retired and disabled	2,854	2,854	0.00%
Beneficiaries	929	929	0.00%
Terminated with deferred benefits	96	96	0.00%
Total	3,879	3,879	0.00%
Total annual benefit	159,592,548	164,018,620	2.77%
Average annual benefit	41,143	42,284	2.77%
Inactive member DROP account balance			
Retired and disabled		702,027,338	
Beneficiaries		19,877,100	
Total		721,904,438	
Inactive members with refunds due			
Number	86	86	0.00%
Accumulated contribution balance	948,715	948,715	0.00%
Total DROP account balance		1,154,744,988	
Fair value of assets		3,206,364,971	
Total DROP account balance as a percentage of assets		36.01%	

Dallas Police and Fire Pension System - Police & Fire Plan
January 1, 2012 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

	Fund Actuary	Foster & Foster	Comparison
1. Covered Payroll			
a. Active members excluding DROP	226,996,912	233,714,012	2.96%
b. DROP members	122,498,082	126,297,819	3.10%
c. Total	349,494,994	360,011,831	3.01%
2. Actuarial present value of future pay			
a. Active members excluding DROP	1,948,525,200	N/A	
b. DROP members	1,389,151,600	N/A	
c. Total	3,337,676,800	3,321,946,851	-0.47%
3. Current contribution rates			
a. City	27.50%	27.50%	
b. Member	8.50%	8.50%	
c. Total	36.00%	36.00%	
4. Actuarial present value of future benefits	5,353,464,083	5,401,609,465	0.90%
5. Actuarial present value of future normal costs			
a. Total	784,613,496	N/A	
b. Member (3b x 2c)	276,318,997	N/A	
c. City (5a - 5b)	508,294,499	N/A	
6. Actuarial accrued liability (4 - 5a)	4,568,850,587	4,642,828,696	1.62%
7. Actuarial value of assets	3,378,481,222	3,378,481,222	0.00%
8. Unfunded actuarial accrued liability (UAAL) (6 - 7)	1,190,369,365	1,264,347,474	
9. Normal Cost			
a. Normal cost percentage (5a / 2c)	23.51%	N/A	
b. Total normal cost (1c x 9a)	82,166,273	83,720,381	1.89%
c. Member normal cost (1a x 3b)	23,888,416	24,601,859	2.99%
d. City normal cost (9b - 9c)	58,277,857	59,118,522	1.44%
e. City normal cost rate (9d / [1c x 1.11])	15.02%	14.79%	-1.53%
10. 30-year funding cost			
a. City normal cost rate	15.02%	14.79%	-1.53%
b. Amortization rate	18.04%	18.24%	1.11%
c. Total	33.06%	33.03%	-0.09%
11. Margin over/(under) 30-year cost	-5.56%	-5.53%	
12. Funding period to amortize UAAL	30	54	

Dallas Police and Fire Pension System - Police & Fire Plan
January 1, 2012 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members (exlcuding DROP)			
Count	3,995	3,995	0.00%
Covered payroll	226,996,912	233,714,012	2.96%
Average annual payroll	56,820	58,502	2.96%
Average age	36.63	36.64	0.03%
Average service	9.70	9.70	0.00%
Active members (current DROP)			
Count	1,381	1,381	0.00%
Covered payroll	122,498,082	126,297,819	3.10%
Average annual payroll	88,702	91,454	3.10%
Average age	54.14	54.15	0.02%
DROP account balance	415,259,442	415,259,442	0.00%
Inactive members			
Retired and disabled	2,767	2,767	0.00%
Beneficiaries	902	902	0.00%
Terminated with deferred benefits	128	128	0.00%
Total	3,797	3,797	0.00%
Total annual benefit	153,990,618	153,958,262	-0.02%
Average annual benefit	40,556	40,547	-0.02%
Inactive member DROP account balance			
Retired and disabled		607,062,457	
Beneficiaries		15,558,818	
Total		622,621,275	
Inactive members with refunds due			
Number	75	75	0.00%
Accumulated contribution balance	470,719	470,719	0.00%
Total DROP account balance		1,037,880,717	
Fair value of assets		2,990,943,353	
Total DROP account balance as a percentage of assets		34.70%	

Dallas Police and Fire Pension System - Police & Fire Plan
January 1, 2011 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

		Fund Actuary	Foster & Foster	Comparison
1.	Covered Payroll			
	a. Active members excluding DROP	236,127,391	243,830,336	3.26%
	b. DROP members	128,998,838	136,273,976	5.64%
	c. Total	365,126,229	380,104,312	4.10%
2.	Actuarial present value of future pay			
	a. Active members excluding DROP	2,123,253,500	N/A	
	b. DROP members	1,486,205,000	N/A	
	c. Total	3,609,458,500	3,622,469,121	0.36%
3.	Current contribution rates			
	a. City	27.50%	27.50%	
	b. Member	8.50%	8.50%	
	c. Total	36.00%	36.00%	
4.	Actuarial present value of future benefits	5,193,430,871	5,258,370,113	1.25%
5.	Actuarial present value of future normal costs			
	a. Total	877,081,589	N/A	
	b. Member (3b x 2c)	290,132,373	N/A	
	c. City (5a - 5b)	586,949,217	N/A	
6.	Actuarial accrued liability (4 - 5a)	4,316,349,282	4,398,765,809	1.91%
7.	Actuarial value of assets	3,430,818,823	3,430,818,823	0.00%
8.	Unfunded actuarial accrued liability (UAAL) (6 - 7)	885,530,459	967,946,986	
9.	Normal Cost			
	a. Normal cost percentage (5a / 2c)	24.30%	N/A	
	b. Total normal cost (1c x 9a)	88,725,674	90,563,001	2.07%
	c. Member normal cost (1a x 3b)	21,038,320	21,747,634	3.37%
	d. City normal cost (9b - 9c)	67,687,354	68,815,367	1.67%
	e. City normal cost rate (9d / [1c x 1.11])	16.70%	16.31%	-2.34%
10.	30-year funding cost			
	a. City normal cost rate	16.70%	16.31%	-2.34%
	b. Amortization rate	12.84%	13.23%	3.04%
	c. Total	29.54%	29.54%	0.00%
11.	Margin over/(under) 30-year cost	-2.04%	-2.04%	
12.	Funding period to amortize UAAL	21	27	

Dallas Police and Fire Pension System - Police & Fire Plan
January 1, 2011 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members (exlcuding DROP)			
Count	4,085	4,085	0.00%
Covered payroll	236,127,391	243,830,336	3.26%
Average annual payroll	57,804	59,689	3.26%
Average age	36.63	36.64	0.03%
Average service	9.70	9.70	0.00%
Active members (current DROP)			
Count	1,397	1,397	0.00%
Covered payroll	128,998,838	136,273,976	5.64%
Average annual payroll	92,340	97,548	5.64%
Average age	54.14	54.15	0.02%
DROP account balance	416,749,700	416,749,700	0.00%
Inactive members			
Retired and disabled	2,644	2,644	0.00%
Beneficiaries	891	891	0.00%
Terminated with deferred benefits	135	135	0.00%
Total	3,670	3,670	0.00%
Total annual benefit	143,188,147	143,163,976	-0.02%
Average annual benefit	39,016	39,009	-0.02%
Inactive member DROP account balance			
Retired and disabled		494,133,024	
Beneficiaries		12,770,869	
Total		506,903,893	
Inactive members with refunds due			
Number	68	68	0.00%
Accumulated contribution balance	225,527	225,527	0.00%
Total DROP account balance		923,653,593	
Fair value of assets		2,990,943,353	
Total DROP account balance as a percentage of assets		30.88%	

Dallas Police and Fire Pension System - Police & Fire Plan
January 1, 2010 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

	Fund Actuary	Foster & Foster	Comparison
1. Covered Payroll			
a. Active members excluding DROP	241,857,063	248,043,840	2.56%
b. DROP members	124,863,052	127,349,950	1.99%
c. Total	366,720,115	375,393,790	2.37%
2. Actuarial present value of future pay			
a. Active members excluding DROP	2,160,021,400	N/A	
b. DROP members	1,486,642,400	N/A	
c. Total	3,646,663,800	3,610,252,976	-1.00%
3. Current contribution rates			
a. City	27.50%	27.50%	
b. Member	8.50%	8.50%	
c. Total	36.00%	36.00%	
4. Actuarial present value of future benefits	5,041,696,694	5,086,108,752	0.88%
5. Actuarial present value of future normal costs			
a. Total	908,407,854	N/A	
b. Member (3b x 2c)	183,601,819	N/A	
c. City (5a - 5b)	724,806,035	N/A	
6. Actuarial accrued liability (4 - 5a)	4,133,288,840	4,208,650,247	1.82%
7. Actuarial value of assets	3,382,907,776	3,382,907,776	0.00%
8. Unfunded actuarial accrued liability (UAAL) (6 - 7)	750,381,064	825,742,471	
9. Normal Cost			
a. Normal cost percentage (5a / 2c)	24.91%	N/A	
b. Total normal cost (1c x 9a)	91,349,981	90,464,674	-0.97%
c. Member normal cost (1a x 3b)	20,557,850	21,083,726	2.56%
d. City normal cost (9b - 9c)	70,792,131	69,380,948	-1.99%
e. City normal cost rate (9d / [1c x 1.11])	17.39%	16.65%	-4.26%
10. 30-year funding cost			
a. City normal cost rate	17.39%	16.65%	-4.26%
b. Amortization rate	10.84%	11.43%	5.44%
c. Total	28.23%	28.08%	-0.53%
11. Margin over/(under) 30-year cost	-0.73%	-0.58%	
12. Funding period to amortize UAAL	26	31	

Dallas Police and Fire Pension System - Police & Fire Plan
January 1, 2010 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members (exlcuding DROP)			
Count	4,170	4,170	0.00%
Covered payroll	241,857,063	248,043,840	2.56%
Average annual payroll	57,999	59,483	2.56%
Average age	36.63	36.66	0.08%
Average service	9.70	9.85	1.55%
Active members (current DROP)			
Count	1,306	1,306	0.00%
Covered payroll	124,863,052	127,349,950	1.99%
Average annual payroll	95,607	97,511	1.99%
Average age	54.14	54.35	0.39%
DROP account balance	416,749,700	416,749,700	0.00%
Inactive members			
Retired and disabled	2,565	2,565	0.00%
Beneficiaries	885	885	0.00%
Terminated with deferred benefits	144	144	0.00%
Total	3,594	3,594	0.00%
Total annual benefit	135,299,594	135,268,598	-0.02%
Average annual benefit	37,646	37,637	-0.02%
Inactive member DROP account balance			
Retired and disabled		417,648,897	
Beneficiaries		10,310,232	
Total		427,959,129	
Inactive members with refunds due			
Number	57	57	0.00%
Accumulated contribution balance	139,166	139,166	0.00%
Total DROP account balance		844,708,829	
Fair value of assets		2,851,645,944	
Total DROP account balance as a percentage of assets		29.62%	

Dallas Police and Fire Pension System - Police & Fire Plan
January 1, 2009 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

	Fund Actuary	Foster & Foster	Comparison
1. Covered Payroll			
a. Active members excluding DROP	230,430,232	235,741,479	2.30%
b. DROP members	117,676,651	120,088,505	2.05%
c. Total	348,106,883	355,829,984	2.22%
2. Actuarial present value of future pay			
a. Active members excluding DROP	2,011,095,100	N/A	
b. DROP members	1,416,929,400	N/A	
c. Total	3,428,024,500	3,381,489,116	-1.36%
3. Current contribution rates			
a. City	27.50%	27.50%	
b. Member	8.50%	8.50%	
c. Total	36.00%	36.00%	
4. Actuarial present value of future benefits	4,750,685,548	4,790,457,567	0.84%
5. Actuarial present value of future normal costs			
a. Total	872,588,906	N/A	
b. Member (3b x 2c)	170,943,084	N/A	
c. City (5a - 5b)	701,645,823	N/A	
6. Actuarial accrued liability (4 - 5a)	3,878,096,642	3,956,218,656	2.01%
7. Actuarial value of assets	3,039,667,165	3,039,667,165	0.00%
8. Unfunded actuarial accrued liability (UAAL) (6 - 7)	838,429,477	916,551,491	
9. Normal Cost			
a. Normal cost percentage (5a / 2c)	25.45%	N/A	
b. Total normal cost (1c x 9a)	88,593,202	86,088,514	-2.83%
c. Member normal cost (1a x 3b)	19,586,570	20,038,026	2.30%
d. City normal cost (9b - 9c)	69,006,632	66,050,488	-4.28%
e. City normal cost rate (9d / [1c x 1.11])	17.86%	16.72%	-6.38%
10. 30-year funding cost			
a. City normal cost rate	17.86%	16.72%	-6.38%
b. Amortization rate	12.75%	13.38%	4.94%
c. Total	30.61%	30.10%	-1.67%
11. Margin over/(under) 30-year cost	-3.11%	-2.60%	
12. Funding period to amortize UAAL	33	48	

Dallas Police and Fire Pension System - Police & Fire Plan
January 1, 2009 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members (exlcuding DROP)			
Count	3,983	3,983	0.00%
Covered payroll	230,430,232	235,741,479	2.30%
Average annual payroll	57,853	59,187	2.31%
Average age	36.63	37.04	1.12%
Average service	9.70	10.36	6.80%
Active members (current DROP)			
Count	1,252	1,252	0.00%
Covered payroll	117,676,651	120,088,505	2.05%
Average annual payroll	93,991	95,917	2.05%
Average age	54.14	54.32	0.33%
DROP account balance	340,065,657	340,065,657	0.00%
Inactive members			
Retired and disabled	2,508	2,508	0.00%
Beneficiaries	867	867	0.00%
Terminated with deferred benefits	151	151	0.00%
Total	3,526	3,526	0.00%
Total annual benefit	125,465,286	125,427,879	-0.03%
Average annual benefit	35,583	35,572	-0.03%
Inactive member DROP account balance			
Retired and disabled		347,935,143	
Beneficiaries		9,719,022	
Total		357,654,165	
Inactive members with refunds due			
Number	45	45	0.00%
Accumulated contribution balance	102,314	102,314	0.00%
Total DROP account balance		697,719,822	
Fair value of assets		2,851,645,944	
Total DROP account balance as a percentage of assets		24.47%	

Dallas Police and Fire Pension System - Supplemental Police & Fire Plan
January 1, 2013 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

		Fund Actuary	Foster & Foster	Comparison
1.	Covered Payroll	449,726	449,711	0.00%
2.	Actuarial present value of future benefits	37,699,772	37,939,962	0.64%
3.	Actuarial present value of future normal costs	434,847	N/A	
4.	Actuarial accrued liability (4 - 5a)	37,264,925	37,499,119	0.63%
5.	Actuarial value of assets	21,562,556	21,562,556	0.00%
6.	Unfunded actuarial accrued liability (UAAL)	15,702,369	15,936,563	
7.	Normal Cost			
	a. Total normal cost	82,795	83,492	0.84%
	b. Member normal cost	33,197	33,197	0.00%
	c. City normal cost	49,598	50,295	1.40%
8.	Funding policy contribution			
	a. City normal cost	49,598	50,295	1.40%
	b. Amortization payment (10-yr amortization)	1,885,990	1,914,119	1.49%
	c. Total	1,935,588	1,964,414	1.49%
9.	Total contribution as a percentage of payroll	430.39%	436.82%	

Dallas Police and Fire Pension System - Supplemental Police & Fire Plan
January 1, 2013 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members (exlcuding DROP)			
Count	19	19	0.00%
Covered payroll	181,501	181,548	0.03%
Average annual payroll	9,553	9,555	0.03%
Average age	45.22	45.22	0.00%
Average service	21.63	21.60	-0.14%
Active members (current DROP)			
Count	20	20	0.00%
Covered payroll	268,225	268,163	-0.02%
Average annual payroll	13,411	13,408	-0.02%
Average age	54.42	54.42	0.00%
Average service	31.49	31.49	0.00%
DROP account balance	1,198,951	1,198,950	0.00%
Inactive members			
Number	120	121	0.83%
Total annual benefit	1,989,031	1,989,710	0.03%
Average annual benefit	16,575	16,444	-0.79%
Inactive member DROP account balance			
Retired and disabled		8,441,817	
Beneficiaries		60,347	
Total		8,502,165	
Total DROP account balance		9,701,115	
Fair value of assets		21,562,556	
Total DROP account balance as a percentage of assets		44.99%	

Dallas Police and Fire Pension System - Supplemental Police & Fire Plan
January 1, 2012 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

		Fund Actuary	Foster & Foster	Comparison
1.	Covered Payroll	620,590	620,511	-0.01%
2.	Actuarial present value of future benefits	37,059,336	36,955,685	-0.28%
3.	Actuarial present value of future normal costs	729,731	N/A	
4.	Actuarial accrued liability (4 - 5a)	36,329,605	36,270,543	-0.16%
5.	Actuarial value of assets	20,822,569	20,822,569	0.00%
6.	Unfunded actuarial accrued liability (UAAL)	15,507,036	15,447,974	
7.	Normal Cost			
	a. Total normal cost	128,524	130,735	1.72%
	b. Member normal cost	37,031	37,034	0.01%
	c. City normal cost	91,493	93,701	2.41%
8.	Funding policy contribution			
	a. City normal cost	91,493	93,701	2.41%
	b. Amortization payment (10-yr amortization)	1,862,529	1,855,435	-0.38%
	c. Total	1,954,022	1,949,136	-0.25%
9.	Total contribution as a percentage of payroll	314.87%	314.12%	

Dallas Police and Fire Pension System - Supplemental Police & Fire Plan
January 1, 2012 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members (exlcuding DROP)			
Count	9	9	0.00%
Covered payroll	289,660	289,795	0.05%
Average annual payroll	32,184	32,199	0.05%
Average age	46.33	46.48	0.32%
Average service	21.00	20.93	-0.33%
Active members (current DROP)			
Count	28	28	0.00%
Covered payroll	330,930	330,716	-0.06%
Average annual payroll	11,819	11,811	-0.06%
Average age	55.28	55.37	0.16%
Average service	31.37	31.66	0.92%
DROP account balance	2,318,968	2,318,968	0.00%
Inactive members			
Number	113	113	0.00%
Total annual benefit	1,877,244	1,877,244	0.00%
Average annual benefit	16,613	16,613	0.00%
Inactive member DROP account balance			
Retired and disabled		6,302,957	
Beneficiaries		58,200	
Total		6,361,157	
Total DROP account balance		8,680,125	
Fair value of assets		20,822,569	
Total DROP account balance as a percentage of assets		41.69%	

Dallas Police and Fire Pension System - Supplemental Police & Fire Plan
January 1, 2011 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

		Fund Actuary	Foster & Foster	Comparison
1.	Covered Payroll	886,150	911,068	2.81%
2.	Actuarial present value of future benefits	35,372,757	35,528,271	0.44%
3.	Actuarial present value of future normal costs	1,063,852	N/A	
4.	Actuarial accrued liability (4 - 5a)	34,308,905	34,546,485	0.69%
5.	Actuarial value of assets	21,119,036	21,119,036	0.00%
6.	Unfunded actuarial accrued liability (UAAL)	13,189,869	13,427,449	
7.	Normal Cost			
	a. Total normal cost	185,072	167,945	-9.25%
	b. Member normal cost	35,504	36,832	3.74%
	c. City normal cost	149,568	131,113	-12.34%
8.	Funding policy contribution			
	a. City normal cost	149,568	131,113	-12.34%
	b. Amortization payment (5-yr amortization)	2,866,054	2,917,678	1.80%
	c. Total	3,015,622	3,048,791	1.10%
	d. Prior year's contribution + $100,000 corridor	1,543,717	1,543,717	0.00%
	e. Final funding policy contribution (lesser of a. and d.)	1,543,717	1,543,717	0.00%
9.	Total contribution as a percentage of payroll	174.20%	169.44%	

Dallas Police and Fire Pension System - Supplemental Police & Fire Plan
January 1, 2011 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members (exlcuding DROP)			
Count	11	11	0.00%
Covered payroll	372,354	387,088	3.96%
Average annual payroll	33,850	35,190	3.96%
Average age	45.73	45.85	0.26%
Average service	18.91	18.76	-0.79%
Active members (current DROP)			
Count	28	28	0.00%
Covered payroll	513,796	523,980	1.98%
Average annual payroll	18,350	18,714	1.98%
Average age	54.54	54.73	0.35%
Average service	30.93	31.05	0.39%
DROP account balance	1,934,159	1,934,158	0.00%
Inactive members			
Number	113	113	0.00%
Total annual benefit	1,804,837	1,804,837	0.00%
Average annual benefit	15,972	15,972	0.00%
Inactive member DROP account balance			
Retired and disabled		6,097,795	
Beneficiaries		72,114	
Total		6,169,908	
Total DROP account balance		8,104,067	
Fair value of assets		21,119,036	
Total DROP account balance as a percentage of assets		38.37%	

Dallas Police and Fire Pension System - Supplemental Police & Fire Plan
January 1, 2010 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

		Fund Actuary	Foster & Foster	Comparison
1.	Covered Payroll	1,044,326	1,044,326	0.00%
2.	Actuarial present value of future benefits	34,767,421	34,996,322	0.66%
3.	Actuarial present value of future normal costs	1,318,151	N/A	
4.	Actuarial accrued liability (4 - 5a)	33,449,270	33,568,168	0.36%
5.	Actuarial value of assets	20,680,752	20,680,752	0.00%
6.	Unfunded actuarial accrued liability (UAAL)	12,768,518	12,887,416	
7.	Normal Cost			
	a. Total normal cost	215,131	222,588	3.47%
	b. Member normal cost	36,806	36,806	0.00%
	c. City normal cost	178,325	185,782	4.18%
8.	Funding policy contribution			
	a. City normal cost	178,325	185,782	4.18%
	b. Amortization payment (5-yr amortization)	2,952,822	2,986,115	1.13%
	c. Total	3,131,147	3,171,897	1.30%
	d. Prior year's contribution + $100,000 corridor	1,443,717	1,443,717	0.00%
	e. Final funding policy contribution (lesser of a. and d.)	1,443,717	1,443,717	0.00%
9.	Total contribution as a percentage of payroll	138.24%	138.24%	

Dallas Police and Fire Pension System - Supplemental Police & Fire Plan
January 1, 2010 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members (exlcuding DROP)			
Count	13	13	0.00%
Covered payroll	433,017	433,017	0.00%
Average annual payroll	33,309	33,309	0.00%
Average age	46.46	46.58	0.26%
Average service	19.31	19.16	-0.78%
Active members (current DROP)			
Count	27	27	0.00%
Covered payroll	611,309	611,309	0.00%
Average annual payroll	22,641	22,641	0.00%
Average age	54.26	54.35	0.17%
Average service	30.07	31.03	3.19%
DROP account balance	1,785,839	1,785,839	0.00%
Inactive members			
Number	112	112	0.00%
Total annual benefit	1,699,279	1,699,279	0.00%
Average annual benefit	15,172	15,172	0.00%
Inactive member DROP account balance			
Retired and disabled		5,448,829	
Beneficiaries		65,895	
Total		5,514,724	
Total DROP account balance		7,300,563	
Fair value of assets		20,680,752	
Total DROP account balance as a percentage of assets		35.30%	

Dallas Police and Fire Pension System - Supplemental Police & Fire Plan
January 1, 2009 Actuarial Valuation Replication

Actuarial Cost, Margin and Funding Period

		Fund Actuary	Foster & Foster	Comparison
1.	Covered Payroll	1,043,356	1,043,357	0.00%
2.	Actuarial present value of future benefits	33,391,974	33,421,727	0.09%
3.	Actuarial present value of future normal costs	1,338,678	N/A	
4.	Actuarial accrued liability (4 - 5a)	32,053,296	32,188,741	0.42%
5.	Actuarial value of assets	18,139,795	18,139,795	0.00%
6.	Unfunded actuarial accrued liability (UAAL)	13,913,501	14,048,946	
7.	Normal Cost			
	a. Total normal cost	217,227	200,751	-7.58%
	b. Member normal cost	41,072	41,072	0.00%
	c. City normal cost	176,155	159,679	-9.35%
8.	Funding policy contribution			
	a. City normal cost	176,155	159,679	-9.35%
	b. Amortization payment (5-yr amortization)	3,199,448	3,212,403	0.40%
	c. Total	3,375,603	3,372,082	-0.10%
	d. Prior year's contribution + $100,000 corridor	1,343,717	1,343,717	0.00%
	e. Final funding policy contribution (lesser of a. and d.)	1,343,717	1,343,717	0.00%
9.	Total contribution as a percentage of payroll	128.79%	128.79%	

Dallas Police and Fire Pension System - Supplemental Police & Fire Plan
January 1, 2009 Actuarial Valuation Replication

Participant Data

	Fund Actuary	Foster & Foster	
Active members (exlcuding DROP)			
Count	15	15	0.00%
Covered payroll	483,199	483,200	0.00%
Average annual payroll	32,213	32,213	0.00%
Average age	46.93	46.98	0.11%
Average service	18.60	18.50	-0.54%
Active members (current DROP)			
Count	26	26	0.00%
Covered payroll	560,157	560,157	0.00%
Average annual payroll	21,545	21,545	0.00%
Average age	54.08	54.18	0.18%
Average service	30.12	31.06	3.12%
DROP account balance	1,602,199	1,602,199	0.00%
Inactive members			
Number	112	112	0.00%
Total annual benefit	1,650,190	1,650,190	0.00%
Average annual benefit	14,734	14,734	0.00%
Inactive member DROP account balance			
Retired and disabled		1,602,199	
Beneficiaries		6,528,220	
Total		8,130,419	
Total DROP account balance		9,732,618	
Fair value of assets		18,139,795	
Total DROP account balance as a percentage of assets		53.65%	

As part of the replication process, Foster & Foster also reviewed liabilities for the following categories of participants in the Police & Fire Plan:

- Active member hired after February 28, 2011
- Active member hired before December 31, 2006 (not-yet normal retirement eligible)
- Active member hired before December 31, 2006 (normal retirement eligible)
- Active DROP participant
- Retiree
- Disabled retiree
- Deferred vested participant

For each of the sample lives the present value of future benefits, present value of future salaries and accrued liabilities mimicked the results seen for the population.

3. Review of Actuarial Methods and Procedures

The review of actuarial methods and procedures will determine if the actuarial cost method, actuarial asset valuation method and amortization method are reasonable and consistent with generally accepted actuarial practice and principles. A general discussion of methods is provided first, followed by specific observations and recommendations for each plan.

Actuarial Cost Method

Actuarial Standard of Practice No. 4, Measuring Pension Obligations states that an acceptable actuarial cost method meets the following criteria:

- Allocates costs over the period of time that benefits are earned; and
- Allocates costs on a basis that has a logical relationship to the plan's benefit formula

Current methodology - Liabilities and contributions for the Dallas Police and Fire Pension System plans are calculated using the Individual Entry Age Normal Cost Method.

The objective under this method is to fund each member's benefits under the Plan as payments which are level as a percentage of salary, starting at original participation date and continuing until the assumed date of retirement, termination, disability or death.

At any given date, a liability is calculated equal to the contributions which would have been accumulated if the funding method had always been used, the current plan provisions always in place, and all assumptions had been precisely accurate. The difference between this liability and the assets is the unfunded accrued liability. Specifically, the components of this method are determined as follows:

- Normal cost – For each active member under the assumed retirement age, a normal cost is determined by applying to earnings the level percentage of salary which, if contributed each year from date of entry into the Plan until the assumed retirement (termination, disability or death) date, is sufficient to provide the full value of the benefits expected to be payable.
- The present value of the future normal costs - Equals the total of the discounted values of all active members' normal cost, assuming they are paid from the valuation date until retirement (termination, disability or death) date.
- The present value of projected benefits is calculated as the value of all benefit payments expected to be paid to the Plan's current members, including active and retired members, beneficiaries and terminated members with vested rights.
- The accrued liability is the excess of the present value of projected benefits over the present value of future normal costs.
- The unfunded accrued liability is the excess of the accrued liability over the assets of the Fund. It represents the portion of the accrued liability which has not been funding by accumulated past contributions.

Findings and recommendations – The actuarial reports completed by the Fund Actuary describe the Entry Age Normal cost method, similar to the method described above, where a normal cost is determined for each individual covered active member. However, in practice, based on correspondence with the Fund Actuary, an average normal cost rate is determined for the active members in total. This rate is then applied

to the total covered payroll to determine a total normal cost. In effect, normal cost for higher service members is understated and normal cost for lower service members hired after February 28, 2011 is overstated. On average, the methodology appears to have an immaterial effect on the total normal cost.

Our recommendation is to update the description of the methodology in the report to more accurately describe the methodology being used.

Actuarial Asset Method

Actuarial Standard of Practice No. 44, Selection and Use of Asset Valuation Methods for Pension Valuations, outlines considerations and guidelines for selecting an appropriate asset valuation method. When selecting an actuarial asset valuation method other than market value, the actuary should "select an asset valuation method that is designed to produce actuarial values of assets that bear a reasonable relationship to the corresponding market values." Specifically, the method should include the following:

- Actuarial value of assets will be sometimes greater and sometimes less than corresponding market values.
- Method should be likely to produce actuarial values that satisfy both of the following:
    - Asset values fall within a reasonable range around corresponding market values
    - Differences between actuarial value of assets and market value are recognized within a reasonable period of time

  In lieu of the above, the criteria are satisfied if, in the actuary's professional judgment, the asset method either produces values within a sufficiently narrow range around market value or recognized differences from market value in a sufficiently short period.

Current methodology – Over the course of the audit period, the Fund Actuary changed the asset method for the Police & Fire Plan. The Supplemental Police & Fire Plan reflects assets at fair market value.

Police & Fire Plan:

- For valuation years January 1, 2009 through January 1, 2012: The Fund Actuary reflected a five year recognition period for investment gains and losses.
- For the valuation year January 1, 2013, the methodology was changed to reflect a ten year recognition period for investment gains and losses. This change was made retroactively resulting in the reversal of gains and losses that had already been recognized.

Findings and Recommendations – The asset methods satisfy Actuarial Standards of Practice. However, we believe the change in asset methodology requires additional disclosure.

The change to 10-year smoothing from five-year smoothing in the January 1, 2013 valuation impacted the funding measures significantly. Under the five-year smoothing, losses from 2008 were already fully recognized in the actuarial value of assets. The 10-year smoothing reverses 50% of that recognition and increases the actuarial value of assets by 14.6%. The changes to the other funding measures are as follows:

- The funded percentage increased from 68.16% to 78.12%
- The funding period decreased 19 years
- The 30-year funding cost decreased 7.10%

The following page illustrates the calculation of the January 1, 2013 actuarial value of assets before and after the change in method.

Given the significance of the change, we believe documentation of the effects of the change in the January 1, 2013 report should have been more robust. Specifically, the summary of principal results and actuarial cost measures displayed on pages 1 and pages 5 and 6, respectively, should have been provided before and after the change.

Actuarial Value of Assets - Police & Fire Plan
January 1, 2013 Valuation

Current Year Gain/(Loss):		**After Method Change**		**Before Method Change**
Market value of assets as of December 31, 2011	$	2,990,943,353	$	2,990,943,353
Benefit payments during fiscal year 2012		(203,099,511)		(203,099,511)
Total contributions during fiscal year 2012		125,801,148		125,801,148
Expected return during fiscal year 2012		250,945,005		250,945,005
Expected market value of assets as of December 31, 2012	$	3,164,589,995	$	3,164,589,995
Actual market value of assets as of December 31, 2012	$	3,206,364,971	$	3,206,364,971
Investment gain/(loss) during the fiscal year	$	41,774,976	$	41,774,976
Development of Actuarial Value of Assets (market value less unrecognized amounts):				
Market value of assets as of December 31, 2012	$	3,206,364,971	$	3,206,364,971
Unrecognized gain/(loss) from fiscal 2012		37,597,478		33,419,981
Unrecognized gain/(loss) from fiscal 2011		(253,263,542)		(189,947,656)
Unrecognized gain/(loss) from fiscal 2010		44,012,466		25,149,980
Unrecognized gain/(loss) from fiscal 2009		79,772,423		26,590,808
Unrecognized gain/(loss) from fiscal 2008		(562,952,284)		N/A
Unrecognized gain/(loss) from fiscal 2007		4,314,324		N/A
Unrecognized gain/(loss) from fiscal 2006		50,405,031		N/A
Unrecognized gain/(loss) from fiscal 2005		11,454,491		N/A
Unrecognized gain/(loss) from fiscal 2004		N/A		N/A
Preliminary actuarial value of assets	$	3,795,024,584	$	3,311,151,858
20% Corridor Check				
80% of market value	$	2,565,091,977	$	2,565,091,977
120% of market value	$	3,847,637,965	$	3,847,637,965
Final actuarial value of assets	$	3,795,024,584	$	3,311,151,858

Amortization Methods

To help create pension costs that are smooth and predictable, plans can amortize unfunded accrued liability, including changes to unfunded accrued liability due to gains and losses, assumption/method changes and plan changes. Amortization methods may be prescribed by law. ASOP No. 4 discusses guidelines for cost/contribution allocation procedures. In general, unfunded accrued liabilities should be recognized (1) over a reasonable time period and (2) in a rational and systematic way.

Current methodology (Police & Fire Plan) – Contributions for the Police & Fire Plan are determined by state statute. They are dependent on the level of member contributions, but are unrelated to unfunded accrued liability amounts. The current city contribution rate is 27.50%. The Fund Actuary also reports the city contribution rate required to pay the normal cost and to amortize the unfunded accrued liability over a 30-year period as required by GASB 27.

In addition, the funding period calculation approximates the time in years that will be required to amortize the current UAAL based on the current contribution rate. Each year, the city contributes 27.50% of payroll. To determine the funding period, a portion of the contribution pays the normal cost for benefits accruing during the year and the remaining portion pays down the current unfunded accrued liability. The years required to pay down the current unfunded accrued liability is the funding period.

The Fund Actuary changed the methodology used for this determination beginning with the January 1, 2011 valuation. The methodologies are as follows:

- January 1, 2009 and January 1, 2010 valuations: Projected unfunded accrued liability with a blend of normal cost rates for the benefits available to members hired before and after December 31, 2006. Normal cost for members active at the valuation date was projected as a level percent of pay at the applicable normal cost rate according to the member's date of hire. Normal cost for future members was projected as a level percent of pay at the normal cost rate applicable to members hired after December 31, 2006
- January 1, 2011 through January 1, 2013 valuations: The funding period was determined using the normal cost rate for only the benefits available to members hired after February 28, 2011.

Findings and Recommendations (Police & Fire Plan) – The calculation of the funding period is consistent with the Texas Pension Review Board (PRB) Guidelines for Actuarial Soundness which require funding the unfunded accrued liability over a level or declining percentage of payroll. However, we do not believe using the ultimate normal cost rate fairly and accurately represents the sufficiency of the current contribution rates to fund the unfunded accrued liability over a reasonable period. For example, the January 1, 2011 calculation reflected a normal cost rate for members hired after February 28, 2011 despite that no members hired after that date were included in the liabilities for that valuation. As a result, the actual amount of time required to pay off the unfunded accrued liability is understated.

The funding period calculated by Foster & Foster reflects normal cost rates based on a weighted-average of the normal cost rates for the three tiers of benefits. The actual normal cost rate will decrease over time; however, not reflecting the higher normal cost rate in the short-term understates the funding period for unfunded liabilities. The lower normal-cost rate applicable to members hired after February 28, 2011 will

not be realized for some time. Using a weighted average normal cost rate still reflects a projected amortization payment that is a level percentage of projected payroll. This method most likely overstates the funding period, but avoids providing a false impression that unfunded liabilities are getting paid down quickly with the current contribution levels.

In summary, the methodologies used to determine the funding period can greatly affect the calculation, especially in times of greater unfunded accrued liabilities. To provide a more realistic picture of the health of the plan, the Fund Actuary should consider disclosing the funding period based on normal cost rates actually accruing in the plan.

Current methodology (Supplemental Police & Fire Plan) – The Supplemental Police & Fire Plan contributions, by contrast, are not determined by statute. Contributions have generally been determined as the normal cost plus an amount to amortize the unfunded accrued liability over a period of years. The methodology was changed beginning with the January 1, 2012 plan year. The specific methodologies are as follows:

- January 1, 2009 through January 1, 2011 valuations: Normal cost plus a five-year amortization of the unfunded accrued liability, subject to a limitation of the previous year's contribution plus $100,000.
- January 1, 2012 and January 1, 2013 valuations: Normal cost plus a 10-year amortization of the unfunded accrued liability.

Findings and Recommendations (Supplemental Police & Fire Plan) – The updated methodology removes the restriction based on the prior year's contribution, but extends the amortization period for the unfunded accrued liability to 10 years. The change in amortization period is reasonable.

4. Review of Valuation Report

ASOP No. 41, Actuarial Communications provides guidance to actuaries regarding various types of actuarial communications, including the valuation report. Specifically: The actuary should state the actuarial findings, and identify the methods, procedures, assumptions, and data used by the actuary with sufficient clarity that another actuary qualified in the same practice area could make an objective appraisal of the reasonableness of the actuary's work as presented in the actuarial report.

Findings and Recommendations – The actuarial reports produced by the Fund Actuary for the valuation years January 1, 2009 through January 1, 2013 generally satisfy the requirements of ASOP No. 41. However, we recommend the Fund Actuary improve documentation of the following items in the report:

- Assumptions –
    - Specify the optional payment form assumptions for retirees (married members elect J&S annuity; single members elect life annuity). The valuation data includes optional payment form data by member. However, based on discussions with the Fund Actuary, we determined those payment form elections are not used in the valuation. This could be due to unreliable payment form election data. To the extent assumptions are used in the valuation, the Fund Actuary should disclose the assumption in the valuation report.
    - Specify that 100% of disabilities are assumed to be service-related.
    - Clarify the presentation of the COLA assumptions; specify that members hired prior to December 31, 2006 are assumed to get 4% COLAs and members hired after that date are assumed to get no COLA increase.
    - Specify the assumed payment pattern for DROP balances
- Methods –
    - Specify the methodology used to determine the funding period
    - Clarify the method used to determine normal cost
- Plan provisions –
    - Update the summary of the survivor benefit for a qualified surviving spouse for members hired after February 28, 2011 and who die while in active service. The benefit according to the plan document should be 50% of the accrued benefit as of the date of death, subject to a minimum of 25% of average compensation. Currently, the plan provisions summary in the report describes a benefit as the greater of 50% of the accrued benefit had the member had left active service and attained age 55 and 50% of average computation pay. To the extent that the valuation parameters reflect the incorrect provisions, the valuation program should be updated. The benefit as summarized in the plan provisions overstates the benefit due. Note this currently has an immaterial effect on the valuation results.
- Exhibits (Police & Fire Plan) –
    - Add detail regarding the split of liabilities between actives and inactives
    - Add detail regarding the calculation of the total 30-year funding cost
    - Add detail regarding the funding period calculation
    - Add information regarding DROP balances current retirees and beneficiaries; include a total and display the total DROP balance relative to the current fair value of assets

- Exhibits (Supplemental Police & Fire Plan) –
    - Add the following items to the Actuarial Cost page:
        - Actuarial present value of future salaries, split by active and active DROP
        - A split of actuarial present value of future benefits by active and active DROP
        - Show normal cost in total and add a split for employer/member normal cost
    - Add an exhibit detailing the calculation of the funding policy contribution

5. Review of Demographic Assumptions

ASOP No. 35, *Selection of Demographic and Other Noneconomic Assumptions for Measuring Pension Obligations*, provides guidance to actuaries in selecting (including giving advice on selecting) demographic and other noneconomic assumptions for measuring obligations under defined benefit pension plans.

Over the following pages, the following demographic assumptions will be reviewed:

- Retirement Rates
- Withdrawal Rates
- Mortality Rates
- Disability Rates
- Other assumptions (e.g. percent married, age at DROP)

Generally, demographic assumptions are based on actual plan experience with additional considerations for current trends. ASOP No. 35 states "the actuary should use professional judgment to estimate possible future outcomes based on past experience and future expectations, and select assumptions based upon application of that professional judgment." ASOP No. 35 also states that "a reasonable assumption is one that is expected to appropriately model the contingency being measured and is not anticipated to produce significant cumulative actuarial gains or losses over the measurement period." Also, "the actuary should not give undue weight to past experience" particularly when recent rates of retirement or termination were largely attributable of a one-time work force reduction.

Note that actuarial assumptions reflect average experience over long periods of time. A change in actuarial assumptions generally results when experience over a period of years indicates a consistent pattern. Proposed changes to the demographic assumptions better reflect actual plan experience over the studied time period, with consideration for whether or not past patterns of experience are expected to continue in the future.

Mortality

Current assumptions - Effective with the January 1, 2012 valuation, the mortality assumption for healthy members was updated to the RP-2000 Combined Healthy Mortality Table, projected to 10 years after the valuation date (2022 for January 1, 2012 valuation). Disabled retiree mortality was updated to the RP-2000 Combined Healthy Mortality Table, set forward one year.

Comments - Mortality experience provided in the January 1, 2012 and January 1, 2013 valuation reports was not compared to the current assumptions. However, based on valuation data provided for the 2009 to 2013 period, we compared the actual incidence of mortality for retired members to the expected incidence based on current assumptions. In total for both police and fire members actual incidence of death was heavier than expected. Therefore, the current rates reflect some level of mortality improvement, consistent with current practices in the actuarial industry.

Findings and Recommendations – No change to the current mortality assumption is needed; The Fund Actuary should continue to monitor experience and show actual mortality experience compared to assumed experience in the experience section of the report.

Withdrawal

Current assumptions – Effective with the January 1, 2012 valuation, the withdrawal assumption was updated for police members to reflect heavier rates of withdrawal for ages under 40 and lower rates of withdrawal for ages 40 and older. The current rates of withdrawal are age-based tables.

Comments – Based on the 2012 experience, the current withdrawal rates appear to be reasonable. The changes effective January 1, 2012 appear to show actual rates of withdrawal that are in line with assumed rates. Analysis could be done to determine if the rates should have a service based component

Findings and Recommendations – No change to the current withdrawal rates. However, additional analysis of experience could suggest a change to select and ultimate rates.

Retirement

Current assumption – Retirement rates are an age-based table of rates: 2% for ages 38 to 49; 4% at age 50; 3% for ages 51 – 54; 25% at age 55; 20% for ages 56 to 64 and 100% at age 65.

Comments – The current assumed rates have been in place since January 1, 2005. Since 2004, actual retirement rates have been consistently significantly less than assumed rates. On average, the number of actual retirements has been 20% less than the number of expected retirements for the rolling 5-year experience from January 1, 2004 – January 1, 2013. However, changes to the DROP provisions are effective for participants participating in DROP after March 1, 2011. Notably DROP accounts for members who become participants on or after March 1, 2011 will not accrue interest and all DROP participants must pay employee contributions for pay periods after October 1, 2011. The Fund Actuary notes that these changes likely will increase retirements as there are fewer benefits to participating in DROP.

Findings and Recommendations – Given the changes to the plan provisions, retirement experience should be continued to be monitored. The retirement experience for the years since the changes to DROP does not yet appear to confirm predictions for higher rates of retirement. An adjustment to assumed retirement rates for members hired before March 1, 2011 should be considered.

Disability

Current assumptions – Separate age-based tables of rates for police and fire members. One-hundred percent of disablements are assumed to be service-related.

Comments – This assumption was last updated effective January 1, 1999. The rolling 5-year average ratio of actual disablements to expected disablements is decreasing. The actual incidence of disability appears to be trending downward. Note, the total number of disablements over a 5 year period is very small so a low weight of credibility should be placed on actual experience.

Findings and Recommendations – The disability rates seem reasonable. Continue to monitor disability experience and adjust if the incidence of disablement continues to decrease.

Percent Married/Spouse Assumptions

Current assumption – Currently, the funds assume 80% of members are married and male spouses are three years older than female spouses.

Findings and Recommendations – The experience section of the valuation report doesn't summarize marriage percentages based on actual experience. Based on the data provided for the 2009 through 2013 audit, the percentage of retired members who are married hovers around 84%. For active members, the actual percentage married is around 56%. Because Qualified Spouses are determined as of the date of the member's death, an assumption of 80% is reasonable. The assumption should be monitored periodically.

Age at DROP Entry

Current Assumption – Currently, the funds assume members enter DROP upon normal retirement eligibility: Age 50 and 5 years of service if hired before February 28, 2011 and age 55 with 20 years if hired after that date.

Findings and Recommendations – Based on the recent actuarial valuation data provided for the years 2009 through 2013, the average age at DROP entry is 49.6 (upon reaching eligibility age). The members who have entered DROP during the audit period were hired prior to February 28, 2011. Based on experience for this group, it is reasonable to assume that members hired after February 28, 2011, would elect DROP upon eligibility (age 55) as well.

DROP Balance Return

Current Assumption – For the January 1, 2009 and January 1, 2010 valuations the assumed rate of return on DROP balances was 9.00%. Effective January 1, 2011 the assumption was set to 8.50%. Members hired prior to February 28, 2011 and enter DROP are assumed to receive 8.50% interest on DROP balances. Members hired after that date who enter DROP do not receive interest on DROP balances.

Findings and Recommendations – The actual return credited to the DROP balance is based on the arithmetic average of the annual market return on the System's investments for the ten preceding calendar years. The rate must not be less than 8% or greater than 10%. Because the interest rate used to determine the plans liabilities is also a prediction of long term plan returns, the 8.50% DROP balance return assumption is reasonable.

Load for Overtime and Other Non-Computation Pay

Current Assumption – 11%

Findings and Recommendations – The City's contribution is based on total pay including non-computation pay. According to the valuation reports the assumption is based on a revised compensation package adopted by the City Council in 2007. We have no reason to believe the assumption should be changed.

6. Review of Economic Assumptions

ASOP No. 27, *Selection of Economic Assumptions for Measuring Pension Obligations,* provides guidance to actuaries in selecting (including giving advice on selecting) economic assumptions – primarily investment return, discount rate, and salary scale – for measuring obligations under defined benefit pension plans.

Throughout the remainder of this section, we have used the standards set forth in ASOP No. 27 as a guideline for reviewing the following economic actuarial assumption:

- Inflation
- Payroll Growth
- Salary Increases
- Investment Return

Please keep in mind that ASOP No. 27 states that "the best an actuary can do is to use professional judgment to estimate possible future economic outcomes based on past experience and future expectations, and to select assumptions based upon that application of professional judgment."

Inflation

Current assumption – 4%

Findings/Recommendations – The inflation assumption estimates future annual price increases. In an actuarial valuation, this assumption is a building block for all economic assumptions. An inflation assumption of 4% is on the upper end of the reasonable range. Over the 30-year period ending on December 31, 2012, the Consumer Price Index for All Urban Consumers (CPI-U) was 2.89%. The Fund Actuary should continue to monitor this assumption for reasonableness.

Payroll Growth

Current assumption – 4%

Findings and Recommendations – The payroll growth assumption is used to determine the amortization payment under the level percentage of payroll approach. While this assumption does not have a direct impact on the City's contribution, it does impact the 30-year funding cost and funding period. This assumption determines how the covered payroll will increase over time. Generally, this assumption is similar to the inflation assumption unless the actuary expects a lot of expansion in the police and fire departments. In the five years we examined, the payroll increased by 2.35% per year which is 0.55% more than the CPI-U during this period. This assumption appears reasonable but the Fund actuary should continue to monitor this assumption for reasonableness.

Investment Return

The ASOP requires that the investment return assumption fall within a best-estimate range of anticipated future experience Therefore, the assumption should be set based on the long-term expectation of the plan as determined by the investment policy statement, target asset allocation and capital market assumptions.

Current assumption – 8.50%, net of investment and administrative expenses.

Findings and Recommendations – This assumption is higher than the rate used by many of its peer plans across the country. However, the Plan's investment strategy is different than many public pension plans since a higher portion of its assets are invested in real estate, private equity, infrastructure and natural resources. These asset classes can provide significant returns as well as diversification. The drawbacks of these investments include increased risk, potential liquidity issues and higher investment-related expenses.

Based on the historical asset returns described in the valuation reports, the average annualized rate of return for the period October 1, 1988 through December 31, 2012 is 9.69%. The historical returns do not indicate that the assumption is unreasonable; however, past experience isn't necessarily the best indicator of future returns. Past experience should be considered in conjunction with other measures.

One factor to consider is that the asset values of both plans include significant portions of DROP balances. Over the course of the audit period, the proportion of plan assets that reflect DROP balances for the Police & Fire Plan increases from about 25% in 2009 to 36% in 2013. For the Supplemental Police & Fire Plan, the proportion of assets that reflect DROP balances hovers around 50%. The exact percentages for each valuation year are included in the valuation replication exhibits on pages 10-29.

Because the DROP balances are also reflected in the liabilities, the proportion of assets that are DROP balances has no direct impact on the funding calculations. However, having significant portions of assets dedicated to member's personal DROP balances has implications on the Plan's asset allocation, expected return and asset liquidity. Since the Plans have a significant portion of assets dedicated to DROP balances and have a fair amount of illiquid assets, the Fund Actuary should consider incorporating the liquidity risk of a "run on the bank" into the investment return assumption.

Another factor, the Plan guarantees an interest rate of 8.5% on nearly half of its assets. In years where the asset return falls short of its target, the impact on the Plan is compounded. The Fund Actuary should monitor this issue to ensure an appropriate investment return assumption is used.

Salary Increase

Current assumption – Currently, the assumed rates of salary increases are a service-based table with rates decreasing from 9.64% at zero years of service to 4.00% at 30 years of service. This assumption was set on January 1, 2007.

Findings and Recommendations – Recent pay increase experience based on data for the audit period indicates lower actual pay increases than expected. This is in agreement with salary increase experience reported in the valuation reports. The lower pay increases could be due to recent municipality experience and could be temporary. The Fund Actuary reported that the assumed rates reflected expectations for future promotional and merit salary increases and assumed inflation. The Fund Actuary should continue to monitor.

7. Audit of Benefit Calculations

The audit of the Dallas Police and Fire Fund plans included a review of the benefit calculations. Foster & Foster reviewed the following categories of calculations:

- Normal retirement
- Early retirement – 20 and out
- Early retirement – reduced
- On-duty disability
- Off-duty disability
- Retiree death benefit
- Active death with survivor and children
- Terminated vested

For each of the benefit calculations, the calculated benefit amounts reflected the applicable plan provisions. In addition, when applicable, the benefits converted to the optional 100% joint and survivor annuity reflected the actuarial equivalence factors with appropriate interest and mortality adjustments.

Based on our review, the calculations are determined correctly.

8. Qualifications of Fund Actuary

Current Actuaries

David L. Driscoll and David Kent of Buck Consultants signed the January 1, 2012 and January 1, 2013 actuarial reports for both the Police & Fire Plan and the Supplemental Police & Fire Plan.

They are both Fellows of the Society of Actuaries, Enrolled Actuaries and Members of the American Academy of Actuaries. These credentials are listed in the valuation reports and have been confirmed through the Society of Actuaries website.

Accordingly, we have no reason to challenge the qualifications of Mr. Driscoll and Mr. Kent.

Previous Actuaries

The January 1, 2011 valuation reports were signed by Richard A. Mackesey and R. Ryan Falls of Buck Consultants.

Richard A. Mackesey signed the January 1, 2010 and January 1, 2009 valuations.

As of the dates the reports were issued, Mr. Mackesey and Mr. Falls are Fellows of the Society of Actuaries, Enrolled Actuaries and Members of the Academy of Actuaries. They are no longer with Buck Consultants.

Accordingly, we have no reason to challenge the qualifications of Mr. Mackesey and Mr. Falls.

D. RESPONSE RECEIVED

Attached is the response received from the Board of Trustees of the City of Dallas Police and Fire Pension Systems and its actuary after reviewing the preliminary draft audit report. The comments in the response have been incorporated into the final report, as appropriate, or included in the following attachments.

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August 15, 2014

Mr. Donald C. Rohan
Interim Administrator
Dallas Police & Fire Pension System
4100 Harry Hines Blvd., Suite 100
Dallas, TX 75219

Re: Buck Response to Preliminary Audit of 2009 – 2013 Valuations of the Dallas Police and Fire Pension Systems

Dear Don:

At the request of the Board of Trustees of the Dallas Police and Fire Pension System (the System), we have reviewed a draft copy of the report to be issued by Foster & Foster on their audit of the annual actuarial valuations of the System and of the Dallas Police and Fire Pension System Supplemental Plan (the Supplemental Plan) performed from January 1, 2009 through January 1, 2013. We are generally pleased with the results; however, we believe that some clarifying observations and additional information regarding some of the matters raised in their report would be helpful.

Review and Replication of Valuation Results

Overall - The auditing actuary was generally able to closely match Buck's results. As noted in the audit report, use of different actuarial software can create differences in valuation results. It should be noted that Buck changed software in 2013, and the software used to prepare the 2013 valuations of the System and Supplemental Plan happens to be the same as that used by the auditing actuary. Not surprisingly, the auditing actuary achieved a closer match to the 2013 results than to those of earlier years.

Covered Payroll - The audit report mentions a difference in covered payroll for the 2009 through 2012 valuations. This is a reflection of the software change mentioned above. The software used to prepare valuations in 2009 through 2012 required a "mid-year" pay rate for active participants, which was increased with an additional half year of pay increase in the first year of projections made by the valuation program. The software used to prepare the 2013 valuation requires a "full-year" pay rate and thus does not apply a pay increase of the sort just described the first year of its projections.

Normal Cost - The audit report mentions a difference between the calculation of normal cost and the manner in which the calculation of normal cost is described in the reports. We agree with the auditing actuary that the difference is not material, but we will expand the description provided in our future reports to provide additional details of this calculation.

Supplemental Plan Pay – The audit report suggests that a multi-year average of active participants' pay amounts be used in the valuation of the Supplemental Plan, in order to smooth out fluctuations. We would be happy to discuss this suggestion with System staff. If desired, prior year results can be recalculated using the suggested change in order to determine whether it results in desirable changes.

Review of Actuarial Methods and Procedures

Actuarial Value of Assets – In 2013, the method for determining the Actuarial Value of Assets was changed. The audit report recommends that the 2013 report should have included a full replication of both methods. Buck's 2013 report did contain the impact of the method change on:

- Unfunded Actuarial Accrued Liability
- 30-year funding cost, and
- Years to fund

In addition, the return on the Actuarial Value of Assets under both methods was also disclosed. Therefore, Buck believes that a full replication of both methods was not necessary. We should acknowledge that extended discussion of this change preceded its adoption by the Board, and parties who did not participate in those exchanges could well find the additional detail recommended by the auditing actuary to be helpful.

Funding Period – The "years to fund" is provided in the actuarial report to satisfy disclosure requirements of the Texas Pension Review Board (PRB). This number is an approximation, and to provide the System with a figure that is suitable for reporting to the PRB, Buck must calculate it in accordance with the PRB's Guidelines for Actuarial Soundness. The audit report suggests that a different methodology for the calculation of "years to fund" would be preferable. Buck notes that the calculation must be performed as mandated by the PRB for the reasons just cited, but would be willing to add alternative calculations of "years to fund" to the valuation reports if the Board deems it useful.

Review of Actuarial Report

The audit report includes various recommendations for additions to the valuation reports. We believe some of these suggestions have merit, and we will discuss making these additions to future reports with the Board and System staff.

In addition, the audit report points out that there is an error in the plan provision description regarding the survivor benefit for qualified surviving spouses of members hired after February 28, 2011, who die in active service. We agree that the description and valuation program should be updated, and that the impact on the valuation results is not material.

Review of Demographic Assumptions

The audit report indicates that our current demographic assumptions are reasonable and includes recommendations regarding possible future changes. Some of the recommendations are helpful, and we will refer to these in our ongoing discussions of the actuarial experience of the System and Supplemental Plan and the actuarial assumptions to be used in the annual valuations.

Review of Economic Assumptions

As in the case of the demographic assumptions, the audit report indicates that our current economic assumptions are reasonable and includes recommendations regarding possible future changes. Of particular note is the potential that liquidity issues may arise in future years due to the operation of the DROP feature. The investment return assumption is based on the System's target asset allocation and the expected future market returns for each asset class represented in it. If the asset

allocation were changed in the future to address the liquidity issue, we would naturally re-examine this assumption.

Use of this letter for any other purposes or by anyone other than the Board members and staff of the System may not be appropriate and may result in mistaken conclusions because of failure to understand applicable assumptions, methods, or inapplicability of the letter for that purpose. No one may make any representations or warranties based on any statements or conclusions contained in this letter without Buck Consultants' prior written consent.

We are Members of the American Academy of Actuaries, and meet the Qualification Standards of the American Academy of Actuaries to render the actuarial opinions contained herein.

If you have any questions or need any further information, please call or e-mail us.

Very Truly Yours,

David L. Driscoll, FSA, EA, MAAA
Principal, Consulting Actuary

David Kent, FSA, EA, MAAA
Director, Retirement

DLD:km
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