

ORSC

Ohio Retirement Study Council

Request for Proposal:

Actuarial Audit of the Public Employees
Retirement System of Ohio

Due: July 15, 2014 by 5:00 pm

BOLTON  PARTNERS

100 Light Street, 9th Floor
Baltimore, MD 21202

Submitted by:

Thomas B. Lowman, FSA, EA
tlowman@boltonpartners.com

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July 18, 2014

Ms. Bethany Rhodes
Director
Ohio Retirement Study Council
88 East Broad Street, Suite 1175
Columbus, Ohio 43215

Re: Request for Proposal- Actuarial
Audit of the Public Employees
Retirement System of Ohio

Dear Ms. Rhodes:

Enclosed is our proposal in response to the Ohio Retirement Study Council's (ORSC) Request for Proposal for Actuarial Audit Services. Our firm provides pension actuarial services both locally and nationally. We are particularly well qualified to provide the actuarial audit described in your RFP, in part because of our unique perspective of focusing on pension risk factors, and the appropriate analysis and valuation of these factors, which we will discuss further in our proposal.

Bolton Partners independence and our nationally recognized experts will insure proper verification of the assumptions, procedures, and methods used by the PERS actuary. A Bolton Partners review will allow ORSC either to confirm the decisions that have been made for the plan and move forward with confidence or allow it to identify potential problems so that they can be corrected. Our team fully understands ORSC's needs and is fully committed to performing the work as scheduled.

The client manager and lead actuary will be Thomas Lowman, FSA, EA, our Chief Actuary. Tom has over 36 years of experience as an actuary with a specialization in the public sector. He directs our public sector retirement practice, covering public sector plans from the local to national level. Bolton Partners, Inc.'s contact information, as well as Tom's, is as follows:

100 Light Street, Baltimore, Maryland 21202
Phone: 443-573-3909
Email: tlowman@boltonpartners.com.

Bolton Partners, Inc.

100 Light Street • 9th Floor • Baltimore, Maryland 21202 • (410) 547-0500 • (800) 394-0263 • Fax (410) 685-1924
Actuarial, Benefit and Investment Consultants

Ms. Rhodes
July 15, 2014
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Thank you for considering us. We look forward to working with you and your colleagues.

Sincerely,

BOLTON PARTNERS, INC.

A handwritten signature in black ink, appearing to read 'T. Lowman', with a long horizontal flourish extending to the right.

Thomas B. Lowman, FSA, EA, MAAA
Vice-President/Chief Actuary

4.1 PROPOSAL SUMMARY

Provide a narrative summary of the proposal being submitted. This summary should identify all the services and work products that are being offered in the proposal and should demonstrate your firm's understanding of the project.

The RFP describes the actuarial audit being requested as follows:

The contract will be for the performance of an actuarial audit for the primary purpose of independent verification and analysis of the assumptions, procedures and methods used by the consulting actuaries (GRS) of PERS for:

- ***PERS' annual pension actuarial valuation as of January 1, 2014***
- ***The five-year experience review for the period January 1, 2006 to December 31, 2010.***
- ***PERS' annual retiree health care actuarial valuation as of January 1, 2014, including GASB Statement 43 disclosures.***

A second purpose of the audit will be to determine whether retiree contributions to health care benefits and prescription drug costs (premiums) are being determined appropriately and consistently for all benefit groups.

Replication Valuation

We understand that the Ohio Retirement Study Council (ORSC) is asking, as part of its oversight mission, for this review of one of Ohio's main state retirement plans (PERS) to ensure its accuracy and reliability. We understand that the work entails two replication valuations (pension and post-retirement medical valuations), and have included a sample replication audit report (Appendix A). We anticipate presenting our results in this format, as well as a presentation report highlighting and summarizing the results of our analysis for use in an executive summary meeting. Should there be any material errors, we will review them with both the PERS staff and the plan actuary (to confirm the error), as well as documenting our findings in our reports and with the ORSC.

ASOPs and Best Practices

We are familiar with the generally accepted accounting principles, and generally accepted actuarial principles and practices. We will see if there are any deviations from these policies. Tom Lowman served two years on the Actuarial Standards Board pension committee and helped write most of the pension actuarial standards that apply.

We will also comment on how the PERS practices compare to the Best Practices issued in 2014 by the GFOA and the draft Conference of Consulting Actuaries White Paper on funding policies that Tom helped write as the vice chair of the CCA Public Plans Community.

Experience Study

We will also review the five-year experience study. The experience study should be the source of the assumptions used in both the pension and post retirement benefits valuations. . However, the PERS actuary has to apply their judgment to the actual experience observed in the experience study to determine the appropriate changes in assumptions that were reflected in the actuarial valuation. So, we will evaluate and review the analysis and recommendations reflected in the experience study report and provide comments on the selection of demographic and economic assumptions used in the valuations of the pension and post-retirement medical plans. We expect that these assumptions changes reflect both the plan's prior experience and the actuary's interpretation of that experience and their expectations of future experience.

A very important part of the review of both the valuations and the experience study's recommendations of assumption revisions is analyzing the PERS' provisions for the potential risks inherent in the plan design. For example, plan provisions that include embedded options, such as cash balance plans with variable interest crediting rates or gain-sharing provisions or optional forms of payment that allow a second election all require both assumptions to value the benefit and some analysis of the potential risks incurred by the presence of these provisions. Bolton Partners has been in the forefront of helping actuaries identify these risks, and developing tools and process for determining the magnitude of the risk and expected effects of adverse experience.

Retiree Contributions

Finally, partially based on our replication valuation of the retiree health plan, we will analyze the retiree contributions for consistency and to determine that the contribution levels are determined appropriately for all benefit groups.

Section 4.5 contains our methodology for this work, focusing on the details involved in:

- Reviewing the data identification and collection process to make sure the correct information is being obtained
- Reviewing the actuarial valuation methods and procedures for consistency with plan provisions (and related risks) and funding goals, as well as Best Practices
- Reviewing the actuarial valuation assumptions for consistency with prior experience, adequate representation of all pension risks and consistency with the funding goals as well as actuarial standards of practice

- Reviewing the experience study conclusions and recommendations
- Reviewing the retiree contributions for the post-retirement health plans

We understand from Section 3.6 that by doing this work we will be precluded from certain other activities for a period of one year.

4.2 CAPABILITITES AND EXPERIENCE

Describe your firm's capabilities and recent experience (at least during the last five years) in performing actuarial valuations, audits, or studies of public employee retirement systems. You should include information on the types and sizes of public employee retirement systems for which past work has been performed, including whether the systems were defined benefit or defined contribution plans, the types and number of participating employers, number of participants, and other relevant indicators of plan type, size, and comparability to PERS. You should include other information you believe may be relevant in demonstrating your capabilities in performing the actuarial audit, including other professional experience and data processing capabilities.

Bolton Partners has provided public sector pension actuarial service since 1981. Bolton Partners has enjoyed steady growth over the past 33 years. Currently we have 194 full service actuarial accounts with 144 of them in the public sector. Many of our clients are in the Maryland/DC/Virginia area, but we boast clients in 24 different states.

Tom Lowman, our chief actuary, is located in our Baltimore office and would be supervising the work under this contract.

Tom Lowman's experience with Public plans goes back to the late 1970's serving as the actuary for the City of Baltimore. We have also been involved in valuations, audits, litigation (Alaska, San Jose, Baltimore City, New Mexico and Rhode Island), labor negotiations, and benefit design studies. We have both ongoing and project based audit work that we do. We annually audit the actuarial valuations for the US State Department retirement plans for United States Citizens and over 80 retirement plans for foreign service nationals employed by the State Department. We are currently auditing the State of Maryland retirement plans.

Tom Lowman and Bolton Partners' reputation has been built over time because of our independence and nationally recognized technical expertise. Because of this, we are prime candidates to perform actuarial audits. Within our clientele, we have performed many actuarial audits. We have included below a sampling of our actuarial auditing experience, as the best way for you to understand the breadth, depth and capability to audit or otherwise review the work of other pension and post-retirement benefits actuaries.

State Department

We perform annual audits of the actuarial valuations of the State Department's pension plans, which span a wide variety of countries, including the US.

The State Department sponsors over 80 international plans for foreign service nationals and 2 plans for its American staff. These plans cover approximately 54,000 participants. We review the actuarial method and assumptions for their appropriateness within the

federal accounting standards and compliance with actuarial standards of practice, and the results for reasonableness; we also review the actuarial reports for compliance with Actuarial Standards of Practice. For the United States plans we review sample data and sample lives. The State Department plans have more than 54,000 employees in 80 countries (each with a separate plan).

Maryland State Retirement Agency

We are currently auditing the Maryland State retirement plan valuations prepared by GRS. This includes the review of the assumptions and methods used by the plans. The audit will be completed by the end of September. The audit includes the review of many sample lives across nine plans and several tiers. The State plan has about 378,000 members and \$36 billion in assets.

Department of Treasury (DC Retirement System)

We recently replicated another actuary's 2012 valuations of the DC Retirement System plans for the US Treasury. The result was the discovery of an error overstating the actuarial liabilities by about \$900 million as the result of incorrect application of the assumed discount rates. Because of the size of the error and its effect on the plan funding as well as annual actuarial gains and losses, we corrected and replaced the 2012 actuarial report. These plans include about 17,000 members and \$5 billion in assets.

Alaska Retirement Management Board

We assisted the Alaska Retirement Management Board (which managed at that time, two large state-wide pension plans for general employees and teachers) in analyzing and exactly replicating the contribution calculations done by their prior actuary, the problems with these calculations, and the contribution levels that would have been recommended had the calculations been done correctly and reflected more appropriate medical cost and trend assumptions. Our analysis helped the Alaska Retirement Management Board in negotiating a \$500 million settlement from their prior actuary. Our duties included providing expert witness work in litigation. The Alaska plans currently have more than 53,000 members and \$16 billion in assets. The two primary plans (PERS and TRS) have three and two tiers respectively, and about 100 participating employers.

City of Philadelphia, City Council

In 2010, Bolton Partners was hired by the City Council of Philadelphia to conduct an actuarial audit of a report issued for the Mayor by Boston College that assessed the cost of Philadelphia's Deferred Retirement Option Plan (DROP). After analyzing the original data, mastering the multiple sets of plan provisions and tiers and working with

the original authors of the first report, Bolton Partners discovered several important discrepancies in that report resulting in significantly different conclusions concerning the likely cost of the DROP program. Subsequently, Bolton Partners advised the Council on ways to amend the existing DROP program in order to reduce its estimated cost to the City. The analysis reduced the estimated actual additional cost for the DROP from \$250 million to less than \$100 million. The Philadelphia pension plan has more than 64,000 participants and \$4 billion in assets. For the Bolton Partners Philadelphia DROP Study see: <https://www.boltonpartners.com/assets/bolton-partners-review-of-bc-drop-study-2-22-11-final.pdf>

4.3 REFERENCES

You must include a list of organizations that may be used as references for your work on actuarial valuations, audits or studies. Selected organizations may be contacted to determine the quality of the work performed, personnel assigned to the project, and contract adherence. The following should be included for the references listed:

- Date of the actuarial audit work or valuation;
- Name and address of client
- Name and telephone number of individual in the client organization who is familiar with the actuarial work; and
- Description of the work performed

STATE DEPARTMENT

“Bolton Partners work and efforts have been beyond outstanding.”

–Chris Flaggs

Name: Chris Flaggs
Date of work: since 2009
Title: Deputy Chief Financial Officer
Address: Department of State
C Street, NW
Washington, DC 20520
Phone: (202) 261-8620
Email: flaggsch@state.gov

Bolton Partners has performed annual audits of the actuarial valuations of the State Department's pension plans, which span a wide variety of countries, including the US since 2009.

The State Department sponsors over 80 international plans for Foreign Service nationals and 2 plans for its American staff. These plans cover approximately 54,000 participants. Our "duties" are: we review the actuarial method and assumptions for their appropriateness within the federal accounting standards and compliance with actuarial standards of practice, and the results for reasonableness; we also review the actuarial reports for compliance with Actuarial Standards of Practice. For the United States plans we review sample data and sample lives.

ANNE ARUNDEL COUNTY GOVERNMENT

Name: John Peterson

Date of work: since 2006
Title: Personnel Officer
Address: P.O. Box 2700
Annapolis, MD 21404
Phone: (410) 222-4506
Email: pepete@aacounty.org

Bolton Partners has been the plan actuary for the County's four pension plans for more than a decade and the plan actuary for the post-retirement medical plans since 2006. The four pension plans provide retirement benefits to more than 6,800 current and former employees, and have more than \$1.3 billion in assets.

We prepare annually actuarial valuations for four pension plans and the post retirement medical plans, as well as preparing benefit statements for all employees. Every five years we perform an experience study for the four pension plans. The last experience study was completed in 2013. We assist the auditor of the pension plans and of the County by providing them any information required for them to complete their work. We also provide additional consulting services as requested.

DEPARTMENT OF TREASURY

Name: Paul Cicchetti
Date of work: since 2012
Title: Actuary
Address: Metropolitan Square Building, Room 6G503
1500 Pennsylvania Avenue, NW
Washington, DC 20220
Phone: (202) 622-1859
Email: paul.cicchetti@treasury.gov

Bolton Partners recently replicated another actuary's 2012 valuations of the DC Retirement System for the US Treasury. The result was an error of about \$0.9 billion because of the misapplication of the discount rates. We revised the prior firm's 2012 actuarial report. Our "duties" were: Prepare 2013 valuation, replicate 2012 valuation, correct 2012 valuation and prepare experience study.

HOWARD COUNTY GOVERNMENT

Name: Lonnie Robbins
Date of work: since 2006
Title: Chief Administrative Officer
Address: 3430 Courthouse Drive

Ellicott City, MD 21403
Phone: (410) 313-2050
Email: lrobbins@howardcountymd.gov

Bolton Partners has been the plan actuary for the County's two pension plans since March 2006 and the Health Care consultant and actuary for the post-retirement medical plans since 1986.

We prepare annually actuarial valuations for two pension plans and the post retirement medical plans, as well as preparing benefit statements for all employees. Every four years we perform an experience study for the two pension plans. We are currently completing the experience study. Additional work has included consulting on alternative funding strategies, preparing pro-forma GASB68 schedules, analyzing potential benefit changes including preparing fiscal impact statements, and participating in Trustee meetings.

4.4 STAFF QUALIFICATIONS

Describe the qualifications of all management and lead professional personnel who will participate in the audit. Include: (1) a resume; (2) a summary of experience each has had in performing actuarial valuations, audits, or studies of public employee retirement systems; and (3) a management plan identifying the responsibilities each will have on the audit.

The resume should include information on the current and past positions held with your firm, educational background, actuarial and other relevant credentials, and other relevant information to demonstrate the personnel's qualifications.

Bolton Partners has selected a team of highly qualified actuaries to assist you in the actuarial review of the PERS plan, including the 2014 actuarial valuations of the pension and post-retirement health care benefits, the experience study and the current retiree contributions for health care benefits. In recent years, all proposed team members have successfully been involved with and conducted audits for our clients. Tom Lowman, FSA will be the overall project director, and will peer review all of the work of the senior actuaries.

He will be assisted by:

- Ann Sturner, FSA and Kris Seets, ASA – will prepare the 2014 pension valuation and reconcile any differences between our valuation and GRS'
- Colin England, FSA – who will review the experience study, and combine the results of all of our reviews into a single analysis. Colin will also serve as the co-lead consultant for this project, and will peer review any work done by Tom Lowman.
- Kevin Binder, FSA and Susan Lee, FSA – will prepare the 2014 post retirement health plan valuation and reconcile any differences between our valuation and GRS', as well as analyzing the retiree contributions for the post retirement health care benefits.
- Drew Freas and Sam Tsang – will provide support for the data management and review for both the pension and post retirement health care valuations
- Tom Lowman – will review the application of actuarial standards and best practices for both the pension and post retirement benefits plans, as well as the experience study and retiree contribution setting process.

THOMAS B. LOWMAN, FSA, EA, MAAA, FCA

Thomas B. Lowman is the Chief Actuary at Bolton Partners. Tom has over thirty-six years of pension actuarial experience. He is a Fellow of the Society of Actuaries (1982), an Enrolled Actuary (1981), a member of the American Academy of Actuaries (1982), and a Fellow, Conference of Consulting Actuaries (2009). Tom is vice chair of the Conference of Consulting Actuaries (CCA) Public Plans Community.

Tom is recognized as one of the top national experts on public sector plans and is sought out as a resource in this area by the professional actuarial societies, GASB, and national journalists. His work with national actuarial organizations is extensive. Tom served a three-year elected term on the Society of Actuaries' Pension Section Council and served as Chair of the Society of Actuaries' Pension Section Research Committee. Tom also served on the Actuarial Standards Board Pension Committee and the Society of Actuaries Enterprise Risk Management Task Force on Pensions.

Tom's clients include the federal government (Pension Benefit Guaranty Corporation, or PBGC, and Treasury), and several local pension valuation clients including: Howard, Anne Arundel, Charles, Harford and St. Mary's Counties. He also has pension clients in Virginia, California, Rhode Island, Florida and Delaware. In the past Tom has worked on large plans including the State of New York Retirement plan and the Federal Civil Service and FERS plans.

Tom helped draft the 2014 CCA White Paper on funding. He was interviewed by the SOA Blue Ribbon Panel on Public Plans and in April 2014 presented to the Actuarial Standards Board Pension Committee his thoughts on the difficulties of introducing the Panel's recommendations into actuarial standards of practice. Tom has been the Chair of several Society of Actuaries Project Oversight Groups. He was chair of the Pension Assumption and Method Project, studying how assumptions and methods vary depending on the type of plan/plan sponsor – ERISA single employer vs. state/local vs. Federal vs. Social Security. Tom wrote a paper on the issues with applying Financial Economic principals to public pension plans which he presented in 2009 and presented another paper to the 2010 Society of Actuaries' Retirement 2020 Symposium.

He has authored numerous papers that are considered primary actuarial reference documents, and address the risks, appropriate methods and best approaches to analyzing these types of plan provisions. Three of them are:

- DROP designs, co-authored with Robert Bolton
- Public Sector Gain Sharing designs for the Society of Actuaries, co-authored with Colin England and Ann Sturner
- Cash Balance Plans

To access Tom's papers, visit Tom's Corner at www.boltonpartners.com/tom-s-corner.html.

Tom holds a mathematics degree from the University of Delaware in 1977.

ANN M. STURNER, FSA, EA, MAAA

Ann Sturner is a senior actuary with Bolton Partners, Inc. and the practice leader for the firm's Actuarial Public Sector team. Ann has 25 years of actuarial experience including 20 years working with public sector clients. Prior to joining Bolton Partners in 2008, Ann worked for Mercer. She is a Fellow in the Society of Actuaries, an Enrolled Actuary and a member of the American Academy of Actuaries.

As Public Sector team leader, Ann is responsible for overall management of public sector client retirement consulting relationships. She directly supervises three actuaries who work primarily with public sector clients. She also works closely with the Chief Actuary to ensure all public sector clients are kept abreast of current regulatory, legislative and economic developments that may affect public sector retirement plans.

Following the release of GASB67 and GASB68, Ann partnered with Tom and Kevin to develop and present seminars on the new accounting rules to the public sector community.

Ann's public sector experience includes:

- Performing and supervising pension plan valuations
- Conducting experience analysis studies
- Presentation of annual valuation and experience analysis results to trustees
- Studying plan changes to help jurisdictions provide appropriate benefits for employees while working within budgetary constraints. Examples include:
 - Assess viability of transferring to state retirement system
 - DROP – analysis of current costs and potential changes
 - Post-retirement COLAs – analysis of current costs and potential changes
 - Early retirement window costs
- Reviewing and providing comments on calculations performed by current plan actuary
- Supervising and preparing benefit statements
- Consulting on complex plan administration issues

Ann holds a BBA in actuarial science from the University of Wisconsin-Madison. While at Mercer, she was a member of the firm's Actuarial Resource Network which provided guidance and interpretation to consultants within the firm on actuarial issues and policies and worked closely with Mercer's Chief Actuary.

COLIN ENGLAND, FSA, EA, FCA, CEBS

Colin England joined Bolton Partners, as a Consulting Actuary, in 2009. He has more than 33 years of actuarial consulting experience, primarily with retirement plans. Colin would be the co-lead consultant for this project.

During his career he has assisted a wide variety of clients with the design, funding, accounting and administration of their retirement programs, including defined benefit pension plans, defined contribution plans and post-retirement medical plans. He has been a frequent speaker at seminars on various topics related to retirement plans, such as expert witness testimony, standards of practice and code of conduct for public plan actuaries, mergers and acquisitions, plan terminations, individual retirement planning, phased retirement, employer retirement strategies, minimum and maximum funding requirements, and discrimination testing.

Actuarial Background

Colin is an expert in the design, funding, administration and termination of defined benefit retirement plans. He has also worked extensively with defined contribution and post-retirement medical plans. Examples of the projects Colin has worked with clients on include:

- Preparing or reviewing over 500 plan termination valuations for the Pension Benefit Guaranty Corporation, including reviewing the plan administrators' calculations of benefits for consistency with the plan provisions and legal requirements to identify systemic calculation errors.
- Assisting PBGC's Appeals department in identifying, reviewing and correcting over 5,000 participants retirement benefits in the Pan American Airways pension plans.
- Assisting a school district redesign their retirement program to decrease the incentive for teachers to retire early, taking their expertise to employment in other jurisdictions
- Assisting a company negotiating to revise post-retirement benefits to reduce the cost of benefits and increase the period of time that benefits will be provided

- Assisting a government transit system in analyzing the alternatives to improve early retirement benefits, including reviewing the cost and benefit implications as well as the likely effect on staffing
- Assisting a police pension plan board in revising the disability provisions to improve the disabled retirees' financial position, without significantly increasing the overall cost
- Assisting a city council in addressing concerns regarding the mayor's allegation that the deferred retirement option program (DROP) significantly increased the cost of the pension plan, and assisting in designing legislation to limit the potential cost effect of the DROP
- Assisting private equity firms in reviewing the benefit plans prior to purchasing companies, to better understand the expected cost, potential liabilities and undisclosed potential opportunities and problems with the existing retirement program
- Assisting the management trustees for a multiemployer plan in analyzing the future cost of a vacation and holiday plan against the current and future contributions available to fund that plan
- Assisting a government sponsored hospital in its efforts to withdraw from a state sponsored retirement plan, so as to improve benefits for employees and reduce the incentive for employees to terminate employment to receive a refund of their employee contributions
- Preparing annual actuarial valuations as required for compliance with ERISA, FAS 35, 87, and 106 (now ASC 960, 715-30 and 715-60), GASB 25, 27 and 45
- Analyzing the actuarial advice and analysis prepared by a consulting actuary to a multiemployer plan against the standards of practice and care required of an actuary
- Assisting the Alaska Retirement Management Board in assessing the likely contributions that would have been made to two state-wide retirement plans had the annual valuations been correctly prepared
- Assisting the Department of the Treasury in valuing the actuarial liabilities for two pension plans providing benefits to employees of the District of Columbia. He discovered that the prior valuation incorrectly represented the plan liabilities, reducing liabilities by about 10%.
- Preparing and delivering various training sessions over the last 15 years for the Pension Benefit Guaranty Corporation, including:

- o Training new actuaries, over a more than 10 year period, regarding their technical responsibilities in preparing actuarial reports, including assisting and guiding them through preparing their first valuation
- o Assisting the policy and research departments by explaining the interaction of the PBGC's limits on participant benefits in concrete, real-world examples
- o Assisting the standard termination compliance auditors by helping them understand the implications of actuarial equivalence and the requirements of the top-heavy rules in the internal revenue code
- o Assisting the department of insurance supervision and compliance by describing the Government's Cost Accounting Standards as they relate to pension plans sponsored by Government contractors, and the potential implications for PBGC's risk profile

Education

Colin is a Fellow of the Society of Actuaries (FSA), a Fellow of the Conference of Consulting Actuaries (FCA), an Enrolled Actuary (EA) and a Certified Employee Benefits Specialist (CEBS). He received a BA in Mathematics from Western Maryland College (now known as McDaniel College).

Colin also developed seminars for the Society of Actuaries. The first was on Expert Witness Testimony. He also developed two merger and acquisition seminars for the Society of Actuaries. He was elected to, and served as the Chairperson of the Pension Section Council of the Society of Actuaries and served on the Retirement Education and Research Committee.

KEVIN BINDER, FSA, EA, MAAA

Kevin Binder is a senior actuary with Bolton Partners, Inc. Kevin has over 25 years of actuarial experience in both the private and public sectors. Kevin heads up Bolton's OPEB practice; in that role he is responsible for OPEB actuarial valuations for over 100 plans.

In addition to his public sector responsibilities he is also responsible for the actuarial valuations for private sector OPEB plans under FAS106 and for Multi-employer OPEBs plan under SOP-92-06. He is the actuary for the Middletown Works VEBA that is a Retiree Managed VEBA established as part of an agreement to terminate the OPEB plan for

former employees of the AK Steel Plant in Middletown, Ohio and has over \$600 million of assets to pay for the benefit for approximately 7,000 participants.

Kevin also certifies to the solvency of self-funded insurance plans under Section 112.08 of the Florida Statutes, calculates IBNR reserves and is the attesting actuary certifying that retiree medical prescription drugs are at least as generous as the Part D Medicare program under the Retiree Drug Subsidy program of CMS for over 50 employers.

Prior to joining Bolton Partners, Kevin worked for Watson Wyatt. While at Wyatt, Kevin supervised the Post-retirement medical valuations for Delphi, Dominion Resources, and Norfolk Southern. Prior to his employment at Watson Wyatt, Kevin worked at Hay Group where he worked on a team that assisted the Congressional Research Service analyze Health Care Reform Proposals.

He is a Fellow in the Society of Actuaries, a Member of the Academy of Actuaries and an Enrolled Actuary.

Kevin has extensive experience with retiree medical plans including:

- Accounting for Public Sector Plan OPEB Plans Under GASB45
- Accounting for Private Sector OPEB Plans Under SFAS 106 and SFAS152
- Claims Analysis
- Funding vehicles for retiree medical programs
- Plan design studies
- Actuarial Equivalence Certifications for the Medicare Part D Retiree Drug Subsidy program

Kevin is an active participant in Society of Actuaries research projects. He is a member of the Pension Section Research Committee of the Society of Actuaries and a former chair of the Retirement Plans Experience Committee. Research projects he has worked on include

- The RP2000 Mortality Table
- Survey on the Prevalence of Traditional and Hybrid Pension Plans (Project Oversight Group Chairperson)
- Modeling Long Term Healthcare Cost Trends (Project Oversight Group Chairperson)

SUSAN LEE, FSA, EA, PH.D.

Susan Lee is an actuary with Bolton Partners, Inc. with over 17 years of benefits experience. Ms. Lee has extensive experience with public sector defined benefit

pension plans and retiree medical plans. She takes a lead role in ensuring the accuracy and completeness of the firm's calculations and reports. Our senior actuaries are supported by her knowledge and she provides valuable guidance to our analysts.

Ms. Lee has worked on a large range of public sector clients, from plans with only 100 participants to plans with more than 10,000 participants. She has wide experience calculating Annual Required Contribution (ARC) for public sector OPEB plans and pension plans. Ms. Lee has worked on several experience studies. The outcome of each experience study was proposed changes to the decrements and other valuation assumptions that are better aligned with past experience.

Ms. Lee's experience also includes:

- Giving training sessions on actuarial topics (was responsible for all new hire training for several years),
- Long term projections for funding and expense purposes,
- Programming OPEB and pension valuations,
- Calculation of benefits for plan participants,
- Communication of benefit issues with clients,
- Review and update valuation data,
- Review of reasonableness of actuarial assumptions,
- Accounting for settlements and curtailments,
- PBGC filings (reportable event filings as well as annual premium filings),
- Contribution and expense amounts for both qualified and nonqualified plans,
- Plan terminations, and
- Non-discrimination testing.

Prior to joining Bolton Partners in 2009, Ms. Lee worked with a national actuarial consulting firms. She has a Bachelor of Science degree in mathematics from MIT and a PhD in mathematics from Cornell University. She was ranked number 5 amongst the math majors graduating her year from MIT.

KRISTOPHER SEETS, ASA, EA

Kris Seets has extensive experience with retirement systems and is the lead analyst for over 20 public sector defined benefit plans. His roles include preparing and reviewing actuarial reports, coordinating tasks with staff and clients, attending trustees' meetings, and reviewing internal valuation methods and procedures.

Public Sector Retirement System Experience

Kris has a lead role in the completion of the firm's actuarial valuations. He is responsible for the tracking and coordination of tasks and deadlines with staff and clients. This includes client communication and reviewing internal valuation methods and procedures.

Kris works closely with the Tom Lowman, Colin England and Ann Sturner, for the majority of his plans. Kris is relied on to make sure the actuarial and data programming correctly model the plans and that all tasks are completed accurately and on time. Kris also peer reviews the appropriateness of assumptions and methods used by Tom and other actuaries for special projects.

Kris provides comprehensive services to his clients and understands the importance of clear communication and organization. This is beneficial for all types of projects including plan experience studies, benefit cost analysis, plan design studies, and analyzing effects of legislation. He is involved in the entire valuation process, from data collection to presentation of the final report.

Professional Involvement

Kris stays current on local and national topics and has a strong understanding of the issues relevant to pensions in the public sector. Kris shares his insight with his clients and the public plan community. In October, he gave a presentation to the Space Coast Chapter of FGFOA on the recent changes to pension accounting and funding standards.

Retirement Plan Experience Outside the Public Sector

Kris also has extensive experience assessing the liabilities and funding positions of the largest single employer pension plans in the country. This includes calculating pension related bankruptcy claims and termination liabilities for the PBGC. His work for the PBGC has involved industry wide risk studies and the preparation of actuarial reports related to highly publicized current events and plan terminations.

He has also helped prepare expert witness reports for the United States Department of Justice in pension settlement cases. Kris recently provided information for an article in the Wall Street Journal about the value of executive compensation pension plans. (June, 2013)

Education & Employment

Kris is an Associate of the Society of Actuaries and an Enrolled Actuary. He holds a Bachelor of Science in Mathematics from Towson University. He joined the Bolton Partners team in 2008.

DREW R. FREAS

Drew R. Freas is an assistant actuary with Bolton Partners, Inc. He has 19 years consulting experience on defined benefit pension plans and retiree medical plans for both public sector and private sector sponsors. He has extensive experience with preparing pension valuations and studies on a wide variety of issues, frequently assisting Tom and Colin with projects for their clients. Drew developed for the Treasury Department the software to calculate the cost of purchasing service under various DC plans.

Examples of Drew's responsibilities and recent projects include:

- Preparation of actuarial valuations and for single-employer, multiemployer, and public sector plans
- Assisting PBGC with on-site analysis of the expected underfunding of pension plans which may or are likely to terminate in the foreseeable future.
- Putting together over 1000 pages of detailed calculations for an expert report written for the Department of Justice
- Calculation of withdrawal liability for multiemployer plans
- Assistance with plan terminations
- Calculation of benefits for plan participants
- Preparation of participant benefit statements
- Annual review of asset data
- Preparation of IRS Form 5500, PBGC Form 1, and Summary Annual Report
- Preparation of PPA certifications and Annual Funding Notices
- Supervising and training staff members preparing pension plan related actuarial work mentioned above
- Communication of benefit issues with clients.

Education

Drew has a B.S. in Mathematics with an Actuarial Science option from the Pennsylvania State University. He has also passed SOA Exams 100 and 110, in addition, he has received credit for SOA Exam EA-1.

SAM TSANG

Sam Tsang is a senior actuarial analyst with Bolton Partners, Inc. Sam has 5 years of actuarial experience working with public sector clients. Prior to joining Bolton Partners in 2013, Sam worked for Segal Consulting's San Francisco office where he worked for Paul Angelo (a well known public pension actuary). Sam has been responsible for initiating and reviewing all aspects of the pension valuation process, including data reconciliation, actuarial software programming, plan document review, pension legislation review, drafting of valuation reports, client communication, and training junior analysts.

Sam has first-hand experience working with large, multiple-tier public sector plans, including: the University of California Retirement Plan, Sacramento County, San Diego County, Fresno County, Kern County, Contra Costa County, Sonoma County, San Bernardino County, Ventura County, the City of Fresno Retirement Systems, the City of Los Angeles Fire and Police Pension Plan, and the Water and Power Employees' Retirement Plan of the City of Los Angeles.

At Bolton Sam has worked on experience studies for Howard County, public sector valuations, and GASB67 disclosures. Sam is currently the lead analyst for 14 multiemployer and public sector clients, in addition to assisting with special projects. As a newer employee, Sam provides a fresh perspective in reviewing the effectiveness of current procedures. Sam understands the importance of providing timely and accurate actuarial services as public sector plans come under increased scrutiny in the current political climate.

Sam's public sector experience includes:

- Performing and reviewing pension plan valuations
- Conducting experience analysis studies
- Studying the cost impact of proposed changes in plan benefits and funding methodology
- Preparing benefit calculations
- Responding to auditors' requests

Sam holds a BA in mathematics from the University of California, Berkeley. Sam has passed SOA exams P, FM, and MFE.

4.5 METHODOLOGY, WORK PRODUCT, AND TIMELINE

Describe the proposed methodology for each element of the components listed in the Scope of Audit section of the Proposal Specifications. The description should include specific techniques that will be used, including anticipated sampling techniques and sizes, and proposed sources of data and information. You may propose alternative ways of addressing the elements of the audit scope.

In describing your proposed methodology, also identify the type and level of assistance that you anticipate will be needed from the staff of PERS and Gabriel Roeder Smith & Company, including assistance to understand the operations and records of PERS; to understand the actuarial assumptions, method, and procedures; and to access, obtain, and analyze information needed for the audit. Identify meetings interviews, programming support, space needs, etc., that you anticipate needing from PERS and Gabriel Roeder Smith & Company.

Describe the final work product including written reports, briefings and availability of working papers. Include one or more examples of work products for actuarial valuations or audits that may help to illustrate the proposed methodology and final work product.

Provide an estimated date that the final report will be submitted and the projected timeline or the anticipated work requirements and milestone dates to reach that date.

Scope of Audit

1. Data Validity

Our process is as follows:

- Review the plan provisions to determine the appropriate data needed to determine plan benefits
- Review the process with PERS staff, or the plan auditors, of obtaining the data and providing it to the plan actuary
- Review the data used by the actuary for reasonableness
- Review the data used by the actuary for consistency with the prior year's data
- Ask to see the audit checks done by the plan's auditor to see how they matched the data sent by the employers (for actives) and the custodian (for retirees) with that used by the plan's actuary

If we see issues with the data or the auditing of data, we will report on this, as well as making any suggestions regarding possible improvements to the process.

2. Actuarial Valuation Method and Procedures

First, we will review the plan benefit provisions, with a particular intent to make sure that all provisions are adequately included in the analysis of plan liabilities, particularly provisions that provide embedded options to employees or retirees.

Next, we will review the funding methods and procedures for compliance with the ASOPs. We are very familiar with the generally accepted accounting principles, and generally accepted actuarial principles and practices. We will see if there are any deviations from these policies including Actuarial Standard of Practice (ASOP) number 4. Tom Lowman served two years on the Actuarial Standards Board pension committee and helped write most of the pension actuarial standards that apply, so he is very familiar with the rules and the reasons for them as well as the intended interaction of ASOPs.

We will also comment on how your practices compare to the Best Practices issued in 2014 by the GFOA and the draft Conference of Consulting Actuaries White Paper on funding policies that Tom helped write as the vice chair of the CCA Public Plans Community. We view the comparison with the CCA Paper as important since it represents the views of many senior actuaries across all of the major actuarial firms working with public sector plans across the country. Please see pages 25 and 26 for a short grid summary of the CCA paper findings.

We will review the plan's own funding objectives and compare the actuarial methods and procedures used to determine whether any changes could be made to better meet the plan's goals. Certainly the plan's amortization period and asset smoothing limits should be consistent with the PERS funding objectives.

To the extent that we find any discrepancies between the valuation methods and procedures and either ASOPs, Best Practices or the PERS funding objectives, we will discuss these with PERS and the PERS actuary. To the extent that we are unable to reconcile these discrepancies, we will analyze the likely effect of potential changes and reflect them in our report.

We expect that the work will be done in our offices. We expect PERS or GRS to provide the data. We expect there will be several phone calls and three in person meeting.

While not addressed by the RFP, we suggest that the ORSC also review the following issues, some of which include embedded options or other opportunities for anti-selection against the plan, hence introducing risk to PERS:

1. The method and assumptions used to determine the amount members are required to pay to purchase service credit (discussed on page 51 of the 2013 CAFR)
2. The methods and assumptions used to allow members to use their defined contribution accounts to purchase annuities from the PERS (discussed on page 51 of the 2013 CAFR)
3. The methods and assumptions used to determine the cost charged to employers to pay for an Early Retirement Incentive Plan to be offered to their employees

We propose separate, additional fees for analyzing these and other items.

Category	Actuarial Cost Method	Asset Smoothing Method	UAAL Amortization
Model Practices	<p>Entry Age cost method</p> <ul style="list-style-type: none"> Level percent of pay "Funding to retirement age" For new tier, Normal Cost based on each member's benefit For future service changes within tier, Normal Cost based on current benefit structure ("replacement life" Entry Age) 	<p>Smooth actuarial gain or loss on market value (MVA)</p> <p>Fixed smoothing periods, not less than 3 years</p> <p>Maximum MVA corridors: 5 years, 50%/150% corridor 7 years, 60%/140% corridor</p> <p>Combine smoothing layers only to avoid "tail volatility"</p> <p>Additional (solvency) analysis for closed plans</p>	<p>Layered fixed amortization periods by source of UAAL</p> <p>Level percent of pay amortization Amortization periods:</p> <p>Active plan amendments: Lesser of demographics or 15 years</p> <p>Inactive plan amendments: Lesser of demographics or 10 years</p> <p>Experience Gain/loss: 15 to 20</p> <p>Assumption / method changes: 15 to 25</p> <p>Early Retirement Incentives: 5 or less</p> <p>Surplus: 30 years</p> <p>Combine layers only to avoid "tail volatility"</p> <p>Additional (solvency) analysis for closed plans</p>
Acceptable Practices	<p>Aggregate cost method, with Entry Age based disclosures</p> <p>Frozen Initial Liability method, with Entry Age based disclosures</p> <p>Entry Age method with "Funding to Decrement"</p> <p>"Averaged" Entry Age normal cost for fut. svc benefit changes</p>	<p>Maximum MVA corridors: 10 years, 70%/130% corridor</p> <p>Five year (or shorter) smoothing with no corridor</p> <p>Rolling smoothing periods with MVA corridors equal to percentage recognition of deferred gains/losses, plus additional analysis</p>	<p>Up to 15 years for Inactive plan amendments</p> <p>Level dollar fixed period layered amortization with model amortization periods</p>
Acceptable Practices, with Conditions	<p>Projected Unit Credit method</p> <p>Aggregate Normal Cost variation of Entry Age cost method</p> <p>Aggregate or FIL without Entry Age based disclosures</p>	<p>Maximum MVA corridors: 15 years, 80%/120% corridor</p>	<p>Layered fixed amortization periods up to 25 years for all sources of UAAL</p> <p>Rolling amortization of a single combined gain/loss layer, with period that avoids negative amortization, with model periods for other sources of UAAL, separate layer for extraordinary gain/loss 30 year fixed amortization of method change or initial UAAL</p>

Category	Actuarial Cost Method	Asset Smoothing Method	UAAL Amortization
Non-recommended Practices	Entry Age with Normal Cost based on open tier ("Ultimate" Entry Age)	Longer than 5 year smoothing with no corridor 15 year or shorter with corridors wider than above	Layered fixed amortization periods from 26 to 30 years Rolling amortization of single gain/loss layer with period that entails negative amortization, but only up to 25 years Rolling amortization of entire UAAL excluding plan amendments but including gain/loss & assumption/method changes even with period that avoids negative amortization Single fixed amortization period, with periodic Restarts
Unacceptable Practices	Traditional Unit Credit for pay related plans	Longer than 15 year smoothing	Layered fixed amortization periods longer than 30 years Rolling amortization of a single gain/loss layer > 25 years Rolling amortization of entire UAAL (excluding plan changes) with period that entails negative amortization Rolling amortization of entire UAAL (including plan changes)

3. Experience Study

We will review the experience study along with the three years of actuarial gains and losses since the study to help understand how the study was done and how the actual plan experience was applied to review the actuary's assumptions for future experience. In reviewing the experience study, we will focus on how the experience was reviewed, which assumptions were reviewed, the creditability of the experience and how the experience was combined with the plan actuary's judgment to produce revised valuation assumptions. We will also consider whether plan experience since the valuation has confirmed those revisions, or suggested that additional revisions may be necessary after an additional experience study.

We may suggest revisions to the experience study methods or process, as well as other assumptions that require review.

4. Actuarial Valuation Assumptions

We will review the following to determine if the assumptions being used are reasonable:

- The most recent experience study
- Surveys of assumptions used by other plans
- ASOPS including 6, 27, 35, 41 and 44

We will also use our own professional judgment in this review, as well as reviewing the OPERS plan actuary's judgment for reasonableness and completeness. Any deviations found will be reviewed, discussed with the PERS actuary and the effect of changing to other, more appropriate assumptions quantified.

Based on a quick review of the assumptions we note that the 8% investment return assumption shown in the 2013 CAFR is currently a higher than typical investment return assumption. We also note that there have been several years of salary gains (not uncommon since 2008). We know that many GRS and NEPC clients have investment return assumptions below 8%, although lowering the assumption does result in lower measurements of funding levels and higher required contribution amounts.

5. Replication Valuations

The parallel replication valuations for the pension and post retirement health care plan contain virtually all of the steps found in a full valuation, and add on a reconciliation between the two actuaries of any differences between the PERS' actuary and the ORSC's actuary. These steps include participant data collection, review of data, collection of asset information, collection of claims information (post retirement benefits plan only), programming the valuation model, reviewing results and writing a report. We can provide more detail, if requested, but, since we assume these routine steps are

of more interest to our actuaries than ORSC, have decided not to discuss these steps further. A few key milestones include:

Request and receive 12/31/2013 data – Assumed Available by 9/1/2014

We will request the following information:

- Data used by GRS for the January 1, 2014 pension and post retirement health care valuations, including
 - Participant data
 - Asset information, including reconciliation of assets from prior valuation
 - Claims information (for post retirement health care valuation)
 - Information on any changes in plan provisions, methods or assumptions expected to be reflected in the 2014 valuations, particularly as it relates to the Connector plan and post-65 post retirement health care benefits
- Record layout and plan code summaries
- Detailed excel file containing all plan decrements and any necessary additional details of assumptions used in the valuation that would be necessary for us to apply the assumption in the valuation (such as how health care reform is reflected)

Data will be transferred through our secure web site, so as to protect any confidential information.

Perform independent parallel valuation of Pension and Post Retirement Health Care plans – Results due by 11/1/2014

Our analysis will first use the GRS data, assumptions and methods. We will look to match the normal cost and actuarial liability for each group/Tier. Where there are material differences, we try to discuss and reconcile these differences with GRS.

If there are differences in assumptions, procedures or methods, we will measure the impact of making changes.

We will separate our results between (1) pension and OPEB as well as (2) between:

- i. Groups A, B and C
- ii. State Group, Local Group and Law Enforcement and Public Safety Group

Additional separations can be made as requested.

We note that once the Connector plan is fully implemented the post age 65 post retirement health care plan will be very similar to a pension plan. However the pre 65 plan is self insured and the costs are likely much higher than the published premium rates. In addition to the demographic data similar to the pension plan, we will also be reviewing the claims experience and reconciling the paid claims used to develop the per capita claims assumption to the fund asset statement.

OPEB valuations have unique assumptions. For example, we will be reviewing the actuarial assumptions for the impact of health care reforms. Perhaps the most important assumption is the initial level and anticipated increases of the Connector plan.

We also anticipate discussing any differences between our results and the results obtained by the PERS plans actuary and PERS staff, as necessary. While we expect to be able to conclude that our valuations are consistent with the PERS plans actuary, to the extent that there remain differences we expect to further analyze the effect of those differences to be able to quantify the impact on the valuation results.

Draft Report – Due by 11/30/2014

We expect to prepare a single report addressing the results of our analysis, with separate sections addressing each of the analysis done through the replication valuations.

Review Draft with ORSC – 12/1/2014

We expect to set up meetings with ORSC staff and board members to review the results of our analysis in December and January.

Final Report – Due by 2/1/2015

We will review the final results of our analysis with PERS and the PERS actuary, after review with the ORSC board. We will work with the PERS actuary to determine the source of any discrepancies between our results and theirs. We will quantify the effect of any discrepancies that we are unable to reconcile with the PERS actuary, and discuss this in our report.

6. Review of Health Care

Part of the replication valuation will be to analyze the expected cost of each of the different post retirement health care tiers. This is a critical portion of the analysis since the current plan is moving to a new design, the Connector plan, which removes much of the cost uncertainty due to future changes in medical costs for retirees age 65 and older. However the pre 65 plan is self insured and the costs are much higher than the published premium rates.

Using this cost information, and adjusting for the cost differences between the different groups of retirees receiving post retirement health care benefits, we will review the retiree contributions toward post retirement health care in order to be able to confirm the reasonableness and equity of the contributions currently charged. We will also review the policy and procedures in place to determine the retiree contributions and assure that the amounts are reasonable and equitable among the different tiers of post retirement health care benefits.

7. Other issues regarding Anticipated Work Product

This portion of the section is intended to address the points raised in Section III of the RFP.

3.1 Written Report

Appendix A contains a sample report. Each audit has differences but the attached is a good illustration of what a report might look like.

The report will document our findings and provide recommendations.

3.2 Briefings

We will be available to present summaries of our results. We understand from Section 3.2 of the RFP that there are expected to be several conference calls and about four meetings. We will create a power point presentation to present our results.

3.3 Exit Conference

Separate from discussions about our preliminary report with ORSC (described in section 3.2), we understand that GRS and PERS staff will have an opportunity to discuss our preliminary report with them. It is customary to allow the plan actuary to include a response as an attachment to our final report.

3.4 Working Papers

Our work papers are comprised of technical notes, meeting notes, emails, billing information and other materials. These will be kept for at least four years after the last payment as requested in the RFP.

3.5 Project Execution and Administration

We understand that we are responsible for establishing communication with GRS and the PERS staff through a PERS liaison.

3.6 Additional Services

Sections 4.6 and 4.8 includes other audit task you might want to consider. We understand that we would be disqualified from doing any suggested studies that we suggest be undertaken. This period of disqualification shall be for a period of one year.

4.6 ADDITIONAL INFORMATION

Include additional information that will be helpful to gain an understanding of the proposal. This may include diagrams, excerpts from reports, or other explanatory documentation that would clarify and/or substantiate the proposal. Any material included here should be specifically referenced elsewhere in the proposal.

Audits often find (1) differences between the stated assumptions use and the actual calculation or (2) missing assumptions. These are often minor. We find that our greatest value is it looking beyond the assumption and method being used and focusing some attention on better practices. For example, we believe that understanding the risks inherent in what are known amongst actuaries as "embedded options" is important to understanding the risks in pension plans. Embedded options provide opportunities for plan members to select against the plan, so the choice of assumptions to embed in the plan provisions and the difference between those assumptions and the valuation assumptions often lead to odd results, such as additional benefits appearing to have no cost to the plan. We identified three of these earlier in the proposal:

1. The purchase of service credits (discussed on page 51 of the 2013 CAFR)
2. Allowing members to use their defined contribution accounts to purchase annuities from PERS (discussed on page 51 of the 2013 CAFR)
3. Allowing employers to purchase an Early Retirement Incentive Plan to be offered to their employees.

See Appendix A for a sample audit report.

4.7 GLOSSARY

Provide a glossary of all abbreviations, acronyms, and technical terms used to describe the services or products proposed. This glossary should be provided even if the terms are described or defined when first used in the proposal response.

Experience Study: A study often done every 3 to 6 years. The study compares actual rates to the assumptions previously used and, if necessary, recommends adjustments to the rates for future valuations.

Normal Cost: The value of portion of plan cost attributed to an employee's service being performed during the current year. A retiree has no Normal Cost at the value of their full benefit is in the Actuarial Liability.

Actuarial Liability: The value of portion of plan cost attributed to an employee's service performed prior to the current year.

OPEB: "Other post employment benefits", which is used interchangeably in this report with post retirement medical plan and post retirement health care plan to refer to all post retirement benefits provided by PERS other than pension benefits.

4.8 COST INFORMATION

The cost estimates in the pricing summary must include all necessary charges to conduct the audit and must be a “not to exceed” figure. The pricing summary should include per element: personnel costs (including hourly rates and estimated hours for professional and clerical staff assigned to the audit), travel and lodging, data processing costs, materials, and any other potential costs.

For Bolton Partners, we have learned that a truly independent verification of another actuary's work requires very similar work load as the valuation itself. For this reason, audit fees often approximate the fees charged by plan actuaries. Below we have detailed the elements of our audit and the corresponding hours and fees:

- Audit of data collection process: \$10,000
- Audit of Pension valuation: \$60,000 (approximately 300 hours of labor)
- Audit of OPEB Valuation: \$50,000 (approximately 300 hours of labor)
- Audit of experience study, and assumptions: \$20,000
- Review of valuations in light of Best Practices, ASOPs: \$10,000
- Review of Health Care Rate Setting: \$20,000
- Preparation of report: \$20,000 (40-60 hours for summary, along with hours in each section above for that portion of report)
- Meetings beyond three: \$2,000 per meeting after the first three

“Not to Exceed” Total = \$190,000 + additional meetings after three

(This “not to exceed” fee is based on an average \$250/hr rate. For some portions of the audit we have discounted this rate to maintain a reasonable total fee based on approximate hours.)

In addition, there are other activities involving the plan actuary or actuarial issues that we could review that are outside of the scope of the RFP. These include (in order of most to least likely to produce interesting finding):

1. Review of the cost to purchase service credit (our fee = \$7,000)
2. Review the cost (and method documentation) charged to employers to pay to have an Early Retirement Incentive Plan (our fee = \$10,000)
3. Review of 50 year pension and health care cost projections (our fee = \$5,000)
4. Review of the cost for members to use their defined contribution accounts to purchase annuities and the impact on plan costs (our fee = \$5,000)
5. Review of Medicare Part D Attestation (our fee = \$4,000)

Appendix A

Sample Audit Report

ABC Retirement System

Full Replication Audit of the 2013 Actuarial Valuation

Date of Report: May 14, 2013

Prepared By: Bolton Partners, Inc.
100 Light Street, 9th Floor
Baltimore, MD 21202



May 14, 2013

ABC Board of Trustees
1234 Street Road
City, State 07740

Re: *Audit of the 2013 Actuarial Valuation for the ABC Retirement System*

Dear State of ABC:

Attached is Bolton Partner's actuarial of XYZ's 2013 valuation of the ABC Retirement system. The purpose of the audit was to:

- Replicate the liabilities of the system at the level of detail discussed below
- Review of the actuarial methods, assumptions, and procedures employed by the ABC Retirement System
- Comment on how the funding methods compare to the GFOA best practices and the CCA PPC White Paper
- Summaries our finding and make recommendations for change where needed
- Suggest studies that might help the Trustees and Sponsor understand the future funding needs and risks

This audit report includes the following sections:

1. *Report review* – a review of the valuation report and results and how they comply with actuarial standards, and whether such valuation reflects appropriate disclosure information under any required reporting.
2. *Methods and assumptions review* – an analysis and benchmarking of the actuarial assumptions (including a review of the most recent experience study) and a review of the actuarial methods (including the Experience Amortization Reserve and actuarial asset value smoothing period and corridor) utilized in determining the funded status and accrued liability as of July 1, 2013 for compliance with generally accepted actuarial principles.
3. *Test lives and data review* – discussion of the procedures used to validate the participant data and the test lives selected, with a detailed review of the findings.
4. *Recommendations* – discussion of potential changes and future work for the plan's actuary

We suggest attaching to this report any responses from XYZ to our report.

This review was conducted under the supervision of Thomas Lowman, FSA, EA, MAAA.

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1. Executive Summary

ABC retained Bolton Partners, Inc. to conduct an independent review of the System's 2013 actuarial report's calculations, assumptions and methods. The State requested an assessment of the validity of the data used in the valuation, our thoughts on the current funding method and procedures, and commentary on alternative methods that might be recommended. ABC also requested a review of the actuarial report and most recent experience analysis and to determine if there is consistency in the presentation of the actuarial results and whether they are consistent with professional standards (including the Actuarial Standards of Practice 4, 27, 35 and 41).

The objective of a full audit (actuarial review) of any system is to provide validation that the liabilities and costs of the Fund are reasonable and being calculated as intended. This audit is a full replication of the actuarial valuation results, and not just a review of the key components in the valuation process that encompass the derivation of the liabilities and costs for the System. These key components are the data, the benefits valued, the actuarial assumptions and funding method used, and the asset valuation method. The valuation report and the valuation output for a select group of test lives provide the detail necessary to provide an opinion on each of these key components.

We reviewed all information supplied to us. We also requested and reviewed additional information provided by XYZ. Finally, we considered the reasonableness of the actuarial assumptions and methods in the context of our own experience, and those of other governmental pension systems.

Statement of Key Findings

Based upon our review of the 2013 actuarial valuation by XYZ and of the actuarial assumptions and methods used in the valuation, the actuarial valuation by XYZ provided a reasonable assessment of the actuarial condition of the Fund, except for the following:

1. Employees who were expected to terminate in the future (before becoming eligible for an immediate retirement benefit) were assumed to withdraw their employee contributions, thus not electing to take a deferred annuity. While this assumption was disclosed, we recommend that some assumption be made to reflect that some employees will elect a deferred annuity.
2. The plan has not changed its form conversion factors for optional forms of annuities in the last 20 years. While the Board might want to change these factors, this is a benefit provisions and not a funding assumption. However, for funding purposes benefits for future retirements are usually valued using the normal single form of payment. We suggest that the actuary consider differences between the two actuarial basis (funding vs. benefits determinations) and decide if the difference is enough to justify a change in assumption. In our opinion, the current funding assumption is conservative and additional disclosure is all that is needed.

1. Executive Summary (cont.)

3. The disability decrement ended once a member became retirement eligible. We recommend that this assumption continue beyond retirement eligibility date.

We recommend these enhancements to the valuation process:

1. Project contributions to demonstrate risk by using either stochastic methods or a simple deterministic model the impact of potential future market losses on the plan's contribution rate and funding level;
2. Provide rationale for each of the key assumptions and proposed in the ASOP requirements. This can be as simple as referring to the last experience study;
3. Enhance the understandability of certain areas in the valuation report by expanding the exhibits that contain asset information and expanding upon the description of the actuarial cost method and assumptions; and
4. Consider and measure the increase in future risks if the funding policy does not change by projecting the future expected ratio of plan assets to payroll. Have a discussion with both the actuary and plan investment advisor to discuss this dynamic and whether changes should be made.

Conclusions

This audit validates the findings of the 2013 actuarial valuation. We believe the stated methods and assumptions were properly employed in determining the cost of the Plan.

The data appears complete and with a cursory analysis of the information supplied by ABC staff, we were able to closely match the participant counts reported by XYZ. The requirements of ASOP 23 (Data Quality) appear to have been met. We were able to match all test life results within an acceptable degree of accuracy and the total liabilities of the plan. Most of the differences disclosed in Section II of this report are minor. All parameters and methods appear consistent with current GASB standards and generally accepted actuarial practices as promulgated in the various Actuarial Standards of Practice applicable to XYZ.

Finally, we offer ideas to improve the quality and understanding of the valuation report. Several suggestions and recommendations are made throughout this document. Some changes are simply for clarity while some have a minor change in the contribution rate.

2. Purpose and Scope of the Audit

Purpose of the Audit

The State of ABC Legislative Audit Department (Audit Department) retained Bolton Partners, Inc. to conduct an independent review of the System's current actuarial calculations, assumptions and methodology. The Audit Department requested an assessment of the validity of the data used in the valuation, a review of the appropriateness of the current funding method and procedures, an evaluation of both economic and non-economic assumptions, and a review of the actuarial report and most recent experience analysis and to determine if there is consistency in the presentation of the actuarial results and whether they are consistent with professional standards.

Scope of the Audit

This actuarial audit has a specified scope in its review. The scope included performing the 2013 actuarial valuation from start to finish, in essence, a parallel valuation. This review is conducted by analyzing detailed output of certain selected test lives from the membership group and a valuation of the entire population.

What this audit can provide is:

1. Assurance that appropriate benefits are being valued;
2. Confirmation that the valuation system is accurately testing both sample lives and replicating the Normal Cost and Actuarial Liability of the entire system;
3. Confirmation that the program is valuing benefits as described in the valuation report and consistent with applicable statutes;
4. A measurement of economic actuarial assumptions against those used by other public plans and hence an assessment of their reasonableness;
5. A review of the reasonableness of actuarial funding and asset valuation methods;
6. An indication as to whether the liabilities and contribution rates shown are not reasonable or are incorrectly calculated; and
7. Recommendations for changes in procedures, methods, assumptions and forecasts of expectations.

2. Purpose, Scope and Methodology of the Audit (cont.)

Methodology of the Audit for the 2013 Actuarial Valuation

The purpose of this audit is to express an opinion regarding the reasonableness and accuracy of the actuarial assumptions, methods, and valuation results.

The measurement of the reasonableness of the funding levels encompasses three key analyses:

1. A verification of the benefits being projected for future payment;
2. A verification of the appropriateness of the actuarial assumptions that are used in calculating the liability; and
3. A verification of the appropriateness of the funding and asset valuation methods.

Benefits Analysis

Critical to projecting future benefits is receiving complete and accurate data. We reviewed the process by which data is prepared for the actuarial valuation, including:

1. An assessment of the completeness of the data; and
2. A review of the data screening process employed.

We developed computer models that enabled us to compare our results with XYZ's results. These models also allowed us to confirm that the XYZ valuation projects benefits in a manner consistent with the Benefit Provisions summary in the valuation report, and that the summary is consistent with state statutes applicable to the ABC Retirement System. For purposes of this study, we regard differences of less than 3% to be immaterial for the Total Present Value of Benefits (PVB) and 2% to be immaterial for the review of census data.

Assumptions Analysis

The second critical component in assessing the reasonableness of the funding levels is in the selection and the application of the actuarial assumptions. With respect to the assumptions, we;

1. Reviewed the Five-Year Experience Study report for the period covering July 1, 2006 to June 30, 2011;
2. Benchmarked the economic assumptions against a survey of state and local employee retirement systems; and
3. Examined individual test life calculations.

2. Purpose and Scope of the Audit (cont.)

Methods Analysis

The third component in assessing funding levels is the selection and application of the actuarial cost method (including the method for amortizing the unfunded actuarial accrued liability) and the asset valuation method (including smoothing techniques). This includes items unique to a particular system, such as ABC's reserving for pre-1980 disabilities. Some of these methods are minor in terms of financial significance and not so unusual as to be offensive. The only material method that we think should be reviewed is the use of the Frozen Initial Liability method. If you have the plan actuary perform the stochastic model of future risk and compare the results to other funding methods (such as the CCA "LCAM" model method of the GASB version of Entry Age normal) you might conclude that a change in the "cost allocation" method is appropriate.

3. Review of Actuarial Report and Validation of Liabilities Valued

Data Used in the Valuation

We independently obtained data files directly from ABC and XYZ. With minimal data scrubbing, we found that the counts for the active and retired files were relatively close, and within the 2% threshold we established for determining materiality of differences.

All data for actives, deferred vested, retirees and beneficiaries was provided as of the valuation date (July 1, 2013). XYZ provided us with a detailed description of their data process for reconciling census data from the prior valuation date to the current date and their checks for the reasonability of data. Based on the description provided, it appears that XYZ has a sound procedure in place to handle missing data. Given the large size of the data, this shortens the amount of staff time spend on data reconciliation (for both XYZ and ABC) without sacrificing any material accuracy in the valuation results. We would, however, recommend XYZ include an upper limit on the number of records they adjust for missing data, if not done so already.

An additional part of our data validity review was addressing the movement of participants from active to retirement status and whether participants are being removed from the active lives valuation and added to the retired lives valuation at the appropriate time. We looked at approximately 870 records from the active lives files that were reported with an end of year status of “closed.” Of these 870 members, we were able to match nearly 850 of them to new records in the retired lives data. The remaining 20 “non-matched” records were coded as either having withdrew their employee contribution balance from the fund, receiving a lump sum benefit or were pending disability application. It was unclear how the “pending disabilities” were treated in the valuation.

The table that follows summarizes our determination of key data elements as compared to those shown in the valuation report.

3. Review of Actuarial Report and Validation of Liabilities Valued (cont.)

July 1, 2013 - Analysis of Participant Data

Active					
In Payment Status - Core		Number	Annual Payroll (\$M)	Average Age	Average Service
General	Bolton	140,000	\$3,200,000,000	44.0	11.8
	XYZ	140,005	\$3,295,602,244	44.0	11.9
	% Difference	0.00%	2.99%	0.00%	-0.80%
Elected Officials	Bolton	500	\$35,000,000	55.0	13.5
	XYZ	500	\$35,000,000	55.0	13.5
	% Difference	0.00%	0.00%	0.00%	0.00%
Police	Bolton	1,100	55,000,000	40.0	12.4
	XYZ	1,108	55,400,000	40.2	12.4
	% Difference	0.73%	0.73%	0.50%	0.00%
Fire	Bolton	1,200	60,000,000	43.0	14.4
	XYZ	1,202	60,100,000	43.5	14.4
	% Difference	0.17%	0.17%	1.16%	0.00%
Total	Bolton	142,800	3,350,000,000	45.0	11.9
	XYZ	142,815	3,446,102,244	45.0	12
	% Difference	0.01%	2.87%	0.00%	0.00%
Inactive Member					
General	Bolton	130,000		46.0	2.9
	XYZ	130,300		46.3	3.00
	% Difference	0.23%		0.65%	0.00%
Elected Officials	Bolton	573		53.6	4.5
	XYZ	577		53.7	4.6
	% Difference	0.70%		0.19%	0.00%
Police	Bolton	4,200		40.2	3.5
	XYZ	4,296		40.3	3.7
	% Difference	2.29%		0.25%	0.00%
Fire	Bolton	200		43.0	7.1
	XYZ	198		43.4	7.3
	% Difference	-1.00%		0.93%	0.00%
Total	Bolton	134,973		46.2	3.00
	XYZ	135,371		46.1	3.00
	% Difference	0.29%		-0.22%	0.00%

3. Review of Actuarial Report and Validation of Liabilities Valued (cont.)

July 1, 2013 - Analysis of Participant Data

In Payment Status - Teachers		Number	Valuation Benefits	Average Benefits
Regular Retirement	Bolton	140,000	\$3,200,000,000	\$23,093
	XYZ	140,005	\$3,295,602,244	\$23,004
	% Difference	0.00%	2.99%	-0.39%
Disabled	Bolton	6,500	\$140,000,000	\$22,000
	XYZ	6,200	\$138,000,000	\$22,010
	% Difference	-4.62%	-1.43%	0.05%
Death In-Service	Bolton	1,100	\$15,000,000	\$13,000
	XYZ	1,108	\$15,100,000	\$12,900
	% Difference	0.73%	0.67%	-0.77%
Total	Bolton	147,600	3,355,000,000	58,093
	XYZ	147,313	3,448,702,244	57,914
	% Difference	-0.19%	2.79%	-0.31%
In Payment Status - Police				
Regular Retirement	Bolton	140,000	\$3,200,000,000	\$23,093
	XYZ	140,005	\$3,295,602,244	\$23,004
	% Difference	0.00%	2.99%	-0.39%
Disabled	Bolton	6,500	\$140,000,000	\$22,000
	XYZ	6,200	\$138,000,000	\$22,010
	% Difference	-4.62%	-1.43%	0.05%
Death In-Service	Bolton	1,100	\$15,000,000	\$13,000
	XYZ	1,108	\$15,100,000	\$12,900
	% Difference	0.73%	0.67%	-0.77%
Total	Bolton	147,600	3,355,000,000	58,093
	XYZ	147,313	3,448,702,244	57,914
	% Difference	-0.19%	2.79%	-0.31%

As previously mentioned, we were able to match most information reported by XYZ to within 5% with minimal data scrubbing.

3. Review of Actuarial Report and Validation of Liabilities Valued (cont.)

Valuation Report

XYZ provides a comprehensive actuarial valuation report, which generally includes enough information for an individual to gain a clear understanding of the financial picture of the System. With respect to increasing the usefulness and understanding of the valuation report, we offer the following comments:

1. In the active liability information, it would help to see the total broken down by “decrement”. This would improve the understanding of the source of the liability by decrement.
2. Throughout the report, it is unclear what the true System assets are, either on a “market value” basis or an “actuarial value” basis. We suggest that ABC simplify the presentation of ABC financial information so that the market and actuarial values of assets can more easily be understood by the reader. It would also be useful if there was an historical chart of these two values.
3. To enhance the understandability of the actuarial valuation report, ABC should consider whether the portions of the reports should be combined, thus showing the information for all participants in the System.
4. It would help if the gain and loss was both shown by source and historical results since the last experience study was also shown.
5. The layout of the valuation report could be modified to improve the understandability of the information presented. We recommend that ABC consider revising the layout of the valuation report to be as follows:
 - a. Management summary and certification
 - b. Purpose and limitations on use of the report
 - c. Summary of participant data
 - d. Summary statement of income and expenses on a market value basis
 - e. Development of actuarial value of assets
 - f. Development of the unfunded actuarial accrued liability
 - g. Analysis of actuarial gain or loss for the plan year
 - h. Development of actuarially determined contribution rates
 - i. GASB 25/27 (67/68) schedules
 - j. Actuarial cost method and actuarial assumptions
 - k. Outline of plan provisions
 - l. Glossary of actuarial terms

3. Review of Actuarial Report and Validation of Liabilities Valued (cont.)

Projected Benefits in the Valuation

In addition to a full replication audit, we requested specific test lives in order to compare the benefit amounts projected in the valuation against our understanding of the ABC benefits summarized in the valuation report.

We reproduced the benefits payable and the present value of future benefits for 6 active members, 6 deferred vested members, 5 disability retirees, 7 service retirees, and 6 beneficiaries to verify their accuracy. We reviewed in detail the calculations for these test lives to determine whether XYZ correctly projected plan benefits and whether the costs and liabilities were determined in accordance with the actuary's stated methods and assumptions. We also requested several calculations from ABC for actual retirements that occurred during 2013. For these same individuals, XYZ provided active and retired liability information as of July 1, 2012 and July 1, 2013, respectively.

Based on our review of the individual test life calculations and actual ABC benefit calculations, we have the following observations and/or recommendations:

1. Observation #1:

Employees who were expected to terminate in the future (before becoming eligible for an immediate retirement benefit) were assumed to withdraw their employee contributions, thus not electing to take a deferred annuity. While this assumption was disclosed, we recommend that some assumption be made to reflect that some employees will elect a deferred annuity. At least one of the test lives is actually expected to get a deferred benefit.

2. Observation #2:

The alignment of ages for eligibility, retirement decrements and early retirement factors do not use consistent round rules or bases for determining service. A consistent approach should be used.

3. Observation #3:

The disability decrement ended once a member became retirement eligible. We recommend that this assumption continue beyond retirement eligibility date.

The test life comparison exhibits on the following pages summarize the calculations performed by Bolton and XYZ and show the differences by each decrement in the present value of benefits (PVB), as well as the ratio of Bolton's result to XYZ'. We regard differences of less than 3% to be acceptable for the Total PVB and in most cases; we matched results within this 3% range. Therefore – except for the comments made in item 2 above – we believe the liabilities of the System are being valued consistently with the description of plan provisions, actuarial assumptions, and actuarial methods stated in XYZ' valuation report.

3. Review of Actuarial Report and Validation of Liabilities Valued (cont.)

However, as noted in item 1 above, we recommend that XYZ include some provision in the non-retired lives valuation to account for the subsidized optional forms of payment available to members retiring after normal retirement age. For illustration purposes, we estimated the impact on two of the sample lives (Actives #3 and #4) of using an assumption that 80% of active members would elect a 100% joint and survivor annuity at retirement and 20% would elect a single life annuity. Under this approach, the PVB of Active #3 would increase by 2% and the PVB of Active #4 would increase by 3%.

3. Review of Actuarial Report and Validation of Liabilities Valued (cont.)

July 1, 2013 Valuation Test Life Comparison

Type	Age	Service	Present Value of Future Benefits		Ratio	Covered Salary		Ratio	Present Value of Future Salary		Ratio
			XYZ	Bolton		Bolton	XYZ		XYZ	Bolton	
Tier 1 Sample 1	55	25	300,000	300,300	100.10%	43,000	43,000	100%	240,000	252,000	105%
Tier 1 Sample 2	50	29	70,000	68,600	98.00%	60,000	60,000	100%	500,000	520,000	104%
Tier 1 Sample 3	30	5	40,000	39,600	99.00%	20,000	20,000	100%	120,000	121,200	101%
Tier 2 Sample 1	50	25	300,000	297,000	99.00%	30,000	30,000	100%	350,000	346,500	99%
Tier 2 Sample 2	40	10	70,000	69,650	99.50%	35,000	35,000	100%	130,000	140,400	108%
Tier 2 Sample 3	30	5	20,000	19,400	97.00%	40,000	40,000	100%	200,000	208,000	104%

Inactive Member Sample

Type	Age	Present Value of Future Benefits		Ratio
		XYZ	Bolton	
Retiree, Joint & 2/3%	77	320,000	320,000	100%
Retiree, Life Annuity	80	27,000	27,000	100%
Retiree, Joint & 100%	45	40,000	40,000	100%
Retiree, Joint & 50%	55	800,000	800,000	100%

4. Analysis of Assumptions and Methods

As part of our analysis, we have reviewed the principal assumptions used in the actuarial valuation and the experience study report for the three-year period ending July 1, 2013. For this purpose, we have reviewed the assumptions for reasonableness based on a cursory examination of the census data as well as assumption setting methodology we have typically seen used for systems like ABC. We also compared the current set of economic assumptions to those used by a peer group of 125 systems covering state and local employees.

Investment Return:

The System's 7.75% assumption, when compared to the peer group, is right in the middle of the range of 7.0% to 8.0% (based on valuations primarily covering fiscal years ending in 2012 and 2013). The 7.75% assumption appears to be comprised of two parts: an inflation assumption of 3.0% and an assumption for real rate of return (net of investment expenses) of 4.75%. The inflation assumption is on par with the average of the peer group. However, the assumption for real rate of return is slightly more than the average of the peer group. The 7.75% assumption appears reasonable for the System but consideration should be given to lower the assumption.

Salary Scale:

For all members, the salary scale assumption is comprised of an age component (for merit and seniority) ranging from 0.5% to 4.0% and a real wage inflation rate of 2.75%. The recent experience study resulted in minor changes to the merit/seniority increase assumption for some participant subgroups, primarily impacting those with less than 15 years of service. These changes appear reasonable, based on the summary data shown in the report. As long as increases in future wages (over the long term) are expected to be similar to recent past experience, the current assumption is appropriate.

Both the investment return and salary progression assumptions use the same 3.0% underlying inflation rate (3.0% wage inflation rate), and it appears that a consistent economic model for assumption setting is being used.

4. Analysis of Assumptions and Methods (cont.)

Mortality:

The mortality rates assumed for healthy annuitants and beneficiaries are based on the “ABC Projected Experience Table”. The illustrative rates shown in the report tie back to the underlying tables, with adjustments as described.

Based on the data from the experience study report, the recommended tables appear to match recent mortality experience closely in aggregate. We also compared the mortality rates to a newer, standard published mortality table (RP-2000 Combined) for consistency in the “shape” of the rates by age. While the expected future lifetime of an individual produced by an older table with a projection may be approximately the same as a current RP-2000 table, the mortality “pattern” across ages can be noticeably different. As a result, the PVB for the same individual could be materially different, especially in a plan that provides post-retirement benefit increases.

As demonstrated in the table above, the pattern of mortality rates from the ABC tables is highly consistent with the pattern of rates from the RP-2000 tables over all rates for males and for all but the highest ages for females. While we would typically recommend setting the mortality assumption to be based on an unprojected current table with appropriate age setbacks/forwards as necessary, continued use of the “ABC Projected Experience Table” (with appropriate adjustments) appears reasonable. We would recommend that XYZ test recommended mortality assumptions from future experience studies against rates from then-current mortality tables for consistency in the pattern of rates.

Although the ratio of actual to expected post-disability retirement appears reasonable in total, the mortality assumption appears to be too low at ages prior to 70 and too high at ages 80 and above. As part of the next experience review, we recommend that XYZ compare the recommended post-disability mortality assumption to a standardized table to ensure reasonableness.

4. Analysis of Assumptions and Methods (cont.)

Benefit Election: Currently, all retirement benefits are valued assuming members elect the single life annuity form of benefit payment. However, there is a subsidy in the optional form of payment conversion factors applicable to formula benefit calculations for members that are beginning to receive benefits after a certain age (62 for non- public safety and Normal Retirement Age for public safety). Since the rates of retirement are such that a portion of each active member is assumed to retire beyond age 62 (Normal Retirement Age for public safety), the value of this subsidy is not currently being included in the actuarial valuation. We recommend including an assumption as to the percentage of active members electing an optional form of payment (with the “Liability Adjustment” disclosed on page 33 of the valuation report lowered accordingly).

Marriage: The valuation assumes all active members are married for purposes of death-in-service benefits, and males are assumed to be three years older than females. We recommend the actual marital status and spouse age difference of relatively new retirees (as a proxy for active members) be examined in the next experience review, even if use of a 100% marriage assumption for death-in-service benefits continues in future valuations.

Retirement Rates: The valuation employs retirement rates from age 55 to age 70 (50 to 65 for public safety). As a result of the last experience review study, most of the retirement rates for non-public safety occupation employees were adjusted to allow for larger probabilities of retirement at ages beyond 65. We have observed a trend toward later ages for retirement in recent experience studies completed for other public employers. If this trend continues, the late retirement benefit subsidy noted earlier will become even more of an issue than it is today.

The benefit commencement age assumption for inactive members with a deferred vested benefit should be separately identified in the valuation report. We understand this assumption to be age 62 executive and elected, age 55 for police occupations, and age 65 for all others. Since age 54 is the earliest unreduced retirement age for police, consideration should be given to using an age 54 commencement assumption for this group.

4. Analysis of Assumptions and Methods (cont.)

Turnover Rates: XYZ has used a select and ultimate approach for separation from active service, based on select rates that apply during a member's first 10 years of service. We support the use of this format for turnover rates, and suggest that XYZ continue this approach for as long as experience review data suggests that it is appropriate.

New termination rates developed in the experience review were set such that the rates generally produce fewer expected terminations relative to the actual experience over the review period. However, on a liability weighted basis, the rates are not expected to produce significant actuarial gains or losses.

Disability Rates: Disabilities are explicitly assumed in the valuation. The rates adopted as part of the recent experience study were developed by gender and by participant group. However, by dividing the experience into such fine categories, the actual occurrence of disabilities for some of the groupings is too small on which to reliably base an assumption. We would recommend aggregating some of the groups with like characteristics in order to have a larger experience base to set the assumption.

Demographic assumptions that were developed using a liability-weighted approach should be re-examined in the next experience review using an assumption for optional form of payment election that reflects the subsidized payment forms.

Overall, the economic and demographic actuarial assumptions adopted by the System are reasonable and consistent with generally accepted actuarial standards and practices contained in Actuarial Standard of Practice No. 27 covering economic assumptions and Actuarial Standard of Practice No. 35 covering demographic and non-economic assumptions. In future experience investigation reports, when discussing recommendations for adjusting assumptions so that the ratio of actual to expected experience is something other than 100%, we recommend that XYZ state the rationale.

Funding Method for Liabilities

The funding method prescribed by statute for ABC is the Frozen Initial Liability actuarial cost method. For the most part, the description of the method stated in the actuarial valuation report is sufficient, though we found one part of it to be confusing and contradictory. The second paragraph on page x states that "...experience gains or losses in any year are amortized (spread) over the average future working lifetime of the group – a period of approximately 13 years", but some amortization bases are amortized over 20 years.

4. Analysis of Assumptions and Methods (cont.)

The amortization of unfunded accrued liability for determination of the contribution rate and Annual Required Contribution (ARC) under GASB 25 is based on the frozen initial unfunded liability described above. The amortization is based on a closed period and is expected to be completed by 2032 (twenty years from the valuation date). Under the FIL funding method, typically, when a change in benefit provisions or actuarial assumptions occurs, the FIL unfunded actuarial liability is adjusted by the amount of the change in the Entry Age Normal actuarial liability. However, XYZ includes the impact of changes in actuarial assumptions in the Experience Amortization Reserve. Ultimately, the impact of assumption changes are reflected in the ABC cost as an amortization component, but the treatment is different from what would typically be done under the FIL cost method. Because of this different treatment, we recommend that XYZ enhance the description of the actuarial valuation method to highlight this alternative approach.

We find the current method to be reasonable, though only 17 of the 125 plans in the peer group use this cost method (most use entry age normal). One item we would point out is that public pension accounting as required by the Governmental Accounting Standards Board (GASB) is currently under review and indications are, for financial reporting purposes, the required actuarial cost method will be entry age normal. Therefore, if entry age normal is required as the reporting method for GASB, the actuary may have to adjust the liabilities that are used for reporting purposes or generate a second set of liabilities.

Asset Valuation Method

Assets in the Trust are valued using the common five year smoothing period. This method smoothes investment gains and losses for each fiscal year by recognizing these gains and losses evenly over a five-year period. The method does not impose a corridor that places limits on the spread between actuarial value of assets (AVA) and market value of assets (MVA).

An essential part of the public sector budgeting process is that material budget items, including pension contributions, should have a level cost pattern from year to year to the extent possible. Bolton recognizes the importance of this requirement and assists clients in establishing reasonable methodologies for recognizing investment gains and losses and limiting the potential volatility that may result in increased contributions due to investment results.

The actuary's guide for determining the reasonableness of an asset smoothing method is Actuarial Standard of Practice (ASOP) No. 44. The following is an excerpt from this ASOP that establishes the qualities a reasonable asset smoothing method must exhibit.

4. Analysis of Assumptions and Methods (cont.)

From the Actuarial Standard of Practice No. 44

3.3 *Selecting Methods Other Than Market Value -- If the considerations in section 3.2 have led the actuary to conclude that an asset valuation method other than market value may be appropriate, 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. The qualities of such an asset valuation method include the following:*

- a. *The asset valuation method is likely to produce actuarial values of assets that are sometimes greater than and sometimes less than the corresponding market values.*
- b. *The asset valuation method is likely to produce actuarial values of assets that, in the actuary's professional judgment, satisfy both of the following:*
 1. *The asset values fall within a reasonable range around the corresponding market values. For example, there might be a corridor centered at market value, outside of which the actuarial value of assets may not fall, in order to assure that the difference from market value is not greater than the actuary deems reasonable.*
 2. *Any differences between the actuarial value of assets and the market value are recognized within a reasonable period of time. For example, the actuary might use a method where the actuarial value of assets converges toward market value at a pace that the actuary deems reasonable, if the investment return assumption is realized in future periods.*

In lieu of satisfying both (1) and (2) above, an asset valuation method could satisfy section 3.3(b) if, in the actuary's professional judgment, the asset valuation method either (i) produces values within a sufficiently narrow range around market value or (ii) recognizes differences from market value in a sufficiently short period.

Two key principles arise from ASOP 44. These are that acceptable asset smoothing must create asset values that fall within a reasonable range around market value and are recognized in a reasonable period of time. In lieu of satisfying both of these principles, a smoothing method could satisfy the requirements if, in the actuary's professional judgment, the range around market value is sufficiently narrow or the differences are recognized in a sufficiently short period.

Bolton has established an internal policy, which is consistent with others in the actuarial community, that five years is a sufficiently short period to constitute a reasonable asset smoothing method. Therefore, it is our opinion that the method utilized by ABC is reasonable.

5. Conclusions and Recommendations

This replication audit reviewed the data used, the benefits valued, and the actuarial methods and assumptions employed in the July 1, 2013 actuarial valuation. The test lives provided by the actuary reflect the plan provisions of ABC as stated in the 2013 actuarial valuation report. These test lives also demonstrate the application of the actuarial assumptions to the benefits as stated in the valuation report. The actuarial assumptions, methods, and procedures are reasonable and reflect the benefit promises made to ABC members. All parameters and methods appear consistent with GASB 25.

Below we summarize our recommendations for your consideration:

A. Data

1. Implement tolerance checks for missing and inconsistent data to shorten amount of time spend on data reconciliation.
2. Remove the adjustment for the value in the Variable Excess/Deficiency data field for the total account balance information shown in the valuation report.

B. Valuation Report

1. Improve the information relative to system assets (on both market value and actuarial values) so that financial information can more easily be reconciled by the reader.
2. Consider combining the two sections of the report into one and modifying the layout of the valuation report to enhance understandability.

C. Projected Benefits and assumptions

1. Assume some members will prefer a deferred annuity over a refund of employee contributions
2. Consider an assumption for election of optional forms of payment to capture the negative subsidy in conversion factors for members retiring after normal retirement age unless the plan is planning to change its conversion factors.
3. Extend disability decrements beyond eligibility for service retirements.
4. Adopt consistent rounding rules when projecting eligibility, decrement look-ups and reduction factors.

5. Conclusions and Recommendations (cont.)

D. Potential Future Projects for the Plan Actuary

We suggest the Board consider the following:

1. 1. Project contributions to demonstrate risk by using either stochastic methods or a simple deterministic model the impact of potential future market losses on the plan's contribution rate and funding level;
2. 2. Consider and measure the increase in future risks if the funding policy does not change by projecting the future expected ratio of plan assets to payroll. Have a discussion with both the actuary and plan investment advisor to discuss this dynamic and whether changes should be made.

To reiterate our summary from Section 1, the plan's actuary appears to have reasonably valued the expected liability of the System. They have applied the methodology consistently and their report generally conforms to accepted actuarial principle and practices. In this report, we have noted areas that we believe will improve the usefulness and clarity of the System's annual actuarial valuation. We are available to discuss any aspect of our review with System staff or the System's actuary.