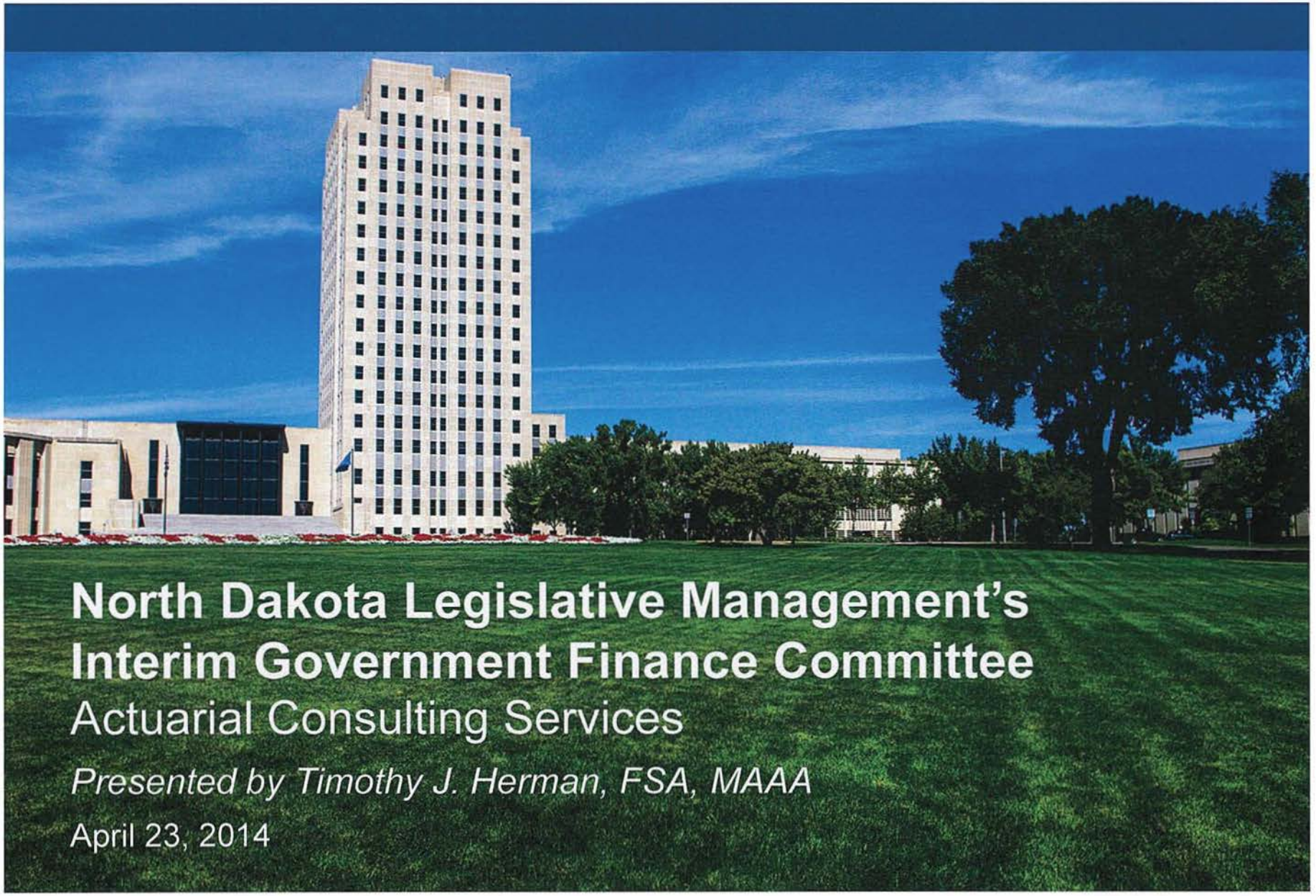

North Dakota Legislative Management's Interim Government Finance Committee

Actuarial Consulting Services

Presented by Timothy J. Herman, FSA, MAAA

April 23, 2014

Milliman

What We'll Talk About Today

- About Milliman
- Project Approach
- Proposed Fees
- The Milliman Advantage
- Questions & Discussion

Milliman

Our Firm

We are one of the largest consulting and actuarial firms in the world and are recognized leaders in the markets we serve.

- Public pension plan services since 1947
- Largest independently owned actuarial consulting firm
- Wholly owned and managed by 400 Principals
- Independent, objective, unbiased advice
- Relied on by our clients to be industry experts, trusted advisors, and creative problem solvers
- Premier peer review and quality assurance practices

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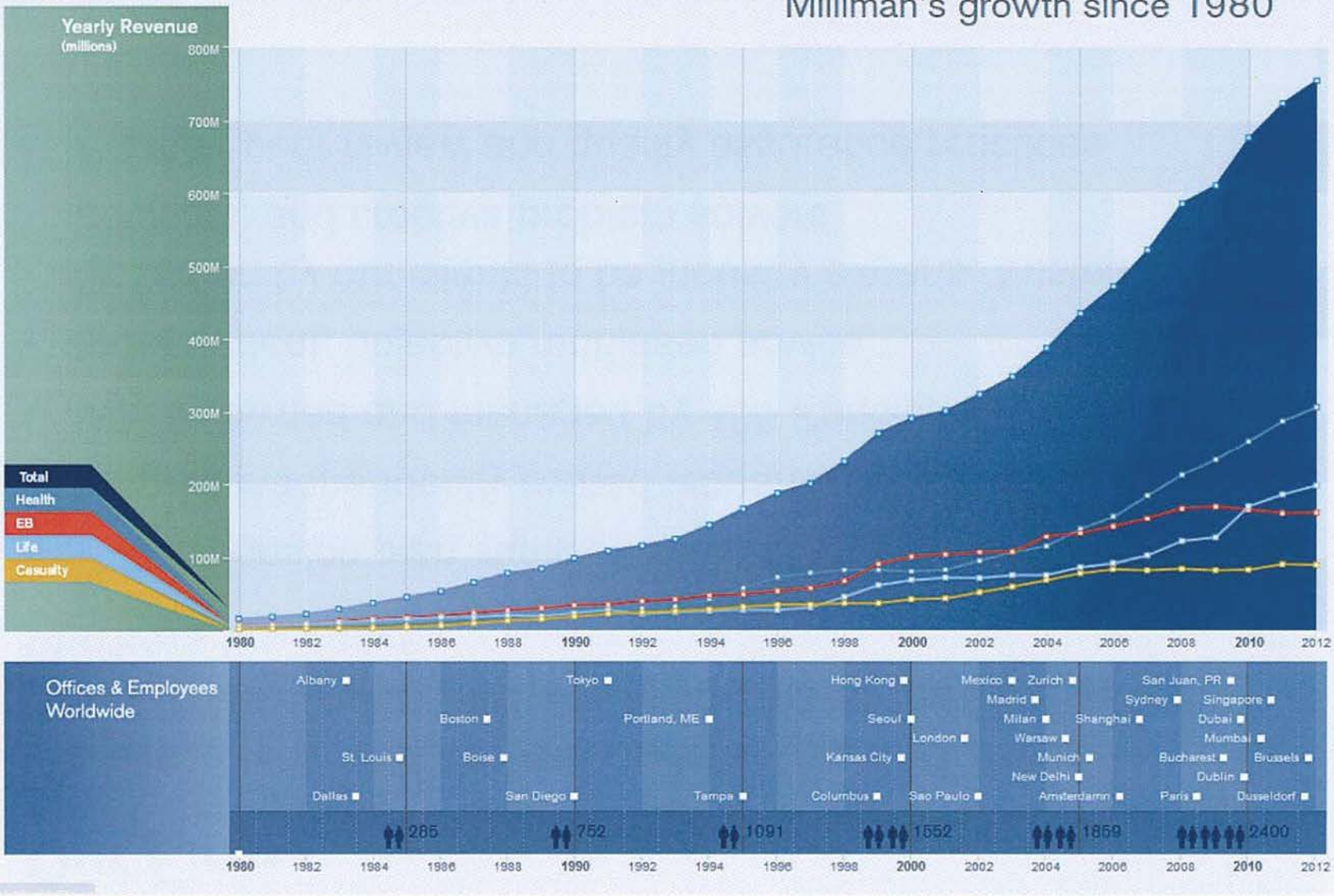
Milliman's growth since 1980
Yearly Revenue
(millions)
800M
700M
600M
500M
400M
300M
200M
100M
Total
Health
EB
Life
Casualty
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
Offices & Employees Worldwide
Albany
Tokyo
Hong Kong
Mexico
Zurich
San Juan, PR
Madrid
Sydney
Singapore
Boston
Portland, ME
Seoul
Milan
Shanghai
Dubai
London
Warsaw
Mumbai
St. Louis
Boise
Kansas City
Munich
Bucharest
Brussels
New Delhi
Dublin
Dallas
San Diego
Tampa
Columbus
Sao Paulo
Amsterdamn
Paris
Dusseldorf
285
752
1091
1552
1869
2400

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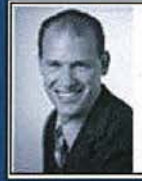
Milliman's North Dakota Project Team

Milliman will serve the Committee with both a team of regional public plan experts, together with the depth of national resources

MIDWEST PUBLIC PLAN SERVICE TEAM

Tim Herman
Consulting Actuary
Lead Consultant

Bill Hogan
Consulting Actuary
Quality Assurance



Jack Chmielewski
Actuary
Project Manager

Al Bittner
Consulting Actuary
Implementation Support

NATIONAL PUBLIC PLAN SUPPORT RESOURCES

Becky Sielman
Consulting Actuary
Hartford, CT
Pension Reform

Glenn Bowen
Consulting Actuary
Philadelphia, PA
Pension Reform

Matt Larrabee
Consulting Actuary
Portland, OR
Pension Reform

Alan Perry
Consulting Actuary
Philadelphia, PA
Investment Experience

Actuarial Analyst Team

IT Specialists

Software Development and Programming

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Understanding Your Goals

- Independent actuarial review of the projected costs of the defined benefit plan if closed to new employees
- Actuarial cash flow projections for the following scenarios:

Scenario 1	Current plan until 100% funded
Scenario 2	Plan closed 1/1/2016 for new state employees until last benefit paid
Scenario 3	» Plan closed 1/1/2016 for new state employees until last benefit paid » Full funding payment made 7/1/2015
Scenario 4	Political subdivision segregated
Scenario 5	Plan closed 1/1/2016 for both state and political subdivision

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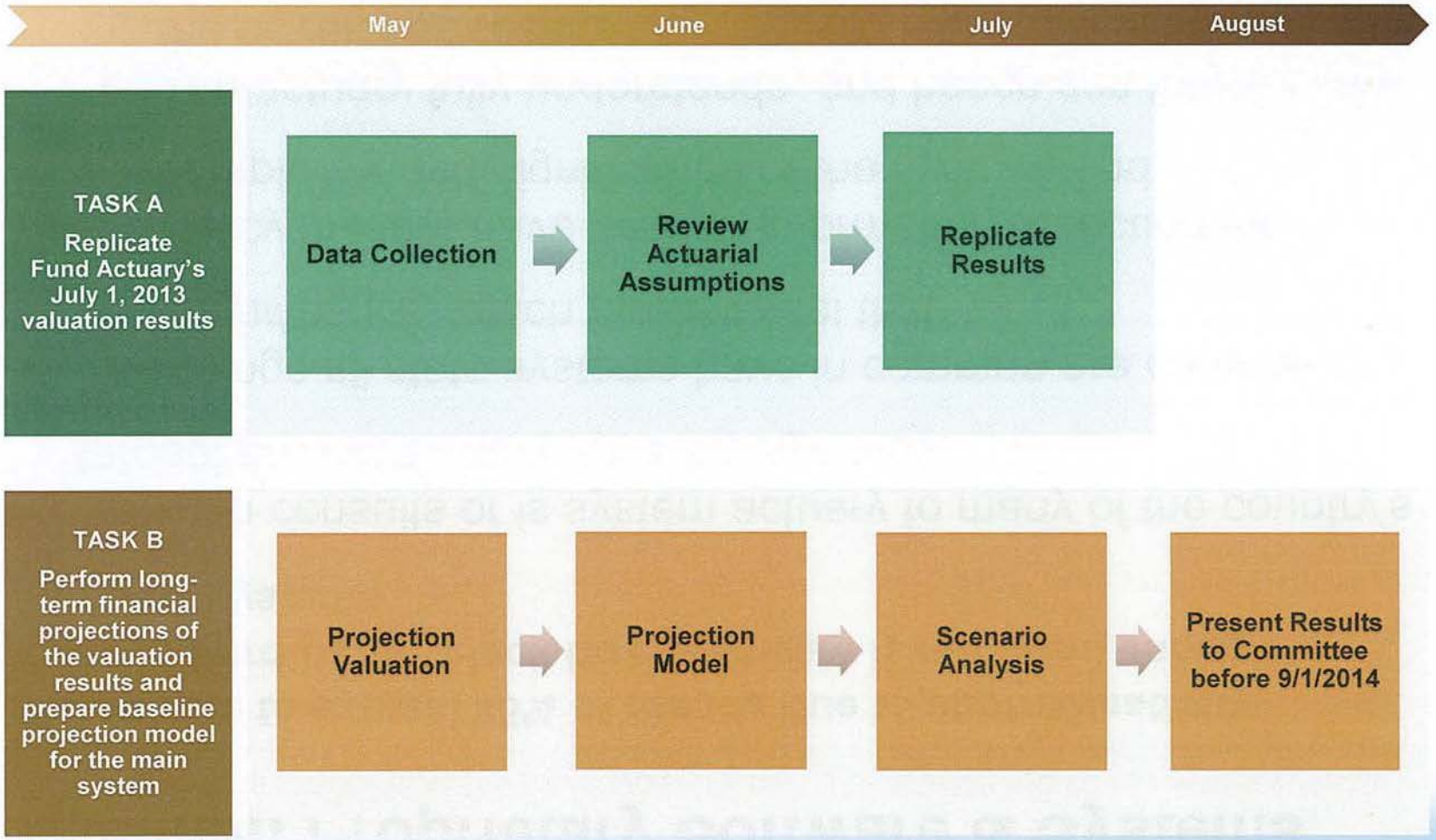
Project Approach for Phase 1



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Milliman Proprietary Software & Systems

Being able to explain 95% of results due to approximations used in third-party "black box" software is not good enough for state systems

- Milliman consults or is system actuary to many of the country's largest and most complex state systems
- Two things all state systems have in common are *complexity* and *significance*, which make it vital that:
  - » Policy makers have precise information reflecting the complexity and significance of the system, and
  - » The actuary fully understands, and hence can fully explain, the developed results

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Milliman Proprietary Software & Systems

Our proprietary software provides another layer of independent review – we are not just confirming that parameters were properly entered in third-party software which may also be used by the Fund Actuary

- Because of this, Milliman has its own proprietary valuation software and financial projection systems
- Our software & systems are fully customizable, recognizing the complexity and significance of each state system
- Consulting actuaries are supported by a highly experienced, dedicated systems & programming team, most of whom also hold actuarial credentials
- When summarizing analysis, our actuaries know their results and never have to speculate – this is due to our major client-focused commitment to our proprietary software & systems

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Optional Services for Phase 1

TASK C

Milliman independently processes data

MILLIMAN OBSERVATIONS

- Additional level of review of the Fund Actuary's valuation results
- July 1, 2004 actuarial audit did not report any material concerns with the Fund Actuary's processing of the data
- Is this add-on service worth the additional cost and potential to delay the delivery of the analysis?

TASK D

Fixed projection period, e.g. 30-year

- Allows an apples-to-apples comparison of scenarios

TASK E

Add stochastic "stress test" to projection model

- Future asset returns will vary from the expected return
- Add stochastic "stress test" to explicitly model variation in asset returns
- Allows assessment of the likelihood of certain events in the 1,000 scenarios modeled

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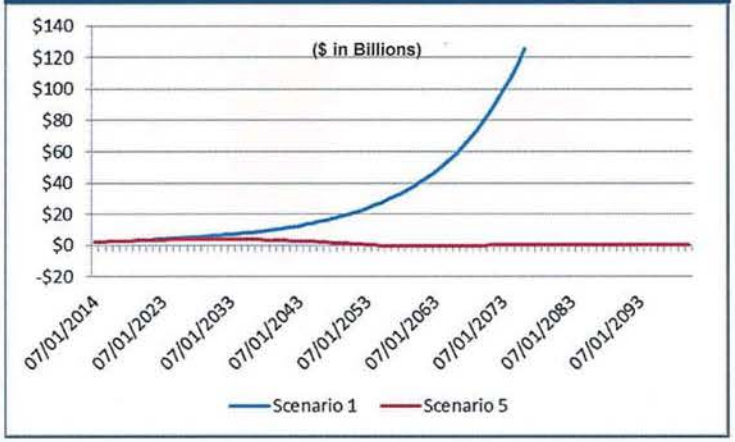
Current Projections

SCENARIOS ILLUSTRATED

- Scenario 1: Current Plan until 100% funded
- Scenario 5: Plan Closed January 1, 2016

MARKET VALUE OF ASSETS



Source: March 6, 2014 Projected Cash Flows prepared by Segal Consulting

MILLIMAN OBSERVATIONS

Risk Analysis

- Assumes investments return 8% each year
- Assumes payroll grows at 4.5% each year
- Unclear to what extent periodic adjustments to mortality assumption are included in the projections
- Size of Fund
  - $120B at 7/1/2076 in Scenario 1
  - $4B or less in Scenario 5

Decision Making

- Different Projection Periods
  - Scenario 1: 100% funded at 7/1/2076
  - Scenario 5: Assets exhausted at 7/1/2054
    Last benefit paid 7/1/2099
- How do you compare results?

$1B paid today is very different from $1B paid 50 years from now

- What is the cost of the Defined Contribution plan?

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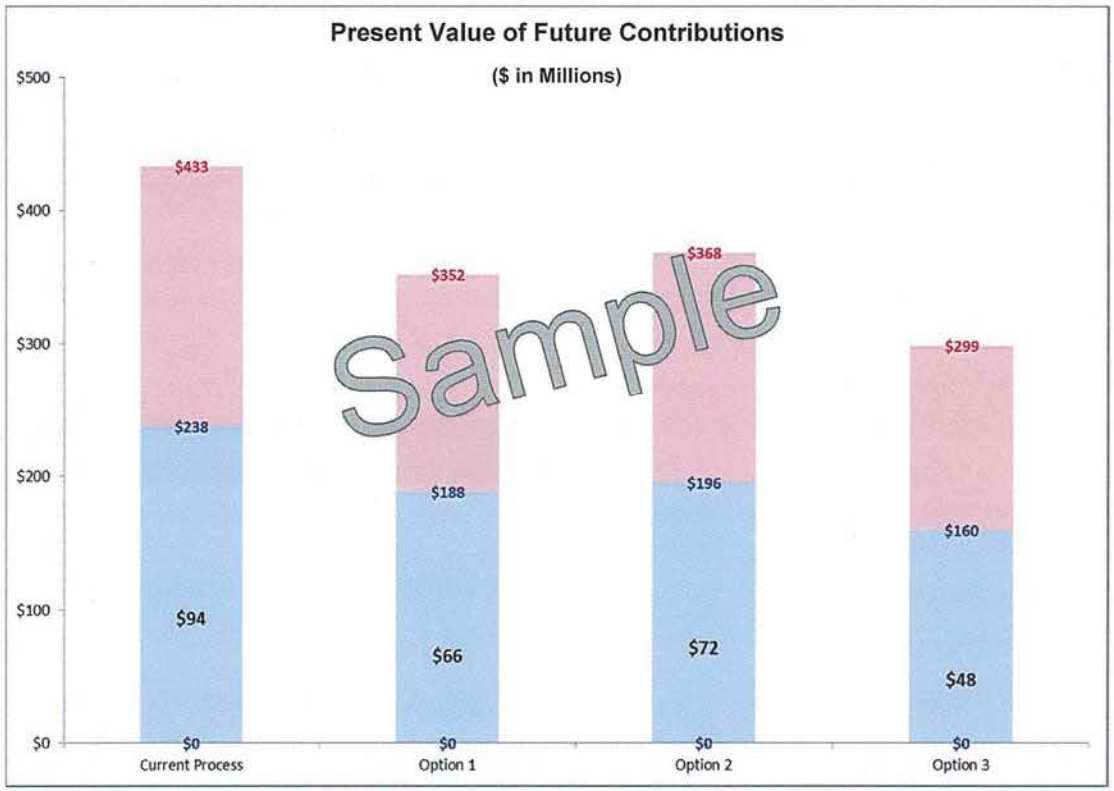
Optional Task D – Fixed projection period

Present Value of Contributions



- Under the current process, the median present value of future contributions is $94 m
- This chart shows the present value of expected contributions
- Fixed projection period allows apples to apples comparison between different options

Present Value of Contributions is the discounted value of projected contributions plus any unfunded accrued liability at January 1, 2043. For this calculation, the interest discount rate is 4%.

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Milliman Independent Investment Experts

Having dedicated in-house investment experts makes Milliman unique to most of our competitors

- No assumption receives more scrutiny from policy makers, media and the general public than investment return
- Having the actuary's independent opinion on prospects for long-term future returns is important to many of our clients
- Reflecting this, Milliman has an experienced, dedicated group of investment experts who:
  - » Regularly review and update capital market outlook guidance to assist in setting reasonable assumptions
  - » Develop properly calibrated "Monte Carlo" simulations of noisy future investment results for financial projections

Optional Task E – Stochastic "Stress Test"

Likelihood of Event	Current Policy	Alternative #1	Alternative #2
Funded Status < 60%	49.4%	50.6%	53.7%
Funded Status < 40%	12.4%	11.8%	14.6%
Base Rate >30% of Pay	54.3%	56.5%	52.6%

- A stochastic "stress test" allows assessment of the likelihood of certain events in the 1,000 scenarios modeled
  - » Project rates of return on assets from 1,000 random simulations
  - » Simulated asset returns are run through projection model to assess risk
  - » Effect of policy changes on these probabilities can be instructive
- The stress test model's probability of specified events occurring at some point during the 20-year projection period under both current and alternative policies is shown below

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Proposed Fixed Fees for Phase 1

	Task	Core/Optional	Fixed Fee
A.	Replicate Fund Actuary's July 1, 2013 Valuation results for the Main System using edited valuation data from the fund actuary.	Core	$35,000
B.	Perform projections of the valuation results and prepare baseline projection model for the Main System.	Core	$20,000
C.	Prepare July 1, 2013 replication valuation using raw demographic data from the retirement system.	Optional	$15,000
D.	Prepare 30-year projections of the scenarios outlined in Step B.	Optional	($4,000)
E.	Add stochastic asset projection capability to PERS projection model.	Optional	$14,000

- Milliman fixed fees to provide Core Services as requested in RFP: $55,000 (= $35,000 + $20,000)
- Milliman Recommended Approach
  - » Use 30-year projection period
  - » Add stochastic "stress test"
  - » Total fixed fees: $65,000 (= $35,000 + $20,000 - $4,000 + $14,000)
- Fixed fees include expected travel, per diem, and other out of pocket expenses

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What Are Others Doing?
Common Pension Plan Design Changes

- Reduce benefits for new hires (31 states*)
- Increase employee contribution rates (25 states*)
- Later normal retirement eligibility
- Reduce, delay, or eliminate COLAs – sometimes linked to plan's funded status or investment returns (7 states*)
- Lengthen period for determining final average earnings

* *Source: The Funding of State and Local Pensions: 2011-2015 (Center for Retirement Research at Boston College, May 2012)*

What Are Others Doing?
Common Pension Plan Design Changes

- Switch to hybrid plan (5 states*)
- Lower benefit multipliers
- Longer vesting period
- Review/modification of final salary calculation provisions
- Reduction or elimination of early retirement subsidies

HYBRID OPTIONS CONSIDERED BY OTHER STATES

- Cash Balance
- Stacked Hybrid
- Side by Side Hybrid
- Variable Annuity Plan

* Source: *The Funding of State and Local Pensions: 2011-2015 (Center for Retirement Research at Boston College, May 2012)*

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Potential Areas for Additional Analysis – Phase 2

Participant Impact

- Benefit Adequacy
- Illustrate current vs. proposed including defined contribution and hybrid

Cost/Risk Analysis of Different Benefit or Funding Policies

- Reduced pension plan, hybrid or DC plan for new hires/current employees
- Work force projections
- Funding subject to min/max

General Education

- Impact of new GASB Standards
- Pension basics
- Benchmarking compared to other states

If additional services are requested for Phase 2, then we suggest an additional consulting budget of $50,000 - $75,000 for the rest of 2014. May need to request additional budget.

Any additional services would be billed monthly based on time and expense.

Name	Position	2014 Rate
Timothy J. Herman	Primary Actuary	$435
John M. Chmielewski	Back-Up Actuary	$253
Consulting/Peer Review Actuary	Actuary/Consulting Actuary	$350 - $500
Actuarial Associate	Staff	$250 - $350
Actuarial Analyst	Staff	$100 - $250

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The Milliman *Advantage*

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Milliman Experience Helping Clients with Challenging Situations

PENSION REFORM/REVIEW EXPERIENCE

- Minnesota COLA Mechanism*
- Pennsylvania Budget Office*
- New Jersey Teachers' Pension and Annuity Fund
- Oregon Public Employees Retirement System reforms
- Florida Retirement System reforms

* Tim Herman is the co-lead consultant to the Minnesota Legislative Commission on Pension and Retirement. Since 2012, he has also provided extensive peer review on the plan design analysis for the Pennsylvania Budget Office.

FUNDING POLICY

- GASB standards divorced from funding policy
- Active involvement in actuarial bodies
  - California Actuarial Advisory Panel
  - CCA Public Plans Committee
  - AAA Public Plans Subcommittee
- Milliman GASB 67/68 Task Force
  - Depletion date projections
  - Calculation of expense, balance sheet items, roll forwards
  - Allocation basis for multiple/agent plans, special funding situations
  - Appropriate application of EAN cost method
  - Amortization method

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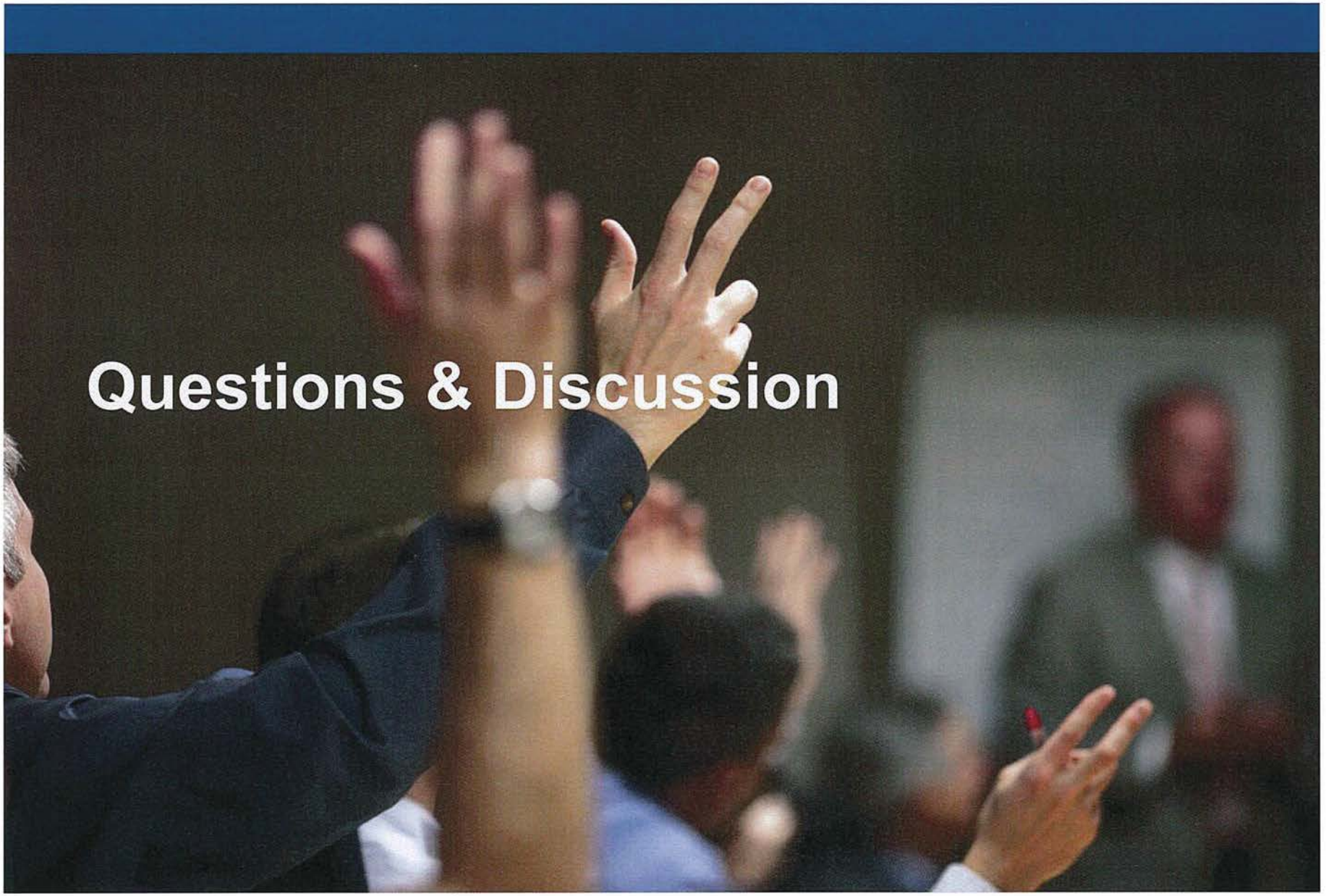

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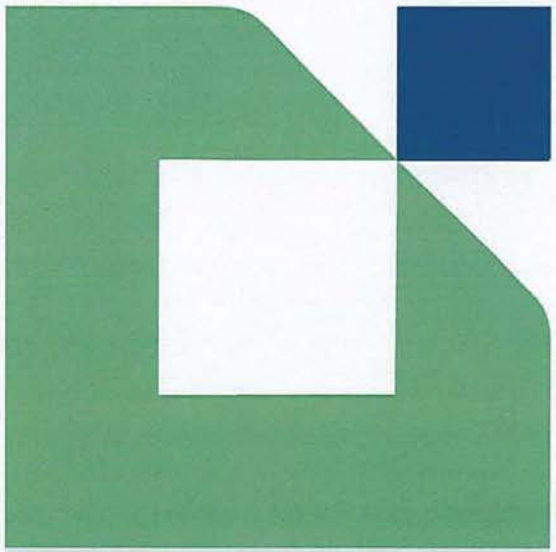
APPENDIX



Milliman

Quality Assurance Process

Our culture of quality means the Committee receives accurate, timely, understandable results

- Established culture of peer review
- Project level review
  - » Multiple reviewers
  - » Internal checks and balances
  - » Independent reviewer
- Consultant requirements
  - » Participate in Milliman's annual educational forum
  - » Work reviewed by outside consultant every three years
- Audit experience as the retained actuary is very favorable
- State-of-the-art data security

Our Understanding of Your Goals

- An independent actuarial review of the projected costs of the defined benefit plan if it is closed to new employees
- Actuarial cash flow projections for the following scenarios:
  1. Existing retirement plan until the plan reaches 100% (market value basis)
  2. Existing retirement plan for members hired before January 1, 2016
     - » State employees hired after 2015 participate in a defined contribution plan
     - » Projection period runs through the year the last current member of the plan is paid a retirement benefit
     - » Projection output separately reported for state employees

Our Understanding of Your Goals

3. Existing retirement plan for members hired before January 1, 2016
   - » State employees hired after 2015 participate in a defined contribution plan
   - » One-time payment on July 1, 2015, to fully fund the plan
   - » Projection period runs through the year the last current member of the plan is paid a retirement benefit
   - » Projection output separately reported for state employees
4. Existing retirement plan – political subdivision
   - » Political subdivision portion of the plan assuming that it remains open and is segregated from the closed state plan
   - » Projection period until the separate political subdivision plan reaches 100% (market value basis)
5. The existing plan if it is closed to both state and political subdivision employees beginning January 1, 2016, until the year the last current member of the plan is paid a retirement benefit

Project Approach for Phase 1

May | June | July | August

TASK A

Replicate Fund Actuary's July 1, 2013 valuation results

Data Collection

- Fund Actuary
  - Edited valuation data
  - Sample life output
  - Tables of assumptions
- Fund Administrator
  - Plan documentation
  - Financial information

Review Actuarial Assumptions

- Review assumptions using Milliman tools and our judgment
- If warranted, recommend changes or present assumption alternatives
- Estimate impact on July 1, 2013 results

Replication Results

- Upload data and assumptions to VAL2000, our proprietary valuation software
- Program benefit formulas, specify actuarial cost methods, and calculate liabilities
- Develop unfunded actuarial accrued liability, normal cost rate, and actuarially calculated contribution rate.
- Compare Milliman results to Fund Actuary's results
- Report results and recommendations/alternatives of any changes for plan design analysis

TASK B

Perform long-term financial projections of the valuation results and prepare baseline projection model for the main system

Projection Valuation

- Create new entrant cohorts
  - Expected new employee profile
  - Based on recent hires
- Assume employment remains level over projection period
- Determine actuarial accrued liability and normal cost for each year of projected actuarial valuations

Projection Model

- Excel-based projection model
  - Contributions
  - Benefits
  - Assets
  - Liabilities
  - Funded ratios
- Allow user to vary expected investment return

Scenario Analysis

- Prepare and review projections for 5 scenarios
- Analyze and report key results

Deliver Report

- Meet with Committee on or before 9/1/2014
- Written report with results of projection scenarios
- Discuss results of analysis

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Optional Services for Phase 1

TASK C

Use demographic data from retirement system for July 1, 2013 replication valuation

- Request data from system
- Review Fund Actuary's data editing procedures
  - Suggest any changes
  - Independently process and upload the raw demographic data

MILLIMAN OBSERVATIONS

- Additional level of review of the Fund Actuary's valuation results
- July 1, 2004 actuarial audit did not report any material concerns with the Fund Actuary's processing of the data
- Is this add-on service worth the additional cost and potential to delay the delivery of the analysis?

TASK D

30-year projection period

- In Task B, the projections are performed until the last current member of the plan is paid a benefit. The final year of the projection varies by scenario
- In Task D, the projections are performed for a fixed 30-year period. The final year of the projection is the same for each scenario
- Allows an apples-to-apples comparison of scenarios

TASK E

Add stochastic "stress test" to projection model

- Future asset returns will vary from the expected return
- Add stochastic "stress test" to explicitly model variation in asset returns
- Review the long-term target asset allocation and the asset class benchmarks set forth in the investment policy for PERS
- Develop 10,000 30-year investment return scenarios on a year by year basis
- Use the projection model to estimate the year by year contributions for each of the 10,000 investment return scenarios
- Summarize the results in a written report
- Allows assessment of the likelihood of certain events in the 1,000 scenarios modeled