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**Robert T. McCrory, FSA**  
**Executive Vice President**

September 13, 2005

Ms. Jane Smith  
Transportation Authority  
Benefits Department  
Main Street  
Anytown, USA

Re: Pension Obligation Bond Analysis

Dear Ms. Smith:

This letter concerns the proposal that the Transportation Authority (TA) issue a Pension Obligation Bond (POB, the Bond). The purpose of this Bond is to pay approximately 80% of the current unfunded actuarial accrued liability of the Retirement Plans for Employees of the Transportation Authority Pension Plan (the Plan).

We have projected the expected cost of the Plan both with and without the Bond under a number of investment return scenarios. In each scenario we analyze the impact of the Bond on the finances of the TA.

**Summary of Conclusions**

This analysis will show that the issuance of a Pension Obligation Bond is likely to result in a net savings for the TA. However, the likelihood and level of savings depend heavily upon the actual rate of return earned by the assets of the Plan.

If Plan assets earn less than the “break-even” rate, which is approximately equal to the financing rate of the Bond (5.3%), then the issuance of the Bond will actually increase the cost of pension benefits to the TA. In order to assess this risk, we simulated future investment returns; we found that returns on Plan assets will fall short of the financing rate of the Bond about 30% of the time. Stated differently, this means that there is about a 70% chance that issuing the Bond will turn out in favor of the TA, and a 30% chance that issuing the Bond will in hindsight be seen as unfortunate.

**Current Cost Projection**

As a first step in evaluating the potential impact of the proposed Bond, we have projected the cost of the Plan into the future, using the same provisions, assumptions and data that were used in the January 1, 2005 actuarial valuation. New entrants have been projected to enter the plan at the same rate as current active employees are expected to leave, either through retirements, disabilities, pre-retirement deaths or other

terminations. Therefore, the projections have been completed using the assumption that the active population is expected to remain level in the future.

One modification has been made to the funding method of the Plan. Under the current method, the unfunded liability is reamortized every year using a fixed 20-year amortization period. An "open" amortization period is considered appropriate, because new gains and losses are expected to emerge each year, which will offset gains and losses from previous years.

However, when we project the results forward for this analysis, we assume that our actuarial assumptions will be met, and therefore no new gains and losses will emerge. Therefore, it is inappropriate to continue reamortizing the current unfunded liability over a 20-year period, as this will only serve to delay the payment of the unfunded liability.

Accordingly, for projection purposes, we have amortized the current unfunded liability using a level dollar amortization schedule which will expire in 20 years, at which time the current unfunded liability will have been fully paid off. The only new unfunded liabilities expected to appear will be those introduced by the new entrants to the Plan. We have amortized these emerging liabilities over a fixed five year period.

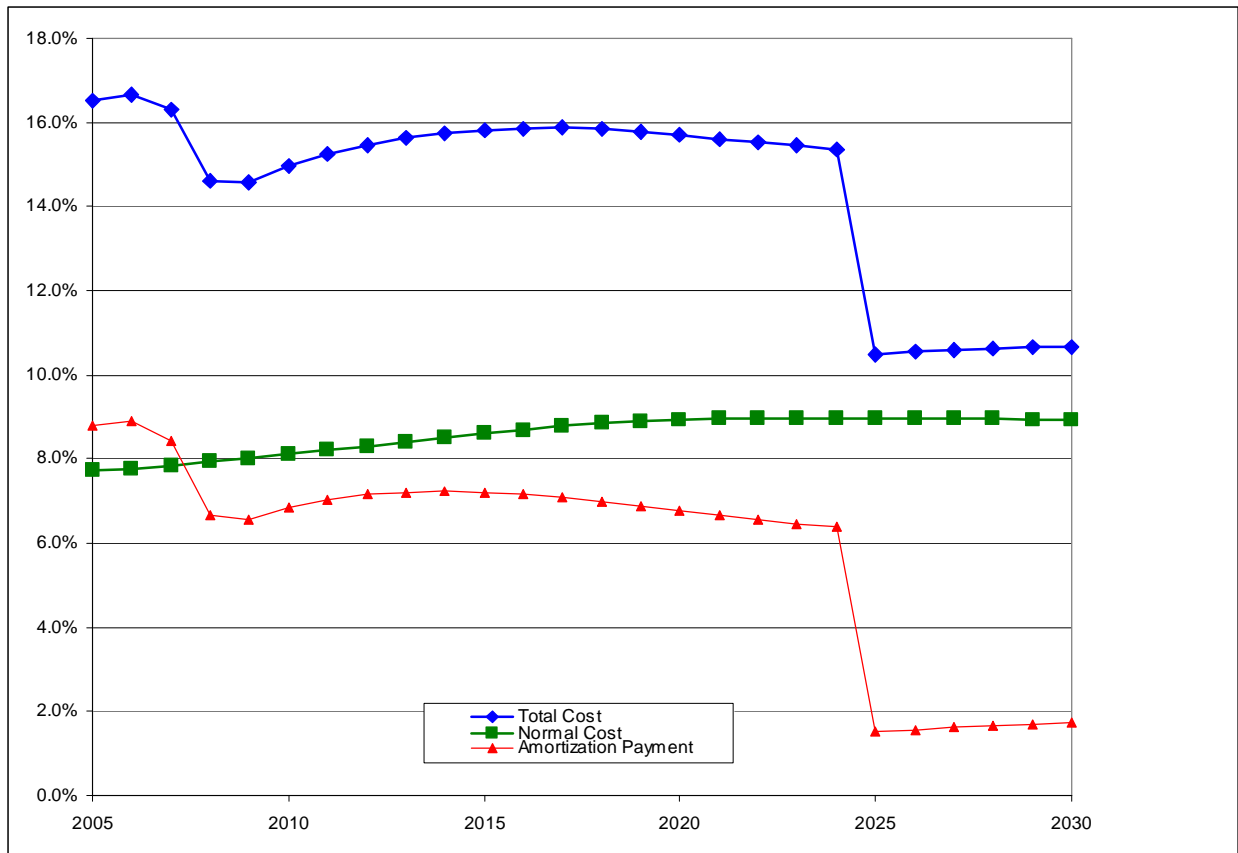
The projected costs are shown in Graph 1, expressed as a percentage of payroll. We have also shown the two component pieces of the cost: The annual normal cost and the amortization of the unfunded actuarial accrued liability. Graph 1, and all other graphs following, shows the projected costs through January 1, 2030, 25 years beyond the current valuation, and five years beyond the lifetime of the bonds being proposed.

The projected costs in Graph 1 have been developed using the assumption that Plan assets will return 8.0% per annum on market value. As was stated in the January 1, 2005 valuation, good investment performance during 2003 and 2004 almost exactly offset losses during 2001 and 2002.

In fact, there are now deferred gains which have yet to work their way through the smoothing process in the actuarial value of assets. Accordingly, if the assets return 8.0% per annum on a market basis, it is likely that there will be a few years of actuarial rates of return above 8.0%. This is reflected in the dip in total and amortization costs expected to occur in 2008-2009.

After this short decrease in cost in 2008-2009, total costs are projected to increase slightly as the normal cost rate begins to climb, slowly increasing from just under 8% of pay to approximately 9% of pay. However, in 2025 the total cost drops sharply, when the amortization of the initial unfunded liability (mentioned above) is completed. From that point, costs quickly stabilize at their long-term equilibrium point.

The change in the normal cost takes place because of changes in the demographics of the workforce. If current assumptions are met, the average service of an active male member will decrease from over 13 years today to a bit over nine years over the next 15 years. This reduction in the average service of male members occurs as the Baby Boom retires. One consequence is that relatively less of the member's benefit is provided through the actuarial accrued liability, and relatively more through the normal cost. Therefore, the Plan's normal cost tends to increase somewhat as the Baby Boom is replaced.



Graph 1: Projection of Plan cost, assuming 8.0% return per annum on market basis.

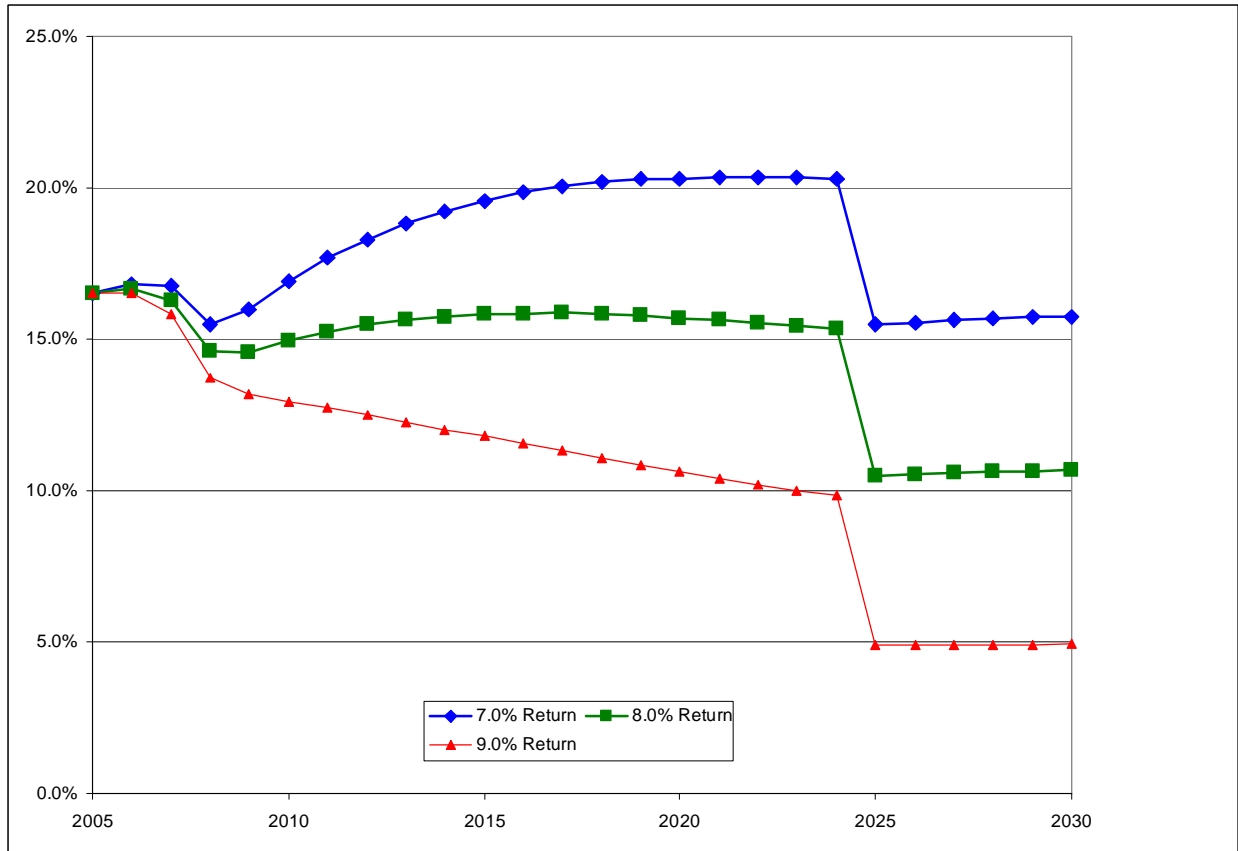
Also, it appears that members are being hired at older ages than in the past; the average assumed hire age (based on the demographics of the most recent new hires) is 35 for a female participant and 41 for a male member, versus an average hire age of 34 for the current active participants. Generally, a greater hire age will result in a higher normal cost rate, as there is less time for contributions to be made on behalf of the participant.

### Impact of Return on Projected Cost

Graph 2 shows the impact on projected costs if the assets were to earn a rate of return different from the actuarial assumed return of 8.0%.

As would be expected, if the assets were to earn more than 8.0% on market value, the cost of the Plan will be lower, and conversely, a rate of return below 8.0% will increase Plan costs. In both cases, the difference in Plan cost is due to the impact on the amount of the amortization payment; the normal cost of the Plan is not affected by changing asset values.

It is informative to note the magnitude of the impact of investment earnings on Plan cost. In Graph 2 we note that the projected cost if Plan assets earn 9% is over three times the cost if assets were to earn 7%.



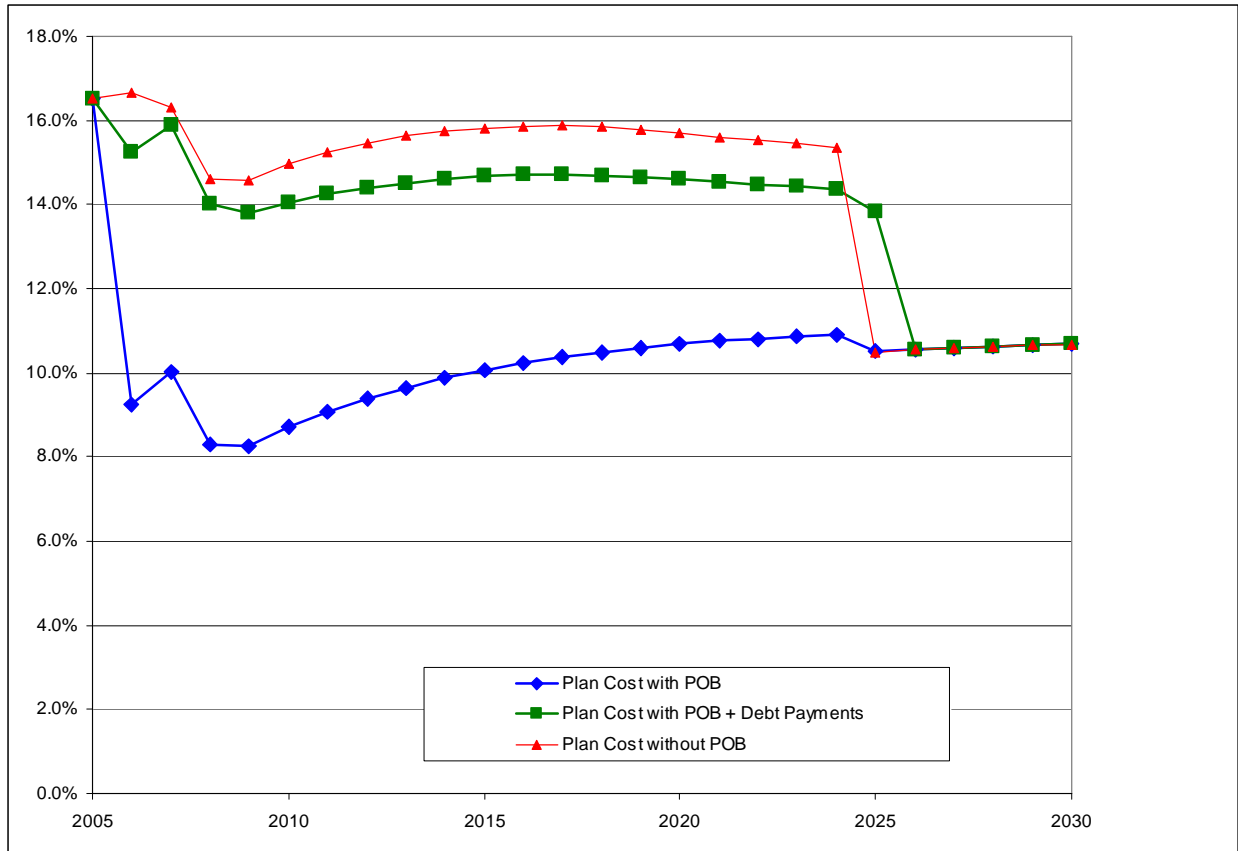
Graph 2: Projection of Plan cost assuming various rates of return on market value of assets.

### Impact of Pension Obligation Bond on Projected Cost

The value of the proposed Bond is the amount necessary to pay off approximately 80% of the Plan's unfunded accrued liability (after the cost of underwriting and other fees). The net proceeds available to deposit in the Plan's assets will be approximately \$66.0 million, which is equal to 80% of \$82.5 million, the unfunded accrued liability computed in the January 1, 2005 actuarial valuation.

The proposed bond payment schedule presents a relatively level series of debt service payments over the lifetime of the bonds. In this case, the anticipated savings derived from the issuance of the bonds would be roughly evenly spread out over the bonds' time horizon. The proposed bonds would be issued on September 1, 2005, with the proceeds (net of expenses of approximately \$1.7 million) being deposited immediately into the Plan's assets. This would cause an immediate reduction in Plan cost, beginning with the January 1, 2006 valuation, because the amortization portion of the required contribution would be greatly reduced.

Then the costs begin to creep up due to projected new entrants to the Plan. These new entrants are assumed to enter the Plan mid-year, which means they bring with them some initial accrued liability which must be amortized. Also, as was mentioned earlier, the normal cost of the Plan continues to increase from 8% to around 9% of payroll.



Graph 3: Projection of Plan cost with POB, 8.0% return

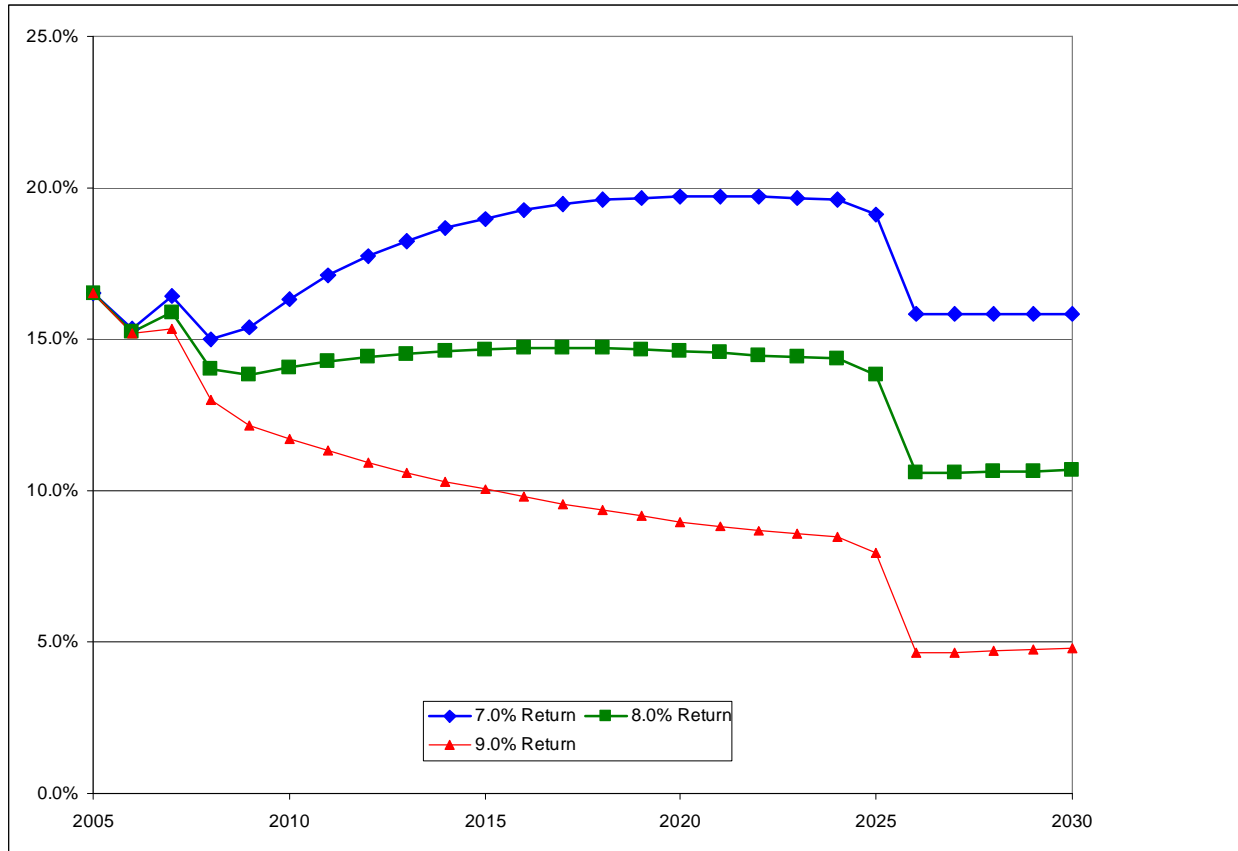
Graph 3 shows the projected costs of the Plan with the proceeds of the POB included in the assets as of January 1, 2006. An annual rate of return on the market value of plan assets of 8.0% is assumed. We have also shown the Plan cost without the POB, as well as the total of Plan cost with POB, plus the required debt service payments on the POB.

Note the large drop-off in the total costs in 2026 when the POB is issued. This occurs because of the expiration of the debt servicing payments.

### Impact of Return on Projected Cost with Pension Obligation Bond

We next look at the impact on the projected cost of varying rates of return when the POB is included. Graph 4 shows the total cost (Plan cost plus the debt service payments) schedule, assuming the same rates of return as in Graph 2. The different rates of return affect only the calculation of the Plan cost. The debt service payments are fixed and do not depend on the rate of return earned on the Plan assets.

Note the wide variation in Plan cost caused by just a 1% variation in the long term return on the market value of Plan assets.



Graph 4: Projection of Plan cost with POB plus debt payments  
Various rates of return

### Comparison with and without POB

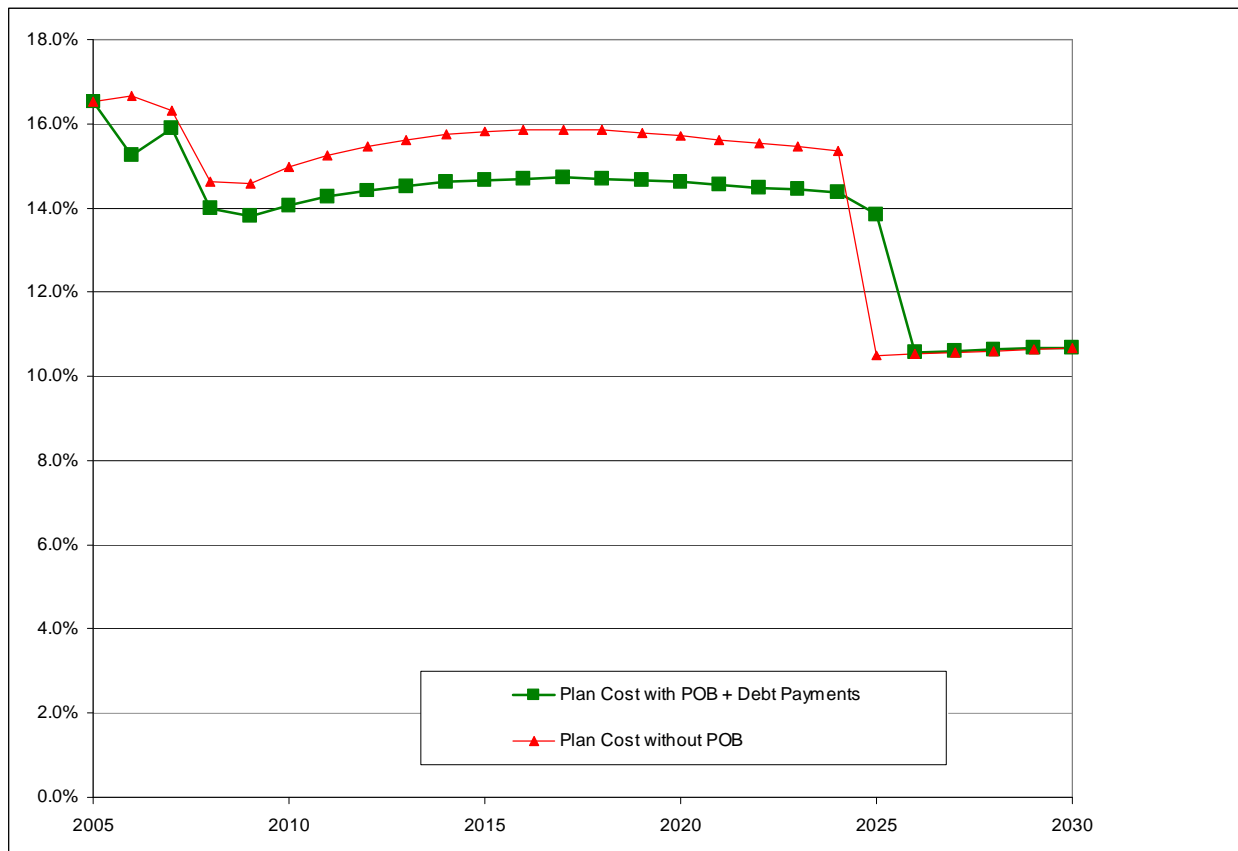
We are now ready to compare the projected costs of the Plan with and without the inclusion of the proposed POB. A subset of Graph 3, Graph 5 shows the projected costs of the Plan without the POB assuming a return of 8.0% alongside the projected total cost (Plan cost plus debt service payments) of the Plan with the POB.

The projected total cost for the POB option is lower than the projected Plan cost without the Bond for the lifetime of the Bond. The anticipated savings is due to the fact that the unfunded accrued liability, which would normally be paid off using a discount rate of 8.0%, is in essence being refinanced at a much lower rate.

Once the Bond is paid off, the projected Plan cost with and without the Bond quickly approach each other, with the Plan cost without the Bond slightly below that of the total cost with the Bond. This is due to the fact that the amortization of the initial unfunded liability under the 20-year closed period expires one year before the debt payments on the Bond cease. The costs under both scenarios gradually approach a stable rate of just under 11% of pay.

If the annual payments of the projected costs with and without the Bond are discounted back to the present with interest at 8.0%, the calculation results in a net savings due to the POB. If the projected costs are restricted to the first 25 years (the lifetime of the POB plus 5 years), then the total present value of savings over the lifetime of the POB is expected to be approximately \$11.1 million. Extending the projections beyond 25 years will not significantly alter the results, because the contribution levels are nearly equal after 2030 under both scenarios.

The anticipated savings shown above (\$11.1 million) is close to the value shown in the POB analysis which was provided to EFI. The POB analysis shows a savings of \$13.4 million over the lifetime of the Bond, when using the Plan interest rate of 8.0%. This discrepancy is due most likely to the fact that EFI uses a dynamic modeling approach, complete with new-entrants. Also, the amortization period modifications mentioned earlier will have an impact on the overall analysis.



Graph 5: Comparison of Total Cost with and without POB, 8.0% return

### Potential Downsides and Breakeven Analysis

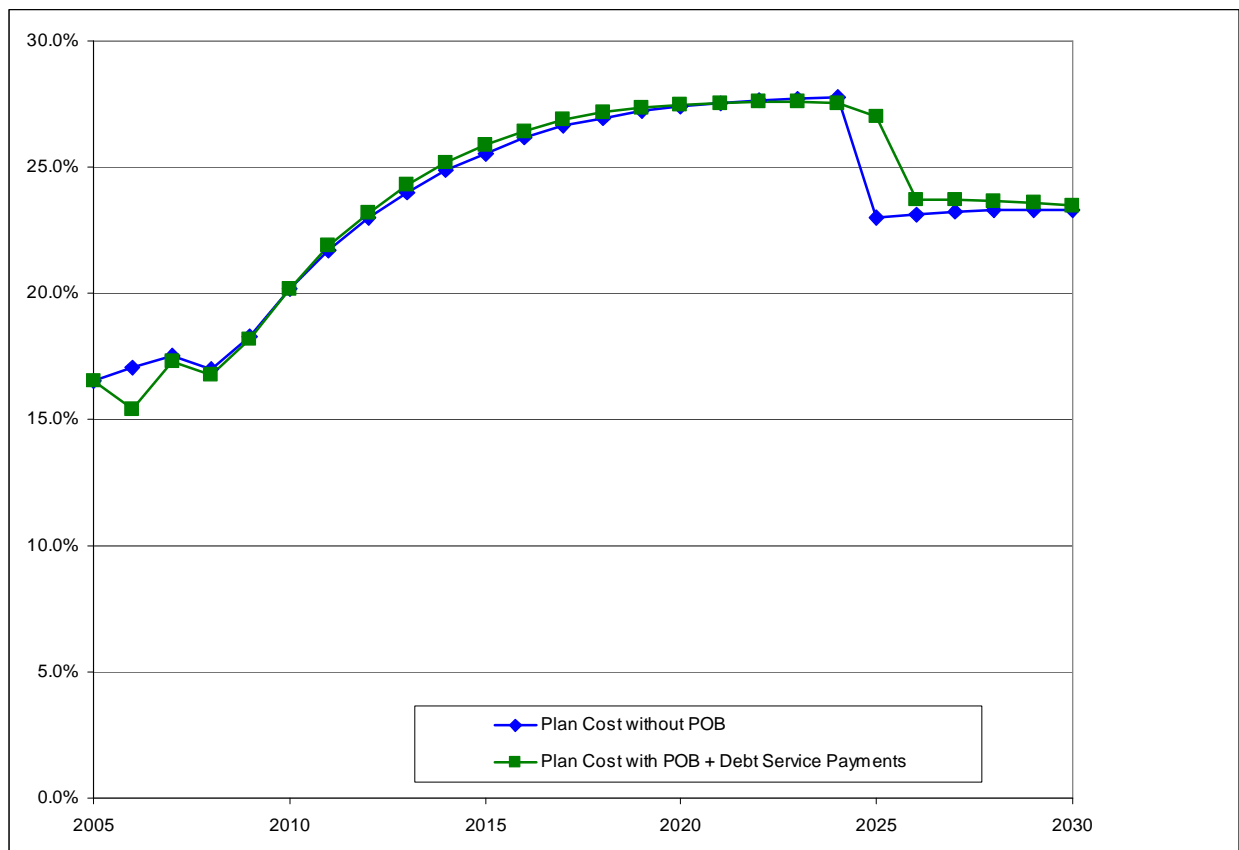
As was stated before, the anticipated savings come from the refinancing of the unfunded liability at a rate lower than 8.0%. However, in order for the anticipated savings to be realized, the Plan assets (including the additional proceeds from the bond issue) must continue to earn 8.0% annually on a market basis. If the assets earn less than 8.0%, then the savings will not be as great. If the assets perform poorly, i.e., below

the rate at which the unfunded liability has been refinanced, then the projected total cost will be *higher* given the inclusion of the POB.

We have seen an analysis of a pension obligation bond by another party that states that “the primary risk of a POB transaction is that the Plan does not, on average, meet its investment management targets over the term of the transaction – a risk which already exists for the Plan without a POB.” This is technically correct, but more can be said. It is correct that the risk of not meeting the investment targets already exists, but the level of risk is much greater with the POB.

However, the investment target that must be exceeded for the POB to provide a savings to the Plan is less than the existing actuarial rate of 8.0% - it is the rate at which the unfunded liability has been refinanced.

So what is the refinancing rate? According to the provided analysis, it is equal to the bond’s repayment rate of approximately 5.3%. Our dynamic analysis shows an almost identical result: if the assets return around 5.25% annually over the term of the transaction, then the present value of the savings (discounted at the Plan actuarial rate of 8.0%) over the lifetime of the bond will be close to zero.



Graph 6: Plan without POB vs. with POB  
5.25 % Annual Rate of Return

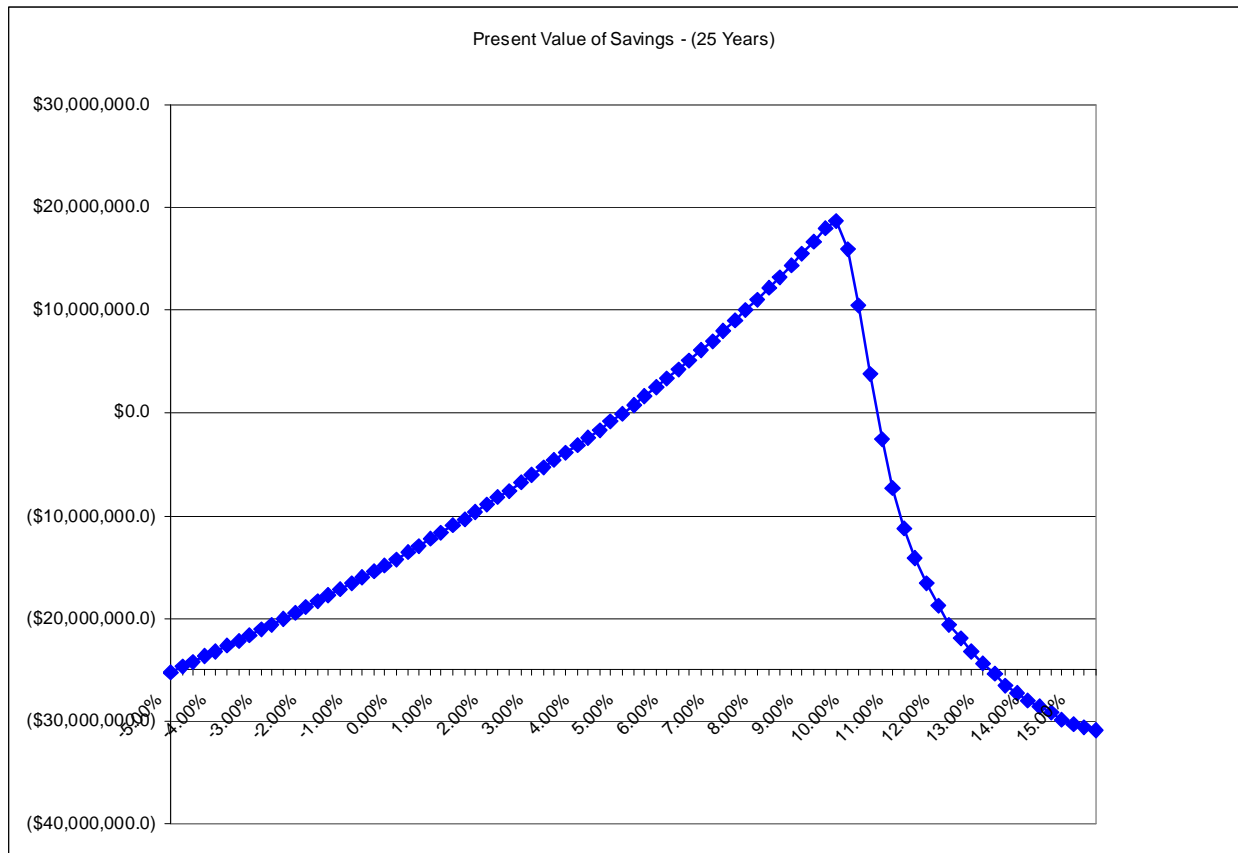
Graph 6 shows the comparison between the projected Plan costs without the POB and the total costs with the POB assuming an annual rate of return equal to the break-even rate of 5.25%. At this rate, the total value of the differences between the non-POB and POB costs over the period specified is approximately zero when discounted at 8%.

### **Cost Savings Versus Rate of Return**

Graph 7 shows the anticipated total cost savings given a specified annual rate of return on the assets. In Graph 7 the horizontal axis is the rate of return earned on Plan assets; the vertical axis is the present value of savings computed with an 8% discount rate. As expected, the present value of total savings is generally positive for rates of return greater than the break-even rates derived above and negative for rates of return less than the break-even rates.

There is a slightly surprising exception, however, for extremely high rates of return (above 10.50%). If the Plan assets do exceedingly well, eventually the Plan cost becomes zero, as the negative amortization payment on the unfunded amount (which is actually a surplus) exceeds the Plan normal cost. If there is no POB, then the total cost of the Plan is zero in these years. However, if the POB has been issued, then the total cost must always be at least equal to the debt service payment on the bond. In essence, the upside potential of the POB is limited by the fact that the Plan cost cannot be less than zero.

We must offer a caveat regarding the above discussion of the excessive-return exception by noting that the analysis deals only with the savings (positive or negative) from the projected Plan contributions. It does not take into account the Plan's funding percentage or the amount of Plan assets. In the event that the assets continually earned high rates of return, the Plan would become well overfunded (which is what would allow the costs to go to zero) and the asset level would continue to grow. The Plan would be in a greater overfunded position if the pension obligation bonds were included. The surplus assets could be used to fund future benefit improvements, which could potentially return the Plan to a lesser or non-overfunded position, thereby removing the limitation on the upside potential of the POB.



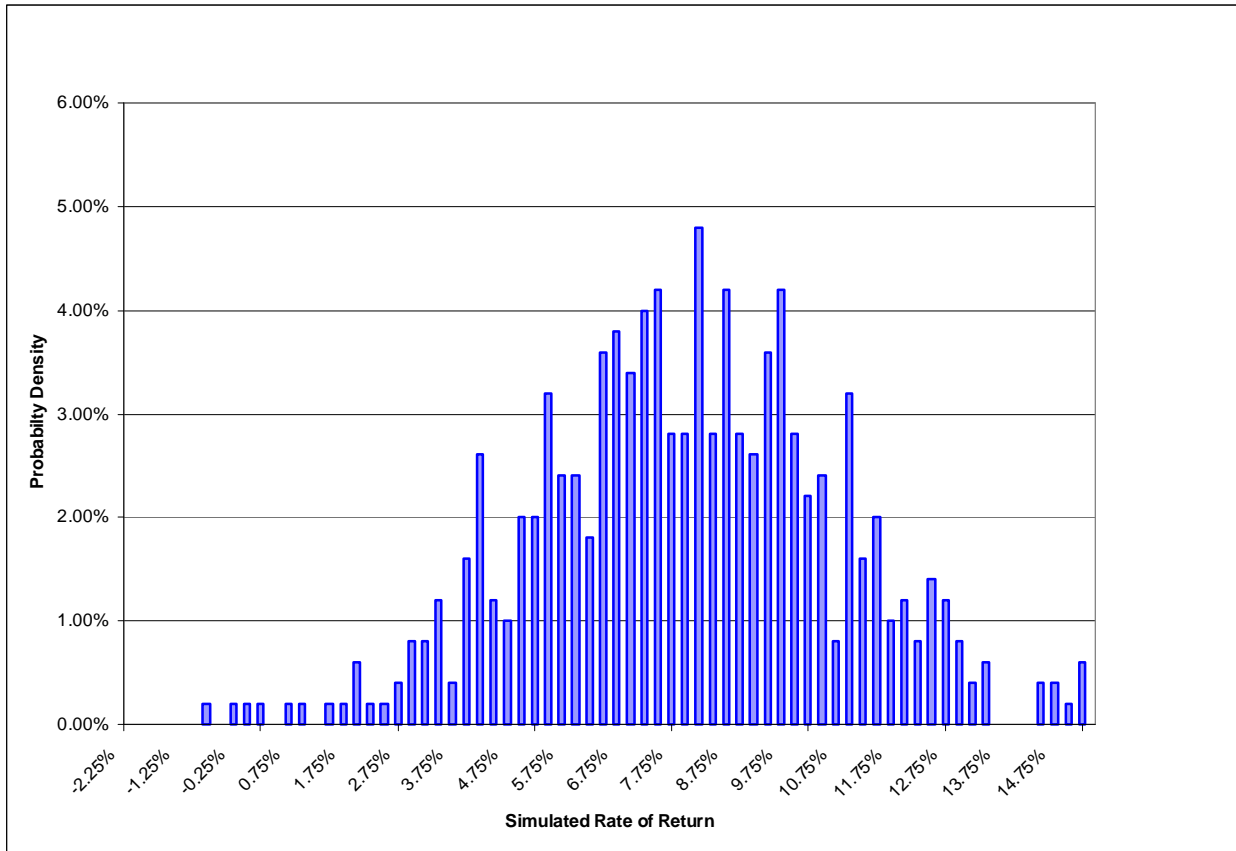
Graph 7: Present Value of Savings Due to POB for Various Rates of Return

It should be clear from this graph that the savings generated by the issuance of the POB depends heavily on the actual rate of return earned by the assets over the lifetime of the bond.

### Probable Outcomes

We have shown the *possible* outcomes of the issuance of a POB given a range of investment returns; the final question is what are the *probable* outcomes? Using our stochastic modeling software, we have run a simulation consisting of 500 trials of potential asset returns over a 25 year period. For each trial, we have calculated the average return over that period. Graph 8 shows the probability distribution of the potential rates of return. The level of savings for each rate of return can be found by referring back to the blue line of Graph 7.

Based on our simulation of the potential asset returns, it appears that the POB has a good chance of providing a positive level of savings to the TA. If we use the 8.0% rate to discount the present value of future savings, the simulations project a positive savings using a POB in about 70% of the trials. Conversely, there is about a 30% chance that the cost of pension benefits to the TA will increase if the POB is issued.



Graph 8: Simulated Probability Distribution of Possible Rates of Return Over 25 Years

We hope this will be helpful in your deliberations. Please let me know if you have any questions or would like to discuss any of the above.

Sincerely,

Robert T. McCrory, FSA  
Executive Vice President

Graham A. Schmidt, ASA  
Vice President