



City of Milwaukee Employees' Retirement System

Asset/Liability Modeling Study Preliminary Findings

March 22, 2005

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Introduction

● Purpose of the study

- Understand how volatility of financial markets affects overall Plan financial performance.
- To develop a policy for contributions to and disbursements from the Employer Reserve Fund (“ERF”).

● Methodology

- City of Milwaukee provided description of current asset mix.
- Mellon provided preliminary capital market assumptions. Two sets of capital market assumptions were used:
 - Base Case
 - Low Equity Returns
- Mellon simulated plan liability and assets for a 10-year period under two treatments of the ERF:
 - No ERF
 - Current ERF, allowing for “Straw Man” contribution/disbursement policy
- Key plan financial metrics were forecast over the 10-year period under both ERF treatments.

Basic Principles of Stochastic Models

- 999 independent 10-year trials are run.
- The independent trials are selected at random, but are based on underlying capital market assumptions describing expected returns, volatility of returns and correlation of returns for each asset class.
- For each trial, each year's pension financial metrics are derived from forecast plan liabilities and assets.
- Key results (contributions, benefit payments, assets, actuarial accrued liability, amortization period for unfunded actuarial accrued liability, funding ratio, funding period) for all trials are ordered from low to high in each year.
- Each variable is independently ordered so, for example, the highest funded ratio in Year X is not from the same trial as the highest asset value in Year X.
- The 85th percentile value means that 85% of the time, the result will be at that value or below.

Most Recent Actuarial Valuation Results At 1/1/2004 and estimated 12/31/2004

- Accrued Liability* = \$3,371 million (\$3,541 million on 12/31/2004)
- Market Value of Assets = \$4,081 million (\$4,388 million on 12/31/2004)
- Actuarial Value of Assets = \$3,909 million (\$4,090 million on 12/31/2004)
- Unfunded (Overfunded) Accrued Liability = (\$538) million ((\$549) million on 12/31/2004)
- Funded Ratio = 116% (116% on 12/31/2004)
- Normal Cost = \$76 million (\$47 million, net of employee contributions)
- City Normal Cost Rate:
 - General Employees = 5.6% of covered compensation
 - Policemen & Firemen = 17.8% of covered compensation
- Employer Reserve Fund = \$12 million (\$19 million on 12/31/2004)

*Interest rate = 8.50%

Stochastic Forecast

Stochastic Forecast Projection Assumptions

- Work Force Changes*** — Open group forecast. New entrants assumed to enter at the rate required to keep active headcounts constant over the forecast period.

- Demographic Assumptions*** — Valuation assumptions, as described in the 1/1/2004 actuarial valuation report.

- Plan Changes*** — None assumed.

- City Contributions to Plan Trust*** — Total contribution = normal cost plus amortization of unfunded accrued liability, limited by “full funding limit”

- ERF Treatments*** —
 - 1) Baseline – No ERF
 - 2) “Straw Man” Policy (see next slide)

Stochastic Forecast

“Straw Man” ERF Policy

- Contributions made to the ERF:
 - Contribution made to ERF if Plan Rules contribution is limited by the “Full Funding Limit”
 - Contribution equals the excess of:
 - Normal Cost plus 30-year amortization of Unfunded/Overfunded Accrued Liability over
 - Plan rules contribution
- Disbursements from ERF (to cover City Contribution)
 - ERF assets used to cover City Contributions payable under the Plan Rules that would otherwise exceed:
 - 5% of General Employees payroll
 - 17% of Police and Fire payroll

Stochastic Forecast

Capital Market Assumptions

Asset Class	Arithmetic Mean Real Return (Baseline)	Arithmetic Mean Real Return (Low Equity Returns)	Standard Deviation of Returns
Large Cap Domestic Equity	8.50%	6.50%	16.15%
Mid Cap Domestic Equity	8.50%	6.50%	16.90%
Small Cap Domestic Equity	8.98%	6.98%	20.64%
International Equity	8.04%	6.04%	16.28%
Fixed Income (Lehman Aggregate)	1.90%	1.90%	4.10%
Real Estate	3.48%	3.48%	12.92%

Stochastic Forecast

Capital Market Assumptions

Correlation Matrix

	Large Cap Domestic Equity	Mid Cap Domestic Equity	Small Cap Domestic Equity	International Equity	Fixed Income (Lehman Aggregate)	Real Estate
Large Cap Domestic Equity	1.00					
Mid Cap Domestic Equity	0.92	1.00				
Small Cap Domestic Equity	0.74	0.90	1.00			
International Equity	0.69	0.68	0.61	1.00		
Fixed Income (Lehman Aggregate)	0.07	0.03	-0.05	0.02	1.00	
Real Estate	0.32	0.44	0.48	0.28	0.10	1.00

Stochastic Forecast Investment Mix and Expected Returns

Asset Class	Current Mix	Arithmetic Mean Real Return (Baseline)	Arithmetic Mean Real Return (Low Equity Returns)
Large Cap Domestic Equity	38%	8.50%	6.50%
Mid Cap Domestic Equity	4%	8.50%	6.50%
Small Cap Domestic Equity	8%	8.98%	6.98%
International Equity	15%	8.04%	6.04%
Fixed Income (Lehman Aggregate)	30%	1.90%	1.90%
Real Estate	5%	3.48%	3.48%
Total	100%		
Expected Real Return		6.24%	4.94%
Standard Deviation of Return		10.45%	10.45%

Stochastic Forecast Observations – Forecast Results

- With no ERF:
 - Funded Ratio:
 - The Plan has over 70% chance of being fully funded over the course of the forecast period.
 - Using the low equity returns assumption, the probability is about 55%.
 - Contributions:
 - The Plan has over 90% chance of not requiring City contributions through the year 2007.
 - The Plan has over 65% chance of not requiring City contributions over the entire forecast period.
 - The Plan has about 75% chance of having City contributions below 10% of payroll in each year of the forecast period.
 - The probability increases to 80% with a limit of 20% of payroll.

Stochastic Forecast Observations – Forecast Results

- Impact of the ERF:
 - Required contributions will rise under the Plan Rules if asset returns are poor.
 - Whether or not contributions will be made to the ERF or assets released from the ERF to cover City contributions depends on a complex interaction among assets, liabilities, funding rules and asset returns.
 - The Straw Man ERF policy results in contributions to the ERF if asset returns are high enough to keep the Plan in Full Funding, but not so high that the Plan is so overfunded that no contribution would be made.

Stochastic Forecast Observations – Forecast Results

- With the ERF:
 - Funded Ratio (including ERF assets):
 - The Plan has a 75% chance of being fully funded over the course of the forecast period.
 - Using the low equity returns assumption, the probability is 60%.
 - Contributions:
 - The Plan has over 90% chance of not requiring City contributions through the year 2007.
 - However, there is a 25% chance that a contribution to the ERF would be required under the “Straw Man” policy in 2007.
 - The ERF reduces volatility in City contributions
 - Total City contributions to the Plan and ERF are lower at the 90th percentile with the ERF than without the ERF in the out years.
 - Under the low equity returns capital market assumptions, the ERF is more likely to hold down City contributions – contributions are lower even at the 75th percentile.
 - Total City contributions to the Plan and ERF are **higher** at the 75th percentile with the ERF than without the ERF.
 - ERF assets are used to offset City contributions at the 90th percentile as early as 2008.

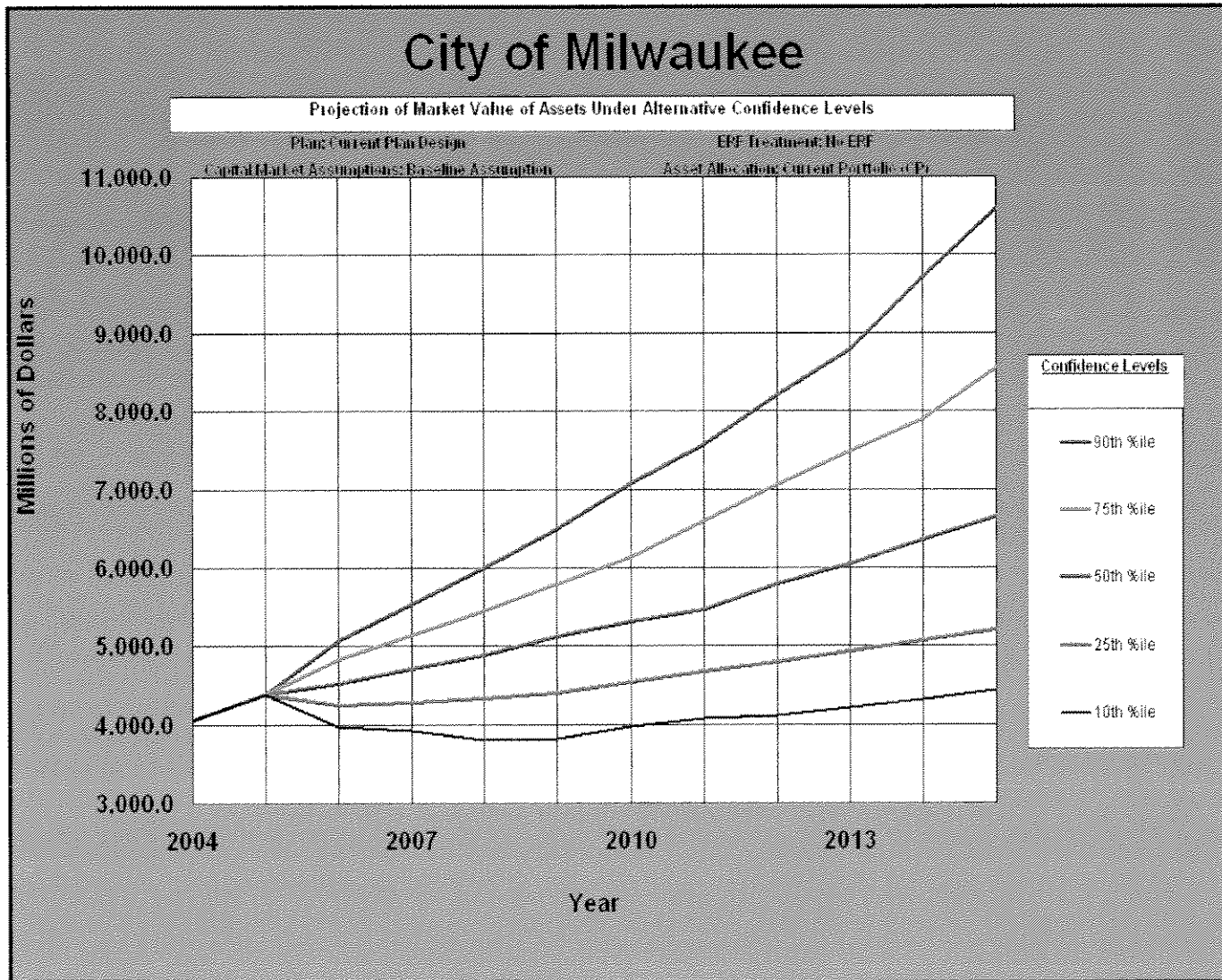
Stochastic Forecast Conclusions

- The Plan is very well funded, even without the ERF.
- Additional ERF assets will further reduce the likelihood that the plan's funded ratio will drop to an unsatisfactory level.
 - But this is a natural consequence of extra contributions.
- The ERF assets are used to offset City contribution requirements only under relatively unusual circumstances (in later years, at the 85th percentile)
 - Otherwise ERF assets continue to build up.
- These trends are independent of whether baseline or low equity returns capital market assumptions are used.

Stochastic Forecast Forecast Results Detail

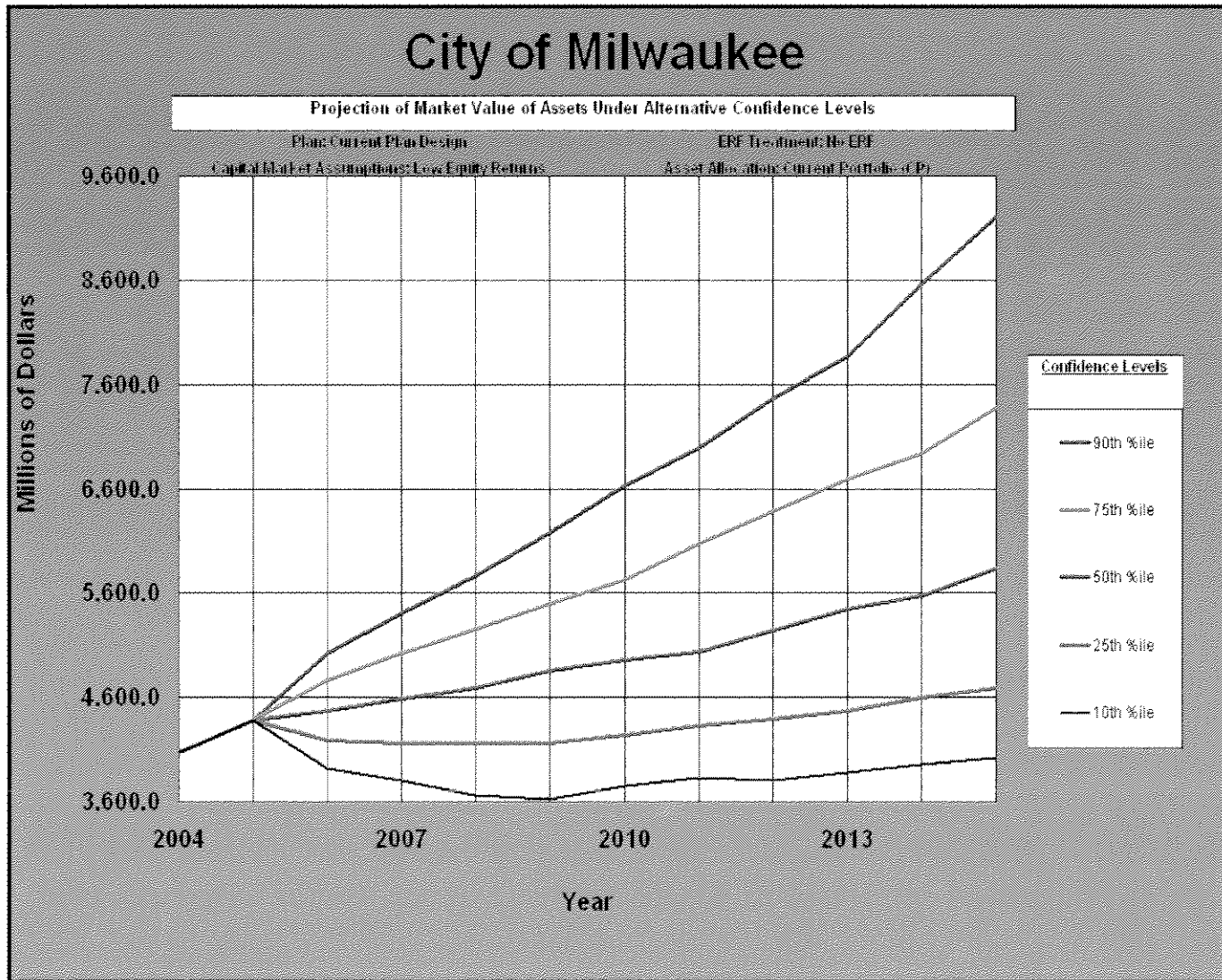
Stochastic Forecast

Market Value of Assets — No ERF, Baseline Capital Market Assumptions

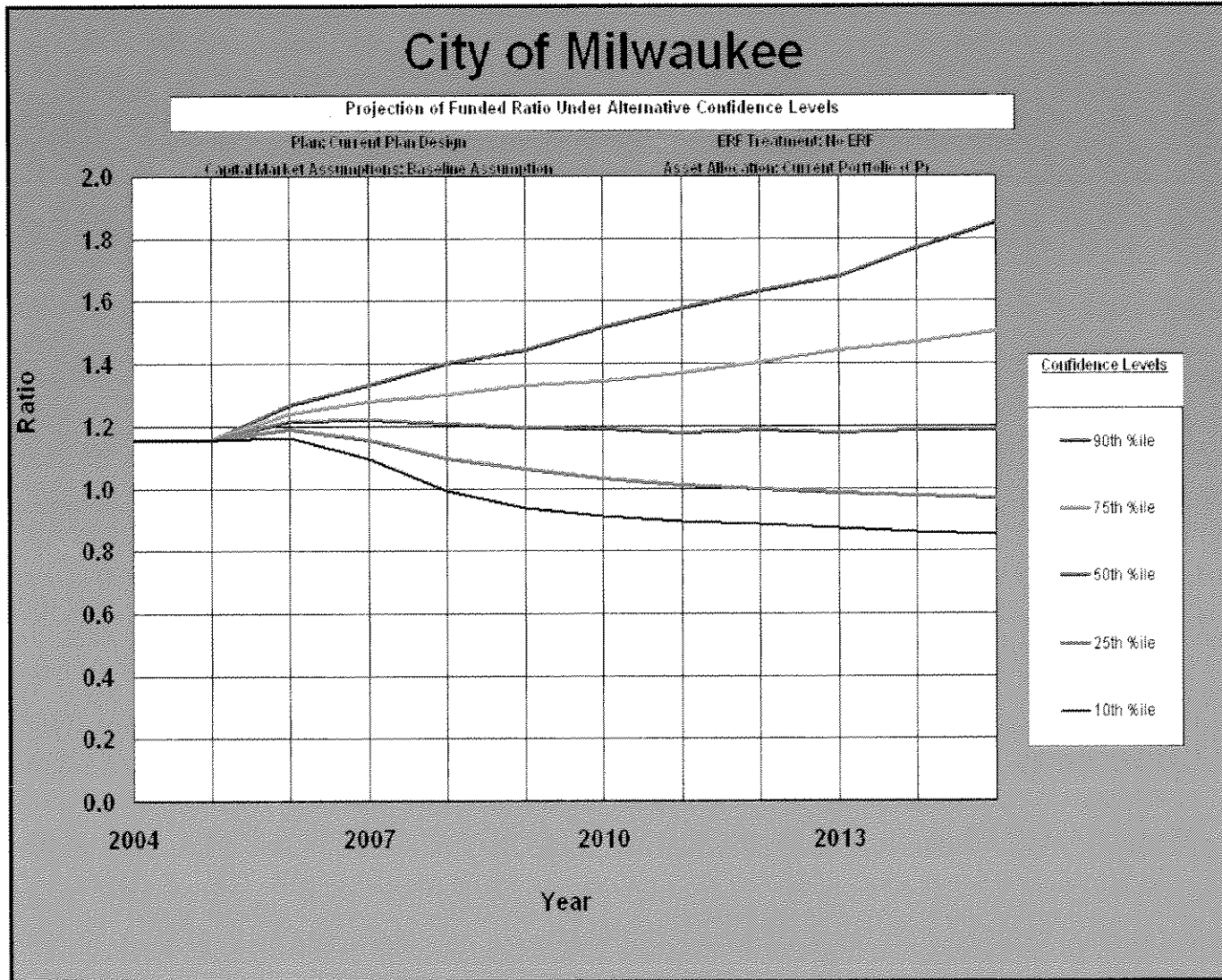


Stochastic Forecast

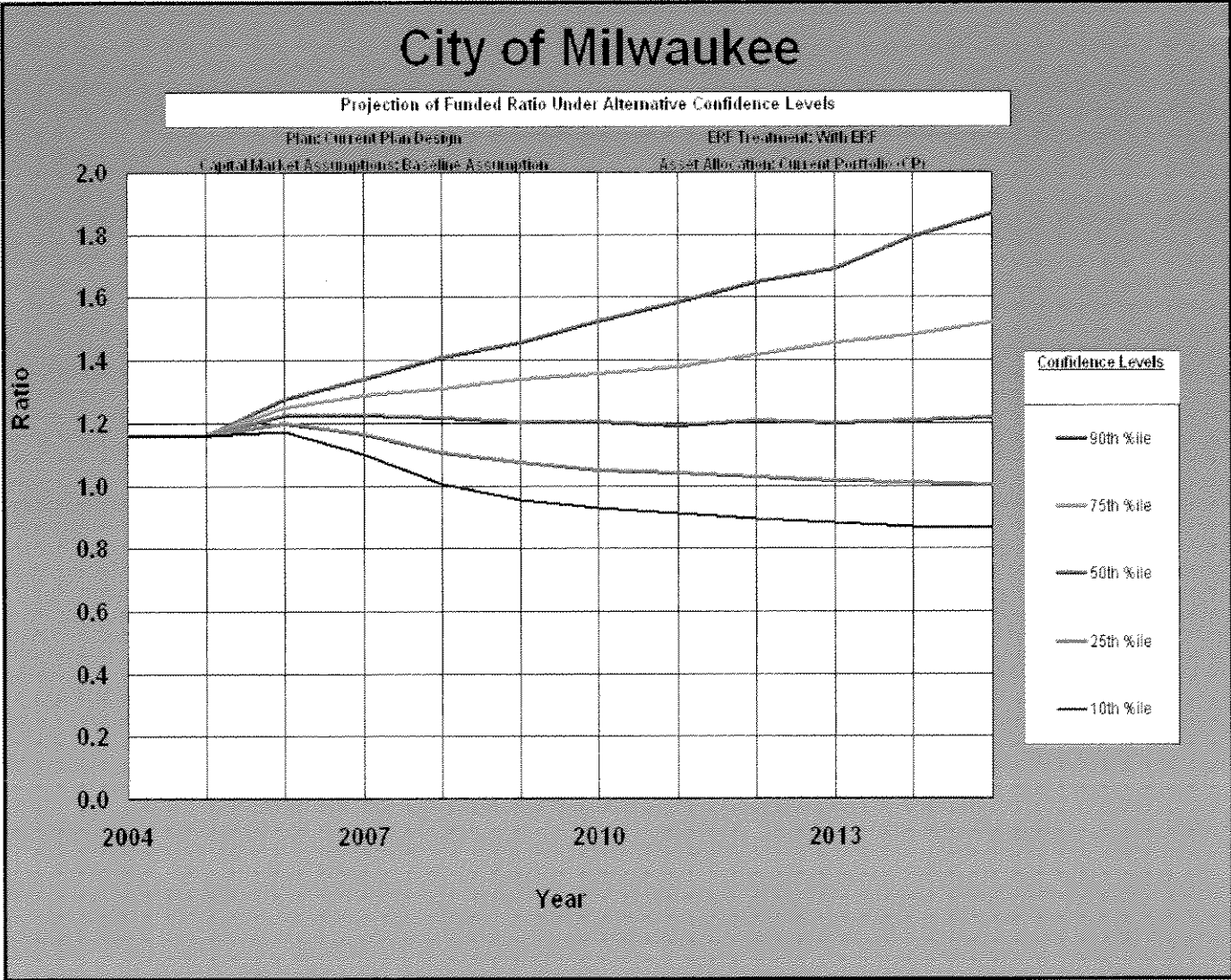
Market Value of Assets — No ERF, Low Equity Returns



Stochastic Forecast Funded Ratio — No ERF, Baseline Capital Market Assumptions

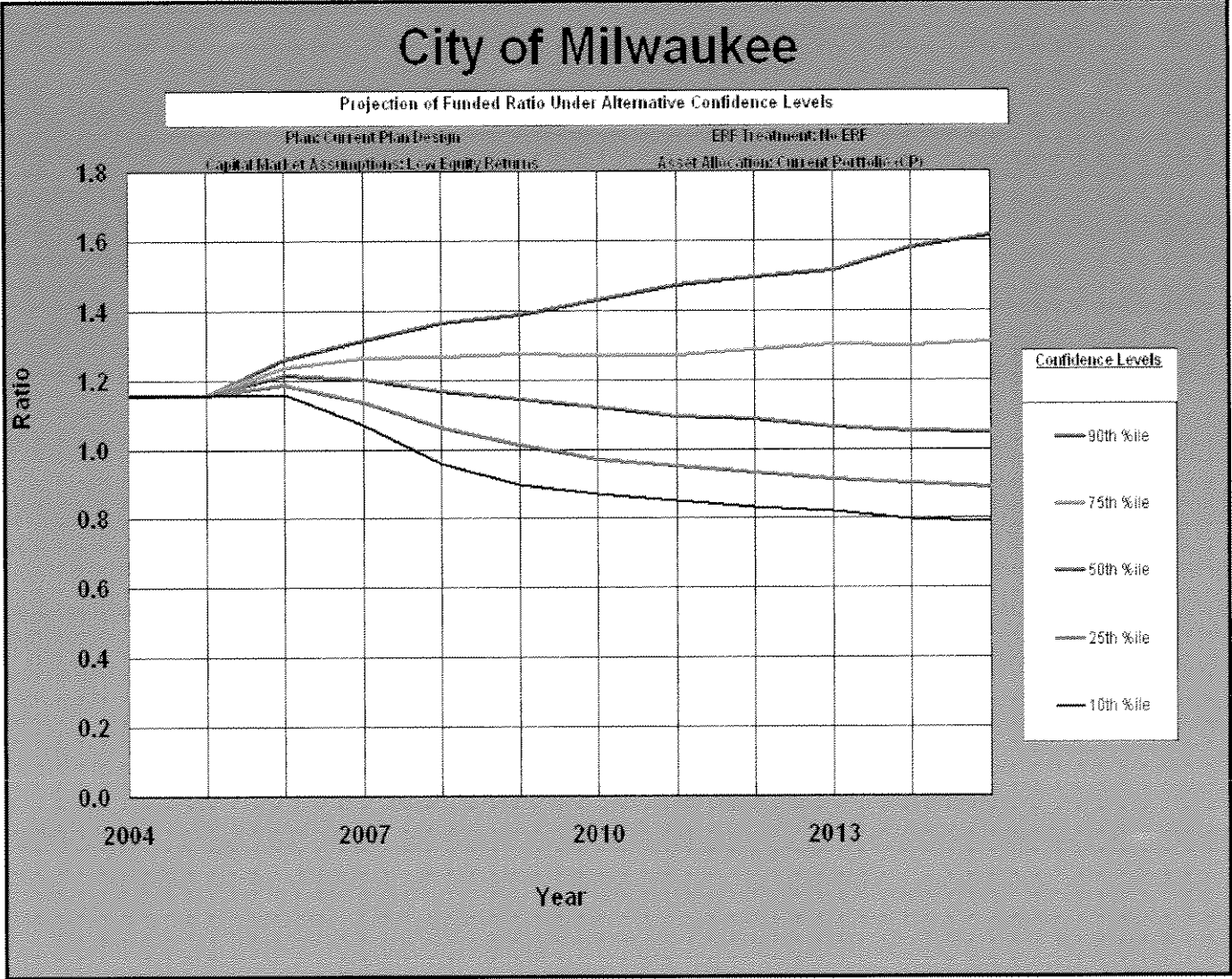


Stochastic Forecast Funded Ratio — With ERF, Baseline Capital Market Assumptions

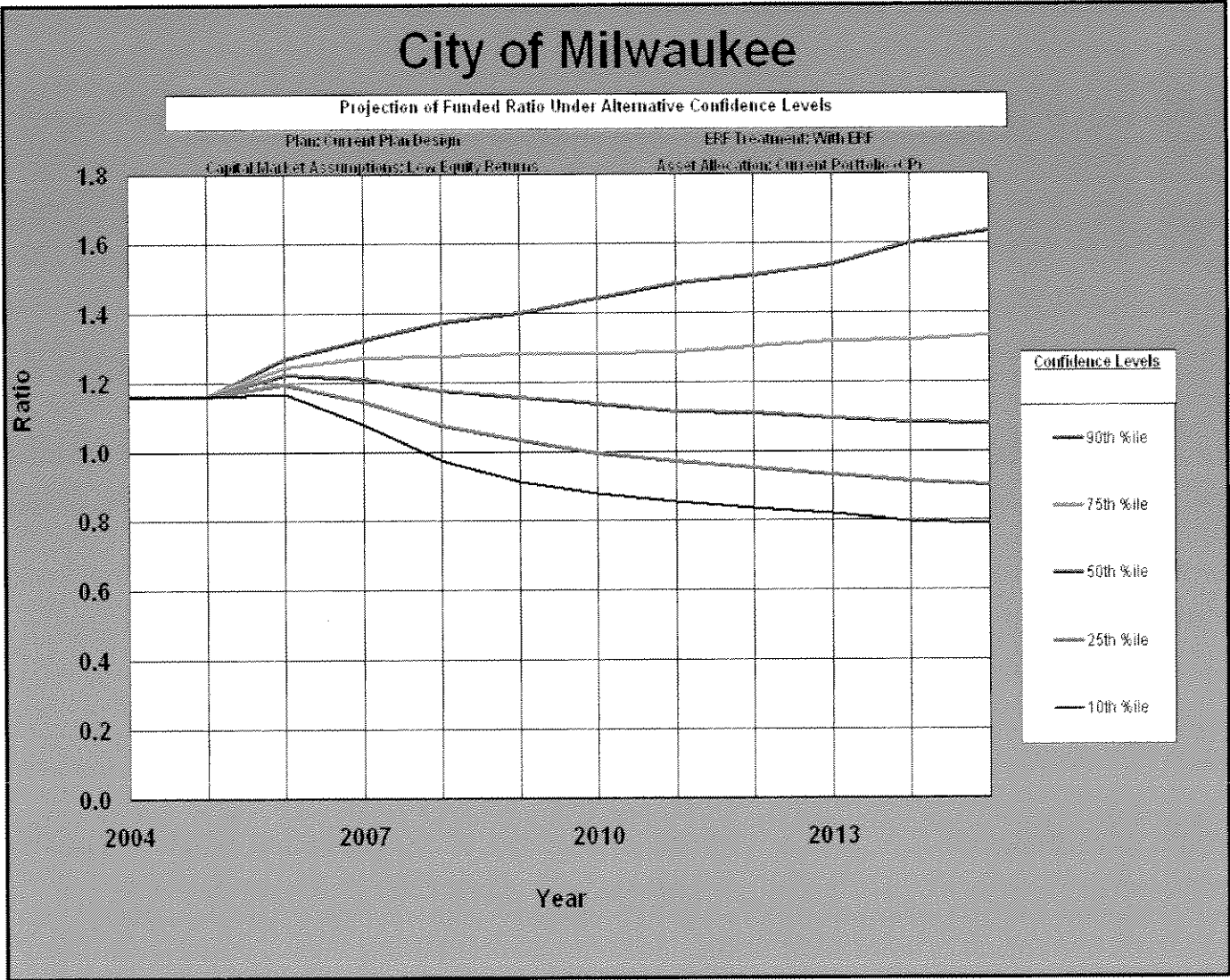


Stochastic Forecast

Funded Ratio — No ERF, Low Equity Returns

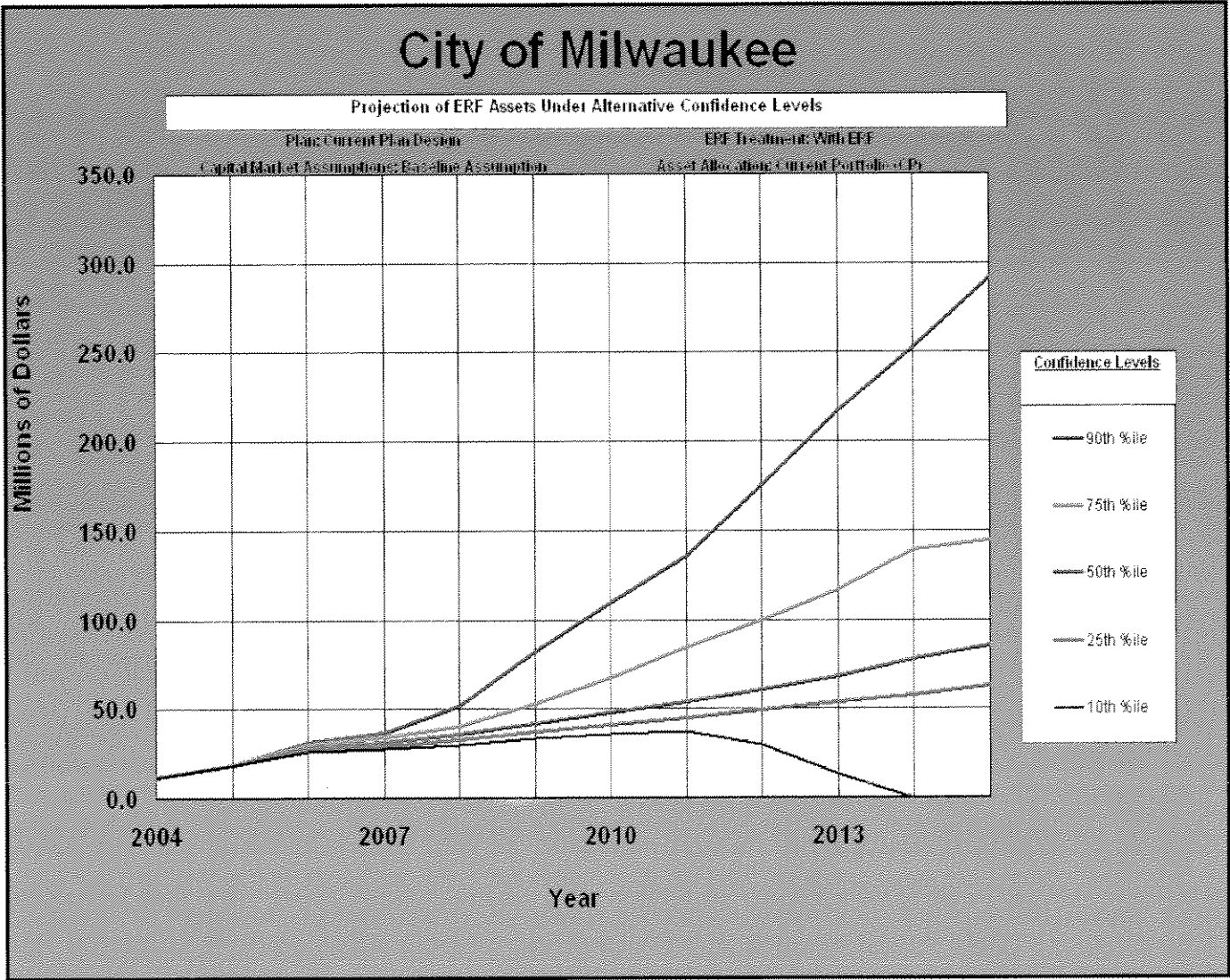


Stochastic Forecast Funded Ratio — With ERF, Low Equity Returns



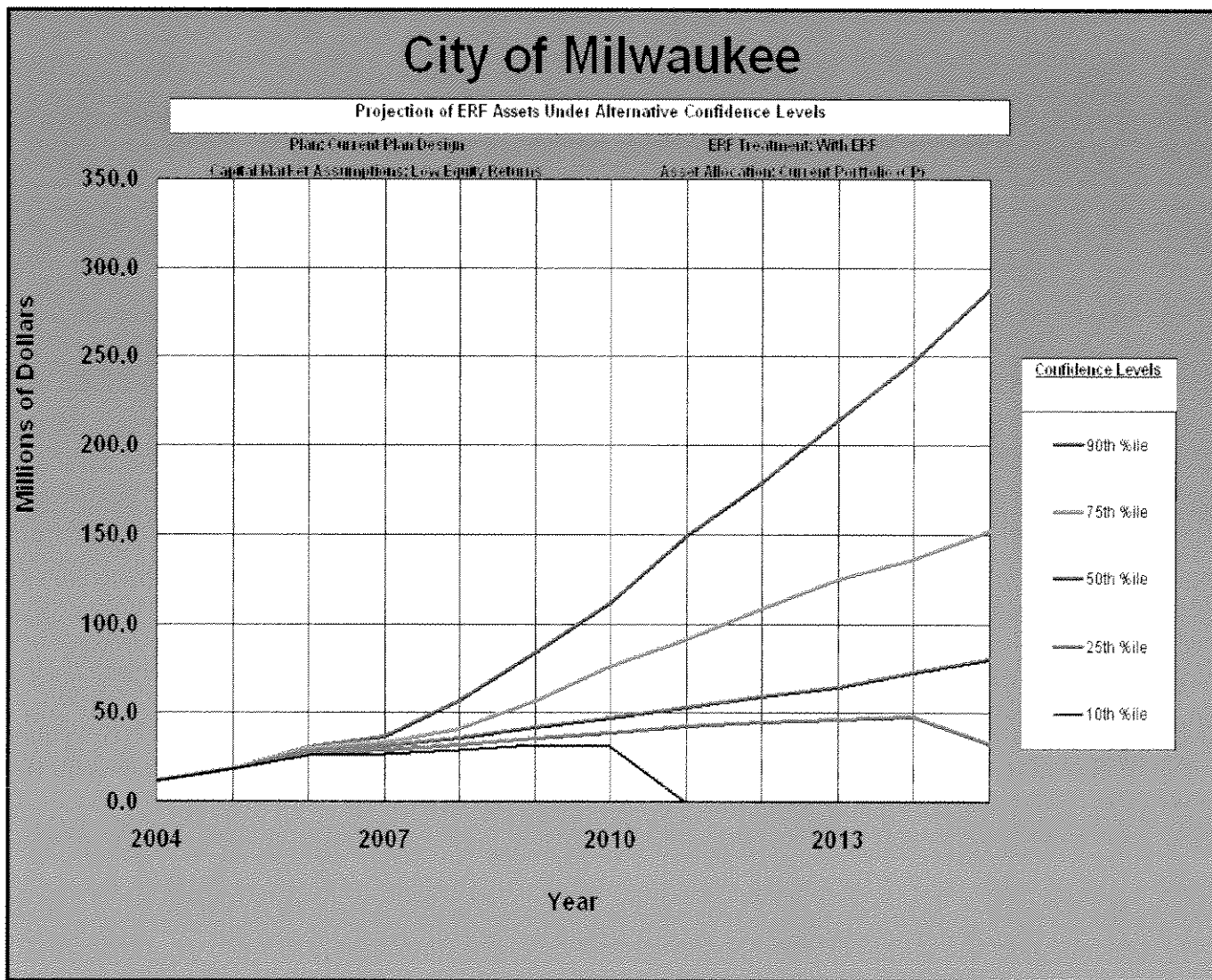
Stochastic Forecast

ERF Assets — With ERF, Baseline Capital Market Assumptions



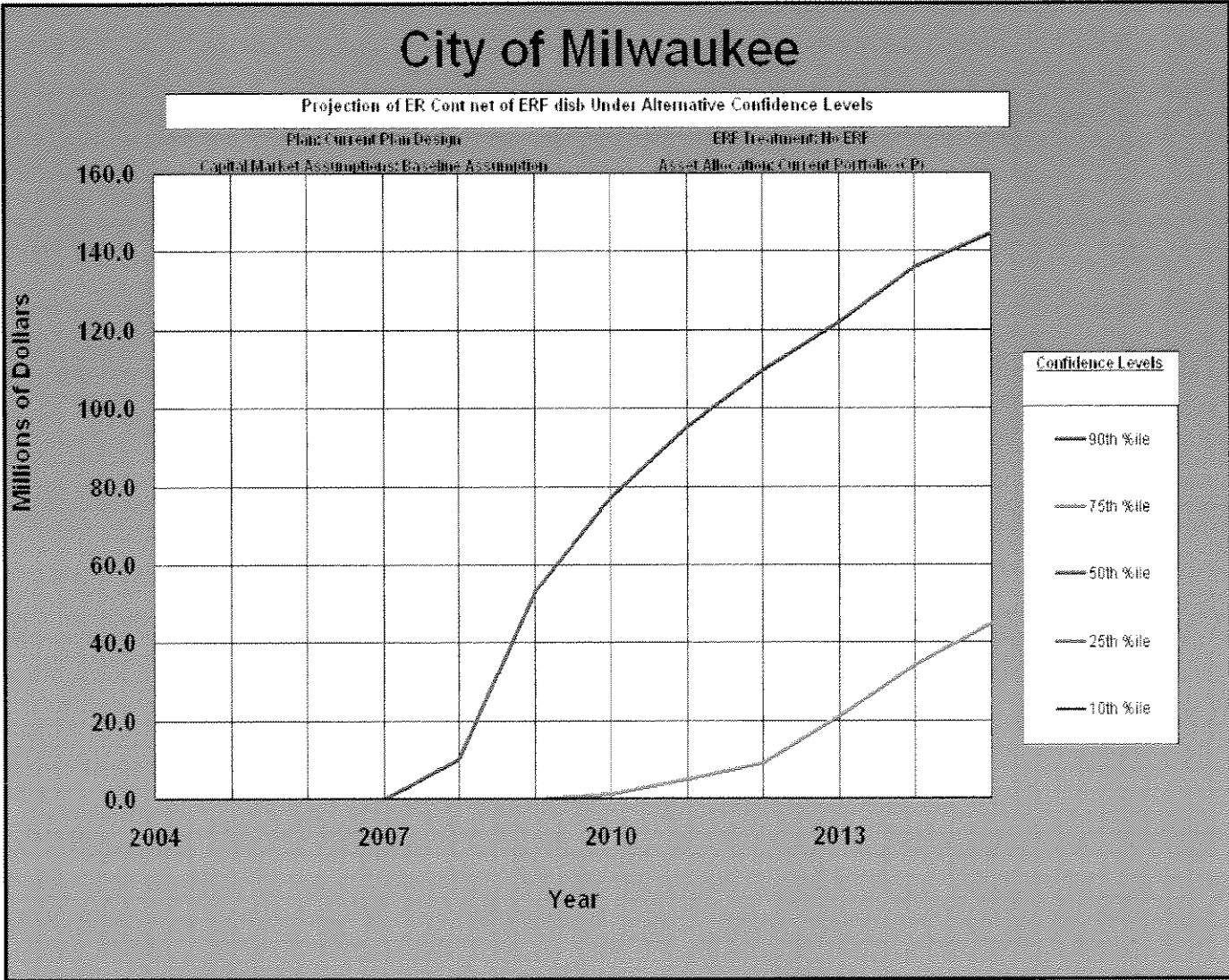
Stochastic Forecast

ERF Assets — With ERF, Low Equity Returns



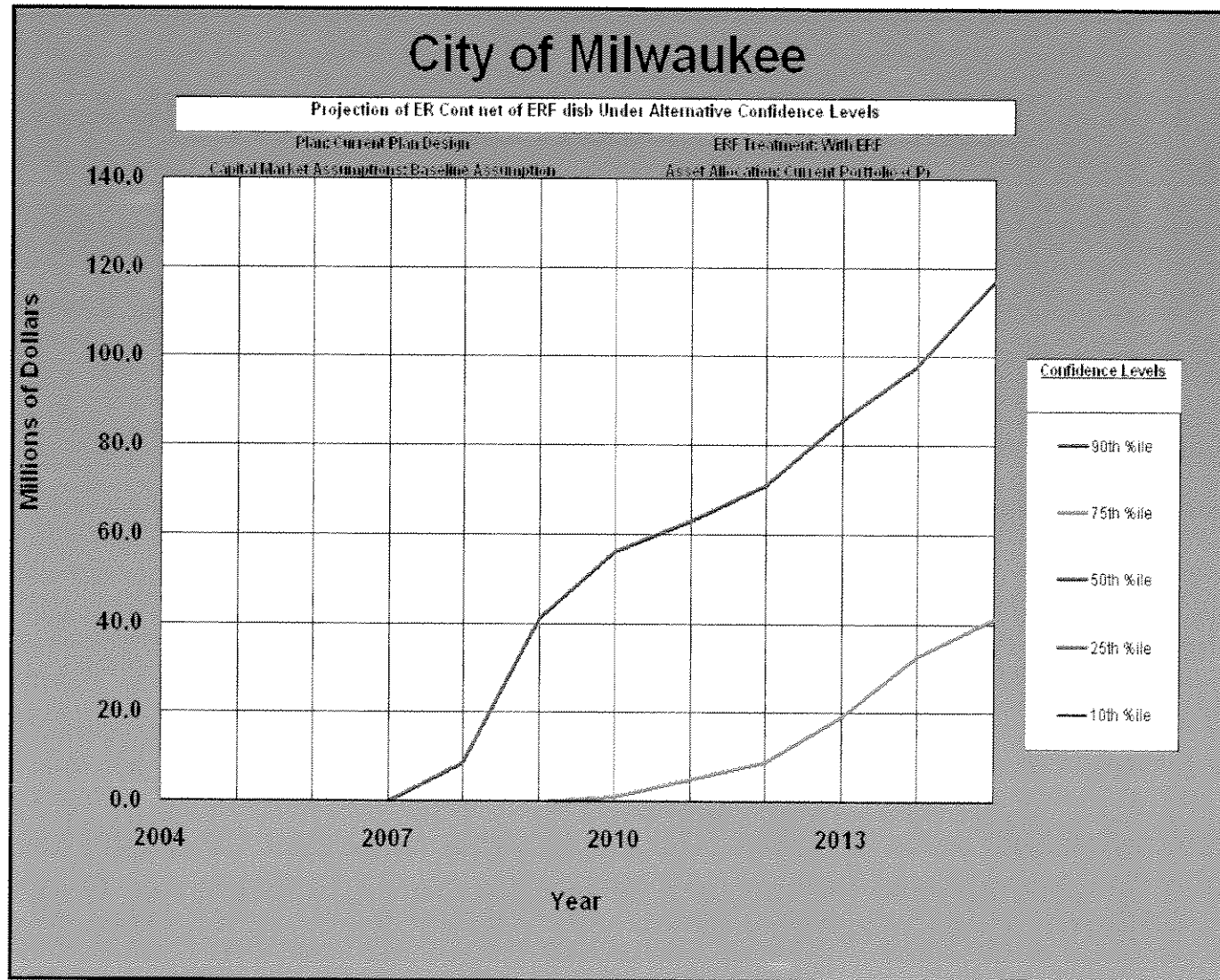
Stochastic Forecast

ER Contributions Net of ERF Disbursements – No ERF, Baseline Capital Market Assumptions

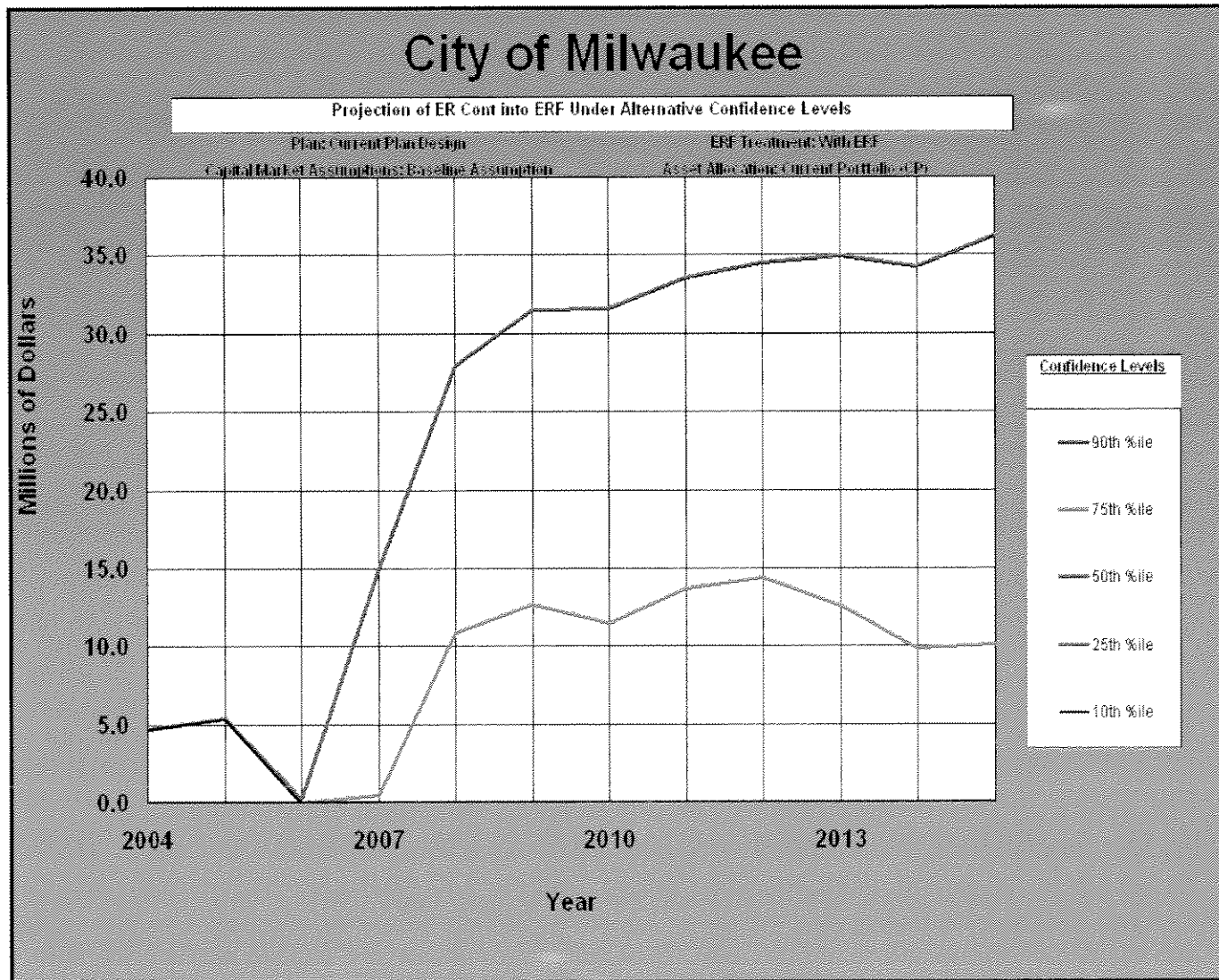


Stochastic Forecast

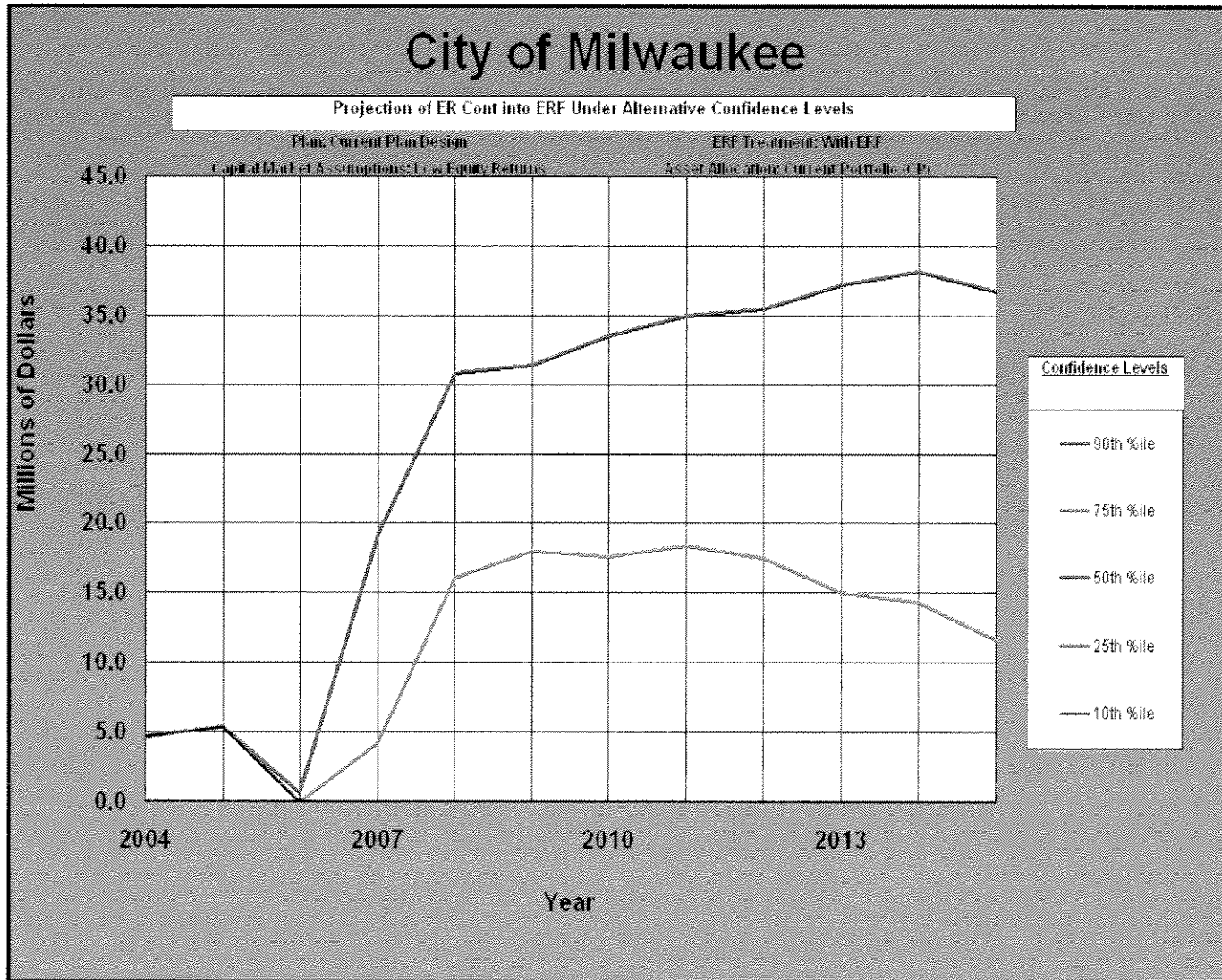
ER Contributions Net of ERF Disbursements – With ERF, Baseline Capital Market Assumptions



Stochastic Forecast ER Contributions to ERF – With ERF, Baseline Capital Market Assumptions



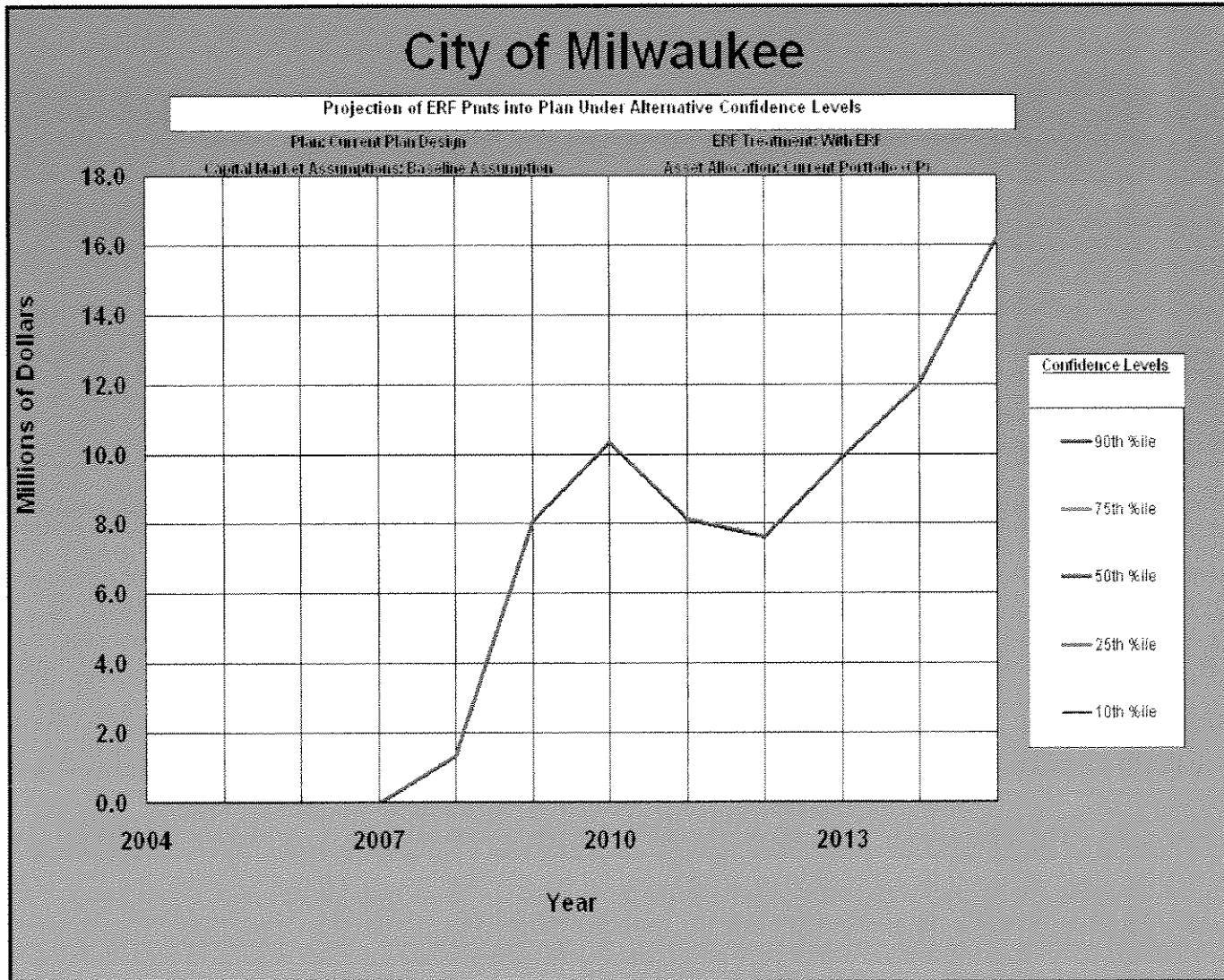
Stochastic Forecast ER Contributions to ERF – With ERF, Low Equity Returns



Stochastic Forecast

ERF Disbursements into Plan –

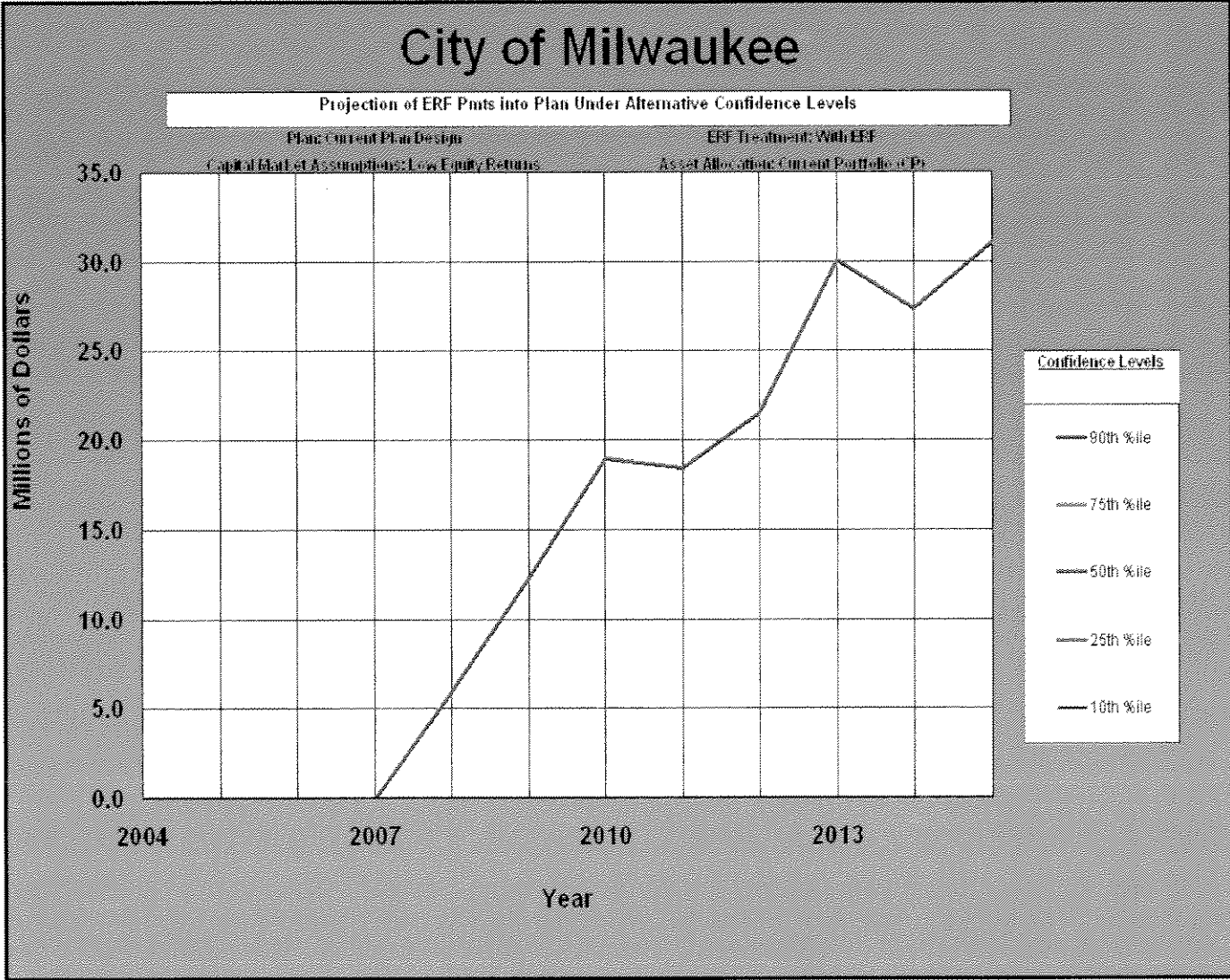
With ERF, Baseline Capital Market Assumptions



Stochastic Forecast

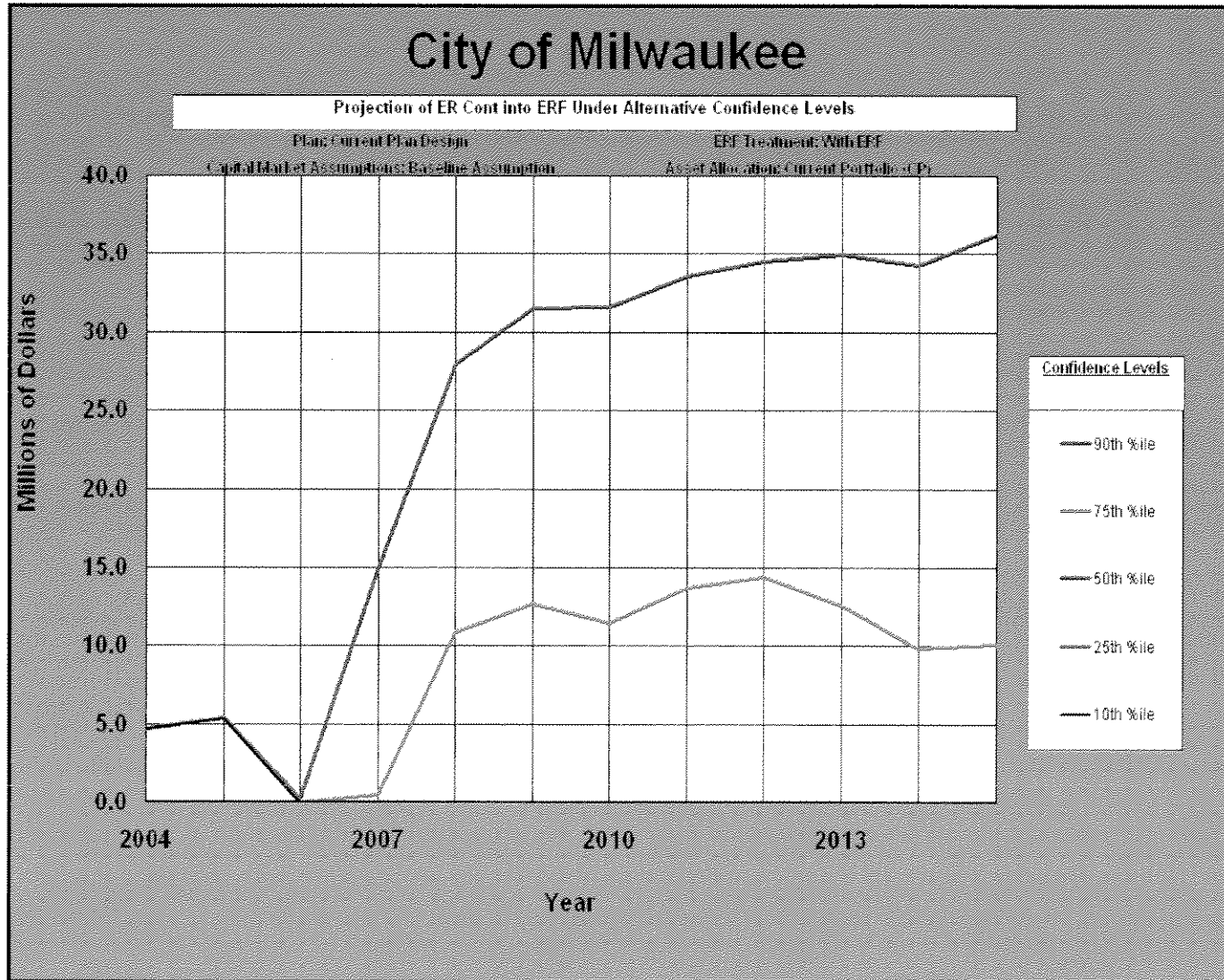
ERF Disbursements into Plan –

With ERF, Low Equity Returns



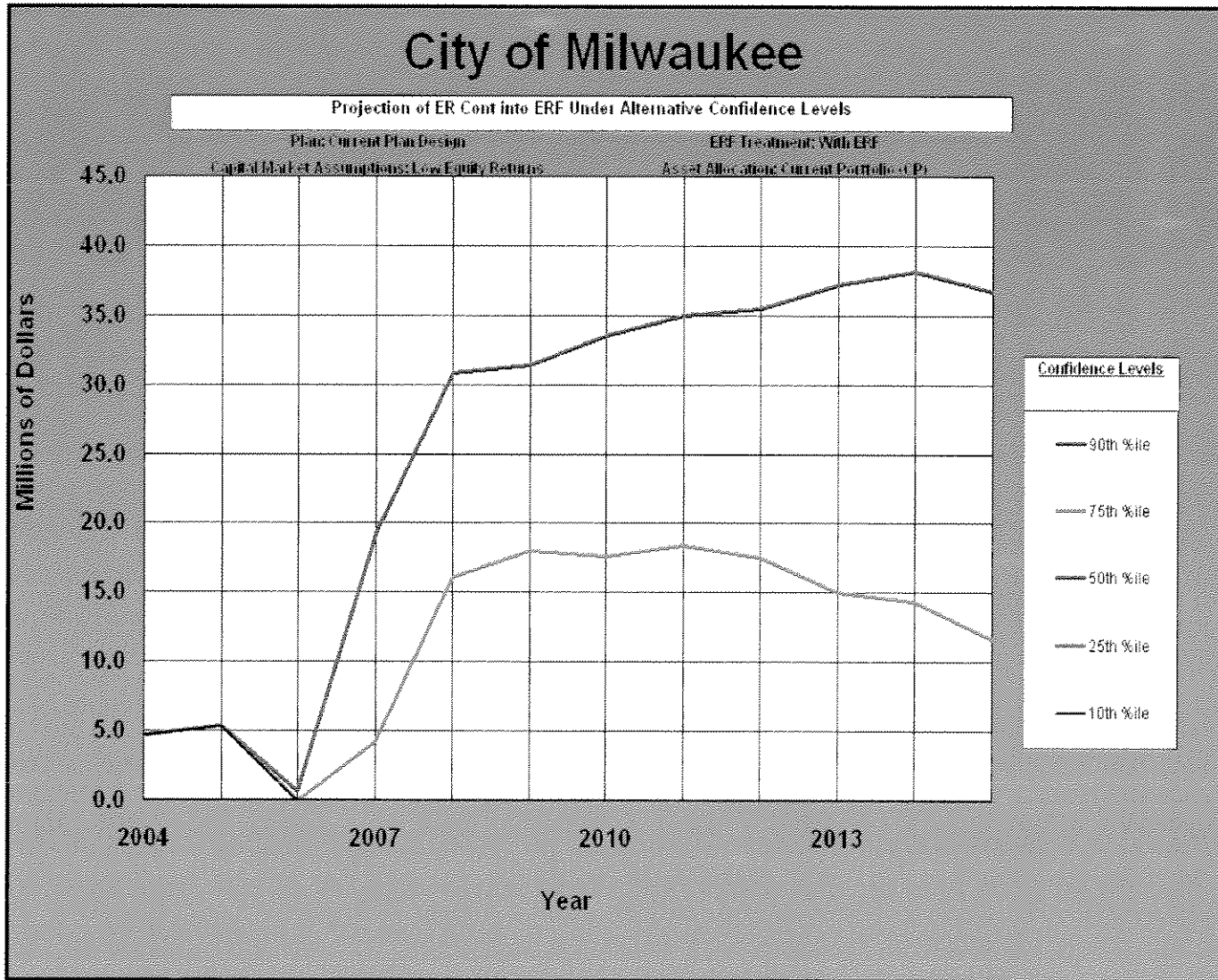
Stochastic Forecast

ER Contributions to ERF – With ERF, Baseline Capital Market Assumptions



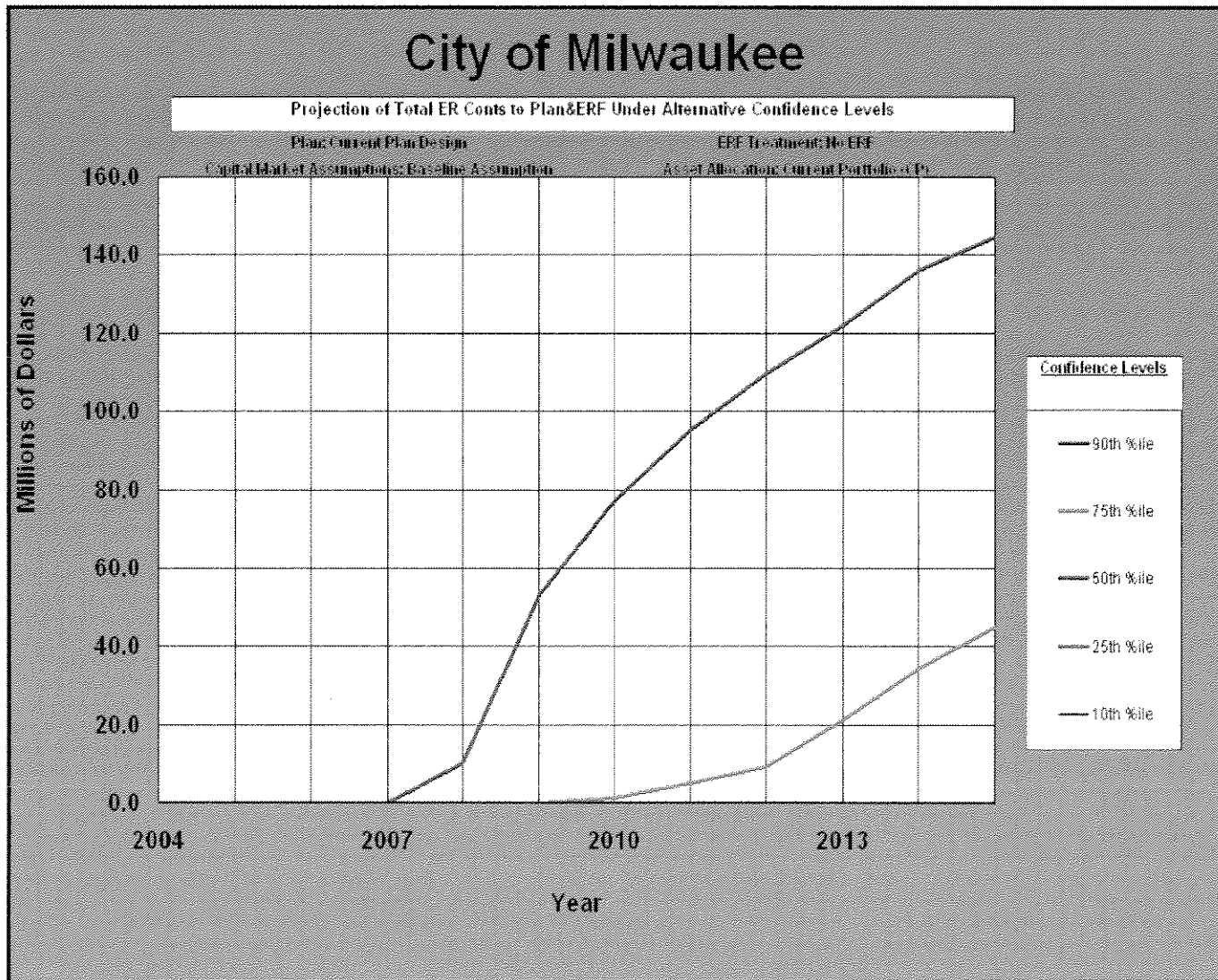
Stochastic Forecast

ER Contributions to ERF — With ERF, Low Equity Returns



Stochastic Forecast

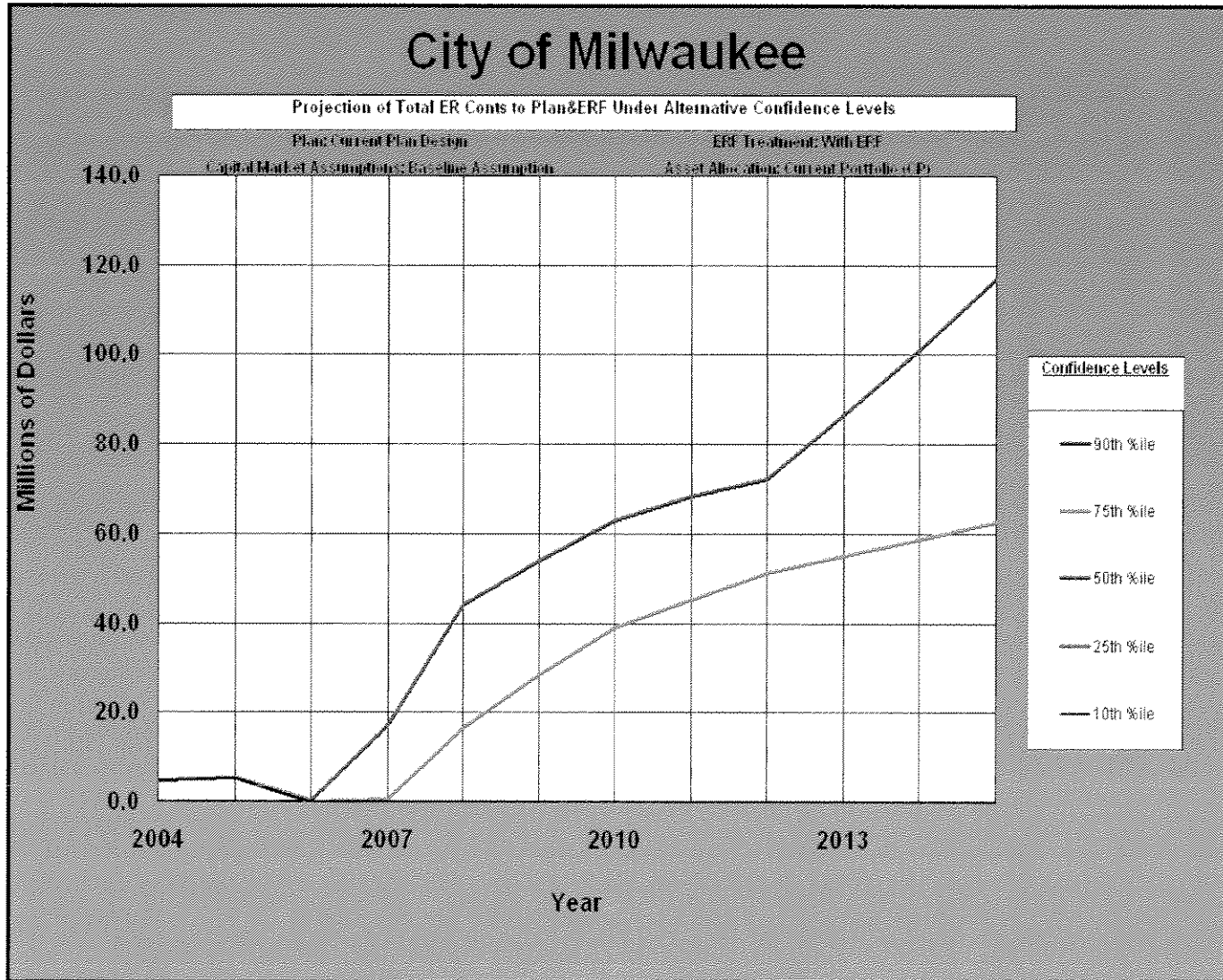
Total ER Contributions to Plan and ERF – No ERF, Baseline Capital Market Assumptions



Stochastic Forecast

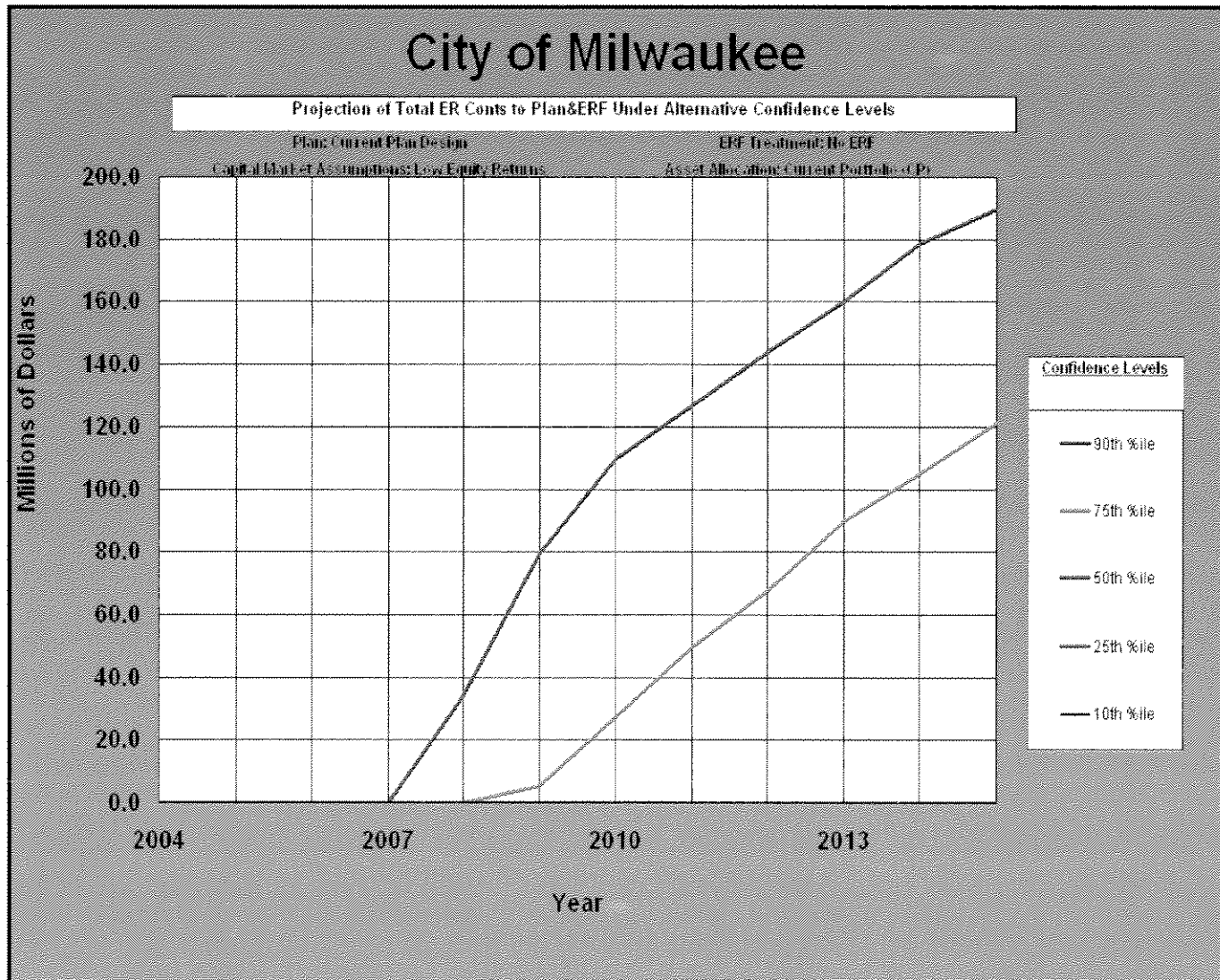
Total ER Contributions to Plan and ERF –

With ERF, Baseline Capital Market Assumptions



Stochastic Forecast

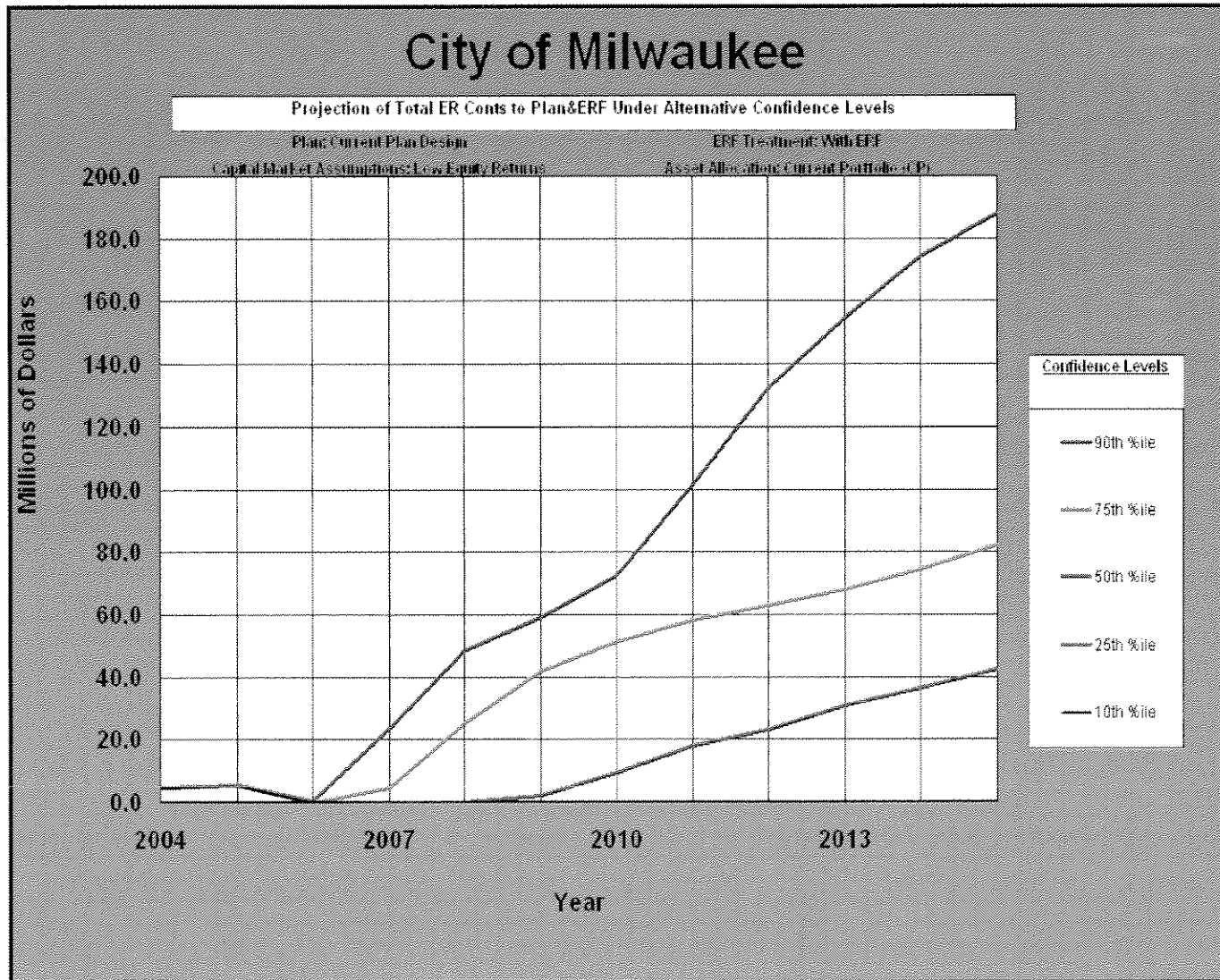
Total ER Contributions to Plan and ERF – No ERF, Low Equity Returns



Stochastic Forecast

Total ER Contributions to Plan and ERF –

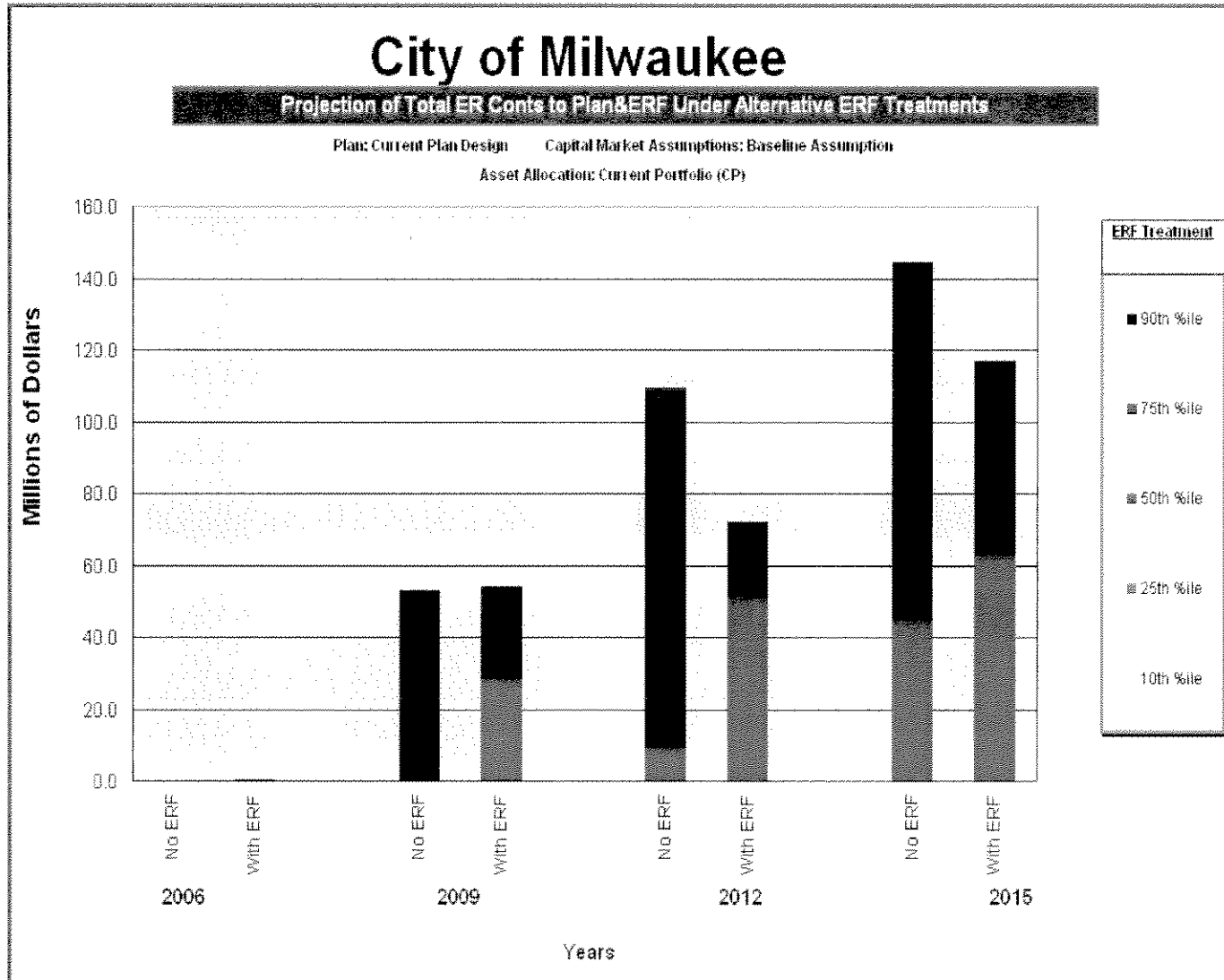
With ERF, Low Equity Returns



Stochastic Forecast

Total ER Contributions to Plan and ERF –

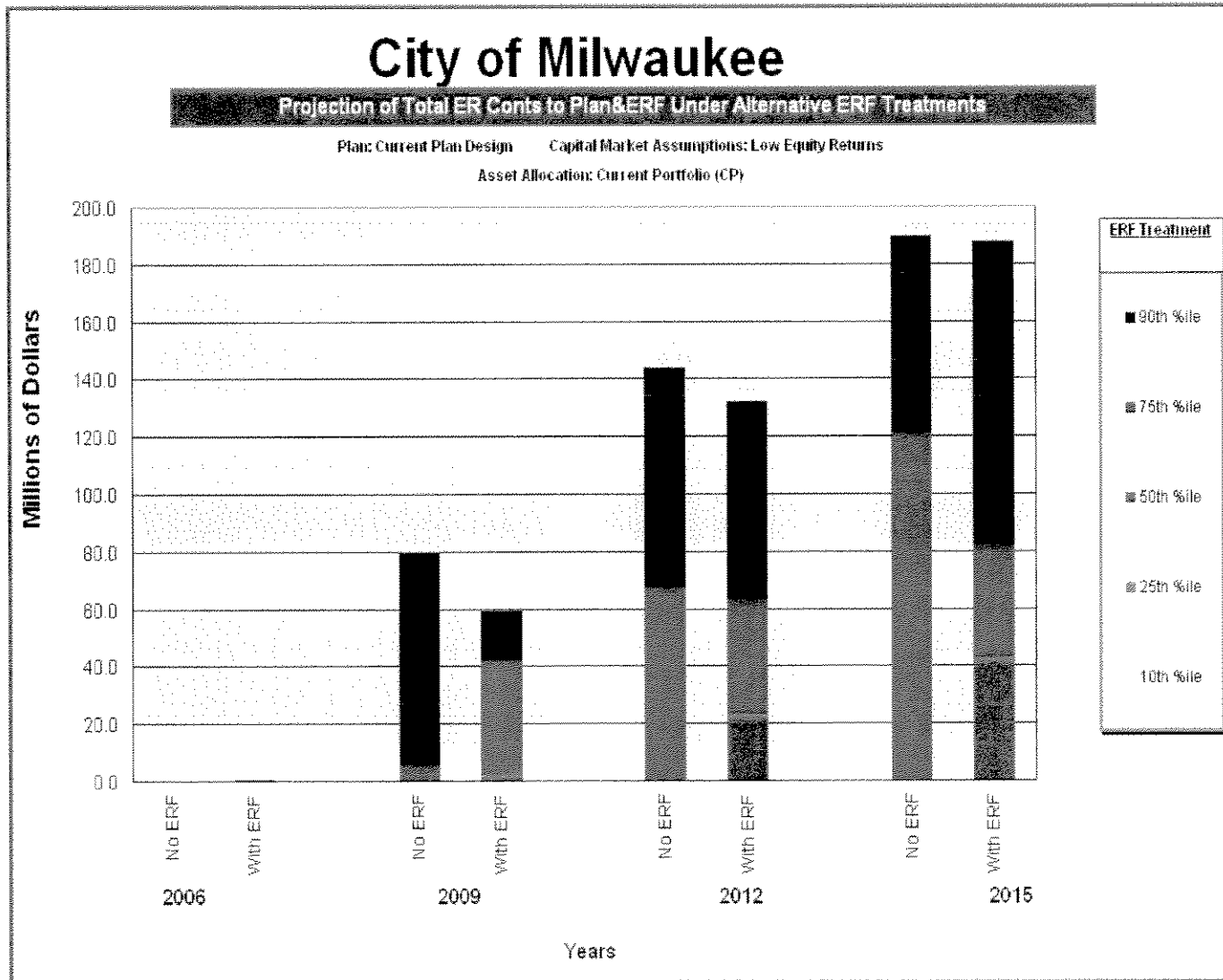
Baseline Capital Market Assumptions – Compare No ERF/With ERF



Stochastic Forecast

Total ER Contributions to Plan and ERF –

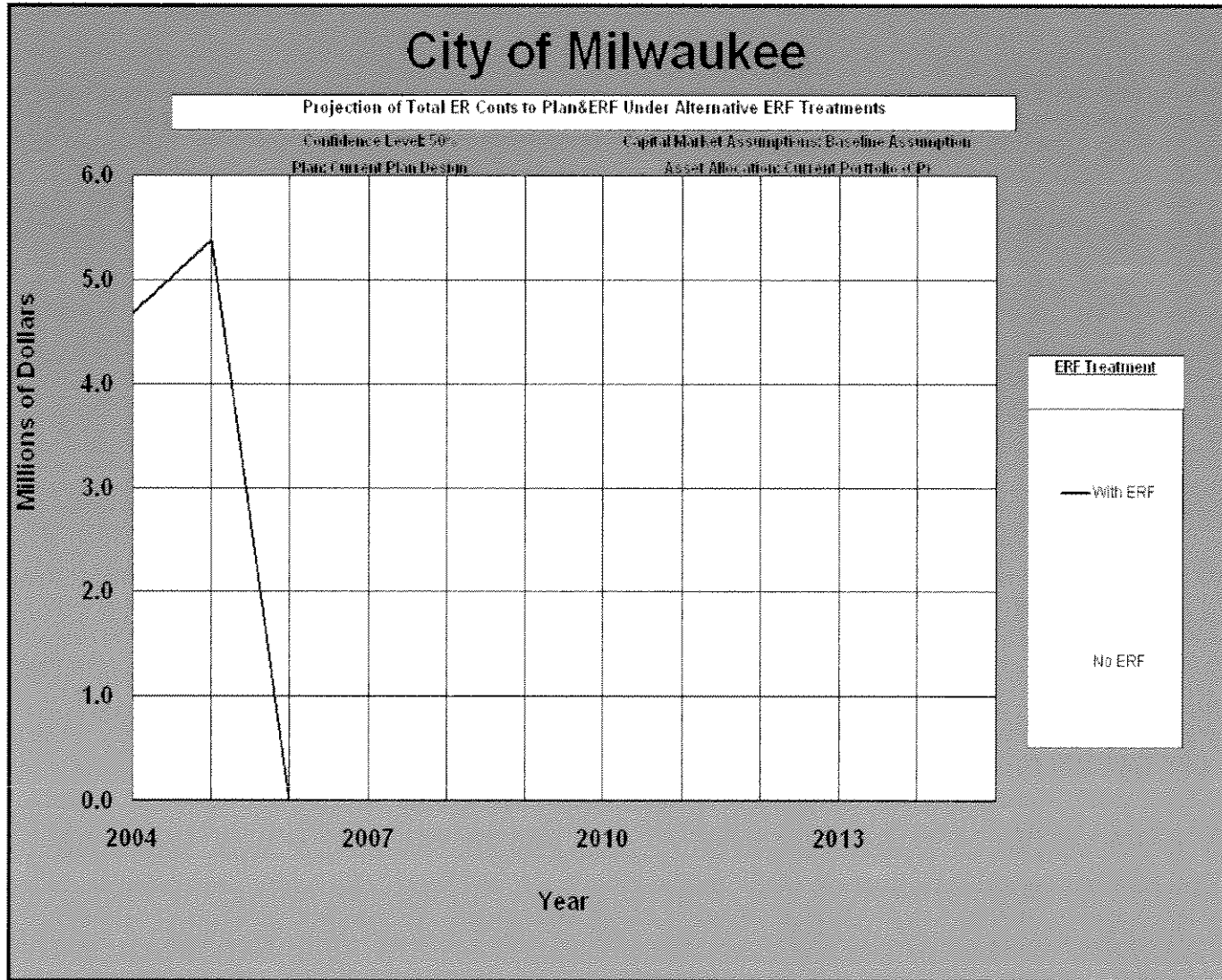
Low Equity Returns – Compare No ERF/With ERF



Stochastic Forecast

Total ER Contributions to Plan and ERF –

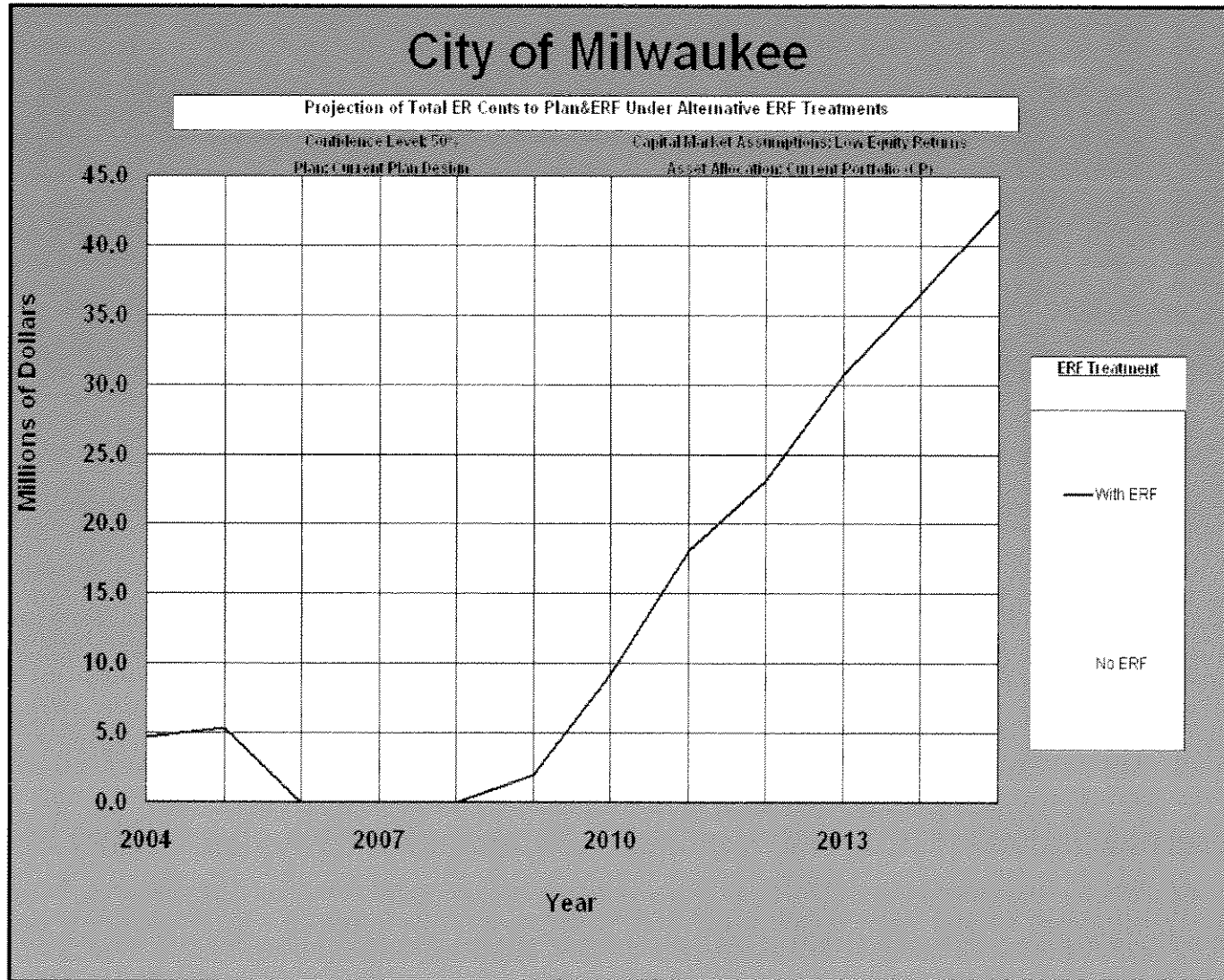
50th Percentile Result, Baseline Capital Market Assumptions – Compare No ERF/With ERF



Stochastic Forecast

Total ER Contributions to Plan and ERF –

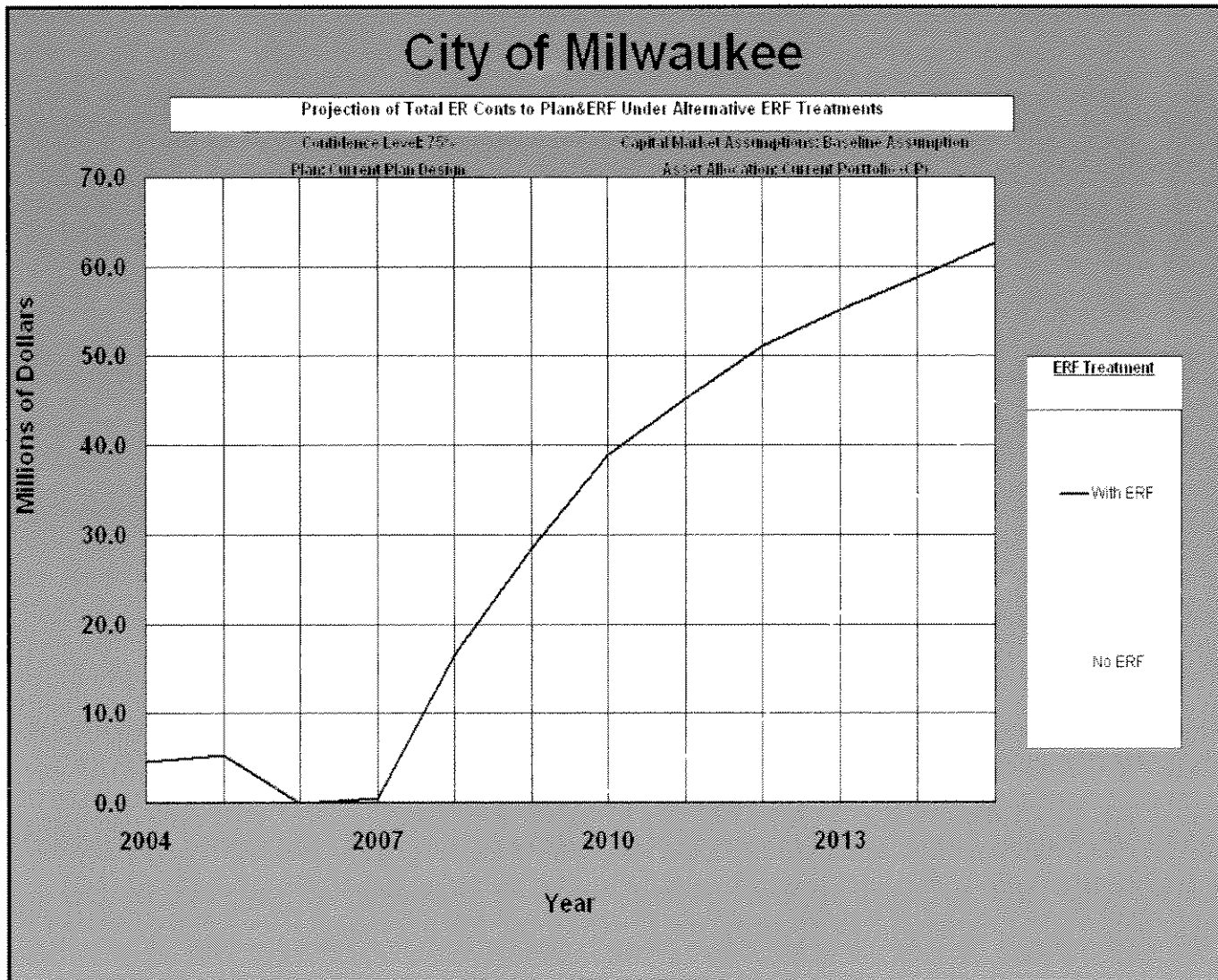
50th Percentile Result, Low Equity Returns – Compare No ERF/With ERF



Stochastic Forecast

Total ER Contributions to Plan and ERF –

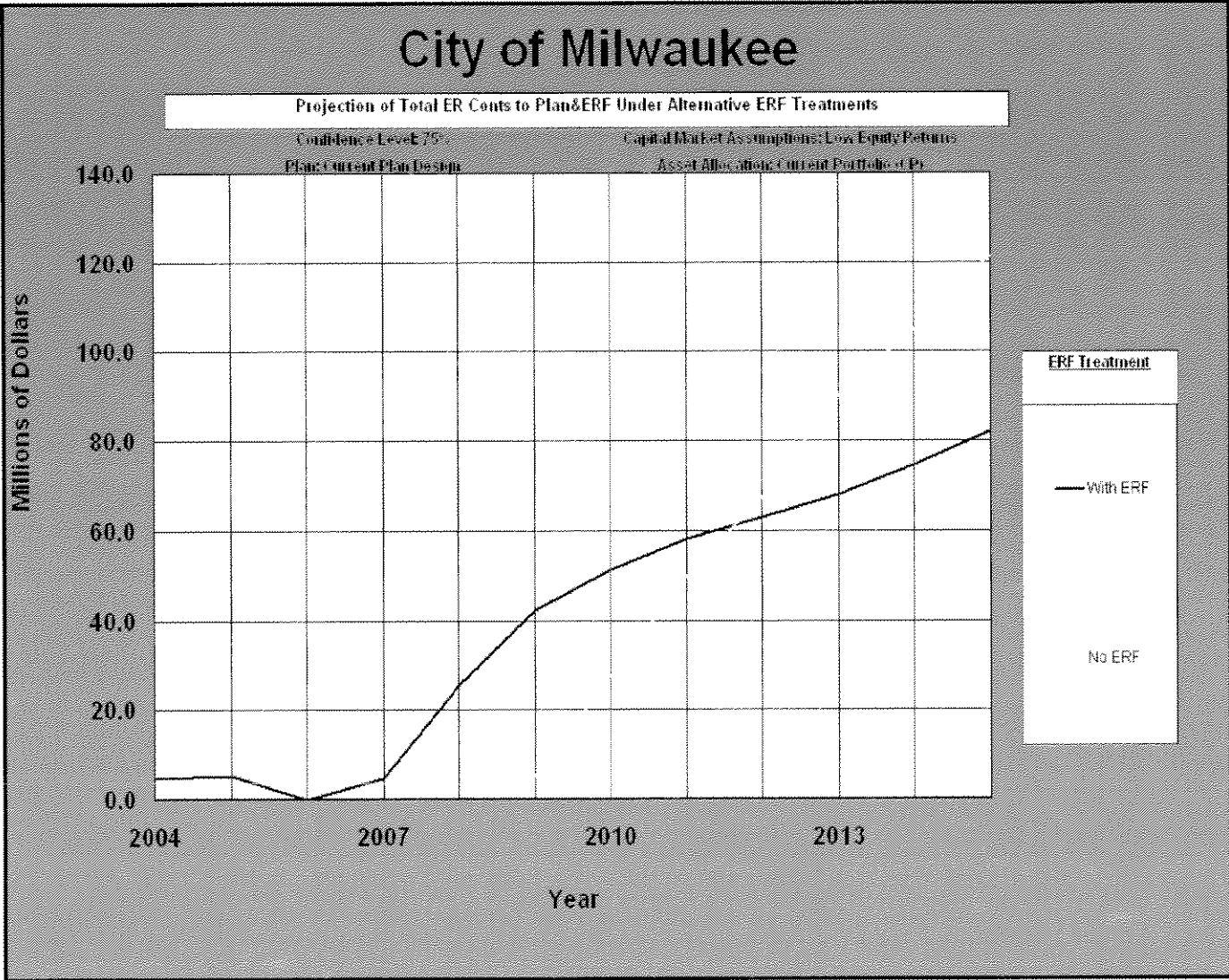
75th Percentile Result, Baseline Capital Market Assumptions – Compare No ERF/With ERF



Stochastic Forecast

Total ER Contributions to Plan and ERF –

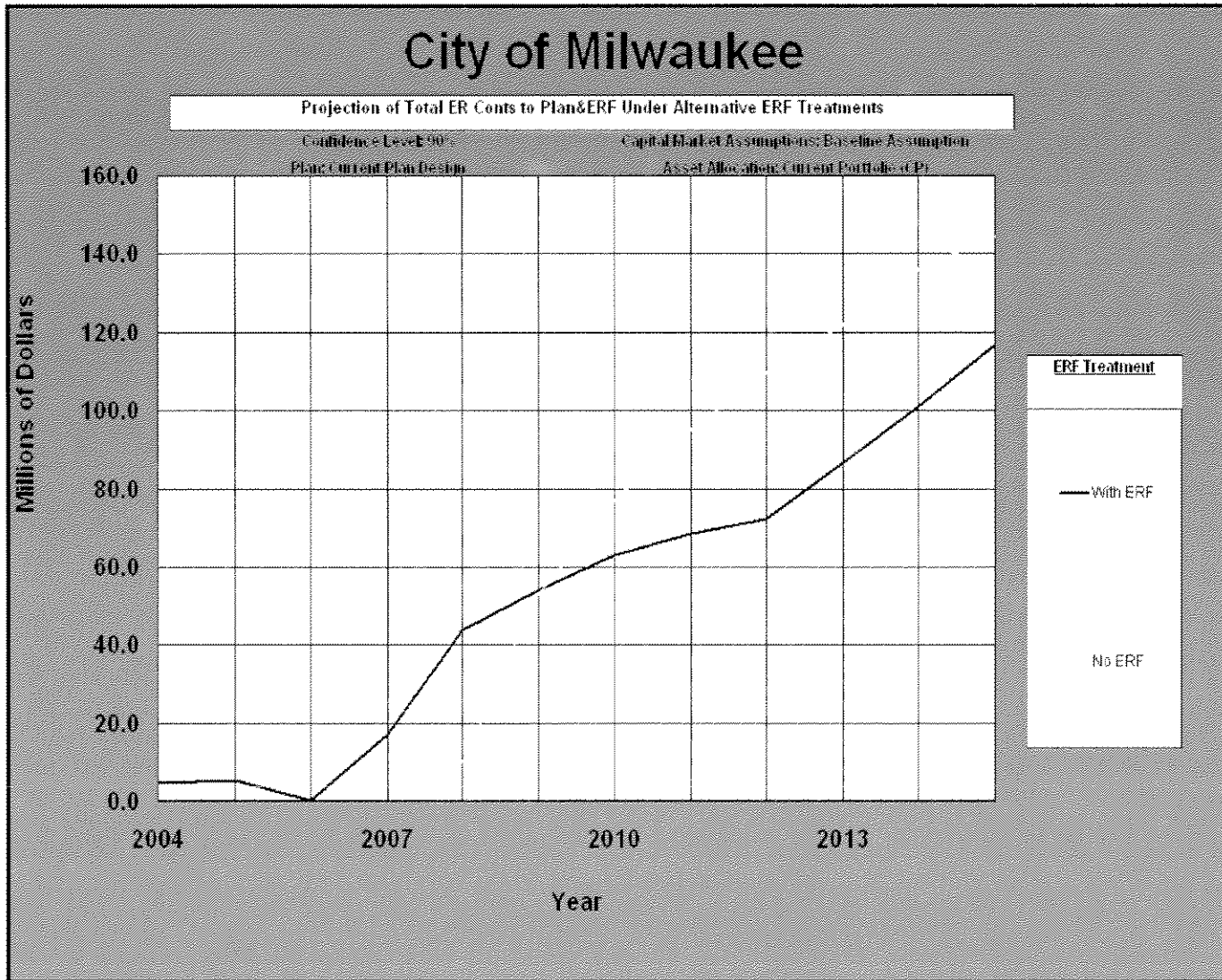
75th Percentile Result, Low Equity Returns – Compare No ERF/With ERF



Stochastic Forecast

Total ER Contributions to Plan and ERF –

90th Percentile Result, Baseline Capital Market Assumptions – Compare No ERF/With ERF



Stochastic Forecast

Total ER Contributions to Plan and ERF –

90th Percentile Result, Low Equity Returns – Compare No ERF/With ERF

