STATE OF VERMONT

BRIDGES AND CULVERTS LONG-TERM ASSESSMENT and FUNDING OPTIONS

Report to the Governor
and the General Assembly

November 15, 2008

Prepared by
The Office of the State Treasurer

With the Assistance of

Agency of Transportation
Legislative Joint Fiscal Office
Citi
Morgan Stanley

TABLE OF CONTENTS

Section I Executive Summary…….…….2

Section II Project Scope and Findings……..….……...5

Section III Review of Current Federal and State Revenues…….…….……11

Section IV Potential Revenue Sources……..14

Section V Financing and Funding Options……..…….……17

Section VI Conclusion..…….29

Bibliography……..31

Appendices

Statutory Reference……..33

Office of the State Treasurer Debt Tables…….34

U.S. D.O.T Overview of Sustainability of Current Revenue Sources

Vermont Agency of Transportation Sec.29 of Act 164 of 2008 Report

I. Executive Summary

The General Assembly directed the State Treasurer, working jointly with the Agency of Transportation (AOT) and the Legislative Joint Fiscal Office (JFO), to prepare a report containing a long-term needs assessment for repair, maintenance, and rehabilitation of bridges and culverts in the state, and providing funding options and recommendations for such long-term needs. Further, the General Assembly directed that funding options and recommendations be developed by the State Treasurer, working with an investment bank to act as an adviser to the State to develop multiple financing proposals, including but not limited to general obligation, revenue, and GARVEE bond options, for a long-term program dedicated to funding life-cycle rehabilitation work on bridges and culverts that will extend the useful lives of these structures on a long-term, cost-effective basis.

The most significant findings are:

1) AOT estimates, in 2008 dollars, that the cost for replacement of structures over 70 years of age (including structurally deficient structures) is $2,308,359,115. In addition, to replace all structurally deficient structures at or under 70 years of age would require an additional $856,253,360. Further, an additional $7,000,000 is needed for preventative maintenance (a detailed analysis is included in Section IV of this report):

2) Based on the AOT study pursuant to Act 164, the Joint Fiscal Office has stated that if during the next 20 years the State wants to reach the structural-deficiency targets, and also replace all bridges over 70 years old, additional funding of approximately $110 million a year would be required. The analysis is as follows:

JFO Estimate

Scenario - spread replacement costs over 20 years	
$158,260,000	Replacement costs per year
$7,000,000	Annual cost of preventive maintenance
$165,260,000	Total annual program need
-$55,800,000	FY-09 total bridge spending
$109,460,000	Annual gap

3) AOT's plans do not contemplate a 100% targeting of all over-70 and structurally deficient bridges. AOT states that federal ratings, such as "structurally deficient," tell us a bridge component is within a range that requires assessment. A "structurally deficient" rating does not necessarily mean the structure is unsafe, but it does indicate that the bridge is aging and could require repairs in the near future. AOT has historically established performance measures to address these needs. AOT calculated the cost of meeting the currently established "structurally deficient" targets or goals. Even taking this more moderate approach, the State is not meeting its goals. Without additional funding, the agency projects that these goals, developed in partnership with the General Assembly several years ago, will remain out of reach.

AOT has completed a year-by-year analysis through 2018 to meet the "structural performance goals," factoring in agency capacity. Using an "unconstrained" scenario (not factoring in annual implementation constraints), it estimates that it would need $1,161,356,132 in resources over that time-frame. Using a "constrained" scenario (factoring in annual implementation constraints), it

estimates it would need $896,899,969 in resources through 2018. Assuming all of the current approximately $55,800,000 annual bridge spending were to be devoted to this effort, an additional infusion of $283,000,000 to $517,000,000 through 2018 would be needed.

4) Traditional sources of transportation revenues at both the federal and state levels are in decline, further increasing the funding gap. While a federal economic stimulus bill of some kind is likely to include a transportation component, it is unclear how this will impact the dollars available to fund these initiatives at this time. There are concerns that the current formula associated with the Highway Trust Fund distributions could be adjusted in a way that would be disadvantageous to Vermont. Vermont's congressional delegation will need to play a key role in preventing a negative outcome. Discussion of this issue is included in Section III of the report.

5) The Office of the State Treasurer has reviewed the State's needs with two investment banks (Citi and Morgan Stanley) per the request of the General Assembly. These professionals stated unequivocally that bonding alone will not solve Vermont's bridge problems. They firmly believe that a significant infusion of up-front revenues from bonding, supported by increased ongoing of revenues to AOT for debt service, is necessary. While certain types of bonding, such as general obligation debt, revenue bonds pledging existing revenue sources, and GARVEES can provide some assistance by accelerating the project schedule, thereby reducing costs associated with inflation and early maintenance, these measures are insufficient to meet the need and pay debt service. New revenue sources, or increases to existing sources, are needed to fund any bonds. As noted by recent study in another state:

> "…while borrowing to pay for transportation projects can be a good idea, … it can also simply be a way to put off for a few years the politically difficult task of restructuring transportation finance. And, unfortunately, many recent decisions to debt-finance transportation projects have been motivated by a desire to get needed projects off of the ground as traditional revenue sources have run dry rather than by dispassionate calculations of expected benefits and costs." [1]

In other words, borrowing makes sense when:

- The costs saved through accelerated construction (inflation and preventative maintenance) exceed the interest paid on the funds; and/or
- Quantifiable economic benefits exceed the cost of borrowing; and
- A future identifiable and available revenue sources exists to pay for the bonds.

6) Any significant bonding will require an examination of the revenue sources currently used to pay for transportation costs, including bridges, and a frank discussion of potential sources of funds. Several possibilities are discussed in the body of this report, based on a previous

[1] Wachs, "A Quiet Crisis in Transportation Finance," 2006, page 10.

study completed by AOT (RSG Report, see below), the JFO Fiscal Facts, and ideas developed by the participating investment bankers. Identification of new sources of revenues as opposed to increases to existing sources has an added advantage in that the rating agencies are more inclined not to treat such bonds as increasing net tax-supported debt, permitting the state to maintain its debt ratios and to protect its debt ratings. One form of bond issue, referred to as a "double-barreled" bond, seeks to optimize the credit rating attributes of general obligation debt while reducing the coverage ratios (i.e., the amount of revenue designated to pay debt service), thereby reducing the cost of capital.

7) The State has taken the position, as evidenced by the discipline associated with the Capital Debt Affordability Advisory Committee process, that it will issue debt only where prudent and cost-effective and within limitations consistent with maintaining manageable debt service levels and favorable credit ratings. Any debt issuance for transportation infrastructure should be analyzed within this framework.

8) A Comprehensive Infrastructure Needs Assessment is needed. The approach directed by Act 164 clearly moves the dialogue to an assessment of needs and relative cost and benefits. While this project has been very useful in identifying the problems and possible remedies related to the bridge program, it is just one component of a larger infrastructure picture. Bridges are a critical issue but need to be incorporated into an overall transportation plan including roads, paving, maintenance, rail, and public transit. As noted in a recent report prepared by the Snelling Center, citing additional studies by AOT consultants and JFO, there are additional needs and funding gaps within the entire scope of the transportation arena:[2]

   - Vermont's pavement is also deteriorating and cannot be maintained with current funding levels; at current spending levels, the percentage of payment in "very poor" condition will rise from 21% to 49% by 2013.

   - A 2008 JFO estimate noted that the funding gap for transportation as a whole, at an optimum level of investment, is approximately $203 million annually (this amount represents a 2008 update from the 2007 study cited by the Snelling Center).

   - AOT consultants have estimated that current transportation revenues will fall short over the next 30 years by between $4.2 million and $8.7 million, the range primarily dependent upon inflation assumptions.

   - The Federal Highway Trust Fund is all but depleted.

In addition to transportation needs, other infrastructure pressures exist including school buildings, parks, public buildings, telecommunications, and others. A comprehensive infrastructure needs assessment is required including a prioritization of these needs based on agreed-upon "need," economics, and cash flows (based on inflation factors). In the meantime, some short-term re-prioritization within the existing capital appropriations is indicated, as outlined in section V of the report.

[2] The Snelling Center for Government, Vermont Roads and Bridges: To Fix or Abandon?, September 2008, pages 7-10.

II. Project Scope and Findings

Process

To begin this effort, the Agency of Transportation (AOT) conducted a study including:

- The evaluation of bridges and culverts using the established performance measures defined and used by the AOT's program development division, and a plan with estimated costs for meeting such performance measures;
- Definition of preventative maintenance, presentation of the Agency's five-year plan for doing such maintenance, and the estimated costs for this maintenance; and
- An estimate of the cost of replacing structures over the age of 70 years.

This study was completed on August 20, 2008, and, while specific references to its data and conclusions are made throughout this report, the entire document is included as an appendix.

In addition, the Governor and the Legislature completed a "consensus revenue estimate" in late July 2008, including anticipated transportation revenues. A number of reports prepared by JFO focusing on transportation needs and funding were also made available.

While AOT completed the needs assessment portion and JFO provided funding and revenue data, the Office of the State Treasurer initiated a "Request for Information" or RFI to gather information from investment banks on funding options and recommendations for long-term financing of the repair, maintenance, and rehabilitation of bridges and culverts in the State. The RFI was issued in July 2008 and the Treasurer's office elected to work with two (Citi and Morgan Stanley) of the five respondents to develop:

- Based on the AOT needs and priorities assessment, construction costs, inflation projections, and revenue projections, an analysis of the funding gap and possible options to close the gap, including the prudent use of debt.
- Alternative funding sources that may be available to Vermont based on its geography, existing tax structure and burden, and demographics.
- Financing strategies that achieve maximum use of federal matches, reduced inflation of construction costs, and optimal economic benefits.
- Financing strategies that prevent further degradation of infrastructure.
- Assessment of the financing volume and offering timing implied by the AOT evaluation and plan.
- To the extent that prudent issuance of debt is recommended, an analysis of alternative financing vehicles, structures, and terms relative to the transportation funding needs and to the State's overall financial position. Financing vehicles include, but are not necessarily limited to, general obligation, revenue, and GARVEE bond options, as well as private/public partnership transactions.
- An analysis of debt maturity structures that provide the optimum approach given project life cycles, inflation, cash flows, and debt service requirements.
- Recommendations of most advantageous financing alternatives.

Findings

AOT's report is included in the appendices. It includes an evaluation of bridges and culverts using the established performance measures defined and used by the AOT's program development division. The current standard is based on the concept of structural deficiency. [3] In its annual report, *structural deficiency* is defined as:

> "Structurally deficient bridges are those having one or more components with a NBI rating of 0 to 4, a load carrying capacity significantly below current federal design standards, or a waterway which frequently overtops the bridge during floods."[4]

The rated components are deck, superstructure, substructure. Scoring is on a scale of 0 to 9. As noted by AOT, these federal ratings tell us that that a bridge component is within a range that requires assessment. A structurally deficient rating does not necessarily mean the structure is unsafe for public use or that load restriction is necessary. It does indicate that the bridge is aging and/or could require repairs in the near future. This position is also taken by the American Association of State Highway and Transportation Officials (AASHTO).

The Federal Highway Administration (FHWA) is responsible for oversight of structurally deficient bridges within the National Highway System. Each state is required to have a bridge inspection capacity and to determine bridge ratings in accordance with AASHTO standards and federal requirements. The findings and results of bridge inspections are recorded in the National Bridge Inventory.

Another term used by FHWA is *functionally obsolete*. This is defined as:

> "A functionally obsolete bridge is one that was built to standards that are not used today. These bridges are not automatically rated as structurally deficient, nor are they unsafe. Functionally obsolete bridges are those that do not have adequate lane widths, shoulder widths, or vertical clearances to serve current traffic demand, or those that may be occasionally flooded."[5]

Why are these ratings important? The designation of a bridge as structurally deficient or functionally obsolete has impact on decisions for bridge maintenance, rehabilitation, or replacement. In addition, the federal government uses these measures to determine the allocation for federal bridge replacement funds and eligibility for federal bridge replacement funds.

The Better Roads 2008 Bridge Inventory is a state-by-state look at trends in deficient and obsolete bridges, conducted annually using these measures. Their most recent report states the following:

---

[3] As noted in the AOT report, page 4, "structural deficiency has been recognized to be a cumbersome measure to manage the basic needs of the bridge system, and it no longer is considered by the industry to be the best measure to chart the overall health of a bridge network." As a result, the agency will be migrating to a more holistic health index measure that will be based on core bridge unit condition ratings. For this analysis, however, the current method will be used.

[4] Agency of Transportation, Program Development – Structures Section, 2008 Annual Report, p.9

[5] AASHTO, "Bridging the Gap: Restoring and Rebuilding the Nation's Bridges," July 2008

> "Vermont's bridge conditions are worse than the national average, with 36 percent of its inventory rated as structurally deficient or functionally obsolete. During the past year, bridge conditions remained stable. The state is ranked 42nd in the nation for its bridge conditions. Of the 958 substandard bridges, just more than one-half (52%) are structurally deficient."[6]

AOT has identified Vermont's structural deficiency trend from 1997 to 2008 as follows for each program category:

- Interstate bridge: 3.38 bridges per year net increase
- State Highway bridge: 1.77 bridges per year net increase
- Town Highway bridge: 2.90 bridges per year net increase
- Culverts: 5.91 per year net increase

In 2002, the General Assembly instructed the AOT to begin using an asset management approach to transportation investment. This requires AOT to maximize public benefit by evaluating the best way to maintain and invest in the State's existing transportation system. Performance measures are essential to this process. Starting with the fiscal year 2006 budget, AOT began using performance measures in preparing the transportation program submitted to the legislature. The agency's "structurally deficient" performance goals are to reduce the levels to:

- 7% on the Interstate system (21 bridges)
- 16% on the State Highway system (122 bridges)
- 16% of the Town Highway systems (257 bridges)
- 12% of Culverts (155 culverts)

AOT has not been able to achieve these goals with current resources and as stated in its report, "Analysis confirms the broad understanding that these goals will remain a challenge with current resources and administrative procedures."

AOT has completed a year-by-year analysis through 2018 of the funding necessary to obtain compliance with the "structural performance goals," including agency capacity. Using an "unconstrained" scenario, it estimates that it would need $1,161,356,132 in resources. On a "constrained" scenario, it estimates it would need $896,899,969 in resources through 2018. [7]

---

[6] Better Roads, 2008 Bridge Inventory

[7] Per AOT, the agency would need to address both resource and procedural issues, which is what the "unconstrained" scenario predicts. The "constrained" scenario reflects the agency's normal operation with procedures as we have today, but with an increased level of funding.

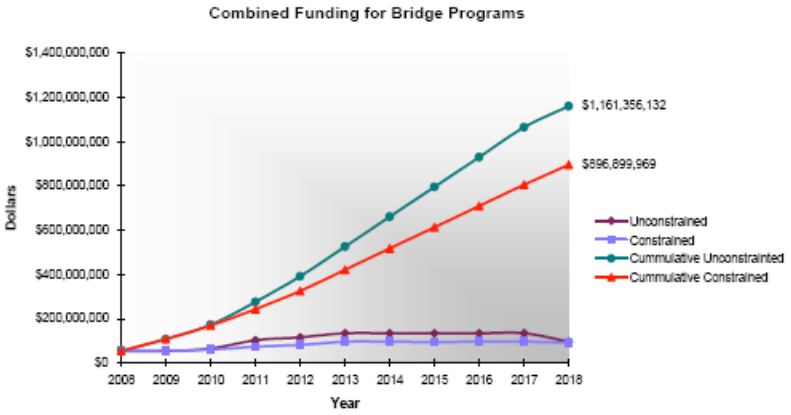
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Interstate Bridge												
	Unconstrained	$ 5,094,635	$ 5,594,635	$ 11,383,906	$ 19,317,811	$ 19,317,811	$ 19,317,811	$ 19,317,811	$ 18,817,811	$ 18,817,811	$ 18,817,811	$ 13,528,541
	Constrained	$ 5,094,635	$ 5,594,635	$ 11,383,906	$ 19,317,811	$ 19,317,811	$ 19,317,811	$ 19,317,811	$ 18,817,811	$ 18,817,811	$ 18,817,811	$ 13,528,541
State Highway Bridge												
	Unconstrained	$ 22,346,821	$ 22,846,821	$ 22,846,821	$ 36,111,369	$ 49,875,917	$ 63,140,464	$ 63,140,464	$ 63,140,464	$ 63,640,464	$ 63,640,464	$ 29,979,095
	Constrained	$ 22,846,821	$ 22,846,821	$ 22,846,821	$ 22,846,821	$ 29,979,095	$ 36,611,369	$ 36,611,369	$ 36,611,369	$ 37,111,369	$ 37,111,369	$ 37,111,369
Town Highway Bridge												
	Unconstrained	$ 19,701,071	$ 20,201,071	$ 24,931,285	$ 30,526,607	$ 30,526,607	$ 36,121,928	$ 36,121,928	$ 36,121,928	$ 36,121,928	$ 36,121,928	$ 36,121,928
	Constrained	$ 20,201,071	$ 20,201,071	$ 20,201,071	$ 20,201,071	$ 21,201,071	$ 29,161,500	$ 29,161,500	$ 29,161,500	$ 29,161,500	$ 29,161,500	$ 29,161,500
Interstate and State Highway "Short" Structures												
	Unconstrained	$ 6,129,717	$ 6,129,717	$ 6,129,717	$ 16,289,151	$ 16,289,151	$ 16,289,151	$ 16,289,151	$ 16,289,151	$ 16,289,151	$ 16,289,151	$ 16,289,151
	Constrained	$ 6,129,717	$ 6,129,717	$ 6,129,717	$ 11,209,434	$ 11,209,434	$ 11,209,434	$ 11,209,434	$ 11,209,434	$ 11,209,434	$ 11,209,434	$ 11,209,434
Total												
	Unconstrained	$ 53,272,245	$ 54,772,245	$ 65,291,730	$ 102,244,938	$ 116,009,486	$ 134,869,355	$ 134,869,355	$ 134,369,355	$ 134,869,355	$ 134,869,355	$ 95,918,715
	Constrained	$ 54,272,245	$ 54,772,245	$ 60,561,516	$ 73,575,138	$ 81,707,412	$ 96,300,114	$ 96,300,114	$ 95,800,114	$ 96,300,114	$ 96,300,114	$ 91,010,844
Cummulative Total												
	Unconstrained	$ 53,272,245	$ 108,044,490	$ 173,336,219	$ 275,581,157	$ 391,590,643	$ 526,459,998	$ 661,329,353	$ 795,698,708	$ 930,568,062	$ 1,065,437,417	$ 1,161,356,132
	Constrained	$ 54,272,245	$ 109,044,490	$ 169,606,006	$ 243,181,143	$ 324,888,555	$ 421,188,669	$ 517,488,783	$ 613,288,897	$ 709,589,011	$ 805,889,125	$ 896,899,969

• 2008 construction dollars per sq. ft. of interstate deck (curb - curb) =	$213.52
• average sq. ft. of interstate deck (curb - curb) =	12,385.89
• constrained to 1 bridge per year ($5,694,000 SFY09 "AS PASSED" Interstate Bridge including Interstate Bridge Maintenance)	

• 2008 construction dollars per sq. ft. of state highway deck (curb - curb)=	$827.30
• average sq. ft. of state highway deck (curb - curb) =	8,016.77
• constrained to 3 bridges per year ($27,412,371 SFY09 "AS PASSED" State Highway Bridge including State Highway Bridge Maintenance)	

• 2008 construction dollars per sq. ft. of town highway deck (curb - curb)=	$817.18
• average sq. ft. of town highway deck (curb - curb) =	2,282.37
• constrained to 10 bridges per year ($18,202,289 SFY09 "AS PASSED" Town Highway Bridge including Town Highway Bridge Maintenance)	

• 2008 construction dollars per ft. of length =	$8,107.85
• assumed average length of buried structure (feet) =	156.63
• constrained to 4 bridges per year ($4,541,977 SFY09 "AS PASSED" Interstate / State Highway Culverts including Interstate / State Highway Culvert Bridge Maintenance)	



Funding levels for both the "constrained" and "unconstrained" scenarios would appropriately be ramped up over time, because the agency, even if provided additional resources, would require time to plan, design, and permit new bridge projects.

Using these scenarios, AOT estimates that it would meet performance measures as follows:

- Interstate bridge: With additional funds, goal would be met in 2017.
- State Highway structures: Using "constrained" scenario, AOT estimates it would meet the goal in 2025, while it would make the goal in 2017 if "unconstrained."
- Town Highway structures: Using "constrained" scenario AOT estimates it would meet the goal in 2029, while it would make the goal in 2018 if "unconstrained."
- Culverts: Meeting the performance goal for culverts under the "constrained" scenario is in 2026, but if "unconstrained," AOT estimates that it could meet the goal in 2018.

Without additional funding, the agency projects these goals, developed in partnership with the General Assembly several years ago, will remain out of reach. Using <u>all</u> of the FY09 bridge appropriation (approximating $55,800,000) to meet these goals, and continuing that level for each year, the funds needed to meet the performance goals fall short by $283,000,000 to $517,000,000, based on the scenario selected.

These resources factor in the necessary ongoing preventative maintenance. The General Assembly also requested AOT to define preventative maintenance and present an estimated cost. AOT essentially uses the definition used by AASHTO:

> AASHTO defines preventative maintenance (PM) as "the planned strategy of cost effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system without increasing structural capacity." (Cited in AOT report)

AOT also notes that:

> "Functionally, Federal-aid-eligible preventative maintenance activities are those that address aging, oxidation, surface deterioration, and normal wear and tear from day-to-day performance and environmental conditions. Preventative maintenance activities extend the service life of the roadway asset or facility in a cost-effective manner."[8]

AOT is estimating a cost of $7,000,000 per year for preventative maintenance included in the shortfall discussion above. To meet its goals, AOT assumed the costs to be distributed at a level of 35% each for interstate and state highway bridge systems and 15% each for town highway and interstate/state highway "short" structure systems.

In addition, AOT was requested to calculate an estimate of the cost of replacing structures over the age of 70 years. There are 786 long structures and 329 short structures greater than 70 years of age. The cost to replace these, including a 20% scale factor, which is an upsizing of the structures' span length to meet environmental permit requirements, is $2,308,359,115, using 2008 dollars.[9] In addition, the cost to replace structures classified as structurally deficient but 70 years of age or less is $856,253,360. This results in a total cost of $3,164,612,475 plus an annual cost of $7,000,000 for preventative maintenance. AOT calculated the need over an eleven-year period to total $3,241,612,475.

[8] AOT Section 29 Report, page 6.

[9] AOT notes that nearly 100 of the long structures are historic covered bridges and steel trusses that will likely never be allowed to be replaced, though they will need repairs to keep in service.

Cost for Replacement of Structures over 70 Years of Age *includes SD (structurally deficient bridges)

* long structures (greater than 20 feet in length)

System	Age	Number of Structures	Area (curb - curb)	Unit Cost (curb - curb)			Cost to Replace *with 20% scale factor
Interstate	over 70	0	0.0 sq. ft.	$213.52 per sq. ft.			$0.00
State	over 70	226	503,228.5 sq. ft.	$827.30 per sq. ft.			$499,585,125.66
Town	over 70	558	827,277.7 sq. ft.	$817.18 per sq. ft.			$811,241,749.06
Other	over 70	2	2,087.8 sq. ft.	$825.00 per sq. ft.			$2,066,922.00
	Total	786	1,332,594.0 sq. ft.			Subtotal =	$1,312,893,796.72

* short structures (greater than 6 feet in length and less than or equal to 20 feet in length)

System	Age	Number of Structures	Area (curb - curb)	Unit Cost (curb - curb)	Length (feet)	Unit Cost (linear feet)	Cost to Replace *with 20% scale factor
Interstate	over 70	0	0.0 sq. ft.	$213.52 per sq. ft.	0.0 culv length	$8,107.85 per linear ft.	$0.00
State	over 70	329	844,547.0 sq. ft.	$827.30 per sq. ft.	16,140.0 culv length	$8,107.85 per linear ft.	$995,465,318.52
	Total	329	860,687.0 sq. ft. + ft.			Subtotal =	$995,465,318.52

Grand Total = $2,308,359,115

Cost for Replacement of SD (structurally deficient) Structures 70 Years of Age or Younger

* long structures (greater than 20 feet in length)

System	Age	Number of Structures	Area (curb - curb)	Unit Cost (curb - curb)			Cost to Replace *with 20% scale factor
Interstate	70 or less	32	386,264.1 sq. ft.	$213.52 per sq. ft.			$98,970,132.76
State	70 or less	68	389,146.2 sq. ft.	$827.30 per sq. ft.			$386,328,781.51
Town	70 or less	116	154,819.4 sq. ft.	$817.18 per sq. ft.			$151,818,380.75
Other	70 or less	0	0.0 sq. ft.	$825.00 per sq. ft.			$0.00
	Total	216	930,229.7 sq. ft.			Subtotal =	$637,117,295.02

* short structures (greater than 6 feet in length and less than or equal to 20 feet in length)

System	Age	Number of Structures	Area (curb - curb)	Unit Cost (curb - curb)	Length (feet)	Unit Cost (linear feet)	Cost to Replace *with 20% scale factor
Interstate	70 or less	41	0.0 sq. ft.	$213.52 per sq. ft.	12,032.0 culv length	$8,107.85 per linear ft.	$117,064,381.44
State	70 or less	103	1,548.8 sq. ft.	$827.30 per sq. ft.	10,333.0 culv length	$8,107.85 per linear ft.	$102,071,683.55
	Total	144	0.0	0		Subtotal =	$219,136,064.99

Grand Total = $856,253,360

Overall Structure Needs Summary

- Cost to replace ALL structures (including those classified as structurally deficient) over 70 years of age = $2,308,359,115.24
- Cost to replace structures classified as structurally deficient 70 years of age or less = $856,253,360.01
- Cost of preventative maintenance activities; assumed at $7 million per year for an 11 year period = $77,000,000.00

Total = $3,241,612,475.25

JFO spread the cost over a 20-year period, holding the annual $7,000,000 preventative maintenance constant, and, after subtracting the annual appropriation, calculated a funding gap of $110,000,000 per year. Since not all structures meeting the definitions outlined above would be replaced, this would represent the high end of the funding gap spectrum, but clearly points to a significant level of underfunding.

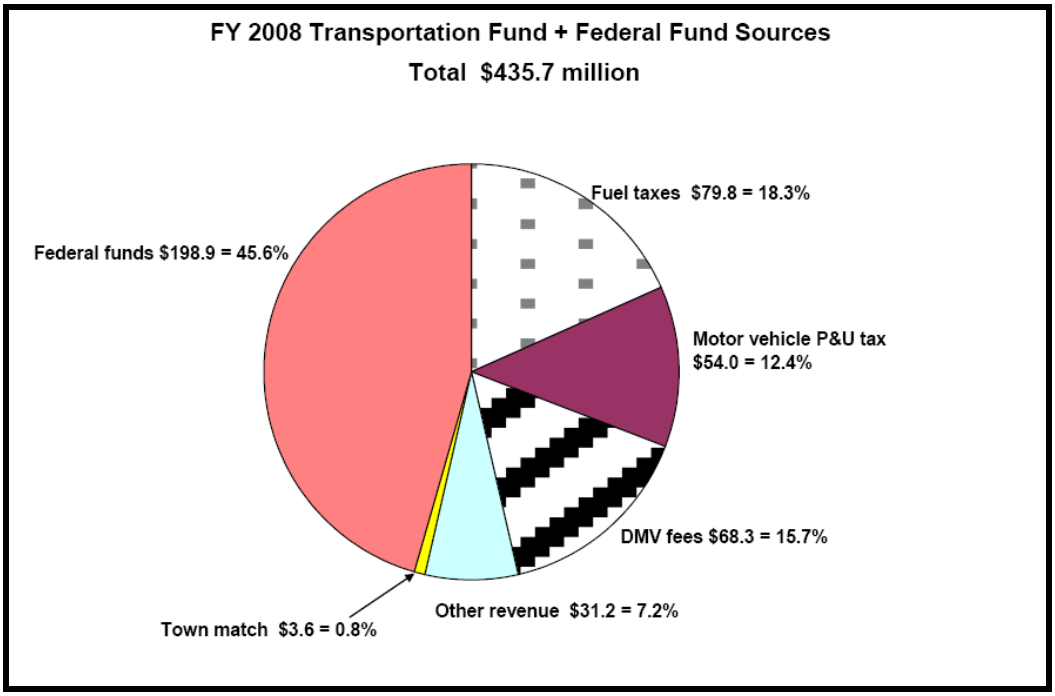
To compound the problem, funding constraints exist at the State and Federal level even to meet the current level of effort. State fuel tax revenues are declining due to a drop in miles travelled, primarily due to fuel prices and a consumer preference toward more fuel-efficient vehicles and

modes of travel. Federal motor fuel excise tax levels are insufficient to keep the Federal Highway Trust Fund (HTF) running at a surplus and the fund is essentially depleted. Even if this resource can be replenished to levels of recent years, U.S. public infrastructure investment has historically been insufficient, relative to the size of the economy and to need.[10]

Unless the State changes course soon, Vermont bridge structural deficiencies will be beyond any effective preventative maintenance opportunity, resulting in the need for complete replacement at significantly higher costs. These costs cannot be supported by current fees and taxing strategies. If left unresolved, the potential exists for significant safety concerns in addition to a degradation of the infrastructure supporting economic development. Planned action to develop the financial resources to meet this need now is required to avoid the need for draconian measures in the future.

III. Review of Current Federal and State Revenues

The following chart displays the sources of funding for the Vermont Transportation Funds:



Source: JFO

The fuel taxes are made up of gasoline tax and the diesel fuel tax. The gasoline tax is a fixed 20 cents per gallon. Technically, however, this consists of a 19-cent-per-gallon tax which is allocated among the Transportation Fund, the DUI Enforcement Fund, and the Fish & Wildlife Fund, and (2) a one-cent-per-gallon fee which is dedicated to the Petroleum Cleanup Fund. The 20 cents per gallon total is allocated as follows[11]:

[10] Galbraith, October 2007, page 7.
[11] JFO, 2008 Fiscal Facts, page 47

Allocation of Gasoline Tax and Fee

Fund	Cents per gallon FY07
Transportation Fund	18.245
DUI Enforcement Fund	0.380
Fish & Wildlife Fund	0.375
Petroleum Cleanup Fund	1.000
Total	20.000

The diesel fuel tax is 26 cents per gallon and is allocated in a similar manner to the gasoline tax: the 25-cents-per-gallon tax is allocated to the Transportation Fund and the one-cent-per-gallon fee is dedicated to the Petroleum Cleanup Fund.

The purchasing power of the per gallon gasoline and diesel taxes and fees are declining with annual inflation. For example, the gasoline taxes and fees above were established in 1997, and the amount of 20 cents is worth only 15 cents today in constant dollars based on the CPI.

Motor Vehicle Purchase and Use Tax monies are the other major contributor to the fund on the state side. This tax applies to motor vehicle sale transactions or to an owner's initial registration of a vehicle in the state. In addition, a variety of motor vehicle fees are a major source of revenue, excluding federal sources. These comprise a wide range of fees collected by DMV including registration fees and driver license fees. A registration fee is collected on all motor vehicles and trailers. The fee varies depending upon the vehicle type, size, weight, and purpose. All motor vehicle fees are deposited in the Transportation Fund.

The DMV registration fees have been increased twice since 2001, creating growth in the fund at an annual rate of 3%. This, has not however, kept up with inflation. Highway construction inflation has grown at a rate of 10.5% for the same period, meaning that the "purchasing power" of the fund is declining. Other trends that are driving down the numbers:

- Motor fuel tax revenues are down because people are driving less, as supported by recent AADT (Average Annual Daily Traffic) data, and there is also a recent emphasis toward the use of more fuel-efficient cars.
- Fuel tax revenues have not been indexed to accommodate inflation; as a result, the purchasing power of the Transportation Fund has eroded.
- Recent economic downturns have had and will continue to have a significant negative impact on the purchase and use tax, further reducing needed revenues.

The Transportation Fund revenue projection for FY09 since January 2007 has been cut by a total of $21.1 million, with additional reductions likely.

The declining state revenues have also had the effect of reducing funds available for federal matching purposes. Even before the most recent decreases in state transportation revenues, AOT's consultant on the Long Range Transportation Business Plan stated in 2007 that the total state funds

needed to match federal funds over the next four years is $52.8 million. However, available funds for that same period totaled $28.6 million, leaving a shortfall of $24.2 million. Given that the state match ranges up to generally 20%, based on the type of projects, $24.2 million is a large sum to potentially leave on the table.

The largest source of funds on the federal side is the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The Act authorized $286 billion nationwide in spending for the six-year period 2004-09 for numerous surface transportation programs, such as highways, transit, freight, safety, and research, and replaced the TEA-21, the previous six-year transportation act. The Highway Trust Fund (HTF) is the source of funding for most of the programs in the Act. The HTF is composed of the Highway Account, which funds highway and intermodal programs, and the Mass Transit Account. Federal motor fuel taxes are the major source of income into the HTF. The federal gas tax is currently set at 18.4 cents per gallon.

On the whole, relative to the size of the economy and need, U.S. public infrastructure investment is a relatively low percentage of GDP expenditures, adding to the problem of an aging infrastructure. Total spending on infrastructure peaked in 1958 at over 3 percent of GDP; it now stands at a little over 2 percent of GDP. The federal contribution to total infrastructure spending peaked at just over 1 percent of GDP in 1980 and has declined significantly since the 1990s.[12] Even in this context, the current levels of federal spending were only achieved by spending down accumulated surpluses in the HTF that have now evaporated. Receipts from motor fuel taxes are not generating sufficient revenue to sustain the current level of federal investment in transportation infrastructure. While Congress has periodically approved modest increases for federal investment in surface transportation, it has not approved an increase in the tax since 1993. Just as with the state motor fuel taxes, inflation has steadily eroded the purchasing power of the HTF.

Federal statute requires the Office of Management and Budget (OMB) to reduce the amount of Obligation Authority (OA) provided to the states in order to always maintain a positive balance in the HTF. As reported by Citi, OMB has already taken six separate actions to reduce the amount of OA provided to the States. The six rescissions have cost the states more than $11 billion in previously unused and current Obligation Authority. The rescissions have cost the Vermont AOT nearly $49 million in unused Obligation Authority for FYs 2006, 2007, and 2008. Due to the same trends experienced at the state level, a decrease in miles of driving and a movement toward more fuel-efficient cars brought the flow of revenues to such a dangerous level that Congress enacted an $8 billion emergency funding to keep the HTF solvent. JFO reports that, "The Congressional Budget Office projects that when the current multi-year federal transportation bill expires in September 2009, federal outlays will decline by more than 20% unless federal taxes are increased by the equivalent of up to 8 cents per gallon in the gasoline tax.[13]

SAFETEA-LU also established the National Surface Transportation Policy and Revenue Commission to study and report on current conditions and future needs of the surface transportation system, and the possibility of potential funding to meet such needs. It also created the National Surface Transportation Infrastructure Financing Commission to study the Highway Trust Fund revenues and the impacts of these revenues on future highway and transit needs. There seems to be

[12] James K. Galbraith, "The Macroeconomic Considerations of a Public Investment Strategy," October 2007, page 7.
[13] Legislative Joint Fiscal Office, "Vermont Transportation Funding: An Ongoing Dilemma," October 2008, page 10.

some movement toward finding an alternative to motor fuel taxes, such as the use of vehicle miles travelled (VMT) systems. These alternatives are, however, at best, several years away.

Because the current federal authorization will expire in September 2009, Vermont will also need to protect its status as a "donee" state (i.e., the State receives more than $1 back for every $1 it contributes to the HTF). Vermont has the sixth highest rate of return (RoR) among the states and has benefited from this position for some time.

Vermont's Projected SAFETEA-LU Rates of Return	
FFY	**Rate of Return**
2005	203.03%
2006	211.60%
2007	207.18%
2008	204.85%
2009	206.43%

Source: Citi

With the re-authorization in 2009 and perhaps even sooner, any economic stimulus program contemplated by the Federal government, Vermont will need to advocate to maintain its positive status, as there will be competing pressures to "equalize" this, especially from "donor" states.

IV. Potential Revenue Sources

On both a national and state level, a dialogue should occur to identify revenues or sources of funds to maintain adequate infrastructure funding. Studies outside of Vermont have identified a number of potential sources as follows:

Specific Tool	Scope: Program	Scope: Project	Potential Yield	Locations Used
Fuel Taxes				
Motor fuel excise (per gallon) tax	X		H	All states, Federal
Indexing of the motor fuel tax	X		H	FL, KY, ME, NE, NY, NC, PA, WV
Sales tax on motor fuel	X		H	CA, GA, HI, IL, IN, MI, NY
Other petroleum related taxes	X		H	NY, PA
Vehicle Fees				
Registration or related fees	X		H	All states
Sales tax on vehicle sales	X		H	KS, NC, NE, MN, MO, OK, SD
Tolling, Pricing, and Other User Fees				
Tolling new or existing roads and bridges		X	M	About ½ of States (e.g., TX, FL, VA)
HOT lanes, express toll lanes, truck toll lanes		X	M	CA, CO, GA, MN, TX
VMT fees	X		H	OR testing, 15 state pooled fund study
Transit fees (fares, park-and-ride fees, other)	X		H	All transit agencies
Freight/Container fees	X	X	M	CA
Local Option and Beneficiary charges				
Beneficiary charges/value capture (special assessment, impact fees, and tax increment financing)		X	L	Multiple (e.g., CA, FL)
Permitting local option taxes for highway and transit improvements (e.g., sales tax)	X	X	M	46 states have legislation
General Revenue Sources	X		H	Most states and localities

Source: Cambridge Systematics, Options in Addressing the Looming Transportation Funding Crisis

Vermont's options are somewhat limited by its population and demographics. It does not have immediately identifiable opportunities for tolling, although both investment banks investigated this option. If the state continues to rely on the traditional types of funding sources, increases will be necessary to address even minimal infrastructure needs.

The AOT consulting report prepared by Resource Systems Group (RSG) includes a number of recommendations for consideration, although recognizing at the same time the difficulties associated with them. The options recommended for consideration include[14]:

- Increasing the Motor Fuel Tax: An increase in the motor fuel tax could be used as a short-term fix for revenue shortfalls.
- Indexing the Motor Fuel Tax: The report suggests that the motor fuel tax could be indexed to some cost and automatically adjusted on a periodic basis.
- Vehicle Tax Increase: A vehicle tax increase can take the form of sales tax, registration, and/or wheelage tax.
- Impact Fees: As stated by RSG, traditionally, impact fees have been used by local governments but they can also be used by the state. This fee, however, does have the tendency to suppress demand for highway improvements as it requires local beneficiaries to contribute to the cost of improvements.

[14] Resource Systems Group, Vt Long Range Transportation Business Plan Working Paper 3: Financial Analysis, February 2007, pages 48- 49.

- Local Option Sales Tax: Again, as noted by the consultant, this tax is generally used by local jurisdictions but it can also be used to raise revenue for regional improvements.
- General Sales Tax Increase: This tax is not normally used for transportation funding, but under certain circumstances may be an appropriate funding tool.
- Mileage-Based Tax Options: These were recommended on a longer-term basis, consistent with the direction being taken at the federal level.

Other options reviewed by RSG include:

- Motor Vehicle Violation Surcharge: A surcharge is levied on various traffic offenses, such as drunk driving and speeding. Funds collected from this source can be used as an additional revenue source to support transportation.
- Vehicle Trade-in Exemption: Elimination of exemption of trade-in value from the sales tax is another source of income.
- Sales Tax on Gasoline Sale: Gasoline is currently exempt from the sales tax. Imposing sales taxes on gasoline has the potential of generating significant revenue.

One interesting potential new revenue source identified by Citi and utilized by the State of New York is a "Petroleum Business Tax (PBT)." In the case of motor fuels, the PBT is in addition to the traditional excise taxes on gasoline and diesel fuels. Gasoline becomes subject to the PBT at the initial point in the New York distribution chain (e.g., importation), while automotive-type diesel becomes taxable upon the first otherwise non-exempt sale or use of the product in New York.

A revenue source crafted in a similar manner, such as a Motor Fuel Distributor Infrastructure Assessment, could provide a source of new funds for Vermont to support a bonding program for bridges and culverts.

JFO has calculated the impact of changes to existing transportation taxes (updated October 2008) as follows:

- Raised by 1¢ on gas tax $3,677,720
- Raised by 1¢ on diesel tax 716,000
- Raised by 1% on purchase & use tax 12,830,944

RSG also reviewed the current practice of the use of "non transportation" appropriations from the Transportation Fund. Over the last several years this has been reduced by approximately $10 million dollars to a current level of $32.789 million for public safety uses. This does, however, represent a considerable diversion of resources. In addition, 1/3 of the purchase and use tax is used as revenue to the Education Fund. Obviously, realignment of these transfers between the transportation, education, and general funds, to the benefit of the transportation fund, will have repercussions in the other funds. However, such a process over a number of years would provide additional capital to the transportation fund and may be a better use of resources given the opportunity for federal grant matches. Two of the bonding scenarios proposed by Citi make use of a gradual phasing/realignment of these resources.

There is never a good time to contemplate tax or fee increases, and given the economic climate, such increases are even harder to consider. That said, transportation infrastructure, including bridges, requires an infusion of cash resources. No options should be taken off the table without first having the benefit of a meaningful analysis. Further, to the extent revenue increases promote job creation and economic stimulus, this may be a very appropriate time to consider such measures.

V. Financing and Funding Options

As noted in the Executive Summary, bonding options have been presented by the two investment banks working with the Office of the State Treasurer. In looking at the options, a distinction is made between financing and funding. Financing involves the use of strategies, including bonding, that capture or leverage the value of a stream of revenue and then paying over time for the current use of those future revenues. [15] In cases where there are significant inflationary costs, this can also result in increased net resources, but as a general rule they add little or no new resources to the funding gap. Pure financing options include general obligation debt and revenue bonds pledging existing revenue sources and, to some extent, GARVEES. They do not provide additional resources to pay for the bonds, except the savings on the inflationary trends. These bonds do have some economic gain, but should be viewed as part of a larger funding program involving the infusion of additional resources.
Funding refers to the generation of revenue through various means such as gas and other taxes, fees, and licenses. An optimum strategy, such as revenue bonds and/or the double-barreled bonding configuration cited below, captures both elements – acceleration of resources by leveraging future increased or new revenue flows.

The most prevalent financing mechanisms identified in other states include the following: [16]

---

[15] Washington State Department of Transportation, Transportation Infrastructure Financing Alternatives, 2004, p1

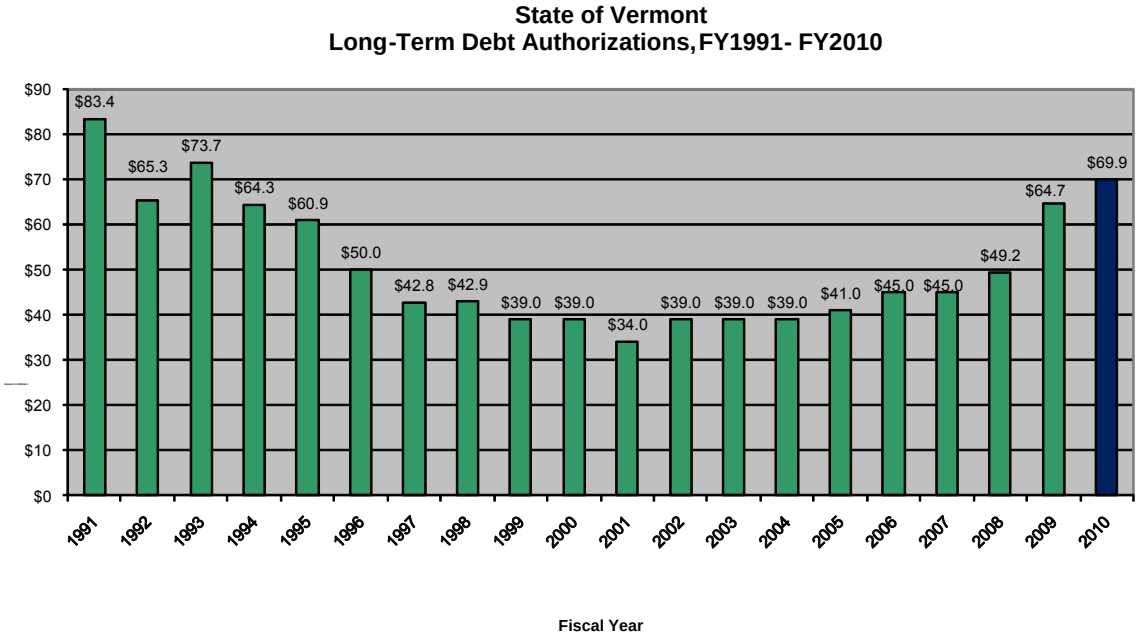
[16] TransTech Management, Inc., "Traditional Debt Financing as a Transportation Financing Mechanism," Briefing paper to Section 1909 Commission of the U.S. Department of Transportation, 2007, page 3.

Type of Debt	Primary Repayment Examples
General Obligation	• General revenues of issuing entity (sometimes issued as "double barreled" with first source of repayment a specific revenue source and only secondarily general fund revenues of the issuing entity)
Highway / Transportation Revenue Bonds	• Gasoline and other fuel taxes • Motor vehicle registration and drivers' license fees • Automotive-related sales taxes (e.g., on automobile and automobile parts) • Personal property taxes (e.g., on automobiles) • Other transportation-related fees, fines, and miscellaneous receipts
Toll and Farebox Revenue Bonds	• Toll receipts (e.g., on tolled highways, bridges, and tunnels) • Farebox receipts and ancillary revenue (e.g., on heavy and light rail and bus transit systems)[4]
Sales Tax Revenue Bonds	• General sales taxes dedicated at least in part to transportation purposes such as transit or highway investment
Personal Income Tax Bonds	• Personal income tax collections
Grant Anticipation Notes / Bonds	• Future federal and / or state funding
Bond Anticipation Notes	• Anticipated bond proceeds
Lease Revenue Bonds (incl. Certificates of Participation)	• Revenues from leases of capital assets

The following information outlines the application of these methods to the Vermont transportation/bridge financing needs. Bond anticipation notes, which provide temporary funding in anticipation of long-term debt, certificates of participation, and personal income tax bonds were not considered feasible alternatives and are not included.

General Obligation Bonds

The State could use General Obligation bonds to fund more transportation needs. As noted previously, transportation is a very small part of current debt outstanding. Because of their use of the State's "full faith and credit," G.O. bonds are generally rated better than other alternatives, reducing the cost of capital. This would require some increase in the current level of general obligation debt, on top of increases of levels already experienced over the past several years (dollars in millions, FY 2010 projected):



Significant increases will have an impact on the State's bond rating and these should be contemplated as part of the annual process of review completed by the Capital Debt Affordability Advisory Committee. As noted above, the State has already had a significant increase in G.O. debt authorized: approximately 79% since 2004, and 42% in the last two years (includes CDAAC recommended authorization amount of $69.9 million in FY 2010).

The balance between bond issuance and the maintenance of high credit ratings, which have the effect of reducing interest rates for borrowed funds, is an important consideration for the State. In the early 1970s, Vermont lost its Triple-A bond rating, largely because of a significant accumulation of bonded indebtedness. There were three principal causes for the increase in outstanding debt: interstate highway construction, extensive school construction and renovation, and sewage treatment plant construction. Another factor that may have concerned analysts at that time was the extension of moral obligation support for industrial mortgage guarantees, the Bond Bank, and VHFA (C. Cohen 9/13/89).

In 1975, Vermont enacted in statute the so-called "90 percent rule" as a policy device to reduce its large amount of accumulated tax-supported debt. New general obligation debt authorization was restricted to 90 percent of the debt being retired in the same fiscal year. The policy was successful. The ratio of debt as a percent of personal income, a key benchmark for rating analysts, was reduced from about 11% in the mid-1970s to about 3% in 1989. Clearly though, the "90 percent rule" policy was not sustainable, and policymakers recognized it would eventually lead to unrealistically small amounts of allowable new debt.

In 1990, the "90 percent rule" was repealed and the Capital Debt Affordability Advisory Committee was created to provide a new framework for determining the appropriate level of new debt issuance for the State. Interestingly, in 1991 the CDAAC recommended issuance of $100 million of new debt based on pent-up demand for infrastructure funding, the need to stimulate the economy with job creation, and attractive interest rates. Perhaps coincidentally, Vermont's bond rating was reduced

from AA to AA- by Standard & Poor's in 1991. Since that time CDAAC and Vermont policymakers have faithfully worked to improve the State's debt profile by being conservative in new debt issuance, utilizing cash from one-time surplus funds to supplement bonding for infrastructure financing, and expanding the State's economic base.

It has been nearly two decades since the Capital Debt Affordability Advisory Committee was created. To give an idea of the kind of progress made by the State, in 1996, Vermont's debt as percentage of personal income was twice the national median and we ranked 9th highest in the country. In 2008, the State is under the national median for that ratio and ranked 33rd highest in the country. In recognition of this kind of progress, as well as the fact that Vermont had surpassed existing benchmarks and the desire to regain Triple-A rating status, in 2004 the CDAAC adopted new debt guidelines reflecting the State's current and prospective performance in terms of debt load measures compared to Triple-A rated states. The State now meets or exceeds all guidelines. In February of 2007, Vermont rejoined the ranks of Triple-A rated states when Moody's raised its rating for the State to Aaa from Aa+.

The improvement in the bond rating and a reduction in bonds outstanding, has had the impact of providing additional capacity for debt, which has been reflected in the recent increases in the CDAAC recommendations. CDAAC could conceivably recommend additional moderate increases over the next several years, but not at levels necessary to fund the transportation needs presented in this report. This would require increases of over 50% to the current outstanding balance of debt outstanding. This would have serious repercussions on our credit ratings.

Prioritization of Existing General Obligation Debt to Incorporate Additional Transportation High Inflation/Ready to Go Projects

While some transportation expenditure is included in the capital bill, the State's transportation system is largely funded by a "pay-as-you-go" approach utilizing a combination of federal and state revenues. As of June 30, 2008 State transportation debt outstanding was just $9,088,000, representing just 2.07% of total overall debt outstanding. With the FY09 bond authorization, this number will increase significantly with the addition of $15,200,000 out of an anticipated issue of $64,650,000. This is still far less than what is needed.

While still only an incremental increase contributing to the total solution, some prioritization of projects to accommodate a larger proportion of transportation projects within the existing CDAAC recommended levels appears to be in order. In addition, a prioritization process of selecting projects for inclusion in a bond issue is needed. The state has at present authorized but unissued bonds of $3.7 million. This is because the projects selected for bonding have not "drawn down" bonded funds at a rate that would support full issuance of existing bond capacity, largely due to slow start-up or use bond funds. Either the project is not "ready" or it is expending at less than anticipated rates. Moreover, the State has had to "swap" projects, i.e., replace slow spending projects with other authorized projects so as not to violate its bond spend down requirements creating an "arbitrage" rebate due to the federal government. Given that some authorized projects are not presently in need of immediate cash but, at the same time, there exists a "pent up" need for transportation (and other needs such as school building), some re-prioritization of future appropriations, to factor in "readiness" and projected schedule of completion, would seem in order. In addition, inflation costs

are higher for some projects than others. It is recommended that proposed project capital planning authorizations submitted to the General Assembly include a documentation of underlying inflation trends and cash-flows and that the Treasurer, jointly with the Commissioner of Finance & Management, complete an independent analysis of each project for review by the General Assembly. An example was noted in the AOT Bridge Study. AOT noted that there were different inflationary assumptions for the three categories of bridges (federal, state, local). While certainly "need" is the predominant factor in prioritization, if all things are held equal, the project with the highest inflationary factor should be given more consideration for bonding. In a personal finance situation, if you had two outstanding loans for similar purposes and excess cash, you would first pay off the loan with the highest interest rate. The same principle should apply to the bonding cost calculations.

Grant Anticipation Revenue Vehicles or GARVEEs

For many years, states, municipalities, and authorities have raised funds by issuing grant anticipation notes (GANs), which allow governmental entities to fund projects based on anticipated future grant revenues. GARVEEs employ federal highway funds in the same way – to repay the debt for road and bridge projects. A GARVEE is a debt-financing instrument that permits the pledge of future federal highway funds to repay investors. A state may use future obligations of federal-aid funds to reimburse the retirement of principal and payment of interest, issuance, insurance, and associated other costs for the sale of an eligible debt-financing instrument. Moving revenues forward in time will reduce the cost of the bridge replacement program as projects can be completed sooner, avoiding inflationary costs related to projects and providing the opportunity to prioritize preventative maintenance projects, reducing costs. It does not, however, add additional revenue streams but merely accelerates the receipt of funds.

- Direct GARVEE: These are bonds, in which Federal assistance directly pays debt service paid to investors. An evaluation of Vermont's federal funding over the life of SAFETEA-LU and assuming conservative interest rate and revenue growth assumptions, Citi believes the State could generate $333 million to be used on its federal-aid projects while maintaining the State's robust PAYGO program and achieving 'AA' category ratings for a new credit that will have no recourse to the State's full faith and credit.

- Indirect GARVEE: This is a funding mechanism in which Federal funds reimburse expenditures on other Federal-aid projects and the State subsequently uses a portion of those funds to pay debt service on the debt-financed project. The debt-financed project does not need to be a Federal-aid project.

While Citi favored GARVEEs, they opted for the direct model in the analysis. Morgan Stanley was less enthusiastic about GARVEEs in general as this approach would not add additional revenues. Morgan Stanley did recommend the use of indirect GARVEEs if GARVEEs were selected, based on enhanced flexibility.

The Office of the State Treasurer would recommend serious consideration of direct GARVEES where preventative maintenance projects with high inflation costs can be identified. AOT would

need to provide a list of those projects with the associated estimated timeframes for completion, to size and price an issue.

GARVEES can be structured in several ways. One is to pledge only the federal highway revenues to back the bonds. The advantage here is that the state's "full faith and credit" is not backing the bonds. If the Federal Highway Trust funds backing the bonds were not re-authorized or diminished, there would be no recourse to access other State revenues or taxing authority to satisfy the bonds. That clearly has some impact on the credit rating associated with the bond issue and affects the cost of capital. Citi states that no direct, naked (no additional state revenue support) GARVEE program has achieved ratings higher than Aa3/AA-/AA- ratings from Moody's, S&P, and Fitch, respectively, since these ratings are more a function of the receipt of federal funds and the ongoing federal highway funding authorization process than the fundamental credit quality of the State. Issuing debt at a lower rating also affects the cost of capital.

The Office of the State Treasurer would more than likely recommend a model that includes additional backstops beyond the federal revenue source. The State of Maryland pledged all of its Transportation Trust Fund (similar to Vermont's T-Fund) as a back-up to its GARVEEs and received Aa2/AAA/AA ratings.

While at least two of the rating agencies would calculate debt ratios with and without GARVEE debt, separate identification of GARVEE debt amounts would be viewed more favorably by investors and rating agencies than an equivalent increase in G.O. debt. In the absence of other negative factors (budgetary, revenue, pension funding, etc.), GARVEE issuance in an amount similar to that discussed above is unlikely to result in a rating reduction to the State's general obligation debt.

As discussed above, the use of GARVEEs would accelerate cash available for projects, which can assist in high inflation projects, but does not add additional new revenues to the equation beyond inflationary savings. In 2004, the Office of the State Treasurer conducted a cost-benefit analysis using a variety of bond scenarios to test the impact of moving the project schedules forward by using GARVEEs. Using a model of two $50 million bond issues, the Treasurer's Office tested various scenarios. Depending on the scenario utilized, use of GARVEEs could cost (after factoring in debt service, inflation, and investment of bond proceeds) $11,562,196 over a 16-year period or save up to $1,599,019 with a range of potential scenarios close to zero fiscal impact. Economic gains from improved highways are not included in the analysis and mitigate any minimal cost.

The advantage of GARVEEs is to move project scheduling forward, which in and of itself can add economic benefit and potentially lower the cost of repairs. Another factor to consider would be the capacity for AOT to utilize these funds in the first few years. Their modeling suggests that there would be a ramp-up period to utilize any significant infusion of capital. If GARVEEs are contemplated, a detailed review of AOT cash-flows for specific projects would need to be completed. Targeted use of GARVEES is recommended for "ready-to-go," high inflation projects.

Highway Revenue Bonds Leveraging Existing Revenues

These bonds leverage a portion of a state's transportation related taxes and/or fees and are widely used tools to accelerate high-priority projects. As noted by Citi, "Unlike GARVEEs, state highway revenue bonds can be used on both federal aid projects and non-federal aid projects. Further, rating

agency criteria are more flexible for highway revenue bonds than to GARVEEs when compared on a basis of additional bonds tests and final maturities as states are in control of the reauthorization or continued authorization of its own taxes whereas it is dependent upon Congress to authorize…funding."

Since Transportation Fund revenues are considered part of the total revenues used by rating agencies to calculate general obligation debt ratios, use of identified transportation revenues in bonding is not additive to the State's debt capacity. While this funding alternative may be a basis to raise capital, unless inflation and preventative maintenance savings on specific projects are identified, the pledging of existing revenues does not add significant value.

Bonding in Combination with New Revenue Source

As noted in the executive summary, bonding makes more sense, and provides a funding mechanism, when backed by a new identifiable and available revenue source to pay for the bonds. There are two traditional ways to bond using revenues: double-barreled bonds using the State's general obligation back-stop with a new revenue source, and revenue bonds utilizing an increase to an existing revenue source or new revenue source. The latter will be reviewed first.

Revenue Bonds with Increased Revenue from Existing Streams

These can include a certain percentage or a portion of certain taxes and fees as security for bonds through increased revenues. For example, as outlined by Citi, last year the Maine Legislature raised its registration fee, vanity license plate fee, and title fee, each by $10 and dedicated those monies to a new highway revenue bond program. The legislature also allocated 7.5% of the Maine motor fuel excise tax and a portion of the state police cost along with the new fee revenue to secure a new highway revenue bond program that is expected to raise more than $200 million for Maine transportation projects over the next four years. Building off the main scenario, Citi has suggested a series of recommendations using a variety of increased revenue sources to fund the bonds.

Using a combination of registration, purchase and use, and motor fuel tax increases, totaling $41,688,409 dedicated to new bonds, Citi estimated that the State could raise over $252 million to fund projects. The line-up proposed by Citi included:

Fee	Increase	Transactions	Total Revenue
Pleasure Car Registration - 1 yr	$10	332,315	3,323,150
Pleasure Car Registration - 2 yr	$10	46,073	460,730
Truck Registration to 6,099lbs	$10	117,687	1,176,870
Truck Registrations 6,100 to 80,000 lbs	$10	20,116	201,160
IRP Registration	$10	13,038	130,375
Motorcycles Registrations	$10	28,284	282,840
Registrations - small trailers	$10	29,671	296,710
Registrations - large trailers	$10	61,949	619,490
Vanity Plates	$10	30,000	300,000
Conservation Plates - New	$10	1,416	14,160
Conservation Plates - Renew	$10	7,470	74,700
Veteran Plates	$10	499	4,990
Safety Organization Plates	$10	369	3,690
Motor Fuel Excise Tax	5 cents	N/A	18,388,600
Diesel Fuel Excise Tax	5 cents	N/A	3,580,000
Purchase and Use Tax	1 cent	N/A	12,830,944
Total			**41,688,409**

Source: Citi

The fees and taxes proposed by Citi are illustrative; any combination of increased revenues to the $41.6 million level would achieve the same result: permit the State to generate $252 million in upfront bonding to fund needed transportation projects, to be paid for by the fee increases. As noted in the chart below, the debt service payments by year equal increase in the "pay-as-you go" revenues, so that future cash flows are positively by the upfront borrowing.

Highway Revenue Bonds - Increased Fees and Taxes Scenario						
Period Ending (1/1)	Principal	Interest	Total Debt Service	Total Revenues	PAYGO Revenues	Coverage
2010	8,010,000	12,830,725	20,840,725	41,688,409	20,847,684	2.00x
2011	8,250,000	12,590,425	20,840,425	41,688,409	20,847,984	2.00x
2012	8,520,000	12,322,300	20,842,300	41,688,409	20,846,109	2.00x
2013	8,840,000	12,002,800	20,842,800	41,688,409	20,845,609	2.00x
2014	9,195,000	11,649,200	20,844,200	41,688,409	20,844,209	2.00x
2015	9,605,000	11,235,425	20,840,425	41,688,409	20,847,984	2.00x
2016	10,040,000	10,803,200	20,843,200	41,688,409	20,845,209	2.00x
2017	10,540,000	10,301,200	20,841,200	41,688,409	20,847,209	2.00x
2018	11,065,000	9,774,200	20,839,200	41,688,409	20,849,209	2.00x
2019	11,620,000	9,220,950	20,840,950	41,688,409	20,847,459	2.00x
2020	12,200,000	8,639,950	20,839,950	41,688,409	20,848,459	2.00x
2021	12,870,000	7,968,950	20,838,950	41,688,409	20,849,459	2.00x
2022	13,580,000	7,261,100	20,841,100	41,688,409	20,847,309	2.00x
2023	14,325,000	6,514,200	20,839,200	41,688,409	20,849,209	2.00x
2024	15,115,000	5,726,325	20,841,325	41,688,409	20,847,084	2.00x
2025	15,945,000	4,895,000	20,840,000	41,688,409	20,848,409	2.00x
2026	16,825,000	4,018,025	20,843,025	41,688,409	20,845,384	2.00x
2027	17,750,000	3,092,650	20,842,650	41,688,409	20,845,759	2.00x
2028	18,725,000	2,116,400	20,841,400	41,688,409	20,847,009	2.00x
2029	19,755,000	1,086,525	20,841,525	41,688,409	20,846,884	2.00x
	252,775,000	**164,049,550**	**416,824,550**	**833,768,180**	**416,943,630**	

Source: Citi

No increase in any tax or fees is a welcome alternative. In order to provide a means of funding larger scale improvements to the highway systems, however, some combination of revenue increases must be examined. While GARVEEs and the pledging of existing revenue streams

will add value in terms of inflationary and preventative savings, these alone are not sufficient to solve the transportation funding problem. As part of its infrastructure planning efforts, Resource Systems Group (RSG) has completed a draft Working Paper 3: Financial Analysis for the "Vt Long Range Transportation Business Plan," developed by AOT. In addition, the JFO, in its 2008 Fiscal Facts, outlines the impact of changes to a number of taxes and fees. Alternative sources of revenue are included in Section IV of this report. Many identified alternatives may not necessarily be feasible at this time but some dialogue to close the funding gap is needed.

In the above table, the coverage factor relates to the additional bond test or ABT. Bonds cannot be issued unless the issuer can demonstrate that revenues are available to pay the current debt service plus the additional debt service of the new bonds. The rating agencies regard this as an important feature because the ABT will establish a minimum debt service coverage level that will legally bind the State from issuing additional debt using the same transportation revenue source if the coverage threshold is crossed. The ABT is usually expressed by a factor such as 1.25 times meaning revenues must be 125% of the current and future debt service in order to issue additional bonds using this revenue source. This is a feature common in revenue bonds.

Eliminating the Diversion or Reallocation of T-Fund Revenues and Expenses

One way to minimize the need to raise revenues is to eliminate the 33% diversion of the Purchase & Use Tax that is sent directly to the Education Fund rather than transportation. Obviously, the Education Fund would then need to be made whole through a combination of either incremental increases to the appropriation base, revenues and/or expenditure efficiencies. Since these would take some time to implement, Citi recommended modeling a "phase-in" approach to reduce the draw on the Transportation Fund and use these funds to raise capital though bonding. Citi presented such a model.

5-Year Phase in of 33% of P&U Tax		
FY	T-Fund ($ Mil)	Education Fund
2008	-	25.66
2009	5.13	20.53
2010	10.26	15.40
2011	15.40	10.26
2012	20.53	5.13
2013	25.66	-

Source: Citi

Using this model, debt issuance of $74 million in year one and $224 million plus in year four of the phase-in, over $299 million in upfront capital would be raised.

Highway Revenue Bonds - Purchase and Use Tax Scenario							
Period Ending (1/1)	Issue 1 Principal	Issue 1 Interest	Issue 2 Principal	Issue 2 Interest	Total Debt Service	Total Revenues	Coverage
2010	-	4,035,775	-	-	4,035,775	5,132,378	1.27x
2011	-	4,035,775	-	-	4,035,775	10,264,756	2.54x
2012	-	4,035,775	-	-	4,035,775	15,397,134	3.82x
2013	2,895,000	4,035,775	1,290,000	12,307,230	20,528,005	20,529,512	1.00x
2014	3,010,000	3,919,975	6,475,000	12,255,630	25,660,605	25,661,890	1.00x
2015	3,145,000	3,784,525	6,765,000	11,964,255	25,658,780	25,661,890	1.00x
2016	3,290,000	3,643,000	7,065,000	11,659,830	25,657,830	25,661,890	1.00x
2017	3,450,000	3,478,500	7,425,000	11,306,580	25,660,080	25,661,890	1.00x
2018	3,625,000	3,306,000	7,795,000	10,935,330	25,661,330	25,661,890	1.00x
2019	3,810,000	3,121,125	8,190,000	10,537,785	25,658,910	25,661,890	1.00x
2020	4,010,000	2,921,100	8,620,000	10,107,810	25,658,910	25,661,890	1.00x
2021	4,230,000	2,700,550	9,080,000	9,650,950	25,661,500	25,661,890	1.00x
2022	4,465,000	2,467,900	9,575,000	9,151,550	25,659,450	25,661,890	1.00x
2023	4,710,000	2,222,325	10,100,000	8,624,925	25,657,250	25,661,890	1.00x
2024	4,970,000	1,963,275	10,655,000	8,069,425	25,657,700	25,661,890	1.00x
2025	5,240,000	1,689,925	11,245,000	7,483,400	25,658,325	25,661,890	1.00x
2026	5,540,000	1,388,625	11,865,000	6,864,925	25,658,550	25,661,890	1.00x
2027	5,860,000	1,070,075	12,515,000	6,212,350	25,657,425	25,661,890	1.00x
2028	6,195,000	733,125	13,205,000	5,524,025	25,657,150	25,661,890	1.00x
2029	6,555,000	376,913	13,960,000	4,764,738	25,656,650	25,661,890	1.00x
2030			21,695,000	3,962,038	25,657,038	25,661,890	1.00x
2031			22,945,000	2,714,575	25,659,575	25,661,890	1.00x
2032			24,265,000	1,395,238	25,660,238	25,661,890	1.00x
	75,000,000	**54,930,038**	**224,730,000**	**165,492,588**	**520,152,625**		

As an alternative model, Citi proposed a phase-out of public safety expenditures from the T-fund. The same approach used to leverage the portion of the P&U tax could be used to leverage funds currently appropriated to fund a portion of the State's police cost (the "T-Fund Public Safety Allocation"). Eliminating this allocation is another way for the State to raise new funds for transportation, although again the "back fill" issue exists in the general fund. Citi used a hypothetical model to display the impacts of this phase-out (note actual FY08 levels are closer to $33 million although the model has a slightly higher starting point):

5-Year Phase in of T-Fund Public Safety Allocation		
FY	**$ Able to be Pledged**	**T-Fund Public Safety Cost**
2009	-	35.44
2010	7.09	28.35
2011	14.18	21.26
2012	21.26	14.18
2013	28.35	7.09
2014	35.44	-

Citi used the same bonding approach as in our P&U tax analysis, which assumes a $75 million issuance in Year 1 of the 5-year phase in period, with a second issuance in Year 4, maximizing the Program once revenues have ramped up. Further, Citi assumed this to be an AA rated "state

appropriation" type credit with 1.)x coverage, where the legislature would make the appropriation of the funds on an annual basis. Under the state appropriation credit, Citi anticipates the state could raise more than $404 million in combined principal.

Highway Revenue Bonds - T-Fund Public Safety Allocation Phase-Out							
Period Ending (1/1)	Issue 1 Principal	Issue 1 Interest	Issue 2 Principal	Issue 2 Interest	Total Debt Service	Total Revenues	Coverage
2010	-	4,035,775	-	-	4,035,775	7,088,177	1.76x
2011	-	4,035,775	-	-	4,035,775	14,176,354	3.51x
2012	-	4,035,775	-	-	4,035,775	21,264,531	5.27x
2013	2,895,000	4,035,775	2,895,000	18,525,840	28,351,615	28,352,708	1.00x
2014	3,010,000	3,919,975	10,100,000	18,410,040	35,440,015	35,440,885	1.00x
2015	3,145,000	3,784,525	10,555,000	17,955,540	35,440,065	35,440,885	1.00x
2016	3,290,000	3,643,000	11,025,000	17,480,565	35,438,565	35,440,885	1.00x
2017	3,450,000	3,478,500	11,580,000	16,929,315	35,437,815	35,440,885	1.00x
2018	3,625,000	3,306,000	12,155,000	16,350,315	35,436,315	35,440,885	1.00x
2019	3,810,000	3,121,125	12,775,000	15,730,410	35,436,535	35,440,885	1.00x
2020	4,010,000	2,921,100	13,445,000	15,059,723	35,435,823	35,440,885	1.00x
2021	4,230,000	2,700,550	14,160,000	14,347,138	35,437,688	35,440,885	1.00x
2022	4,465,000	2,467,900	14,935,000	13,568,338	35,436,238	35,440,885	1.00x
2023	4,710,000	2,222,325	15,760,000	12,746,913	35,439,238	35,440,885	1.00x
2024	4,970,000	1,963,275	16,625,000	11,880,113	35,438,388	35,440,885	1.00x
2025	5,240,000	1,689,925	17,545,000	10,965,738	35,440,663	35,440,885	1.00x
2026	5,540,000	1,388,625	18,510,000	10,000,763	35,439,388	35,440,885	1.00x
2027	5,860,000	1,070,075	19,525,000	8,982,713	35,437,788	35,440,885	1.00x
2028	6,195,000	733,125	20,600,000	7,908,838	35,436,963	35,440,885	1.00x
2029	6,555,000	376,913	21,780,000	6,724,338	35,436,250	35,440,885	1.00x
2030			29,965,000	5,471,988	35,436,988	35,440,885	1.00x
2031			31,690,000	3,749,000	35,439,000	35,440,885	1.00x
2032			33,510,000	1,926,825	35,436,825	35,440,885	1.00x
	75,000,000	**54,930,038**	**339,135,000**	**244,714,448**	**713,779,485**	**744,258,585**	

Over the past several years, the reallocation of public safety expenditures from the general fund has been reduced by approximately $10 million to the current level of $32.789 million. In the current economic climate, it may prove difficult to absorb any decreases in the base transfer level and again new revenues or expenditure reductions may be necessary.

In both "phase-in" (revenues) and "phase out" (expenditures), the central theme is the same: dedicate all originally intended resources to the transportation fund. As stated by Morgan Stanley:

> "In the course of our analysis, we have noted that a sizeable amount of Transportation Fund revenues is transferred out for non-transportation purposes. For example, one third of the annual revenue associated with the Purchase & Use Tax is allocated to the Education Fund. The Transportation Fund currently provides approximately $50 million [the actual current figure is $33 million] per year for other State operations. Reduction or elimination of these costs could significantly improve the State's transportation funding picture. While we recognize that other funding sources would be required to replace the transportation funds, it may be beneficial, as part of a broader review of government funding sources, to

review these sources in order to provide additional funds for transportation."

Double- Barreled Bonds

When using revenue bonds, issuers typically must pay slightly higher interest rates, and as noted above revenue bonds have higher coverage ratios to cover increased investor risk in the event that revenues do not materialize as expected. Double-barreled bonds are a hybrid solution that reduces both investor risk and the cost of capital. In this debt structure, the project's revenues provide the initial security and the secondary guarantee is provided by the general obligation taxing powers of the issuer. For instance, a revenue bond would be double-barreled if that bond is secured by highway revenues and if the state also secures the bonds with its full faith and credit. If highway revenues are insufficient to cover the debt service, investors can rely on the full faith and credit pledge of the State.

According to Morgan Stanley, "Because the pledged highway revenues would be assumed to pay the debt service on the bonds, there is no impact on the net direct debt of the State and therefore no impact on the State's debt ratios."

Since the rating agencies currently use the State's transportation fund as a source when calculating debt ratios for general obligation debt, its use as a mechanism to leverage double-barreled bonds is limited. To maintain the advantages of a double-barreled configuration it was determined, after review with bond specialists, that the State would have to use a **new revenue source** and not an enhancement to an existing source, to meet the rating agency requirements and gain the advantages contemplated in this configuration.

Using a variation of a proposal made by Morgan Stanley, the State could also issue general obligation bonds additionally secured by a pledge of a **new** source of funds for highway revenues. Because the pledged new highway revenues would be assumed to pay the debt service on the bonds, there is likely no impact on the net direct debt of the State and therefore no impact on the State's debt ratios. However, the State would still benefit from a low cost of capital because of the general obligation backstop.

Bond Maturity Schedule

Current state statute limits bond issuance to maturities of not over 20 years. While this has had the effect of rapid retirement of debt, a factor that sits well with the rating agencies, a review of appropriate bond principal amortization to create better matching of the maturity schedule to the useful life of the capital improvement may be in order. Lengthening the amortization to 30 years, for example, would increase the interest cost on the debt but would free up bond authorization capacity in the short-term.

Tolling

As part of the revenue enhancement section of this study, both investment banks reviewed the opportunities for tolling. As noted in the Morgan Stanley report, toll roads/bridges can provide a revenue stream for ongoing costs associated with State transportation and bridge assets. Given the

ramp-up period, estimated at several years, the expense associated with the conversion to tolls, and limited volume of traffic in likely toll locations, not much opportunity appears to exist based on tolling. The Citi report generally is in agreement. While consideration of tolling on I-89 and I-91 immediately inside the Vermont/Canadian border has been raised, a preliminary review of Average Annual Daily Traffic (AADT) data does not appear to be supportive of the concept.

In reviewing AADT data, Citi did note the State could potentially raise additional revenues if it considered the implementation of tolls at points with higher daily traffic volumes. For example imposing a toll on I-89 at the New Hampshire State line (37,000 AADT) and in between Exits 13 and 14 in South Burlington (52,200 AADT) along with a strategic tolling location on I-91 between Exits 10 and 11 in Hartford (28,800 AADT), could generate more substantial revenue than the cross-Canadian border alternative, but could have substantial public opposition in addition to significant ramp-up costs.

Other Considerations

Advocacy to Maintain the Current HTF Distribution Formulas

As noted in section IV of this report, Vermont currently receives substantially more than $1 back for every $1 it contributes to the HTF. The history of the re-authorization acts shows that there has been a narrowing of the gap between donor and donee states, setting a higher minimum floor. SAFETEA-LU raised the minimum RoR for donor states from 90.5% to 92% over the life of the Act (2005 – 2009). Citi expects that this relationship between donor and donee states "will surely be one of the most significant issues during the negotiations of the next reauthorization act." Any rise in the minimal guarantee will have a negative impact on Vermont's' more favorable position. Advocacy though our Congressional delegation on this issue will be critical.

Potential Economic Stimulus Package

All indications are that the Congress will soon take up some form of economic stimulus package incorporating both an infrastructure and jobs component, Infrastructure spending is the obvious first priority as it cures a large need, spurs economic development and creates good paying jobs during a time of rising unemployment. Reports suggest a major stimulus bill similar to one that passed the House in September 08 but stalled in the Senate and may be moved quickly, ahead of possibly a second initiative during the Obama Administration. Vermont should, through its congressional delegation, advocate for substantial distributions which should be considered in the State's capital needs and planning.

VI. Conclusion

Based on the following reality:

- Current revenue and spending patterns are not sufficient to address the deteriorating condition of Vermont Bridges;
- The longer this situation remains unaddressed, the more Vermonters will have pay to repair and replace failing bridges;

- Finance experts have stated unequivocally that bonding alone, without concomitant additional revenues, will not solve Vermont's bridge problems;
- The State is committed to protecting its favorable debt profile and ratings;
- An expanded effort to rehabilitate and replace, where necessary, Vermont's failing bridges would provide jobs and economic stimulus for Vermonters in a time of severe economic stress;
- The current depressed economic conditions are highly likely to provide a limited window of lower interest and construction inflation costs in the near to medium term;
- Vermont's per gallon gasoline tax rate was last adjusted in 1997, while the number of gallons of gasoline sold annually has declined over the last five years, and
- Vermont's total motor fuels taxes and fees should remain competitive with other New England states:

The Office of the State Treasurer recommends the following for consideration, in addition to the other options outlined in this report:

- A $150-180 million bridge rehabilitation and replacement bonding program in issuances phased in over the next decade, beginning with a $30-50 million issuance in year one, depending on readiness of projects;
- Funded by a Motor Fuels Distributor Infrastructure Assessment (MFDIA) of five cents per gallon (gasoline and diesel fuels - raises approximately $20 million annually) with a double-barreled backstop of Vermont full faith and credit;
- Revenues from MFDIA to be deposited in a restricted bridge rehabilitation and replacement fund to be used for debt service, relevant capital projects, and a capital reserve; and
- Additional consideration of GARVEE bonds for targeted bridges with the most compelling cost of construction inflation characteristics.

The advantages of the MFDIA funding approach include:

- Reduced costs to taxpayers over time, since savings from accelerated rehabilitation (reduced deterioration) and inflation avoidance will exceed the interest costs on borrowing supported by the MFDIA;
- Adequate revenues to pay the debt service on the bonds, without further depletion of the already declining revenues to pay for the care and maintenance of Vermont's transportation infrastructure;
- The lowest cost of interest rates stemming from the double-barreled backstop of Vermont's Triple-A rated full faith and credit;
- The likelihood this approach would not be additive to state net tax supported debt, since it relies on a newly identified revenue source, and would not negatively impact debt ratios and other capital financing priorities; and
- An administratively simple approach, since the MFDIA would be collected in the same fashion as the current motor fuels taxes and fees.

Bibliography

American Association of State Highway and Transportation Officials, Transportation: Invest in our Future - Revenue Sources to Fund transportation Needs, April 2007.

Arizona Department of Transportation, Developing a Stabilized Public Transportation Revenue Source, January 2007

Better Roads, "2008 Bridge Inventory"

Brasso, Jack, Infrastructure Financing: An Exploration of Options, American Association of State Highway and Transportation Officials, 2007

Cambridge Systematics, Options in Addressing the Looming Transportation Funding Crisis, presentation to 2007 AMPO Annual Conference, October 4, 2007.

Citi, "Vermont's Transportation Funding Opportunities:, October 24, 2008

Mishel, Lawrence, Ross Eisenbrey, and John Irons, " Briefing Paper: Strategy for Economic Rebound", Economic Policy Institute, January 2008.

Gailbraith, James K., The Macroeconomic Considerations of a Public Investment Strategy, New America Foundation, October 2007.

Morgan Stanley, "State of Vermont: Report on Bridge Improvement Financing Options, October 24, 2008

National Surface Transportation Policy and Revenue Study Commission, Section 1909 Staff, "Overview of Sustainability of Current Revenue Sources for Highway and Transit", Commission Briefing Paper 5A-16, March 2007.

New York Department of Taxation and Finance, Business Tax Publications, Petroleum Business tax, no date.

National Governors Association, State Policy Options for Funding Transportation, NGA Center for Best Practices, February 2007.

National Surface Transportation Policy and Revenue Study Commission, Transportation for Tomorrow, Commission Final Report, December 2007.

North Dakota Legislative Council "Highway Funding and Transportation Infrastructure needs-Background Memorandum", September 2007.

Oberstar, James L., Chairman, US House Committee on Transportation and Infrastructure, "The High Cost of Our Failing Infrastructure ", Address delivered to Iona College Nation Infrastructure Conference, New Rochelle, New York, February 19, 2008.

Rand Corporation, "Evaluation of Fuel Taxes as a Transportation Revenue Source", Commission Briefing Paper 5A-02, National Surface Transportation Policy and Revenue Study Commission, January 2007.

Resource Systems Group, Inc.; Snelling Center for Government; TransManagement; Center for Rural Studies and Hubert H. Humphrey Institute, Documentation for: Vt Long Range Transportation Business Plan Working Paper 3: Financial Analysis, February 26, 2007.

Scovel, Calvin L., Federal Highway Administration's Oversight of Structurally deficient Bridges, Office of the Inspector General, U.S. Department of Transportation, September 5, 2007.

Snelling Center for Government, "Vermont Roads and Bridges: Fix or Abandon?", September 26, 2008.

TransTech Management, Inc., "Traditional Debt Financing as a Transportation Financing Mechanism", Commission Briefing Paper 5A-12, National Surface Transportation Policy and Revenue Study Commission, January 2007.

Transportation Economic Partnerships office, Washington Department of Transportation, "Transportation Infrastructure Financing Alternatives, January 2004

Vermont Agency of Transportation, Performance Measures, March 21, 2005.

Vermont Agency of Transportation, "Section 29 of the Acts of 2008 Report", August 20, 2008.

Vermont Agency of Transportation, Program Development-Structures section, 2008 Annual Report.

Vermont Agency of Transportation, Technical Services Division, Traffic Research Unit, 2006 (Route Log) AADTs State Highways, June 2007.

Vermont Legislative Joint Fiscal Office, 2008, FI$CAL FACT$

Vermont Legislative Joint Fiscal Office, Vermont Transportation Funding An Ongoing Dilemma", October 2008.

Wachs, Martin, "A Quieter Crisis in Transportation Finance", Testimony presented before the Texas Study Commission on Transportation Finance, Rand Corporation, April 19, 2006.

Statutory Reference (Act 164 of 2008)

Sec. 29. BRIDGES AND CULVERTS, LONG-TERM ASSESSMENT, FUNDING OPTIONS

(a) The state treasurer, working jointly with the agency of transportation and the joint fiscal office, shall prepare a report containing a long-term needs assessment for repair, maintenance, and rehabilitation of bridges and culverts in the state and provide funding options and recommendations for such long-term needs.

(b) The report shall include, but not be limited to, the following:

(1) an evaluation of bridges and culverts using the established performance measures defined and used by the agency of transportation's program development division, and develop a plan, with estimated costs, for meeting such performance measures;

(2) a definition of preventative maintenance, present the agency's five-year plan for doing such maintenance, and the estimated costs for this maintenance;

(3) an estimate of the cost of replacing structures over the age of 70 years.

(c) The funding options and recommendations shall be developed by the state treasurer, who shall select and oversee, pursuant to a public competitive selection process, an investment bank to act as an adviser to the state to develop multiple financing proposals, including but not limited to general obligation, revenue, and GARVEE bond options, for a long-term program dedicated to funding life cycle rehabilitation work on bridges and culverts in the state system and on town bridges eligible for funding under the town highway bridge program that will extend the useful lives of these structures on a long-term, cost-effective basis.

(d) On or before November 15, 2008, the treasurer shall provide the report to a special committee composed of the following: the members of the joint transportation oversight committee, the secretary of transportation, the treasurer, the secretary of administration, two gubernatorial appointees, and the commissioner of finance and management. The chair of the Joint transportation oversight committee shall be the chair of the special committee. The special committee shall meet as necessary to review the report, and by December 1, 2008 shall make such recommendations to the governor as the committee may deem appropriate regarding funding options for such programs, including annual reductions in the amount of transportation funds appropriated for general government purposes as well as other state revenues generated by transportation functions that are not deposited in the transportation fund.

(e) The state treasurer shall also provide the report to the capital debt affordability advisory committee for its consideration and deliberations.

Office of the State Treasurer

Debt Information and Schedules

Vermont Bridge Funding Study Summary of Financing Options Amounts Issuable				
Bond Type	Coverage Ratio	Amount Issuable	Coverage Ratio	Amount Issuable
20 year Double Barrel	1.25x	$189,000,000	1.5x	$157,000,000
20 year Trans Revenue	1.75x	$133,000,000	1.5x	$156,000,000
30 year Double Barrel	1.25x	$219,000,000	1.5x	$181,500,000
30 year Trans Revenue	1.75x	$153,000,000	1.5x	$180,000,000

VERMONT

2009

Estimated Debt Service Schedule Computed on: 16-Nov-08

For the:

State of Vermont

FY 2009 Double Barrel

Assumptions:

Bonds Delivered: 01-Jan-09

Bonds Rated AAA/AA+

Estimated % Rates as of: ***31-Oct-08***

Bond Amount:

$ 189,000,000

TERM: 20 Years

# Years	Payment Dates	$Amount of Principal	Est % Rates	$Amount of Interest	$Total Debt Service	$Total Fiscal Year
	January-09				0	
	July-09			4,066,335	4,066,335	
1	January-10	9,450,000	1.850%	4,066,335	13,516,335	17,582,670
	July-10			3,978,923	3,978,923	
2	January-11	9,450,000	2.310%	3,978,923	13,428,923	17,407,845
	July-11			3,869,775	3,869,775	
3	January-12	9,450,000	2.770%	3,869,775	13,319,775	17,189,550
	July-12			3,738,893	3,738,893	
4	January-13	9,450,000	3.230%	3,738,893	13,188,893	16,927,785
	July-13			3,586,275	3,586,275	
5	January-14	9,450,000	3.690%	3,586,275	13,036,275	16,622,550
	July-14			3,411,923	3,411,923	
6	January-15	9,450,000	3.870%	3,411,923	12,861,923	16,273,845
	July-15			3,229,065	3,229,065	
7	January-16	9,450,000	4.060%	3,229,065	12,679,065	15,908,130
	July-16			3,037,230	3,037,230	
8	January-17	9,450,000	4.240%	3,037,230	12,487,230	15,524,460
	July-17			2,836,890	2,836,890	
9	January-18	9,450,000	4.430%	2,836,890	12,286,890	15,123,780
	July-18			2,627,573	2,627,573	
10	January-19	9,450,000	4.610%	2,627,573	12,077,573	14,705,145
	July-19			2,409,750	2,409,750	
11	January-20	9,450,000	4.720%	2,409,750	11,859,750	14,269,500
	July-20			2,186,730	2,186,730	
12	January-21	9,450,000	4.820%	2,186,730	11,636,730	13,823,460
	July-21			1,958,985	1,958,985	
13	January-22	9,450,000	4.930%	1,958,985	11,408,985	13,367,970
	July-22			1,726,043	1,726,043	
14	January-23	9,450,000	5.030%	1,726,043	11,176,043	12,902,085
	July-23			1,488,375	1,488,375	
15	January-24	9,450,000	5.140%	1,488,375	10,938,375	12,426,750
	July-24			1,245,510	1,245,510	
16	January-25	9,450,000	5.180%	1,245,510	10,695,510	11,941,020
	July-25			1,000,755	1,000,755	
17	January-26	9,450,000	5.230%	1,000,755	10,450,755	11,451,510
	July-26			753,638	753,638	
18	January-27	9,450,000	5.270%	753,638	10,203,638	10,957,275
	July-27			504,630	504,630	
19	January-28	9,450,000	5.320%	504,630	9,954,630	10,459,260
	July-28			253,260	253,260	
20	January-29	9,450,000	5.360%	253,260	9,703,260	9,956,520
	July-29			0	0	
	Total:	$ 189,000,000		$ 95,821,110	$ 284,821,110	$ 284,821,110

VERMONT						2009
Estimated Debt Service Schedule Computed on:			16-Nov-08			
For the:		***Assumptions:***				Bond Amount:
State of Vermont 1.5x		Bonds Delivered:			01-Jan-09	
FY 2009 Double Barrel		Bonds Rated AAA/AA+				**$ 157,000,000**
		Estimated % Rates as of:		***31-Oct-08***		**TERM: 20 Years**
	Payment	**$Amount of**	**Est %**	**$Amount of**	**$Total**	**$Total**
# Years	**Dates**	**Principal**	**Rates**	**Interest**	**Debt Service**	**Fiscal Year**
	January-09				0	
	July-09			3,377,855	3,377,855	
1	January-10	7,850,000	1.850%	3,377,855	11,227,855	14,605,710
	July-10			3,305,243	3,305,243	
2	January-11	7,850,000	2.310%	3,305,243	11,155,243	14,460,485
	July-11			3,214,575	3,214,575	
3	January-12	7,850,000	2.770%	3,214,575	11,064,575	14,279,150
	July-12			3,105,853	3,105,853	
4	January-13	7,850,000	3.230%	3,105,853	10,955,853	14,061,705
	July-13			2,979,075	2,979,075	
5	January-14	7,850,000	3.690%	2,979,075	10,829,075	13,808,150
	July-14			2,834,243	2,834,243	
6	January-15	7,850,000	3.870%	2,834,243	10,684,243	13,518,485
	July-15			2,682,345	2,682,345	
7	January-16	7,850,000	4.060%	2,682,345	10,532,345	13,214,690
	July-16			2,522,990	2,522,990	
8	January-17	7,850,000	4.240%	2,522,990	10,372,990	12,895,980
	July-17			2,356,570	2,356,570	
9	January-18	7,850,000	4.430%	2,356,570	10,206,570	12,563,140
	July-18			2,182,693	2,182,693	
10	January-19	7,850,000	4.610%	2,182,693	10,032,693	12,215,385
	July-19			2,001,750	2,001,750	
11	January-20	7,850,000	4.720%	2,001,750	9,851,750	11,853,500
	July-20			1,816,490	1,816,490	
12	January-21	7,850,000	4.820%	1,816,490	9,666,490	11,482,980
	July-21			1,627,305	1,627,305	
13	January-22	7,850,000	4.930%	1,627,305	9,477,305	11,104,610
	July-22			1,433,803	1,433,803	
14	January-23	7,850,000	5.030%	1,433,803	9,283,803	10,717,605
	July-23			1,236,375	1,236,375	
15	January-24	7,850,000	5.140%	1,236,375	9,086,375	10,322,750
	July-24			1,034,630	1,034,630	
16	January-25	7,850,000	5.180%	1,034,630	8,884,630	9,919,260
	July-25			831,315	831,315	
17	January-26	7,850,000	5.230%	831,315	8,681,315	9,512,630
	July-26			626,038	626,038	
18	January-27	7,850,000	5.270%	626,038	8,476,038	9,102,075
	July-27			419,190	419,190	
19	January-28	7,850,000	5.320%	419,190	8,269,190	8,688,380
	July-28			210,380	210,380	
20	January-29	7,850,000	5.360%	210,380	8,060,380	8,270,760
	July-29			0	0	
	Total:	$ 157,000,000		$ 79,597,430	$ 236,597,430	$ 236,597,430

VERMONT						2009
Estimated Debt Service Schedule Computed on:			16-Nov-08			
For the:		***Assumptions:***				Bond Amount:
State of Vermont		Bonds Delivered:			01-Jan-09	
FY 2009 Trans Rev Bonds		Bonds Rated AA				**$ 133,000,000**
		Estimated % Rates as of:		***31-Oct-08***		**TERM: 20 years**
	Payment	**$Amount of**	**Est %**	**$Amount of**	**$Total**	**$Total**
# Years	**Dates**	**Principal**	**Rates**	**Interest**	**Debt Service**	**Fiscal Year**
	January-09				0	
	July-09			2,927,995	2,927,995	
1	January-10	6,650,000	1.950%	2,927,995	9,577,995	12,505,990
	July-10			2,863,158	2,863,158	
2	January-11	6,650,000	2.410%	2,863,158	9,513,158	12,376,315
	July-11			2,783,025	2,783,025	
3	January-12	6,650,000	2.870%	2,783,025	9,433,025	12,216,050
	July-12			2,687,598	2,687,598	
4	January-13	6,650,000	3.330%	2,687,598	9,337,598	12,025,195
	July-13			2,576,875	2,576,875	
5	January-14	6,650,000	3.790%	2,576,875	9,226,875	11,803,750
	July-14			2,450,858	2,450,858	
6	January-15	6,650,000	3.970%	2,450,858	9,100,858	11,551,715
	July-15			2,318,855	2,318,855	
7	January-16	6,650,000	4.160%	2,318,855	8,968,855	11,287,710
	July-16			2,180,535	2,180,535	
8	January-17	6,650,000	4.340%	2,180,535	8,830,535	11,011,070
	July-17			2,036,230	2,036,230	
9	January-18	6,650,000	4.530%	2,036,230	8,686,230	10,722,460
	July-18			1,885,608	1,885,608	
10	January-19	6,650,000	4.710%	1,885,608	8,535,608	10,421,215
	July-19			1,729,000	1,729,000	
11	January-20	6,650,000	4.820%	1,729,000	8,379,000	10,108,000
	July-20			1,568,735	1,568,735	
12	January-21	6,650,000	4.920%	1,568,735	8,218,735	9,787,470
	July-21			1,405,145	1,405,145	
13	January-22	6,650,000	5.030%	1,405,145	8,055,145	9,460,290
	July-22			1,237,898	1,237,898	
14	January-23	6,650,000	5.130%	1,237,898	7,887,898	9,125,795
	July-23			1,067,325	1,067,325	
15	January-24	6,650,000	5.240%	1,067,325	7,717,325	8,784,650
	July-24			893,095	893,095	
16	January-25	6,650,000	5.280%	893,095	7,543,095	8,436,190
	July-25			717,535	717,535	
17	January-26	6,650,000	5.330%	717,535	7,367,535	8,085,070
	July-26			540,313	540,313	
18	January-27	6,650,000	5.370%	540,313	7,190,313	7,730,625
	July-27			361,760	361,760	
19	January-28	6,650,000	5.420%	361,760	7,011,760	7,373,520
	July-28			181,545	181,545	
20	January-29	6,650,000	5.460%	181,545	6,831,545	7,013,090
	July-29			0	0	
	Total:	$ 133,000,000		$ 68,826,170	$ 201,826,170	$ 201,826,170

VERMONT

2009

Estimated Debt Service Schedule Computed on: 16-Nov-08

For the:

State of Vermont 1.5x

FY 2009 Trans Rev Bonds

Assumptions:

Bonds Delivered: 01-Jan-09

Bonds Rated AA

Estimated % Rates as of: ***31-Oct-08***

Bond Amount:

$ 156,000,000

TERM: 20 years

# Years	Payment Dates	$Amount of Principal	Est % Rates	$Amount of Interest	$Total Debt Service	$Total Fiscal Year
	January-09				0	
	July-09			3,434,340	3,434,340	
1	January-10	7,800,000	1.950%	3,434,340	11,234,340	14,668,680
	July-10			3,358,290	3,358,290	
2	January-11	7,800,000	2.410%	3,358,290	11,158,290	14,516,580
	July-11			3,264,300	3,264,300	
3	January-12	7,800,000	2.870%	3,264,300	11,064,300	14,328,600
	July-12			3,152,370	3,152,370	
4	January-13	7,800,000	3.330%	3,152,370	10,952,370	14,104,740
	July-13			3,022,500	3,022,500	
5	January-14	7,800,000	3.790%	3,022,500	10,822,500	13,845,000
	July-14			2,874,690	2,874,690	
6	January-15	7,800,000	3.970%	2,874,690	10,674,690	13,549,380
	July-15			2,719,860	2,719,860	
7	January-16	7,800,000	4.160%	2,719,860	10,519,860	13,239,720
	July-16			2,557,620	2,557,620	
8	January-17	7,800,000	4.340%	2,557,620	10,357,620	12,915,240
	July-17			2,388,360	2,388,360	
9	January-18	7,800,000	4.530%	2,388,360	10,188,360	12,576,720
	July-18			2,211,690	2,211,690	
10	January-19	7,800,000	4.710%	2,211,690	10,011,690	12,223,380
	July-19			2,028,000	2,028,000	
11	January-20	7,800,000	4.820%	2,028,000	9,828,000	11,856,000
	July-20			1,840,020	1,840,020	
12	January-21	7,800,000	4.920%	1,840,020	9,640,020	11,480,040
	July-21			1,648,140	1,648,140	
13	January-22	7,800,000	5.030%	1,648,140	9,448,140	11,096,280
	July-22			1,451,970	1,451,970	
14	January-23	7,800,000	5.130%	1,451,970	9,251,970	10,703,940
	July-23			1,251,900	1,251,900	
15	January-24	7,800,000	5.240%	1,251,900	9,051,900	10,303,800
	July-24			1,047,540	1,047,540	
16	January-25	7,800,000	5.280%	1,047,540	8,847,540	9,895,080
	July-25			841,620	841,620	
17	January-26	7,800,000	5.330%	841,620	8,641,620	9,483,240
	July-26			633,750	633,750	
18	January-27	7,800,000	5.370%	633,750	8,433,750	9,067,500
	July-27			424,320	424,320	
19	January-28	7,800,000	5.420%	424,320	8,224,320	8,648,640
	July-28			212,940	212,940	
20	January-29	7,800,000	5.460%	212,940	8,012,940	8,225,880
	July-29			0	0	
	Total:	$ 156,000,000		$ 80,728,440	$ 236,728,440	$ 236,728,440

VERMONT STATE						2009
Estimated Debt Service Schedule as of:			11/16/08			
For the:	State of Vermont Double Barrel	*Assumptions: (See NOTE below)*				Bond Amount:
		Bonds Delivered:		01/01/09		$219,000,000
		Bonds Rated AAA/AA+				Term (Years):
		Estimated % Rates& (NIC) as of:		*11/16/08*	*5.227%*	30

# Years of Bond	Payment Dates	$Amount of Principal	Est. Interrest Rates	$Amount of Interest	$Total Debt Service	$Total Fiscal Year
	January-09			0	0	
	July-09			5,165,115	5,165,115	
1	January-10	7,300,000	1.850%	5,165,115	12,465,115	17,630,230
	July-10			5,097,590	5,097,590	
2	January-11	7,300,000	2.310%	5,097,590	12,397,590	17,495,180
	July-11			5,013,275	5,013,275	
3	January-12	7,300,000	2.770%	5,013,275	12,313,275	17,326,550
	July-12			4,912,170	4,912,170	
4	January-13	7,300,000	3.230%	4,912,170	12,212,170	17,124,340
	July-13			4,794,275	4,794,275	
5	January-14	7,300,000	3.690%	4,794,275	12,094,275	16,888,550
	July-14			4,659,590	4,659,590	
6	January-15	7,300,000	3.870%	4,659,590	11,959,590	16,619,180
	July-15			4,518,335	4,518,335	
7	January-16	7,300,000	4.060%	4,518,335	11,818,335	16,336,670
	July-16			4,370,145	4,370,145	
8	January-17	7,300,000	4.240%	4,370,145	11,670,145	16,040,290
	July-17			4,215,385	4,215,385	
9	January-18	7,300,000	4.430%	4,215,385	11,515,385	15,730,770
	July-18			4,053,690	4,053,690	
10	January-19	7,300,000	4.610%	4,053,690	11,353,690	15,407,380
	July-19			3,885,425	3,885,425	
11	January-20	7,300,000	4.720%	3,885,425	11,185,425	15,070,850
	July-20			3,713,145	3,713,145	
12	January-21	7,300,000	4.820%	3,713,145	11,013,145	14,726,290
	July-21			3,537,215	3,537,215	
13	January-22	7,300,000	4.930%	3,537,215	10,837,215	14,374,430
	July-22			3,357,270	3,357,270	
14	January-23	7,300,000	5.030%	3,357,270	10,657,270	14,014,540
	July-23			3,173,675	3,173,675	
15	January-24	7,300,000	5.140%	3,173,675	10,473,675	13,647,350
	July-24			2,986,065	2,986,065	
16	January-25	7,300,000	5.180%	2,986,065	10,286,065	13,272,130
	July-25			2,796,995	2,796,995	
17	January-26	7,300,000	5.230%	2,796,995	10,096,995	12,893,990
	July-26			2,606,100	2,606,100	
18	January-27	7,300,000	5.270%	2,606,100	9,906,100	12,512,200
	July-27			2,413,745	2,413,745	
19	January-28	7,300,000	5.320%	2,413,745	9,713,745	12,127,490
	July-28			2,219,565	2,219,565	
20	January-29	7,300,000	5.360%	2,219,565	9,519,565	11,739,130
	July-29			2,023,925	2,023,925	
21	January-30	7,300,000	5.400%	2,023,925	9,323,925	11,347,850
	July-30			1,826,825	1,826,825	
22	January-31	7,300,000	5.440%	1,826,825	9,126,825	10,953,650
	July-31			1,628,265	1,628,265	
23	January-32	7,300,000	5.470%	1,628,265	8,928,265	10,556,530
	July-32			1,428,610	1,428,610	
24	January-33	7,300,000	5.510%	1,428,610	8,728,610	10,157,220
	July-33			1,227,495	1,227,495	
25	January-34	7,300,000	5.550%	1,227,495	8,527,495	9,754,990
	July-34			1,024,920	1,024,920	
26	January-35	7,300,000	5.570%	1,024,920	8,324,920	9,349,840
	July-35			821,615	821,615	
27	January-36	7,300,000	5.590%	821,615	8,121,615	8,943,230
	July-36			617,580	617,580	
28	January-37	7,300,000	5.620%	617,580	7,917,580	8,535,160
	July-37			412,450	412,450	
29	January-38	7,300,000	5.640%	412,450	7,712,450	8,124,900
	July-38			206,590	206,590	
30	January-39	7,300,000	5.660%	206,590	7,506,590	7,713,180
	July-39			0	0	
	Total:	$ 219,000,000		$ 177,414,090	$ 396,414,090	$ 396,414,090

VERMONT STATE						2009
Estimated Debt Service Schedule as of:			11/16/08			
For the:	State of Vermont Double Barrel 1.5x	*Assumptions: (See NOTE below)*				Bond Amount:
		Bonds Delivered:		01/01/09		$181,500,000
		Bonds Rated AAA/AA+				Term (Years):
		Estimated % Rates& (NIC) as of:		*11/16/08*	*5.227%*	30
# Years of Bond	Payment Dates	$Amount of Principal	Est. Interrest Rates	$Amount of Interest	$Total Debt Service	$Total Fiscal Year
	January-09			0	0	
	July-09			4,280,678	4,280,678	
1	January-10	6,050,000	1.850%	4,280,678	10,330,678	14,611,355
	July-10			4,224,715	4,224,715	
2	January-11	6,050,000	2.310%	4,224,715	10,274,715	14,499,430
	July-11			4,154,838	4,154,838	
3	January-12	6,050,000	2.770%	4,154,838	10,204,838	14,359,675
	July-12			4,071,045	4,071,045	
4	January-13	6,050,000	3.230%	4,071,045	10,121,045	14,192,090
	July-13			3,973,338	3,973,338	
5	January-14	6,050,000	3.690%	3,973,338	10,023,338	13,996,675
	July-14			3,861,715	3,861,715	
6	January-15	6,050,000	3.870%	3,861,715	9,911,715	13,773,430
	July-15			3,744,648	3,744,648	
7	January-16	6,050,000	4.060%	3,744,648	9,794,648	13,539,295
	July-16			3,621,833	3,621,833	
8	January-17	6,050,000	4.240%	3,621,833	9,671,833	13,293,665
	July-17			3,493,573	3,493,573	
9	January-18	6,050,000	4.430%	3,493,573	9,543,573	13,037,145
	July-18			3,359,565	3,359,565	
10	January-19	6,050,000	4.610%	3,359,565	9,409,565	12,769,130
	July-19			3,220,113	3,220,113	
11	January-20	6,050,000	4.720%	3,220,113	9,270,113	12,490,225
	July-20			3,077,333	3,077,333	
12	January-21	6,050,000	4.820%	3,077,333	9,127,333	12,204,665
	July-21			2,931,528	2,931,528	
13	January-22	6,050,000	4.930%	2,931,528	8,981,528	11,913,055
	July-22			2,782,395	2,782,395	
14	January-23	6,050,000	5.030%	2,782,395	8,832,395	11,614,790
	July-23			2,630,238	2,630,238	
15	January-24	6,050,000	5.140%	2,630,238	8,680,238	11,310,475
	July-24			2,474,753	2,474,753	
16	January-25	6,050,000	5.180%	2,474,753	8,524,753	10,999,505
	July-25			2,318,058	2,318,058	
17	January-26	6,050,000	5.230%	2,318,058	8,368,058	10,686,115
	July-26			2,159,850	2,159,850	
18	January-27	6,050,000	5.270%	2,159,850	8,209,850	10,369,700
	July-27			2,000,433	2,000,433	
19	January-28	6,050,000	5.320%	2,000,433	8,050,433	10,050,865
	July-28			1,839,503	1,839,503	
20	January-29	6,050,000	5.360%	1,839,503	7,889,503	9,729,005
	July-29			1,677,363	1,677,363	
21	January-30	6,050,000	5.400%	1,677,363	7,727,363	9,404,725
	July-30			1,514,013	1,514,013	
22	January-31	6,050,000	5.440%	1,514,013	7,564,013	9,078,025
	July-31			1,349,453	1,349,453	
23	January-32	6,050,000	5.470%	1,349,453	7,399,453	8,748,905
	July-32			1,183,985	1,183,985	
24	January-33	6,050,000	5.510%	1,183,985	7,233,985	8,417,970
	July-33			1,017,308	1,017,308	
25	January-34	6,050,000	5.550%	1,017,308	7,067,308	8,084,615
	July-34			849,420	849,420	
26	January-35	6,050,000	5.570%	849,420	6,899,420	7,748,840
	July-35			680,928	680,928	
27	January-36	6,050,000	5.590%	680,928	6,730,928	7,411,855
	July-36			511,830	511,830	
28	January-37	6,050,000	5.620%	511,830	6,561,830	7,073,660
	July-37			341,825	341,825	
29	January-38	6,050,000	5.640%	341,825	6,391,825	6,733,650
	July-38			171,215	171,215	
30	January-39	6,050,000	5.660%	171,215	6,221,215	6,392,430
	July-39			0	0	
	Total:	$ 181,500,000		$ 147,034,965	$ 328,534,965	$ 328,534,965

VERMONT STATE						2009
Estimated Debt Service Schedule as of:			11/16/08			
For the:	State of Vermont Trans Rev Bonds	*Assumptions: (See NOTE below)*				Bond Amount:
		Bonds Delivered:		01/01/09		$153,000,000
		Bonds Rated AA				Term (Years):
		Estimated % Rates& (NIC) as of:		*10/31/08*	*5.327%*	30

# Years of Bond	Payment Dates	$Amount of Principal	Est. Interrest Rates	$Amount of Interest	$Total Debt Service	$Total Fiscal Year
	January-09			0	0	
	July-09			3,685,005	3,685,005	
1	January-10	5,100,000	1.950%	3,685,005	8,785,005	12,470,010
	July-10			3,635,280	3,635,280	
2	January-11	5,100,000	2.410%	3,635,280	8,735,280	12,370,560
	July-11			3,573,825	3,573,825	
3	January-12	5,100,000	2.870%	3,573,825	8,673,825	12,247,650
	July-12			3,500,640	3,500,640	
4	January-13	5,100,000	3.330%	3,500,640	8,600,640	12,101,280
	July-13			3,415,725	3,415,725	
5	January-14	5,100,000	3.790%	3,415,725	8,515,725	11,931,450
	July-14			3,319,080	3,319,080	
6	January-15	5,100,000	3.970%	3,319,080	8,419,080	11,738,160
	July-15			3,217,845	3,217,845	
7	January-16	5,100,000	4.160%	3,217,845	8,317,845	11,535,690
	July-16			3,111,765	3,111,765	
8	January-17	5,100,000	4.340%	3,111,765	8,211,765	11,323,530
	July-17			3,001,095	3,001,095	
9	January-18	5,100,000	4.530%	3,001,095	8,101,095	11,102,190
	July-18			2,885,580	2,885,580	
10	January-19	5,100,000	4.710%	2,885,580	7,985,580	10,871,160
	July-19			2,765,475	2,765,475	
11	January-20	5,100,000	4.820%	2,765,475	7,865,475	10,630,950
	July-20			2,642,565	2,642,565	
12	January-21	5,100,000	4.920%	2,642,565	7,742,565	10,385,130
	July-21			2,517,105	2,517,105	
13	January-22	5,100,000	5.030%	2,517,105	7,617,105	10,134,210
	July-22			2,388,840	2,388,840	
14	January-23	5,100,000	5.130%	2,388,840	7,488,840	9,877,680
	July-23			2,258,025	2,258,025	
15	January-24	5,100,000	5.240%	2,258,025	7,358,025	9,616,050
	July-24			2,124,405	2,124,405	
16	January-25	5,100,000	5.280%	2,124,405	7,224,405	9,348,810
	July-25			1,989,765	1,989,765	
17	January-26	5,100,000	5.330%	1,989,765	7,089,765	9,079,530
	July-26			1,853,850	1,853,850	
18	January-27	5,100,000	5.370%	1,853,850	6,953,850	8,807,700
	July-27			1,716,915	1,716,915	
19	January-28	5,100,000	5.420%	1,716,915	6,816,915	8,533,830
	July-28			1,578,705	1,578,705	
20	January-29	5,100,000	5.460%	1,578,705	6,678,705	8,257,410
	July-29			1,439,475	1,439,475	
21	January-30	5,100,000	5.500%	1,439,475	6,539,475	7,978,950
	July-30			1,299,225	1,299,225	
22	January-31	5,100,000	5.540%	1,299,225	6,399,225	7,698,450
	July-31			1,157,955	1,157,955	
23	January-32	5,100,000	5.570%	1,157,955	6,257,955	7,415,910
	July-32			1,015,920	1,015,920	
24	January-33	5,100,000	5.610%	1,015,920	6,115,920	7,131,840
	July-33			872,865	872,865	
25	January-34	5,100,000	5.650%	872,865	5,972,865	6,845,730
	July-34			728,790	728,790	
26	January-35	5,100,000	5.670%	728,790	5,828,790	6,557,580
	July-35			584,205	584,205	
27	January-36	5,100,000	5.690%	584,205	5,684,205	6,268,410
	July-36			439,110	439,110	
28	January-37	5,100,000	5.720%	439,110	5,539,110	5,978,220
	July-37			293,250	293,250	
29	January-38	5,100,000	5.740%	293,250	5,393,250	5,686,500
	July-38			146,880	146,880	
30	January-39	5,100,000	5.760%	146,880	5,246,880	5,393,760
	July-39			0	0	
	Total:	$ 153,000,000		$ 126,318,330	$ 279,318,330	$ 279,318,330

VERMONT STATE						2009
Estimated Debt Service Schedule as of:			11/16/08			
For the:	State of Vermont Trans Rev Bonds 1.5x	*Assumptions: (See NOTE below)*				Bond Amount:
		Bonds Delivered:		01/01/09		$180,000,000
		Bonds Rated AA				Term (Years):
		Estimated % Rates& (NIC) as of:		*10/31/08*	*5.327%*	30
# Years of Bond	Payment Dates	$Amount of Principal	Est. Interrest Rates	$Amount of Interest	$Total Debt Service	$Total Fiscal Year
	January-09			0	0	
	July-09			4,335,300	4,335,300	
1	January-10	6,000,000	1.950%	4,335,300	10,335,300	14,670,600
	July-10			4,276,800	4,276,800	
2	January-11	6,000,000	2.410%	4,276,800	10,276,800	14,553,600
	July-11			4,204,500	4,204,500	
3	January-12	6,000,000	2.870%	4,204,500	10,204,500	14,409,000
	July-12			4,118,400	4,118,400	
4	January-13	6,000,000	3.330%	4,118,400	10,118,400	14,236,800
	July-13			4,018,500	4,018,500	
5	January-14	6,000,000	3.790%	4,018,500	10,018,500	14,037,000
	July-14			3,904,800	3,904,800	
6	January-15	6,000,000	3.970%	3,904,800	9,904,800	13,809,600
	July-15			3,785,700	3,785,700	
7	January-16	6,000,000	4.160%	3,785,700	9,785,700	13,571,400
	July-16			3,660,900	3,660,900	
8	January-17	6,000,000	4.340%	3,660,900	9,660,900	13,321,800
	July-17			3,530,700	3,530,700	
9	January-18	6,000,000	4.530%	3,530,700	9,530,700	13,061,400
	July-18			3,394,800	3,394,800	
10	January-19	6,000,000	4.710%	3,394,800	9,394,800	12,789,600
	July-19			3,253,500	3,253,500	
11	January-20	6,000,000	4.820%	3,253,500	9,253,500	12,507,000
	July-20			3,108,900	3,108,900	
12	January-21	6,000,000	4.920%	3,108,900	9,108,900	12,217,800
	July-21			2,961,300	2,961,300	
13	January-22	6,000,000	5.030%	2,961,300	8,961,300	11,922,600
	July-22			2,810,400	2,810,400	
14	January-23	6,000,000	5.130%	2,810,400	8,810,400	11,620,800
	July-23			2,656,500	2,656,500	
15	January-24	6,000,000	5.240%	2,656,500	8,656,500	11,313,000
	July-24			2,499,300	2,499,300	
16	January-25	6,000,000	5.280%	2,499,300	8,499,300	10,998,600
	July-25			2,340,900	2,340,900	
17	January-26	6,000,000	5.330%	2,340,900	8,340,900	10,681,800
	July-26			2,181,000	2,181,000	
18	January-27	6,000,000	5.370%	2,181,000	8,181,000	10,362,000
	July-27			2,019,900	2,019,900	
19	January-28	6,000,000	5.420%	2,019,900	8,019,900	10,039,800
	July-28			1,857,300	1,857,300	
20	January-29	6,000,000	5.460%	1,857,300	7,857,300	9,714,600
	July-29			1,693,500	1,693,500	
21	January-30	6,000,000	5.500%	1,693,500	7,693,500	9,387,000
	July-30			1,528,500	1,528,500	
22	January-31	6,000,000	5.540%	1,528,500	7,528,500	9,057,000
	July-31			1,362,300	1,362,300	
23	January-32	6,000,000	5.570%	1,362,300	7,362,300	8,724,600
	July-32			1,195,200	1,195,200	
24	January-33	6,000,000	5.610%	1,195,200	7,195,200	8,390,400
	July-33			1,026,900	1,026,900	
25	January-34	6,000,000	5.650%	1,026,900	7,026,900	8,053,800
	July-34			857,400	857,400	
26	January-35	6,000,000	5.670%	857,400	6,857,400	7,714,800
	July-35			687,300	687,300	
27	January-36	6,000,000	5.690%	687,300	6,687,300	7,374,600
	July-36			516,600	516,600	
28	January-37	6,000,000	5.720%	516,600	6,516,600	7,033,200
	July-37			345,000	345,000	
29	January-38	6,000,000	5.740%	345,000	6,345,000	6,690,000
	July-38			172,800	172,800	
30	January-39	6,000,000	5.760%	172,800	6,172,800	6,345,600
	July-39			0	0	
	Total:	$ 180,000,000		$ 148,609,800	$ 328,609,800	$ 328,609,800

Vermont Committee on Transportation Funding Options

Effects of Different Funding Options

Proposal Source Financing Option	Impact on Debt Ratios			Impact on G.O. Bond Ratings*	Restrictions		Likely Issue Rating	Int. Cost Versus G.O. Bonds	Increase Existing Fees/Tax	Add New Source of Funds	Debt Recourse	Debt Serv Source
	Debt/C	Debt%PI	DS%Revs		Rev/DS	Maturity						
GARVEE BONDS												
Direct	yes	yes	yes	possible	3x-4x	12 yrs	AA to AA-	^	no	no	Trust	FHWA
Indirect	yes	yes	yes	possible	3x-4x	12 yrs	AA to AA-	^	no	no	possible	FHWA
Highway Revenue Bonds												
T Fund Revenues	yes	yes	yes	possible	3x	20 yrs**	AA	^	no	no	T Fund	TF
T Fund Increased Fees	yes	yes	yes	possible	2x	20 yrs**	AA	^	yes	no	T Fund	TF ^ Fees
T Fund Revenues + 33% P&U	yes	yes	yes	possible	3x	20 yrs**	AA	^	no	no	T Fund	GF 33% P&U
New T Fund Revenues	no	no	no	no	1.5x to 2.0x	20 yrs**	AA	^	no	yes	New Source	New Source
General Obligation Bonds	yes	yes	yes	possible	none	10-20 yrs**	Aaa/AA+	NA	no	no	State G.O.	TF
General Obligation Bonds ("Double Barreled")	no	no	yes	possible	1.25x to 1.5x	10-20 yrs**	Aaa/AA+	NA	no	yes	State G.O.	New Source
Toll Revenue Bonds	no	no	no	no	2x	20 yrs	Aa3/AA-	^	no	yes	no	Tolls
Public/Private Partner - Tolls	no	no	no	no	2x	20 yrs	?	?	no	yes	no	Tolls

*Ratings are based on many factors, including debt ratios. A change in debt ratios due to additional tax supported debt may or may not be sufficient to cause a change in ratings. In the instance of self-suporting debt (bonds using revenues not derived from current sources), ratios and ratings should not be impacted if revenues to debt service coverage is deemed adequate .

**Subject to statutory changes and useful life of bonded assets, maturity could be up to thirty years.

Commission Briefing Paper 5A-16

Overview of Sustainability of Current Revenue Sources for Highway and Transit

Prepared by: Section 1909 Commission Staff
Date: March 6, 2007

Introduction

This paper is part of a series of briefing papers to be prepared for the National Surface Transportation Policy and Revenue Study Commission authorized in Section 1909 of SAFETEA-LU. The papers are intended to synthesize the state-of-the-practice consensus on the issues that are relevant to the Commission's charge outlined in Section 1909, and will serve as background material in developing the analyses to be presented in the final report of the Commission.

This paper presents information on key criteria for assessing the advantages and disadvantages of alternative revenue sources for surface transportation. A broad range of taxes, user fees, and other revenue sources currently support surface transportation programs at all levels of government. The many revenue sources reflect in part historical practices among States and local government agencies and in part differences in the kinds of fees that are most appropriate to finance different types of transportation services. There is increasing concern, however, about whether current revenue sources can continue to sustain future transportation improvement programs.

Background and Key Findings

Several factors point to the need for new revenue sources to support surface transportation, both in the short term and the long term. Without changes in either revenues or outlays, the Federal Highway Trust Fund is projected to have a negative balance by 2009. Likewise, many State departments of transportation face revenue shortfalls that do not allow them to meet important transportation priorities. New revenues will be needed to meet near term revenue shortfalls. Questions about the sustainability of the fuel fax are even more serious in the longer term. Alternative fuels and increasing vehicle fuel efficiency will make it difficult to rely on fuel taxes to support highway and transit programs.

Several recent studies have examined this issue and it is one of the key issues to be considered by the National Surface Transportation Policy and Revenue Study Committee. Advantages and disadvantages of alternative revenue sources can be evaluated against a number of criteria including yield, revenue stability, efficiency, equity, the applicability to different types of improvements, public acceptance, and other potential barriers to implementation.

Fuel taxes represent the largest source of highway revenues for the Federal Government and most States. Motor vehicle related fees are only about 10 percent of Federal highway revenues, but in several states they account for a larger share of highway revenues than fuel taxes. Vehicle fees could be increased to generate substantially more revenues, but because they generally are flat fees that do not vary with the amount of travel, they are not as efficient as fuel taxes, tolls, or

other direct user fees. Several recent studies have pointed toward a mileage-based fee as a longer term replacement for the fuel tax, and it has many desirable characteristics. However, many potential barriers to implementing mileage-based taxes must be overcome before they could be implemented on a widespread basis.

Tolls, congestion pricing, local option taxes, and private capital currently represent a small share of total highway revenues and can be considered niche revenue sources for some years to come. Several States are beginning to make greater use of tolls, but motorists who are not accustomed to paying tolls resist them, especially on existing lanes. Each of these sources, however, can be an important potential source of revenues to fund new highway capacity, and pricing can be an effective tool in reducing congestion.

Transit generally has more balanced funding than highways, with fares, general funds, sales taxes, and other public funds all representing significant revenue sources. Impact fees currently are not as large a source of transit revenues, but they could become more important, especially where transit improvements are linked with broader land use development.

Evaluation of Alternative Transportation Revenue Sources

Several studies recently have examined alternatives to the fuel tax including a studies sponsored by the National Chamber Foundation of the U.S. Chamber of Commerce, the Transportation Research Board, and the National Cooperative Highway Research Program (NCHRP). The following charts are taken from the December 2006 NCHRP study, Future Financing Options to Meet Highway and Transit Needs. They succinctly summarize advantages and disadvantages of alternative revenue sources in terms of the amount of revenues that each can produce, the stability of those revenues over time, administrative costs, the extent to which they promote economic efficiency and equity, their applicability to different types of transportation projects, public acceptability, implementation issues, and potential strategies to overcome barriers to implementation.

The NCHRP study did not assess several revenue sources that have been mentioned as potential mechanisms to finance freight-related projects. Those revenue sources are evaluated against the same criteria used in the NCHRP study in the final chart. An assessment of a value-added tax has also been included in the charts.

Source and History	Yield, Adequacy and Stability	Cost-Efficiency, Economic Efficiency, and Equity	Potential Applicability and Acceptability	Implementation Issues and Potential Strategies to Overcome Barriers
Motor Fuel Taxes - Excise Tax (Per Gallon) Most states have a traditional "cents per gallon" excise taxes on the highway use of motor fuel. Some also have variable rates based on an inflation adjustment or a fuel price.	Motor fuel taxes are constitutionally dedicated to highways in most states, and therefore, adjustments to these taxes 'result in higher yields for highway investment. Motor fuel taxes have been the most important revenue mechanism for highway programs at the Federal and state levels. They also support transit programs at the Federal level and in some states.	Motor fuel taxes are very easy to administer and have low costs of compliance. Evasion has been a major issue, but states and the FHWA have curtailed evasion. Motor fuel taxes at rates sufficient to fund all needs will not add enough to fuel prices to impact travel volumes. Motor fuel prices have recently increased by amounts significantly higher than tax rate increases that could fund all needs, with very minimal impacts on travel behavior.	The motor fuel tax could add cents per gallon or could be indexed to inflation or to fuel prices as in some states.	Based on history, adjustments through legislation to the motor fuel excise tax have been the method of choice in most states for major new funding resources to fill funding gaps for state highways. Flat rate fees per gallon have not been adjusted fast enough to keep pace with needs. Motor fuel taxes may be higher per gallon than in some neighboring states. Opponents of fuel taxes generally raise the issue of diversion of purchases to neighboring states.
Motor Fuel Taxes - Indexing of Fuel Taxes	The yield of motor fuel taxes could be enhanced by indexing to inflation or, in some cases to fuel prices. A ceiling and a floor on the change in the indexed rate is likely.	Motor fuel taxes by themselves are not equitable among vehicle classes, since the largest vehicles may pay less in fuel taxes relative to the costs imposed on highways.	Indexing the rate to inflation is a very promising adjustment since the index to inflation makes partial corrections for economic changes. It could also be indexed to needs estimates or to construction prices, making it responsive to anticipated program costs.	

This paper represents draft briefing material; any views expressed are those of the authors and do not represent the position of either the Section 1909 Commission or the U.S. Department of Transportation.

Source and History	Yield, Adequacy and Stability	Cost-Efficiency, Economic Efficiency, and Equity	Potential Applicability and Acceptability	Implementation Issues and Potential Strategies to Overcome Barriers
Motor Fuel Taxes - Sales Tax on Fuel	A sales tax on fuel is likely to be more volatile, but could be subject to limits in terms of the maximum or minimum or the rate of change each year.	Motor fuel taxes are mildly regressive among income groups.	A sales tax on fuel also is promising; some states have a portion of the total tax based on sales prices.	Sales taxes on fuel have recently been of greater interest due to the increase in fuel prices.
Other Types of Petroleum Taxes	Other types of motor fuel taxes could be utilized.		Pennsylvania has an oil company franchise tax to collect fees on petroleum fuels. This is currently capped at its maximum allowed rate.	Some believe that petroleum taxes have more voter appeal because of a perception that they are imposed on petroleum companies rather than on individual drivers; however, such taxes are normally passed through to drivers the same as other types of motor fuel taxes.
Value Added Tax The U.S. is one of the few countries that does not have a value added tax. The tax is similar to a sales tax, but is levied at every stage in the production process, not just on final consumption as the traditional sales tax.	The yield could be high and would be fairly stable, fluctuating with changes in the national economy.	Administrative costs would be higher than for the fuel tax since there are many taxpayers and considerable documentation involved. This potentially could also make it subject to evasion. The economic efficiency would not be as great as the fuel tax since the VAT would not directly reflect transportation requirements or use.	The VAT could be applicable to general transportation purposes. Like any new tax it would face opposition from taxpayers and from businesses.	A general VAT has been discussed for many years, but rejected. Estimating just the value added by transportation could be difficult.

This paper represents draft briefing material; any views expressed are those of the authors and do not represent the position of either the Section 1909 Commission or the U.S. Department of Transportation.

Source and History	Yield, Adequacy and Stability	Cost-Efficiency, Economic Efficiency, and Equity	Potential Applicability and Acceptability	Implementation Issues and Potential Strategies to Overcome Barriers
Registration and Other Vehicle Fees All states have traditional types of registration fees for light vehicles and somewhat higher and graduated fees for heavy vehicles	Registration fees provide major revenue sources for states and local governments (through state allocations) and must be adjusted through legislation. In addition to adjusting rates, other options include revising the type of registration fee.	Registration fees are relatively inexpensive to administer in relation to potential yield, but not as inexpensive as fuel taxes. Registration fees can be varied by vehicle size and can be set in rough relation to highway cost responsibility, except for the impacts of different mileage by similar sized vehicles.	Registration fee adjustments are very promising as both a short- and long-term option for funding highways. Registration fees allow for collections from vehicles using alternative fuels without establishing new mechanisms for collection.	Equity among vehicle classes would indicate that parallel adjustments in registration fees should be made applicable to all vehicles.
Registration Fees Based on Value - Personal Property Taxes A registration fee based on value can be structured as a personal property tax and be deductible from Federal income.	A fee on the value of a vehicle could raise substantial revenue, and could be structured to be deductible for Federal income tax purposes, thus increasing the state's revenue yield without an equal increase in net total tax payments.	Registration fees for light vehicles, if collected on a flat basis, are somewhat regressive by income class. Registration fees for light vehicles on the basis of value are progressive.	Registration fees (in actuality, personal property taxes on vehicles) based on value have the best revenue generating potential and are less costly to taxpayers in the state.	Some states have recently eliminated or reduced such fees despite their advantages in comparison to collecting other state taxes that are not deductible for federal income tax purposes.
Sales Taxes on Vehicles	Sales taxes on vehicles can be useful revenue sources.	Sales taxes on vehicles will be fairly progressive.	Sales taxes on vehicles have substantial revenue raising potential.	All sales taxes already may be deposited into general revenue accounts.

This paper represents draft briefing material; any views expressed are those of the authors and do not represent the position of either the Section 1909 Commission or the U.S. Department of Transportation.

Source and History	Yield, Adequacy and Stability	Cost-Efficiency, Economic Efficiency, and Equity	Potential Applicability and Acceptability	Implementation Issues and Potential Strategies to Overcome Barriers
Traditional Tolls Selected highways and selected bridges have historically been toll facilities.	Existing toll facilities have been proven to be reliable and stable generators of revenue. The bonds of toll agencies are highly marketable.	Administration and compliance costs for tolling are greater than for motor fuel taxes, although these costs are reduced greatly through electronic toll collection.	Tolls and pricing may be considered to be highly promising options for application to new highway capacity in the longer term with perhaps some limited short-term opportunities.	A few existing toll facilities have been leased to international companies, substituting short-term revenue gains by public agencies for lesser longer-term revenues.
Tolling New Lanes In the past 10 years, 30-40 percent of new limited access highway mileage has been financed at least in part through tolls.	Legislation may be necessary to enable new types of tolls or pricing initiatives. Electronic pricing could significantly expand future opportunities.	Tolls can be set to achieve equity among vehicle classes Concerns about the impacts of tolling on equity among income groups have been addressed in several analyses.	Major positive opportunities exist to toll new future capacity. Sometimes this could be accomplished with tolls covering only a portion of needed revenues, which provides more total revenue and capacity than no tolling new facilities. Special types of toll facilities such as for truck lanes or HOT lanes could be promising.	Acts allowing Regional Mobility Authorities (RMA) and a PPP act could expand future possibilities for tolling. Some states do not yet have a PPP act parallel to that of other states, which would enable private parties to initiate proposals to develop new facilities or to add toll lanes to existing facilities.
Tolling Existing Lanes	Tolling existing lanes could provide very substantial additional revenues.	Tolling existing lanes could provide for greater equity than other sources of new revenues, but is widely perceived as inequitable ("paying twice").	Little short-term opportunity is thought to exist to toll existing free lanes. This does not mean that such opportunities might not exist in the future, particularly with new types of approaches to toll collection and pricing, including electronics and PPPs.	Sentiment is against tolling any currently free highway lanes. Likewise, little opportunity exists for tolling existing free bridges.

This paper represents draft briefing material; any views expressed are those of the authors and do not represent the position of either the Section 1909 Commission or the U.S. Department of Transportation.

Source and History	Yield, Adequacy and Stability	Cost-Efficiency, Economic Efficiency, and Equity	Potential Applicability and Acceptability	Implementation Issues and Potential Strategies to Overcome Barriers
VMT Fees Fees on VMT could be longer-term options that could supply revenues without being directly tied to fuel consumption.	VMT fees could be set to yield any level of desired revenues. VMT fees do not conflict with the need to reduce energy costs, reduce the balance of payments, or reduce fossil fuel consumption. VMT fees could be indexed to carbon output if a jurisdiction chooses.	VMT fees are slightly more related to vehicle use equity than fuel taxes or registration fees. VMT fees, especially if applied as congestion pricing fees, send strong pricing signals to travelers.	In the long run, VMT fees and congestion pricing could replace all or a portion of current user fees. Oregon is demonstrating the technologies for collecting VMT fees at the fuel pump.	VMT fees or congestion pricing fees require the technology to collect those fees reliably and also the political will to implement a new approach.
Congestion Pricing Could be applied as a special kind of VMT fee, with fees varying based on the level of congestion on the road.	VMT fees or congestion-related fees themselves would have to be indexed to respond to inflation. Congestion fees could be indexed to carbon output if a jurisdiction chooses.	VMT fees will require much more administrative and compliance efforts than motor fuel taxes. VMT fees will be about as regressive among income groups as motor fuel taxes, since DOE data show small differences in fuel efficiency by vehicles owned by different income groups. VMT fees must be graduated by vehicle weight and characteristics to raise fees equitably among the various vehicle classes.	A 2005 study of highway and transit revenue options for the U.S. Chamber of Commerce's National Chamber Foundation identified VMT fees and congestion pricing fees as a promising option in the long term (15 or more years.).	There are not yet any VMT fees or congestion pricing fees in the United States that re not associated with toll facilities.

This paper represents draft briefing material; any views expressed are those of the authors and do not represent the position of either the Section 1909 Commission or the U.S. Department of Transportation.

Source and History	Yield, Adequacy and Stability	Cost-Efficiency, Economic Efficiency, and Equity	Potential Applicability and Acceptability	Implementation Issues and Potential Strategies to Overcome Barriers
Local Option Taxes Have been widely used in many states to support highway and transit investments. Local governments in most states have implemented some type of local option tax, which must be specifically allowed by state enabling legislation. Local option taxes for transportation investments include motor fuel, vehicle, property, sales, and income taxes.	Sales taxes tend to have the highest yield compared to other local option taxes. Motor fuel and vehicle taxes tend to generate less revenue compared to other local option taxes. Except for motor fuel and vehicle taxes, other local option taxes tend to be indexed with inflation. Sales taxes respond to economic growth. Fluctuations in economic conditions tend to affect sales tax yield. Gasoline taxes and income taxes also could be impacted to some level by fluctuations in the economy.	Collection mechanisms already are in place to levy these taxes at the state or local level. Most local option taxes do not send pricing signals to drivers. Most local option taxes are regressive (except for income taxes). However, sales taxes tend to receive stronger support than other local option taxes. People consider that sales taxes are more "fair," since everyone pays, whether they are vehicle or transit users.	State legislation must be in place that allows local option taxes. Sales taxes have been widely used by transit agencies to support operations and capital investments. Rates of success with ballot measures to fund transportation have been increasing, as documented by the Center for Transportation Excellence.	Commonly, local option taxes require voters' approval. While an expenditure plan that specifies projects and/or programs to be funded with the new local option tax levies is not always required, local option taxes have better chances of success for implementation where expenditures and uses are clearly defined. Implementation plans that are well designed have resulted in very high success rates for ballot measures to enhance transportation revenues.

This paper represents draft briefing material; any views expressed are those of the authors and do not represent the position of either the Section 1909 Commission or the U.S. Department of Transportation.

Source and History	Yield, Adequacy and Stability	Cost-Efficiency, Economic Efficiency, and Equity	Potential Applicability and Acceptability	Implementation Issues and Potential Strategies to Overcome Barriers
Beneficiary Charges **Impact Fees** Impact fee legislation exists in 26 states (excluding Florida). Impact fees for transportation improvements are widely used in California and Florida.	Revenues from impact fees are typically dedicated for certain road and transit improvements that would serve the new development. In addition, revenues from impact fees will be highly dependent on development opportunities in the area where implemented. Value capture tools are subject to increases in property value realized by infrastructure improvements.	Beneficiary charges send modest pricing signals to encourage efficient transportation and land use decisions. These charges can be relatively efficient and equitable if properly structured. Benefit districts can target the specific beneficiaries. While impact fees are directly charged to developers, they pass those charges to buyers, increasing the cost of real estate. TIF allocates a portion of the additional property taxes resulting from the increase in property values. Communities and local agencies could argue that implementation of TIF would take away revenues that otherwise would be used to meet other public needs.	Implementation is subject to enabling legislation that allows the collection of impact fees and the formation of assessment districts. These tools tend to be most applicable in higher growth state or localities.	Impact fees are only applicable to new development. TIF and other property assessments may require the formation of districts, where property tax levies are dedicated for transportation improvement. This may require voters' approval from district residents and business owners. Beneficiary charges have been the subject of numerous lawsuits in many areas.

This paper represents draft briefing material; any views expressed are those of the authors and do not represent the position of either the Section 1909 Commission or the U.S. Department of Transportation.

Source and History	Yield, Adequacy and Stability	Cost-Efficiency, Economic Efficiency, and Equity	Potential Applicability and Acceptability	Implementation Issues and Potential Strategies to Overcome Barriers
Innovative Finance Most states have used one or more forms of the IF financing tools.	IF financing tools are used to leverage capital in the form of debt or equity. They rely on existing or new revenue sources to pay the indebtedness.	Incurring longer-term debt helps advance programs and projects that would otherwise take years to develop if at all.	They are widely applicable and can be used for program and individual project delivery. The applicability of finance tools is market driven, with the financial community rating each project or deal.	States may require enabling legislation to issue GARVEE bonds. Most innovative finance grant management tools are codified under Title 23 U.S.C. and require no special action from states to be used. To test new grant management tools, states may apply to U.S. DOT under the SEP-15 or TE-045 programs Debt mechanisms must be balanced against long-term revenue sources. Many states cap the amount of debt that can be issued.
Public-Private Partnerships PPPs are a long-term opportunity to impact on project and program delivery. PPPs are commonly used in Europe to reduce public-sector costs to construct, operate, and maintain highway facilities but are not yet widely used to support similar projects in the United States.	States and other public sponsors increasingly consider private-sector involvement as a way to spur implementation of large projects	PPPs can facilitate access to private capital and bring innovative cost-saving projects delivery methods.	Several states are using PPPs to operate and maintain portions of their highway systems. There is potential for large-scale PPPs. The U.S. DOT has preliminary evaluations which indicate the potential for significant cost savings and improvements in the quality of highway services provided to the public.	Specific project proposals need to be evaluated to determine if it will be cost-effective. May require enabling legislation. More than 20 states have explicit PPP acts that provide means to bring the private sector into funding and management of highways. Virginia's act has fostered a wide range of proposals.

This paper represents draft briefing material; any views expressed are those of the authors and do not represent the position of either the Section 1909 Commission or the U.S. Department of Transportation.

Source and History	Yield, Adequacy and Stability	Cost-Efficiency, Economic Efficiency, and Equity	Potential Applicability and Acceptability	Implementation Issues and Potential Strategies to Overcome Barriers
Container fees A number of current and emerging trends are driving the exploration of container charges and other direct user fees as a transportation revenue source. These include the rapid growth in international and domestic freight volumes and recognition that new revenue sources will be needed to fund freight-specific transportation improvements.	Container fees represent a potentially large source of revenue. A recent NCHRP report estimated that a $30/TEU fee applied at all U.S. ports, would generate average annual revenues of $2.2 billion through 2017[i]. A study performed in 2005 for the Southern California Association of Governments (SCAG) found that a container fee of $192 per TEU assessed on every inbound loaded container at the San Pedro Bay ports could fund about $20 billion in access infrastructure improvements.	Container fees offer a way to tie freight system users more directly to the resources and infrastructure they use. These fees are seen by many as a more efficient and equitable method to raise revenue that can be dedicated specifically to freight system improvements.	There are limited options to fund or finance non-highway freight improvement projects. Current federal programs may be applicable to small, localized freight system improvements, but are not well suited to larger regional intermodal freight improvements. Container fees could provide substantial revenues for such large-scale projects.	,It will be challenging to develop consensus among competing jurisdictions and other stakeholders on the types and locations of projects to be developed. Implementing a container fee that equitably links costs and potential benefits for the mix of freight traffic using any given gateway may also be difficult.
Customs Duties The majority of customs duties currently are deposited into the U.S. General Fund, although a portion is used to support costs of Customs and Border Patrol operations.	In FY 2002 these fees amounted to $23.8 billion in gross revenue, ¾ of which was collected from marine sources. This would be a very stable source of revenues.	Fees based on the value of cargo are not as equitable as those on the volume because they do not reflect the transportation requirements as well.	Customs duties would be most appropriately used for improvements to waterside or landside port or airport facilities, to improve the connections between these facilities and the highway and freight rail systems, or to improve freight facilities serving large volumes of international shipments.	One key disadvantage is the likely resistance by the Congress and federal agencies to the diversion of Customs duties to offset freight transportation investments. Some will argue that gateway improvement programs already exist and point to SAFETEA-LU's Coordinated Border Infrastructure Program (Section 1303), but finding from that program currently is inadequate.

This paper represents draft briefing material; any views expressed are those of the authors and do not represent the position of either the Section 1909 Commission or the U.S. Department of Transportation.

Conclusions

Federal and state governments have come to rely on the fuel tax for a large part of their highway funding. For many years fuel taxes served as a solid financial base for highway programs. They produced large amounts of revenue and lawmakers were relatively willing to raise taxes to meet growing program needs. The attractiveness of fuel taxes has diminished somewhat in recent years, especially with respect to their stability and revenue adequacy. In the long term as fuel economy improves and as alternative fuels become more prevalent, problems with equity and economic efficiency could also become significant.

In the short term vehicle fees are a potential supplement for motor fuel taxes, especially at the State level where they already exceed fuel taxes in some States. At the federal level vehicle fees currently apply only to heavy trucks. Several recent studies have identified increased vehicle fees as an alternative to raising the fuel tax to support the Highway Trust Fund, but efficiency and equity would require that vehicle fees be extended to all vehicle classes if that were to be done. There is a precedent for that since there had been a federal sales tax on automobiles ranging from 3 to 10 percent of the manufacturer's sales prices dating from 1917 until it was repealed in 1971. Vehicle sales taxes and registration fees are not nearly as efficient as the current fuel tax or other direct user fee alternatives, but they can be relatively more progressive.

In recent years as States have been unable to increase fuel taxes to meet highway investment requirements, State and local governments have turned to a variety of other revenue sources to construct key facilities. Included in these sources are tolls, dedicated taxes such as sales and property taxes, private equity, and general funds. Toll revenues increased from 7 to 10 percent of total State highway revenues between 1980 and 2005, and a recent report estimates that between 30 and 40 percent of new limited access road mileage built over the past 10 years was financed at least in part through tolls.[ii] There also has been an increase in some States, especially in the West, to impose local option sales taxes, fuel taxes, property taxes, and other fees to finance needed highway and transit improvements.

Several recent studies have suggested that a mileage-based tax may be a strong alternative to the fuel tax in 15 to 20 years. There is a general belief that until that time trends toward alternative fuels and more fuel efficient vehicles will not have eroded the fuel tax so much that it no longer was viable, but that after that time the fuel tax may no longer be sustainable. Mileage-based taxes would be more economically efficient and equitable than the current fuel tax, but administrative costs would be higher. Unless indexed, they could face the same problem as the fuel tax in terms of not rising automatically with inflation. Many technical and institutional issues need to be resolved concerning mileage-based taxes. On-going demonstrations will provide some of those answers.

---

[i] National Cooperative Highway Research Program (NCHRP), *Future Financing Options to Meet Highway and Transit Needs: NCHRP Project 20-24*, 2005.

[ii] Current Toll Road Activity in the U.S., A Survey and Analysis (http://www.fhwa.dot.gov/ppp/toll_survey_0906.pdf)

VTrans

SEC 29 – Transportation Study on Bridges

Sec. 29 of Act 164 of 2008 Report

August 20, 2008

SEC 29 – Transportation Study on Bridges

Section I – Documentation
- outline
- transportation study
- needs, findings and assumptions
- overview

Section II – Program Predictions
- interstate bridge, state highway bridge, town highway bridge and interstate/state highway 'short' structures

Section III – Replacement Needs
- cost for replacement of structures over 70 years of age

Section IV – Cost History
- FHWA bridge construction unit costs
- average total project cost

Section V – Inflationary Trends
- federal aid system bridge construction unit cost
- off system bridge construction unit cost
- total project cost
- normalized unit cost and linear regression for select items

Section VI – Condition 'Structural Deficiency' Trends
- interstate bridge, state highway bridge, town highway bridge and interstate/state highway 'short' structures

Section VII – Deficiency Trends and Performance Goals
- interstate bridge, state highway bridge, town highway bridge and interstate/state highway 'short' structures

Section VIII – Age History
- interstate, state highway and town highway bridges
- interstate/state highway 'short' structures

Section IX – Construction History
- interstate bridge, state highway bridge, town highway bridge and interstate/state highway 'short' structures

Section I – Documentation

A few explanatory notes/observations relative to the information presented:

Assumptions

The assumptions made in this analysis were available funds and staffing/processing time to develop projects (i.e. scoping, design, environmental clearances, right of way requirements, utility clearances, etc.).

There were two different scenarios assumed to address the resource/processing time. The first called 'constrained' reflects current procedural requirements, but requires additional resources. The second called 'unconstrained' reflects the assumption that all the additional resources needed would be available, and that processes and permit requirements will have been streamlined. On the Interstate system, however, there is no need to consider a constrained scenario because the constraint is eliminated due to the fact that the majority of the work can be accomplished within the existing right of way, with limited utilities and a number of the structures are dry crossings.

Inflationary Trends

While projections of inflation into the future can be difficult, total project cost* increases are shown to reflect the inflation being experienced in the design, development and construction of structures:

A. Interstate structures $3.88 per square foot of deck area (length x curb to curb width) per year (approximately 2% increase per year). Although these numbers reflect current history, we do not believe they are realistic in predicting the future as we have done very few of these projects so our sample size is extremely small. Natural variations in project scope and scale can be expected, to the point that we believe future costs will be considerably higher than what our limited history has shown.

B. State Highway structures $67.01 per square foot of deck area (length x curb to curb width) per year (approximately 6% increase per year).

C. Town Highway structures $48.18 per square foot of deck area (length x curb to curb width) per year (approximately 8% increase per year).

*These reflect total project costs including preliminary engineering (PE), right of way (ROW) and construction (CONST). Although lacking history, the lower interstate trend indicates the fact that Interstate projects have savings by staying within the ROW limits and minimizing resource impacts.

Using an alternative analysis (FHWA cost index), which does not include all construction items** we get:

A. On the Federal Aid system the cost increases $12.81 per square foot of deck area (length x out to out width) per year (approximately 6% increase per year).
B. Off the Federal Aid system cost increases $8.41 per square foot of deck area (length x out to out width) per year (approximately 4% increase per year).

**The items not included are: mobilization, demolition of existing bridge(s), approach slabs (approach slabs may be included when paid for as bridge item, e.g. on integral abutment bridge), stream channel work, riprap, slope paving, earthwork (exclusive of structural excavation and structural backfill), clearing and grubbing, retaining walls not attached to the abutment, guardrail transitions to bridges, maintenance and protection of traffic, detour costs, signing and marking, lighting, electrical conduit, inlet frames and grates, field office, construction engineering items, training, right-of-way, utility relocation and contingencies.

As an alternative, if it is assumed that structural steel is 15% of a bridge, concrete is 18% and all other items are 67%, we can deduce that a 13% annual inflation rate would be appropriate on a straight line projection based on recent history. Spikes like this in inflation, however, historically do not continue over long periods of time.

Considering the volatility of inflationary rates, the disparities in kinds of work involved in all the different structures, we recommend that a 6% per year rate be used for interstate, state highway and culvert projects; and that an 8% rate per year be used for town highway bridges.

Performance Measures

The current, established agency performance measure for bridges is based on the number of structurally deficient bridges within each program category. Recently, however, structural deficiency has been recognized to be a cumbersome measure to manage the basic needs of the bridge system, and it no longer is considered by the industry to be the best measure to chart the overall health of a bridge network. As a result, the agency will be migrating to a more holistic health index measure that will be based on core bridge unit condition ratings. This initiative will allow for more accurate trending and forecasting of how financial and resource constraints impact the asset. To meet the legislative intent of Sec. 29, however, structural deficiency was primarily used to compile this report.

SEC 29 – Transportation Study on Bridges

Vermont's STRUCTURAL DEFICIENCY TREND from 1997 to 2008 is as follows for each program category:

- Interstate bridge: 3.38 bridges per year net increase
- State Highway bridge: 1.77 bridges per year net increase
- Town Highway bridge: 2.90 bridges per year net increase
- Culverts[***]: 5.91 bridges per year net decrease

[***]The culvert numbers are a bit deceiving since often these catch us by surprise – a lot can happen in the 60 months between inspections.

The agency's 'Structurally Deficient' performance goals are;

- 7% on the Interstate system (21 bridges)
- 16% on the State Highway system (122 bridges)
- 16% of the Town Highway systems (257 bridges)
- 12% of Culverts (155 culverts)

Since the agency established these goals in partnership with the legislature several years ago, we have not met them in any of the categories. Analysis confirms the broad understanding that these goals will remain a challenge with current resources and administrative procedures.

Results

To meet the system performance goals in approximately 10 years, with the exception of the Interstate system, we would need to address both resource and procedural issues, which is what the '<u>unconstrained</u>' scenario predicts. The '<u>constrained</u>' scenario reflects the agency's normal operation with procedures as we have today, but with an increased level of funding.

Our cost analysis shows that we would need an accumulated amount of $1.16 billion unconstrained or $896 million constrained to meet the goals by the years indicated for the constrained or unconstrained conditions. With these funding levels, we would expect to meet performance measures as follows:

A. Interstate bridge: With additional funds goal would be met in 2017.
B. State Highway structures: Constrained we would meet the goal in 2025, while we would make the goal in 2017 if unconstrained.
C. Town Highway structures: Constrained we would meet the goal in 2029, while we would make the goal in 2018 if unconstrained.
D. Culverts: Meeting the performance goal for culverts under the constrained scenario is in 2026, but if unconstrained we could make the goal in 2018.

Preventative Maintenance

VTrans' definition of bridge preventative maintenance is similar to the AASHTO preventive maintenance definition and includes key concepts such as a planned strategic approach, cost effectiveness, system preservation, extension of life and maintaining functionality without increasing structural capacity.

> AASHTO defines preventative maintenance (PM) as "the planned strategy of cost effective treatments to an existing roadway system and its appurtenances that preserves the system, retards future deterioration, and maintains or improves the functional condition of the system without increasing structural capacity". Projects that address deficiencies in the pavement structure or increase the capacity of the facility are not considered preventive maintenance and should be designed using appropriate 3R standards. Functionally, Federal-aid eligible preventive maintenance activities are those that address aging, oxidation, surface deterioration, and normal wear and tear from day-to-day performance and environmental conditions. Preventive maintenance activities extend the service life of the roadway asset or facility in a cost-effective manner.

It is important to keep in mind that preventive maintenance does not correct existing structural deficiencies, but instead retards deterioration so that a bridge's lifespan can be extended thus preventing the structure from becoming structurally deficient. To this end, preventive maintenance is essential to slowing the rate at which structural deficiencies evolve over time. A stringent preventative maintenance program when vigilantly carried out over time not only prevents expensive rehabilitations or replacements from being necessary, but slows the rate at which structural deficiencies occur and therefore improves the overall condition rating of the entire network. The value of preventive maintenance will be appropriately demonstrated in the future through the use of a condition rating that evaluates a bridge's overall core unit condition. The agency is currently developing such a performance measure for future application.

Seventy Year Old Structure Replacement

At this time, there are 786 long structures and 329 short structures greater than 70 years of age. The cost to replace these, including a 20% scale factor, which is an upsizing of the structures' span length to meet environmental permit requirements, the total cost would be $2,308,359,115. Note, nearly 100 of the long structures are historic covered bridges and steel trusses that will likely never be allowed to be replaced, though will need repairs to keep in service.

SEC 29 – Transportation Study on Bridges

Summary

The Vermont Agency of Transportation in consultation with the Vermont Legislature in 2005 established structural deficiency goals. With current resources and procedures, reaching these goals remains a challenge as additional bridges will become structurally deficient each year.

Although a vigilant preventive maintenance program over time will slow the rate of system deterioration, current funding levels are not enough to stop all bridges from being categorized as structurally deficient. To place the state on track to meet its goal under a constrained scenario, analysis predicts a need for $897 million in bridge funding during the next 10 years. In an unconstrained analysis, the structural deficiency goals could be achieved in 10 years with a total investment of $1.16 billion.

Funding levels for both the 'constrained' and 'unconstrained' scenarios would appropriately be ramped up over time as the agency, even if provided additional resources, would require time to plan, design and permit new bridge projects. Using the 'constrained' scenario as an example, although $897 million total funding is needed over 10 years to meet the structural deficiency goal, only about $90 million (one 10th of the overall total) is needed during the next four fiscal years. Higher funding levels would be required in years five through ten when construction activity is fully ramped up.

The Administration and the Legislature have long acknowledged that additional resources are needed to solve Vermont's long-term bridge issues. Both remain open to discussions designed to solve these issues.

Section II – Program Predictions

Sec 29 Transportation Study

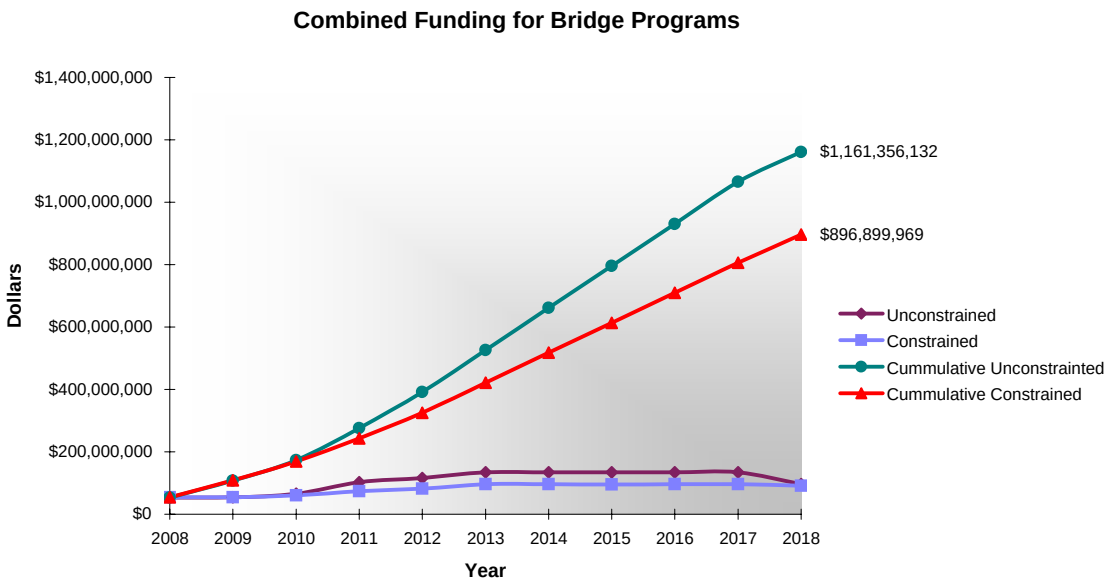
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Interstate Bridge												
	Unconstrained	$ 5,094,635	$ 5,594,635	$ 11,383,906	$ 19,317,811	$ 19,317,811	$ 19,317,811	$ 19,317,811	$ 18,817,811	$ 18,817,811	$ 18,817,811	$ 13,528,541
	Constrained	$ 5,094,635	$ 5,594,635	$ 11,383,906	$ 19,317,811	$ 19,317,811	$ 19,317,811	$ 19,317,811	$ 18,817,811	$ 18,817,811	$ 18,817,811	$ 13,528,541
State Highway Bridge												
	Unconstrained	$ 22,346,821	$ 22,846,821	$ 22,846,821	$ 36,111,369	$ 49,875,917	$ 63,140,464	$ 63,140,464	$ 63,140,464	$ 63,640,464	$ 63,640,464	$ 29,979,095
	Constrained	$ 22,846,821	$ 22,846,821	$ 22,846,821	$ 22,846,821	$ 29,979,095	$ 36,611,369	$ 36,611,369	$ 36,611,369	$ 37,111,369	$ 37,111,369	$ 37,111,369
Town Highway Bridge												
	Unconstrained	$ 19,701,071	$ 20,201,071	$ 24,931,285	$ 30,526,607	$ 30,526,607	$ 36,121,928	$ 36,121,928	$ 36,121,928	$ 36,121,928	$ 36,121,928	$ 36,121,928
	Constrained	$ 20,201,071	$ 20,201,071	$ 20,201,071	$ 20,201,071	$ 21,201,071	$ 29,161,500	$ 29,161,500	$ 29,161,500	$ 29,161,500	$ 29,161,500	$ 29,161,500
Interstate and State Highway "Short" Structures												
	Unconstrained	$ 6,129,717	$ 6,129,717	$ 6,129,717	$ 16,289,151	$ 16,289,151	$ 16,289,151	$ 16,289,151	$ 16,289,151	$ 16,289,151	$ 16,289,151	$ 16,289,151
	Constrained	$ 6,129,717	$ 6,129,717	$ 6,129,717	$ 11,209,434	$ 11,209,434	$ 11,209,434	$ 11,209,434	$ 11,209,434	$ 11,209,434	$ 11,209,434	$ 11,209,434
Total												
	Unconstrained	$ 53,272,245	$ 54,772,245	$ 65,291,730	$ 102,244,938	$ 116,009,486	$ 134,869,355	$ 134,869,355	$ 134,369,355	$ 134,869,355	$ 134,869,355	$ 95,918,715
	Constrained	$ 54,272,245	$ 54,772,245	$ 60,561,515	$ 73,575,138	$ 81,707,412	$ 96,300,114	$ 96,300,114	$ 95,800,114	$ 96,300,114	$ 96,300,114	$ 91,010,844
Cummulative Total												
	Unconstrained	$ 53,272,245	$ 108,044,490	$ 173,336,219	$ 275,581,157	$ 391,590,643	$ 526,459,998	$ 661,329,353	$ 795,698,708	$ 930,568,062	$ 1,065,437,417	$ 1,161,356,132
	Constrained	$ 54,272,245	$ 109,044,490	$ 169,606,005	$ 243,181,143	$ 324,888,555	$ 421,188,669	$ 517,488,783	$ 613,288,897	$ 709,589,011	$ 805,889,125	$ 896,899,969

• 2008 construction dollars per sq. ft. of interstate deck (curb - curb) =	$213.52
• average sq. ft. of interstate deck (curb - curb) =	12,385.89
• constrained to 1 bridge per year ($5,694,000 SFY09 "AS PASSED" Interstate Bridge including Interstate Bridge Maintenance)	

• 2008 construction dollars per sq. ft. of state highway deck (curb - curb)=	$827.30
• average sq. ft. of state highway deck (curb - curb) =	8,016.77
• constrained to 3 bridges per year ($27,412,371 SFY09 "AS PASSED" State Highway Bridge including State Highway Bridge Maintenance)	

• 2008 construction dollars per sq. ft. of town highway deck (curb - curb)=	$817.18
• average sq. ft. of town highway deck (curb - curb) =	2,282.37
• constrained to 10 bridges per year ($18,202,289 SFY09 "AS PASSED" Town Highway Bridge including Town Highway Bridge Maintenance)	

• 2008 construction dollars per ft. of length =	$8,107.85
• assumed average length of buried structure (feet) =	156.63
• constrained to 4 bridges per year ($4,541,977 SFY09 "AS PASSED" Interstate / State Highway Culverts including Interstate / State Highway Culvert Bridge Maintenance)	



• average total project (PE, ROW and CONST) cost for an interstate bridge	$213.52	sq. ft. of deck (curb-curb)
• average total project cost (PE, ROW and CONST) for a state highway bridge	$827.30	sq. ft. of deck (curb-curb)
• average total project cost (PE, ROW and CONST) for a town highway bridge	$817.18	sq. ft. of deck (curb-curb)
• average total project cost (PE, ROW and CONST) for a "short" bridge	$8,107.85	per length of barrel
• 5 year average number of interstate bridges built / reconstructed (rehabilitated)	0.80	per year
• 5 year average number of state highway bridges built / reconstructed (rehabilitated)	5.40	per year
• 5 year average number of town highway bridges built / reconstructed (rehabilitated)	17.40	per year
• 5 year average number of "short" bridges built / reconstructed (rehabilitated)	3.80	per year
• number of interstate bridges expected to become structurally deficient	3.38	per year
• number of state highway bridges expected to become structurally deficient	1.77	per year
• number of town highway bridges expected to become structurally deficient	2.90	per year
• number of "short" bridges expected to become structurally deficient	0.00	per year (estimated to better represent reality)

• using today's dollars and internal limitations to move projects (ROW, SHPO, utilities, etc.) → What is realistic?
- performance goal ≤ 21 structurally deficient bridges on the interstate system (7%)
- performance goal ≤ 122 structurally deficient bridges on the state highway system (16%)
- performance goal ≤ 257 structurally deficient bridges on the town system (16%)
- performance goal ≤ 155 structurally deficient bridges on the "short" system (12%)

• preventative maintenance and repair needs (≈ $7,000,000 budget amount)
- assumed 35% for interstate and state highway bridge systems and 15% for town highway and interstate/state highway "short" structure systems

Interstate Bridge
- assume, per year, 0.8 bridges under construction (no longer deficient)
- the SD trend is the net result of bridges under construction and those becoming deficient, therefore assume 3.38 becoming deficient (SD) per year, say 4 per year
- constrained to 1 bridge per year ($5,694,000 SFY09 "AS PASSED" Interstate Bridge including Interstate Bridge Maintenance)

State Highway Bridge
- assume, per year, 5.4 bridges under construction (no longer deficient)
- the SD trend is the net result of bridges under construction and those becoming deficient, therefore assume 1.77 becoming deficient (SD) per year, say 2 per year
- constrained to 3 bridges per year ($27,412,371 SFY09 "AS PASSED" State Highway Bridge including State Highway Bridge Maintenance)

Town Highway Bridge
- assume, per year, 17.4 bridges under construction (no longer deficient)
- the SD trend is the net result of bridges under construction and those becoming deficient, therefore assume 2.90 becoming deficient (SD) per year, say 3 per year
- constrained to 10 bridges per year ($18,202,289 SFY09 "AS PASSED" Town Highway Bridge including Town Highway Bridge Maintenance)

Interstate and State Highway "Short" Structures
- assume, per year, 3.8 bridges under construction (no longer deficient)
- based on the numbers an actual downward trend is shown but since "short" are only inspected every 60 months this may be incorrect and 0 was used
- the SD trend is the net result of bridges under construction and those becoming deficient, therefore assume 0 becoming deficient (SD) per year
- constrained to 4 bridges per year ($4,541,977 SFY09 "AS PASSED" Interstate/State Highway Culverts including Interstate/State Highway Culvert Bridge Maintenance)

Sec29 Transportation Study Overview

	Goals	Year the structural deficiency goal could be met		
		normal program	constrained * w/added funding	unconstrained ** w/added funding
Interstate Bridge	7% or ≤ 21 bridges	never	2017	2017
State Highway Bridge	16% or ≤ 122 bridges	never	2025	2017
Town Highway Bridge	16% or ≤ 257 bridges	never	2029	2018
Interstate and State Highway Culverts	12% or ≤ 155 culverts	never	2026	2018

* constrained = existing program limitations imposed
** unconstrained = no limitations on process and availablility of personnel

	Total program costs through 2018 *costs are in 2008 dollars and include preliminary engineering, right of way and		
Interstate Bridge	$62,634,000	$169,326,397	$169,326,397
State Highway Bridge	$301,536,081	$342,534,596	$500,709,167
Town Highway Bridge	$200,225,179	$276,974,354	$342,618,210
Interstate and State Highway Culverts	$49,961,747	$108,064,622	$148,702,358
	$614,357,007	$896,899,969	$1,161,356,132
Costs per year over 11 years (2008 to 2018) =	$55,850,637	$81,536,361	$105,577,830

Interstate Bridge including Bridge Maintenance =	$5,694,000
State Highway Bridge including Bridge Maintenance =	$27,412,371
Town Highway Bridge including Bridge Maintenance =	$18,202,289
Interstate/State Highway Culverts including Bridge Maintenance =	$4,541,977
"As Passed" SFY09	$55,850,637

Interstate Bridge

• 2008 construction dollars per sq. ft. of deck (curb - curb)= $213.52
• average sq. ft. of interstate deck (curb - curb) = 12,385.89
• major repair 'targeted' project (estimated total project cost) = $500,000.00

• unconstrained & constrained; estimated 1 - 3 years (used 2 year average) for new projects, increased production, project process, etc.
• without past or a good history on preventative maintenance work activities; estimated 35% of the $7,000,000 budgeted amount (included in cost total)

• in 2008 NHI submitttal year, of the 35 interstate bridges classified as structurally deficient, 7 were because of a deck rating only and 4 due to a superstructure rating only

Year	# Replacement / Rehabilitation Projects	# Major Repair 'Targeted' Projects	Average Sq. Ft.	Cost	# Replacement / Rehabilitation Projects	# Major Repair 'Targeted' Projects	Average Sq. Ft.	Cost
	Unconstrained				Constrained			
2008	1	0	12385.89	$5,094,635.23	1	0	12385.89	$5,094,635.23
2009	1	1	12385.89	$5,594,635.23	1	1	12385.89	$5,594,635.23
2010	3	2	37157.67	$11,383,905.70	3	2	37157.67	$11,383,905.70
2011	6	2	74315.34	$19,317,811.40	6	2	74315.34	$19,317,811.40
2012	6	2	74315.34	$19,317,811.40	6	2	74315.34	$19,317,811.40
2013	6	2	74315.34	$19,317,811.40	6	2	74315.34	$19,317,811.40
2014	6	2	74315.34	$19,317,811.40	6	2	74315.34	$19,317,811.40
2015	6	1	74315.34	$18,817,811.40	6	1	74315.34	$18,817,811.40
2016	6	1	74315.34	$18,817,811.40	6	1	74315.34	$18,817,811.40
2017	6	1	74315.34	$18,817,811.40	6	1	74315.34	$18,817,811.40
2018	4	1	49543.56	$13,528,540.93	4	1	49543.56	$13,528,540.93
2019	4	1	49543.56	$13,528,540.93	4	1	49543.56	$13,528,540.93
2020	4	1	49543.56	$13,528,540.93	4	1	49543.56	$13,528,540.93
2021	4	1	49543.56	$13,528,540.93	4	1	49543.56	$13,528,540.93
2022	4	1	49543.56	$13,528,540.93	4	1	49543.56	$13,528,540.93
2023	4	1	49543.56	$13,528,540.93	4	1	49543.56	$13,528,540.93
2024	4	1	49543.56	$13,528,540.93	4	1	49543.56	$13,528,540.93
2025	4	1	49543.56	$13,528,540.93	4	1	49543.56	$13,528,540.93
2026	4	1	49543.56	$13,528,540.93	4	1	49543.56	$13,528,540.93
2027	4	1	49543.56	$13,528,540.93	4	1	49543.56	$13,528,540.93
2028	4	1	49543.56	$13,528,540.93	4	1	49543.56	$13,528,540.93
			Total (10 year) =	$169,326,396.87			Total (10 year) =	$169,326,396.87
			Total (20 year) =	$304,611,806.18			Total (20 year) =	$304,611,806.18

State Highway Bridge

• 2008 construction dollars per sq. ft. of deck (curb - curb)= $827.30
• average sq. ft. of state highway deck (curb - curb) = 8,016.77
• major repair 'targeted' project (estimated total project cost) = $500,000.00

• unconstrained & constrained; estimated 3 - 5 years (used 4 year average) for new projects, increased production, project process, etc.
• without past or a good history on preventative maintenance work activities; estimated 35% of the $7,000,000 budgeted amount (included in cost total)

• in 2008 NHI submitttal year, of the 157 state bridges classified as structurally deficient, 48 were because of a deck rating only and 21 due to a superstructure rating only

Year	# Replacement / Rehabilitation Projects	# Major Repair 'Targeted' Projects	Average Sq. Ft.	Cost	# Replacement / Rehabilitation Projects	# Major Repair 'Targeted' Projects	Average Sq. Ft.	Cost
	Unconstrained				Constrained			
2008	3	0	24050.31	$22,346,821.46	3	1	24050.31	$22,846,821.46
2009	3	1	24050.31	$22,846,821.46	3	1	24050.31	$22,846,821.46
2010	3	1	24050.31	$22,846,821.46	3	1	24050.31	$22,846,821.46
2011	5	1	40083.85	$36,111,369.11	3	1	24050.31	$22,846,821.46
2012	7	2	56117.39	$49,875,916.75	4	2	32067.08	$29,979,095.28
2013	9	2	72150.93	$63,140,464.39	5	2	40083.85	$36,611,369.11
2014	9	2	72150.93	$63,140,464.39	5	2	40083.85	$36,611,369.11
2015	9	2	72150.93	$63,140,464.39	5	2	40083.85	$36,611,369.11
2016	9	3	72150.93	$63,640,464.39	5	3	40083.85	$37,111,369.11
2017	9	3	72150.93	$63,640,464.39	5	3	40083.85	$37,111,369.11
2018	4	2	32067.08	$29,979,095.28	5	3	40083.85	$37,111,369.11
2019	3	2	24050.31	$23,346,821.46	5	3	40083.85	$37,111,369.11
2020	3	2	24050.31	$23,346,821.46	5	3	40083.85	$37,111,369.11
2021	3	2	24050.31	$23,346,821.46	5	3	40083.85	$37,111,369.11
2022	3	2	24050.31	$23,346,821.46	5	3	40083.85	$37,111,369.11
2023	3	2	24050.31	$23,346,821.46	5	3	40083.85	$37,111,369.11
2024	3	2	24050.31	$23,346,821.46	5	3	40083.85	$37,111,369.11
2025	3	2	24050.31	$23,346,821.46	5	3	40083.85	$37,111,369.11
2026	3	2	24050.31	$23,346,821.46	5	2	40083.85	$36,611,369.11
2027	3	2	24050.31	$23,346,821.46	3	2	24050.31	$23,346,821.46
2028	3	2	24050.31	$23,346,821.46	3	2	24050.31	$23,346,821.46
			Total (10 year) =	$500,709,167.47			Total (10 year) =	$342,534,595.77
			Total (20 year) =	$734,177,382.10			Total (20 year) =	$685,619,191.53

Town Highway Bridge

• 2008 construction dollars per sq. ft. of deck (curb - curb)= $817.18
• average sq. ft. of town highway deck (curb - curb) = 2,282.37
• major repair 'targeted' project (estimated total project cost) = $500,000.00

• unconstrained & constrained; estimated 3 - 5 years (used 4 year average) for new projects, increased production, project process, etc.
• without past or a good history on preventative maintenance work activities; estimated 15% of the $7,000,000 budgeted amount (included in cost total)

• in 2008 NHI submitttal year, of the 305 town bridges classified as structurally deficient, 37 were because of a deck rating only and 33 due to a superstructure rating only

Year	# Replacement / Rehabilitation Projects	# Major Repair 'Targeted' Projects	Average Sq. Ft.	Cost	# Replacement / Rehabilitation Projects	# Major Repair 'Targeted' Projects	Average Sq. Ft.	Cost
	Unconstrained				Constrained			
2008	10	0	22823.7	$19,701,071.17	10	1	22823.7	$20,201,071.17
2009	10	1	22823.7	$20,201,071.17	10	1	22823.7	$20,201,071.17
2010	12	3	27388.44	$24,931,285.40	10	1	22823.7	$20,201,071.17
2011	15	3	34235.55	$30,526,606.75	10	1	22823.7	$20,201,071.17
2012	15	3	34235.55	$30,526,606.75	10	3	22823.7	$21,201,071.17
2013	18	3	41082.66	$36,121,928.10	14	4	31953.18	$29,161,499.63
2014	18	3	41082.66	$36,121,928.10	14	4	31953.18	$29,161,499.63
2015	18	3	41082.66	$36,121,928.10	14	4	31953.18	$29,161,499.63
2016	18	3	41082.66	$36,121,928.10	14	4	31953.18	$29,161,499.63
2017	18	3	41082.66	$36,121,928.10	14	4	31953.18	$29,161,499.63
2018	18	3	41082.66	$36,121,928.10	14	4	31953.18	$29,161,499.63
2019	12	3	27388.44	$24,931,285.40	14	4	31953.18	$29,161,499.63
2020	12	2	27388.44	$24,431,285.40	14	3	31953.18	$28,661,499.63
2021	12	2	27388.44	$24,431,285.40	14	3	31953.18	$28,661,499.63
2022	12	2	27388.44	$24,431,285.40	14	3	31953.18	$28,661,499.63
2023	12	2	27388.44	$24,431,285.40	14	3	31953.18	$28,661,499.63
2024	12	2	27388.44	$24,431,285.40	14	3	31953.18	$28,661,499.63
2025	12	2	27388.44	$24,431,285.40	14	3	31953.18	$28,661,499.63
2026	12	2	27388.44	$24,431,285.40	14	3	31953.18	$28,661,499.63
2027	12	2	27388.44	$24,431,285.40	14	3	31953.18	$28,661,499.63
2028	12	2	27388.44	$24,431,285.40	14	3	31953.18	$28,661,499.63
			Total (10 year) =	$342,618,209.82			Total (10 year) =	$276,974,353.62
			Total (20 year) =	$587,431,063.81			Total (20 year) =	$564,089,349.95

Interstate and State Highway "Short" Structures

• 2008 construction dollars per ft. of length = $8,107.85
• estimated average length of buried structure (feet) = 156.63

• unconstrained & constrained; estimated 1 - 3 years (used 2 year average) for new projects, increased production, project process, etc.
• without past or a good history on preventative maintenance work activities; estimated 15% of the $7,000,000 budgeted amount (included in cost total)

• in 2008 NHI submitttal year, an unknown number of culverts of the 219 structurally deficient were due to a corroded invert only (shape still good and backfill not compromised)

Year	# Replacement / Rehabilitation Projects	# Major Repair 'Targeted' Projects	Average Sq. Ft.	Cost	# Replacement / Rehabilitation Projects	# Major Repair 'Targeted' Projects	Average Sq. Ft.	Cost
	Unconstrained				Constrained			
2008	4	0	626.52	$6,129,716.97	4	0	626.52	$6,129,716.97
2009	4	0	626.52	$6,129,716.97	4	0	626.52	$6,129,716.97
2010	4	0	626.52	$6,129,716.97	4	0	626.52	$6,129,716.97
2011	12	0	1879.56	$16,289,150.91	8	0	1253.04	$11,209,433.94
2012	12	0	1879.56	$16,289,150.91	8	0	1253.04	$11,209,433.94
2013	12	0	1879.56	$16,289,150.91	8	0	1253.04	$11,209,433.94
2014	12	0	1879.56	$16,289,150.91	8	0	1253.04	$11,209,433.94
2015	12	0	1879.56	$16,289,150.91	8	0	1253.04	$11,209,433.94
2016	12	0	1879.56	$16,289,150.91	8	0	1253.04	$11,209,433.94
2017	12	0	1879.56	$16,289,150.91	8	0	1253.04	$11,209,433.94
2018	12	0	1879.56	$16,289,150.91	8	0	1253.04	$11,209,433.94
2019	4	0	626.52	$6,129,716.97	8	0	1253.04	$11,209,433.94
2020	4	0	626.52	$6,129,716.97	8	0	1253.04	$11,209,433.94
2021	4	0	626.52	$6,129,716.97	8	0	1253.04	$11,209,433.94
2022	4	0	626.52	$6,129,716.97	8	0	1253.04	$11,209,433.94
2023	4	0	626.52	$6,129,716.97	8	0	1253.04	$11,209,433.94
2024	4	0	626.52	$6,129,716.97	8	0	1253.04	$11,209,433.94
2025	4	0	626.52	$6,129,716.97	8	0	1253.04	$11,209,433.94
2026	4	0	626.52	$6,129,716.97	8	0	1253.04	$11,209,433.94
2027	4	0	626.52	$6,129,716.97	5	0	783.15	$7,399,646.21
2028	4	0	626.52	$6,129,716.97	4	0	626.52	$6,129,716.97
			Total (10 year) =	$148,702,358.19			Total (10 year) =	$108,064,622.43
			Total (20 year) =	$209,999,527.89			Total (20 year) =	$211,269,457.13

Section III – Replacement Needs

Cost for Replacement of Structures over 70 Years of Age

* long structures (greater than 20 feet in length)

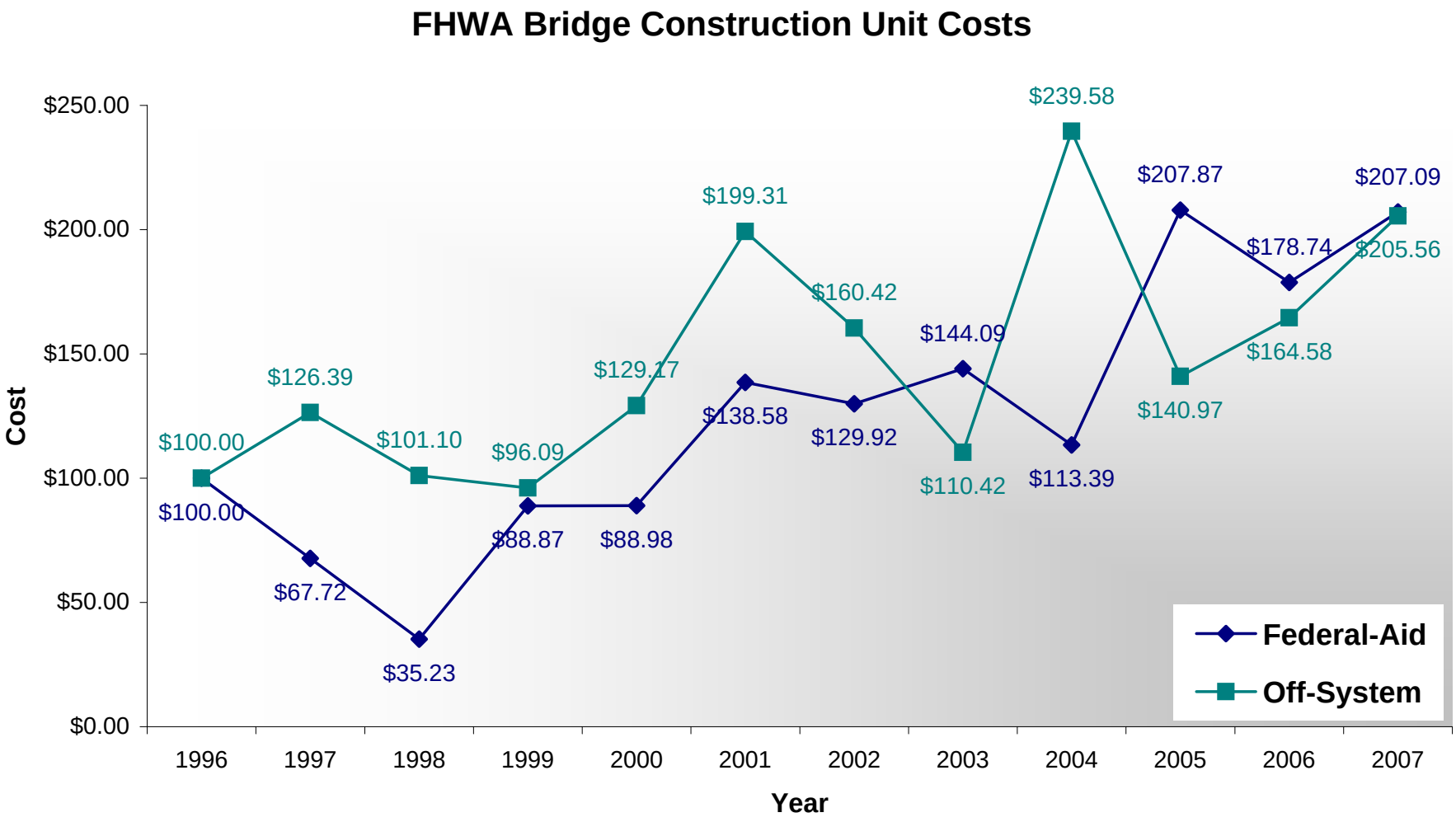
System	Age	Number of Structures	Area (curb - curb)	Unit Cost (curb - curb)		Cost to Replace *with 20% scale factor
Interstate	over 70	0	0.0 sq. ft.	$213.52 per sq. ft.		$0.00
State	over 70	226	503,228.5 sq. ft.	$827.30 per sq. ft.		$499,585,125.66
Town	over 70	558	827,277.7 sq. ft.	$817.18 per sq. ft.		$811,241,749.06
Other	over 70	2	2,087.8 sq. ft.	$825.00 per sq. ft.		$2,066,922.00
	Total	786	1,332,594.0 sq. ft.		Subtotal =	$1,312,893,796.72

* short structures (greater than 6 feet in length and less than or equal to 20 feet in length)

System	Age	Number of Structures	Area (curb - curb)	Unit Cost (curb - curb)	Length (feet)	Unit Cost (linear feet)	Cost to Replace *with 20% scale factor
Interstate	over 70	0	0.0 sq. ft.	$213.52 per sq. ft.	0.0 culv length	$8,107.85 per linear ft.	$0.00
State	over 70	329	844,547.0 sq. ft.	$827.30 per sq. ft.	16,140.0 culv length	$8,107.85 per linear ft.	$995,465,318.52
	Total	329	860,687.0 sq. ft. + ft.			Subtotal =	$995,465,318.52

Grand Total = $2,308,359,115

Section IV – Cost History


FHWA Bridge Construction Unit Costs
$250.00
$200.00
$150.00
$100.00
$50.00
$0.00
Cost
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Year
$100.00
$126.39
$101.10
$96.09
$129.17
$199.31
$160.42
$110.42
$239.58
$140.97
$164.58
$205.56
$100.00
$67.72
$35.23
$88.87
$88.98
$138.58
$129.92
$144.09
$113.39
$207.87
$178.74
$207.09
Federal-Aid
Off-System

AVERAGE TOTAL PROJECT COST
"PER SQ. FT. (CURB-CURB)

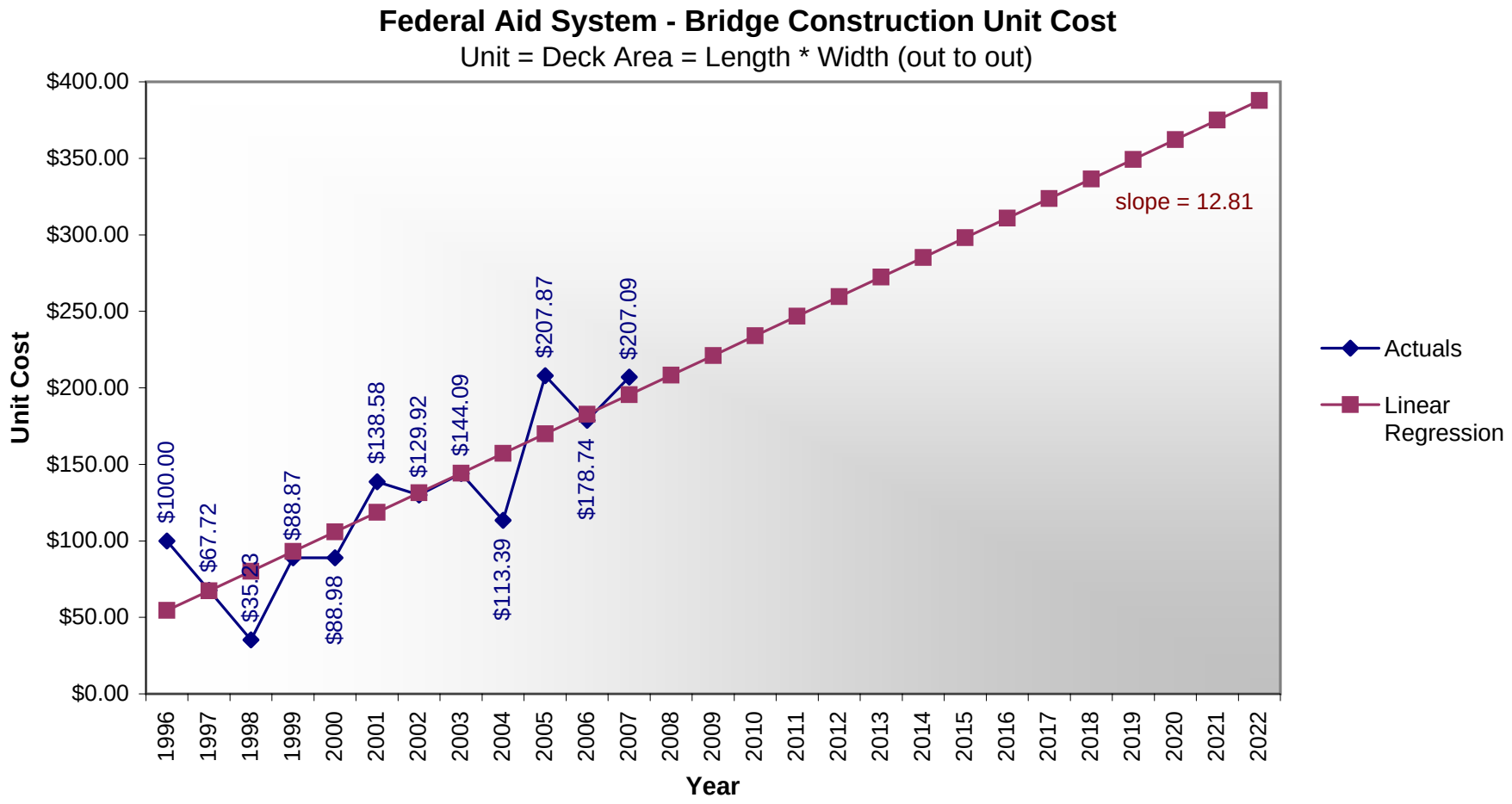
TOWN NAME	ROUTE NAME	BRIDGE NUMBER	OWNER	LAST PROJECT NUMBER	LAST PROJECT NAME	LENGTH	CURB-CURB WIDTH	OUT-OUT WIDTH	BRIDGE TYPE	YEAR BUILT	YEAR RECONSTR.	ANALYSIS YEAR	EXPENDED TO DATE - PE	EXPENDED TO DATE - ROW	EXPENDED TO DATE - CONST	EXPENDED TO DATE - TOTAL	SQ. FT. (CURB-CURB)	COST PER SQ. FT.	NOTE
S. BURLINGTON	US2	0018C	01	IM DECK (36)	SOUTH BURLINGTON	000261	0382	0938	4 SPN ROLLED BEAM	1962	2003	2003	$0	$0	$7,907,022	$7,907,022	9970.20	$793.07	
BOLTON	I89	0051N	01	AC IM 089-2(29)	BOLTON	000364	0320	0360	5 SP CONT WELDED PL	1961	2005	2005	$0	$0	$2,712,240	$2,712,240	11648.00	$232.85	50% project cost
BOLTON	I89	0051S	01	AC IM 089-2(29)	BOLTON	000453	0320	0360	6 SP CONT WLD PL GIR	1961	2006	2006	$0	$0	$2,712,240	$2,712,240	14496.00	$187.10	50% project cost
RICHMOND	I89	0056N	01	I89-2(8)C/4		000232	0420	0470	3 SPAN ROLLED BEAM	1964	2007	2007	$25,623	$0	$726,112	$751,735	9744.00	$77.15	50% project cost
RICHMOND	I89	0056S	01	I89-2(8)C/4		000222	0300	0350	3 SPAN ROLLED BEAM	1964	2007	2007	$25,623	$0	$726,112	$751,735	6660.00	$112.87	50% project cost
CONCORD	US2	00117	01	F028-4(1)		000240	0335	0364	3 SPN CONT ROLLED BM	1961	2000	2000	$234,421	$405	$1,577,404	$1,812,230	8040.00	$225.40	
ANDOVER	VT11	00037	01	BHF0161(21) SBMA6736 FAP 100C	ANDOVER	000060	0292	0317	ROLLED BEAM	1929	2000	2000	$10,872	$0	$315,502	$326,374	1752.00	$186.29	
ANDOVER	VT11	00039	01	BHF0161(22)S BMA6308 FAP 100C	ANDOVER	000046	0294	0317	ROLLED BEAM	1929	2000	2000	$8,512	$0	$350,321	$358,833	1352.40	$265.33	
FAYSTON	VT17	00035	01	BHF 0200(8) 38FL90	FAYSTON	000078	0286	0324	WELDED PLATE GIRDER	1939	2000	2000	$217,312	$25,366	$1,013,226	$1,255,904	2230.80	$562.98	
TOWNSHEND	VT30	00015	01	BHF 0151(18) S159(2)	TOWNSHEND	000446	0310	0350	4 SP CONT. ROLLED BM	1952	2000	2000	$91,121	$1,075	$1,436,331	$1,528,527	13826.00	$110.55	
TOWNSHEND	VT30	00018	01	BRF BST 015-1(17)	TOWNSHEND	000045	0317	0357	CONCRETE SLAB	2000	0000	2000	$99,623	$186,799	$954,736	$1,241,158	1426.50	$870.07	
LONDONDERRY	VT100	00091	01	BRF 013-2(8)	LONDONDERRY	000234	0335	0370	2 SP CONT WELD PL GD	2000	0000	2000	$252,174	$82,474	$2,145,199	$2,479,847	7839.00	$316.35	
BRISTOL	VT116	00010	01	ER 021-1(13)	BRISTOL	000148	0315	0350	WELDED PLATE GIRDER	2000	0000	2000	$565,732	$268,470	$2,115,936	$2,950,138	4662.00	$632.81	
MONTGOMERY	VT118	00011	01	S0283(2) STP028(10)S	MONTGOMERY	000059	0319	0336	ROLLED BEAM	1961	2000	2000	$13,419	$0	$325,222	$338,641	1882.10	$179.93	
SHELBURNE	US7	00144	01	NHEGC FEGC 019-4 26	SHELBURNE	000275	0533	0631	3 SP CONT CUR PL GIR	2001	0000	2001	$0	$0	$4,413,408	$4,413,408	14657.50	$301.10	
WILMINGTON	VT9	00032	01	AC BHF 010-1(35)S ER9B	WILMINGTON	000084	0336	0442	ROLLED BEAM	1939	2001	2001	$107,929	$0	$713,644	$821,573	2822.40	$291.09	
MANCHESTER	VT11	00004	01	AC BHF 016-1(19)S	MANCHESTER	000069	0332	0372	STEEL BEAM	1955	2001	2001	$91,890	$0	$591,134	$683,024	2290.80	$298.16	
IRASBURG	VT14	00129	01	BRF 0251 (6)	IRASBURG	000136	0280	0311	WELDED PLATE GIRDER	2001	0000	2001	$120,173	$2,526	$992,500	$1,115,199	3808.00	$292.86	
WARREN	VT100	00167	01	BHF013-4(27)S ST 157(T)	WARREN	000085	0328	0352	ROLLED BEAM	1957	2001	2001	$13,690	$0	$385,451	$399,141	2788.00	$143.16	
MORETOWN	VT100B	00008	01	BRS 0167 (11)	MORETOWN-MIDDLESEX	000265	0390	0427	2SP CONT CURVED GIR	2001	0000	2001	$480,211	$322,140	$3,043,834	$3,846,185	10335.00	$372.15	
STOWE	VT108	00007	01	AC BHF 0235(8)S 234-L	STOWE	000094	0292	0317	ROLLED BEAM	1941	2001	2001	$74,758	$0	$550,842	$625,600	2744.80	$227.92	
WHITINGHAM	VT112	00011	01	SA60		000075	0243	0261	ROLLED BEAM	1934	2001	2001	$189	$0	$94,780	$94,969	1822.50	$52.11	
VERSHIRE	VT113	00019	01	AC BHF 0180 (6) S	VERSHIRE	000074	0301	0327	ROLLED BEAM	1939	2001	2001	$14,428	$0	$374,351	$388,779	2227.40	$174.54	
VERSHIRE	VT113	00020	01	AC BHF 0180 (7) S	VERSHIRE	000047	0290	0315	PRECAST PT VOID SLAB	1928	2001	2001	$25,895	$0	$366,692	$392,587	1363.00	$288.03	
BRIDPORT	VT125	00003	01	BHF 0172(7)S	BRIDPORT	000049	0250	0276	CONCRETE T-BEAM	1936	2001	2001	$15,062	$0	$387,634	$402,696	1225.00	$328.73	
WARREN	VT100	00169	01	AC BHF 013-4(28)S S157(6)	WARREN	000163	0330	0356	3 SPAN ROLLED BEAM	1954	2002	2002	$50,430	$0	$1,184,305	$1,234,735	5379.00	$229.55	
MORRISTOWN	VT100	00213	01	BRF 029-1(11)	MORRISTOWN	000148	0330	0370	WELDED PLATE GIRDER	2002	0000	2002	$273,456	$47,167	$1,703,941	$2,024,564	4884.00	$414.53	
DERBY	VT105	00064	01	BRF 034 - 3 (14)	DERBY	000146	0357	0435	CURVED WLD PL GIRDER	2002	0000	2002	$642,977	$437,431	$3,231,258	$4,311,666	5212.20	$827.23	
BRISTOL	VT116	00011	01	BRF 021-1 (13)	BRISTOL	000160	0315	0351	CURVED WD PLT GIRDER	2002	0000	2002	$0	$0	$1,942,375	$1,942,375	5040.00	$385.39	
BARTON	US5	00161	01	STP 0113	BARTON	000137	0305	0344	WELDED PLATE GIRDER	2003	0000	2003	$381,359	$76,900	$2,831,727	$3,289,986	4178.50	$787.36	
WHITINGHAM	VT112	00013	01	BHS 013-1(10)S 38FL-3	WHITINGHAM	000084	0268	0290	ROLLED BEAM	1939	2003	2003	$113,505	$207	$100,825	$214,537	2251.20	$95.30	
HARTLAND	US5	00062	01	I91-1(22)C/2	IM 091-1 (36)	000375	0308	0349	5SP ROLLED BEAM	1965	2004	2004	$286,290	$0	$2,710,587	$2,996,877	11550.00	$259.47	
SHELBURNE	C2003	00015	01	BRO 1445 (30)	SHELBURNE	000092	0291	0316	WELDED PLATE GIRDER	2004	0000	2004	$243,849	$47,235	$1,317,550	$1,608,634	2677.20	$600.86	
ROYALTON	VT14	00021	01	BRS 0147(5)	ROYALTON	000134	0318	0406	WELLED PLATE GIRDER	2005	0000	2005	$459,075	$135,232	$1,940,683	$2,534,990	4261.20	$594.90	
BERKSHIRE	VT118	00026	01	BRF-RS 0283(7)		000149	0305	0344	WEDED GIRDER	2005	0000	2005	$758,924	$288,477	$4,056,844	$5,104,245	4544.50	$1,123.17	
MAIDSTONE	VT933	00001	01	BHO 1447(24)	MAIDSTONE-STRAFFORD, NH	000196	0151	0159	PIN & EYE BAR TRUSS	1893	2005	2005	$624,376	$0	$2,177,978	$2,802,354	2959.60	$946.87	
HARTLAND	US5	00060	01	BRS 0113 (22)	HARTLAND	000144	0330	0370	CURVED WELDED GIRDER	2006	0000	2006	$582,438	$146,916	$2,742,873	$3,472,227	4752.00	$730.69	
JAMAICA	VT100	00080	01	AC BRF 013-1(8)	JAMAICA	000267	0324	0349	STEEL THRU TRUSS	2006	0000	2006	$1,108,740	$139,471	$4,471,942	$5,720,153	8650.80	$661.23	
DUXBURY	VT100	00187	01	STP 013-4(24)	DUXBURY	000069	0334	0344	ROLLED BEAM	2006	0000	2006	$169,903	$118,155	$1,359,499	$1,647,557	2304.60	$714.90	
LYNDON	VT114	00008	01	BRS 0269 (8)S	LYNDON	000095	0310	0344	WELDED PLATE GIRDER	2006	0000	2006	$318,448	$35,380	$1,986,924	$2,340,752	2945.00	$794.82	
MONTGOMERY	VT118	00021	01	S33(2) BHF 0283 [8]S	MONTGOMERY	000187	0311	0352	3-SPAN ROLLED BEAM	1953	2006	2006	$167,356	$0	$1,492,886	$1,660,242	5815.70	$285.48	
CASTLETON	VT4A	00008	01	RS 0142 (10)	CASTLETON	000060	0270	0310	PRESTRESS CONC SLAB	2007	0000	2007	$417,319	$80,167	$1,092,893	$1,590,379	1620.00	$981.72	
WOODFORD	VT9	00011	01	BHF 010-1(29)	WOODFORD	000279	0430	0470	3SPN CONT PLT GIRDER	2007	0000	2007	$332,751	$49,616	$5,159,906	$5,542,273	11997.00	$461.97	
FAYSTON	VT17	00036	01	BHF 0200 (9)	FAYSTON	000081	0285	0325	ROLLED BEAM	1939	2007	2007	$243,112	$36,476	$1,516,039	$1,795,627	2308.50	$777.83	
READING	VT44	00001	01	BRS 0148 (6)S	READING	000068	0330	0370	ROLLED BEAM	2007	0000	2007	$274,895	$154,718	$1,452,866	$1,882,479	2244.00	$838.89	
ALBURGH	VT78	00002	01	BRF 036-1 (1)	ALBURGH-SWANTON	003586	0423	0462	23 SP WELDED PLT GRD	2007	0000	2007	$7,260,023	$346,205	$35,463,018	$43,069,246	151687.80	$283.93	
TUNBRIDGE	VT110	00004	01	BRS 0169(6)	TUNBRIDGE	000184	0273	0357	2SPN CONT WELD GIRD	2007	0000	2007	$762,880	$166,875	$4,229,909	$5,159,664	5023.20	$1,027.17	
LYNDON	VT114	00002	01	BRF 0269(10)		000100	0334	0364	STEEL BEAM	2007	0000	2007	$380,218	$125,703	$1,742,804	$2,248,725	3340.00	$673.27	
BENNINGTON	US7	00010	04	WPMH73-D BHF1000(17S)	BENNINGTON	000053	0338	0338	RIVETED THRU GIRDER	1936	2000	2000	$214,293	$0	$163,618	$377,911	1791.40	$210.96	
BRIGHTON	VT114	00025	03	BRS 0321 (6) S	BRIGHTON	000037	0289	0314	CONC SLAB	2000	0000	2000	$132,147	$24,044	$463,349	$619,540	1069.30	$579.39	
BARRE CITY	BLACKWELL	00010	04	BRM 6000(13)		000081	0300	0393	WELDED PLATE GIRDER	2000	0000	2000	$171,944	$24,381	$1,120,562	$1,316,887	2430.00	$541.93	
MANCHESTER	FAS 0171	00009	03	SA37 1952 BH 017(1)S	MANCHESTER	000069	0239	0329	STEEL BEAM	1955	2000	2000	$406,841	$0	$55,528	$462,369	1649.10	$280.38	
GRAFTON	FAS 0126	00012	03	BHF 0138 (9)S 38FL70		000075	0239	0315	ROLLED BEAM	1939	2000	2000	$241,929	$0	$159,721	$401,650	1792.50	$224.07	
WEYBRIDGE	FAS 0181	00005	03	BHS 0181(1)S S76(1)	WEYBRIDGE	000089	0245	0268	WELDED PLATE GIRDER	1953	2000	2000	$82,587	$9,116	$423,802	$515,505	2180.50	$236.42	
WARREN	FAS 0188	00006	03	COV. BR. 12	WARREN	000058	0134	0138	QUEEN POST COV. BR.	1879	2000	2000	$0	$0	$53,925	$53,925	777.20	$69.38	
HARDWICK	FAS 0257	00041	03	BRS 0257 (1)	HARDWICK	000075	0317	0456	PRESTRESSED BOX BEAM	2000	0000	2000	$145,530	$66,659	$1,592,333	$1,804,522	2377.50	$759.00	
RICHFORD	FAS 0302	00010	03	BRS 0302 (2)	RICHFORD	000092	0326	0366	WELDED PL GIRDER	2000	0000	2000	$155,692	$28,076	$1,025,124	$1,208,892	2999.20	$403.07	
BENNINGTON	C3019	00031	03	BHZ1441 [18)	BENNINGTON	000127	0105	0150	TOWN LATTICE COV BR	2000	0000	2000	$280,894	$1,321	$692,942	$975,157	1333.50	$731.28	
TUNBRIDGE	C3002	00005	03	MILL COV. BR.	MILL COVERED BRIDGE	000072	0100	0165	MULTI KINGPST COV BR	2000	0000	2000	$138,481	$0	$0	$138,481	720.00	$192.33	
HUNTINGTON	C3003	00011	03	BHO 1445 (23)	HUNTINGTON	000120	0176	0195	STL PONY TRUSS galv	2000	0000	2000	$8,675	$0	$89,978	$98,653	2112.00	$46.71	
HUNTINGTON	C3003	00011	03	BHO 1445 (23)	HUNTINGTON	000120	0176	0195	STL PONY TRUSS galv	2000	0000	2000	$66,507	$0	$494,075	$560,582	2112.00	$265.43	
LINCOLN	C2001	00013	03	BHO 1445(28) TH2-9921	LINCOLN	000038	0215	0238	PRECAST CONC. SLAB	1939	2000	2000	$47,329	$0	$151,466	$198,795	817.00	$243.32	
BARRE CITY	C30WI	00012	04	BRZ 1446(17)	WILLEY STREET BRIDGE	000073	0320	0408	STEEL BEAM	2000	0000	2000	$189,435	$10,810	$1,331,210	$1,531,455	2336.00	$655.59	
STOWE	C2006	00044	03	BHO 1446(28) T4-1961	STOWE	000049	0239	0263	ROLLED BEAM	1962	2000	2000	$24,300	$0	$242,906	$267,206	1171.10	$228.17	
CHESTER	FAS 0125	00009	03	BHF0125(4)S/FLDBR#4A	CHESTER TH2-9916	000099	0210	0273	ROLLED BEAM	1940	2001	2001	$49,562	$0	$435,450	$485,012	2079.00	$233.29	
HUNTINGTON	FAS 0211	00013	03	BRF 0211 (4)	HUNTINGTON	000147	0272	0311	WELDED PLATE GIRDER	2001	0000	2001	$118,958	$0	$916,439	$1,035,397	3998.40	$258.95	
UNDERHILL	FAS 0233	00009	03	BRS 0233 (2)	UNDERHILL	000060	0268	0290	PS/PT CONC BOX BEAM	2001	0000	2001	$210,302	$40,484	$611,969	$862,755	1608.00	$536.54	
CLARENDON	C3010	00025	03	BRO 1443(27)	CLARENDON	000034	0260	0310	PRECAST CONC. ARCH	2001	0000	2001	$165,911	$17,362	$546,544	$729,817	884.00	$825.58	
POULTNEY	C2004	00005	03	BRZ 1443(25)	POULTNEY	000100	0273	0297	WELDED PLATE GIRDER	2001	0000	2001	$157,527	$24,013	$956,393	$1,137,933	2730.00	$416.83	
HARTLAND	C3015	00021	03	TH 3 9011	HARTLAND	000083	0156	0170	TOWN LATTICCE COV BR	2001	0000	2001	$68,979	$0	$810,614	$879,593	1294.80	$679.33	
HUNTINGTON	C3022	00031	03	BRO 1445 (20)	HUNTINGTON	000037	0177	0190	CONC SLAB	2001	0000	2001	$93,651	$22,674	$406,718	$523,043	654.90	$798.66	
RIPTON	C3018	00010	03	FH 010-1 (1)	RIPTON	000033	0216	0236	GLU-LAM WD DK PANELS	2001	0000	2001	$109,432	$7,327	$719,820	$836,579	712.80	$1,173.65	
NORTHFIELD	C30WA	00082	03	TH3-0011	NORTHFIELD	000041	0273	0360	PRESTRESS CONC SLAB	1973	2001	2001	$60,197	$0	$195,219	$255,416	1119.30	$228.19	
HARDWICK	C3049	00024	03	TH3-9434	MACKVILLE	000046	0174	0198	PRESTRESS CONC SLAB	2001	0000	2001	$203,691	$0	$557,307	$760,998	800.40	$950.77	
MONTPELIER	PIONR	00006	04	AC BRF 6400(29)	MONTPELIER	000165	0280	0417	CONT CURVED GIRDER	2002	0000	2002	$324,769	$227,973	$3,225,361	$3,778,103	4620.00	$817.77	
PROCTOR	FAS 0155	00002	03	BHF 0155 (5) S	PROCTOR	000164	0360	0390	CLOSED SPN CONC ARCH	1918	2002	2002	$113,223	$153,012	$1,685,014	$1,951,249	5904.00	$330.50	
HALIFAX	C3003	00028	03	BRZ 1442 (18)	HALIFAX	000034	0230	0258	CONCRETE ARCH	2002	0000	2002	$145,862	$29,264	$542,902	$718,028	782.00	$918.19	
LUDLOW	C3008	00008	03	BHO 1443 (40) APPL. T-1946	LUDLOW	000074	0135	0160	ROLLED BEAM	1948	2002	2002	$76,295	$0	$242,687	$318,982	999.00	$319.30	
MOUNT HOLLY	C3012	00065	03	BRO 1443(30)	MT. HOLLY	000030	0176	0190	CONCRETE SLAB	2002	0000	2002	$101,482	$19,990	$409,478	$530,950	528.00	$1,005.59	

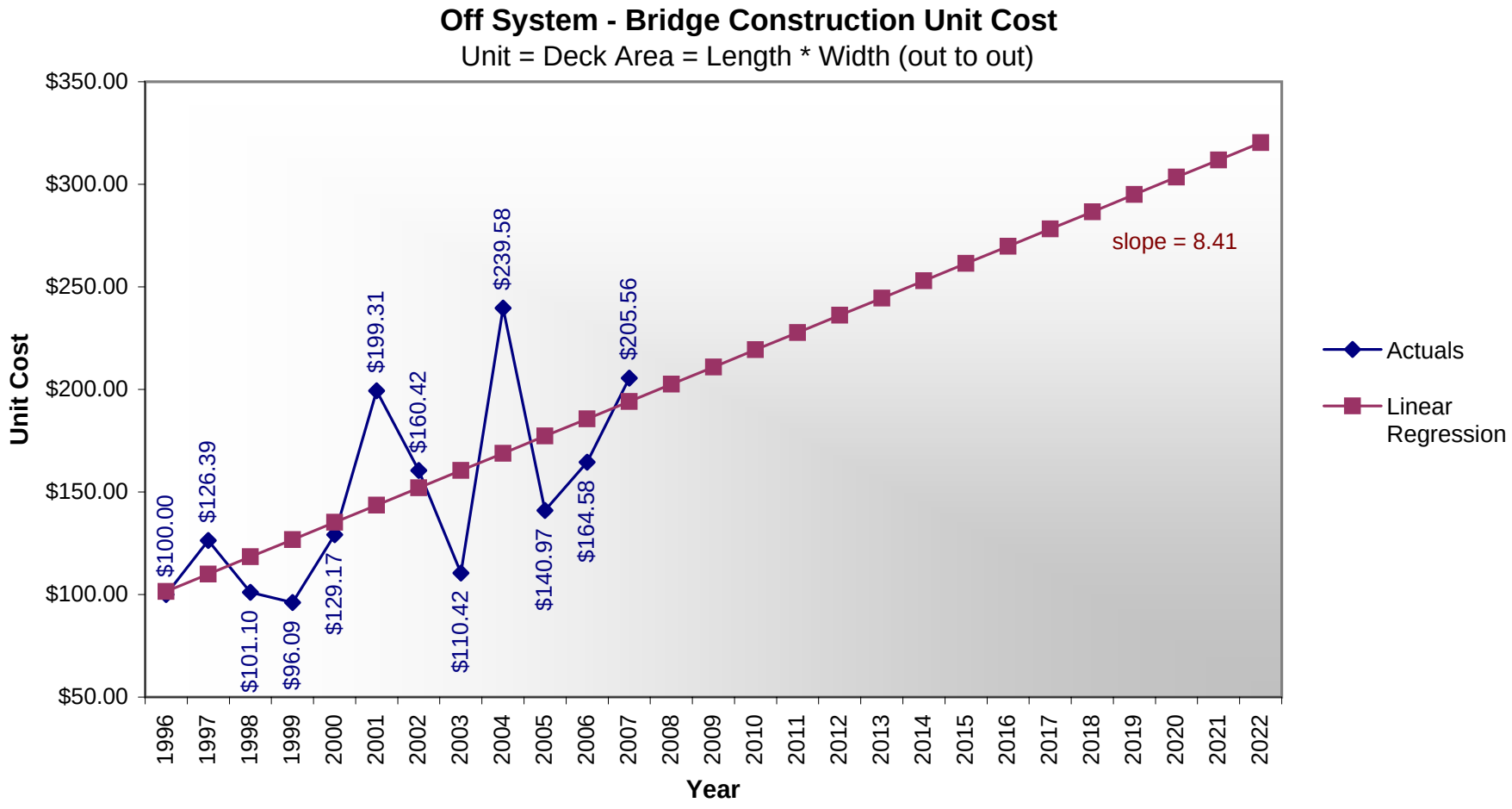
AVERAGE TOTAL PROJECT COST
"PER SQ. FT. (CURB-CURB)

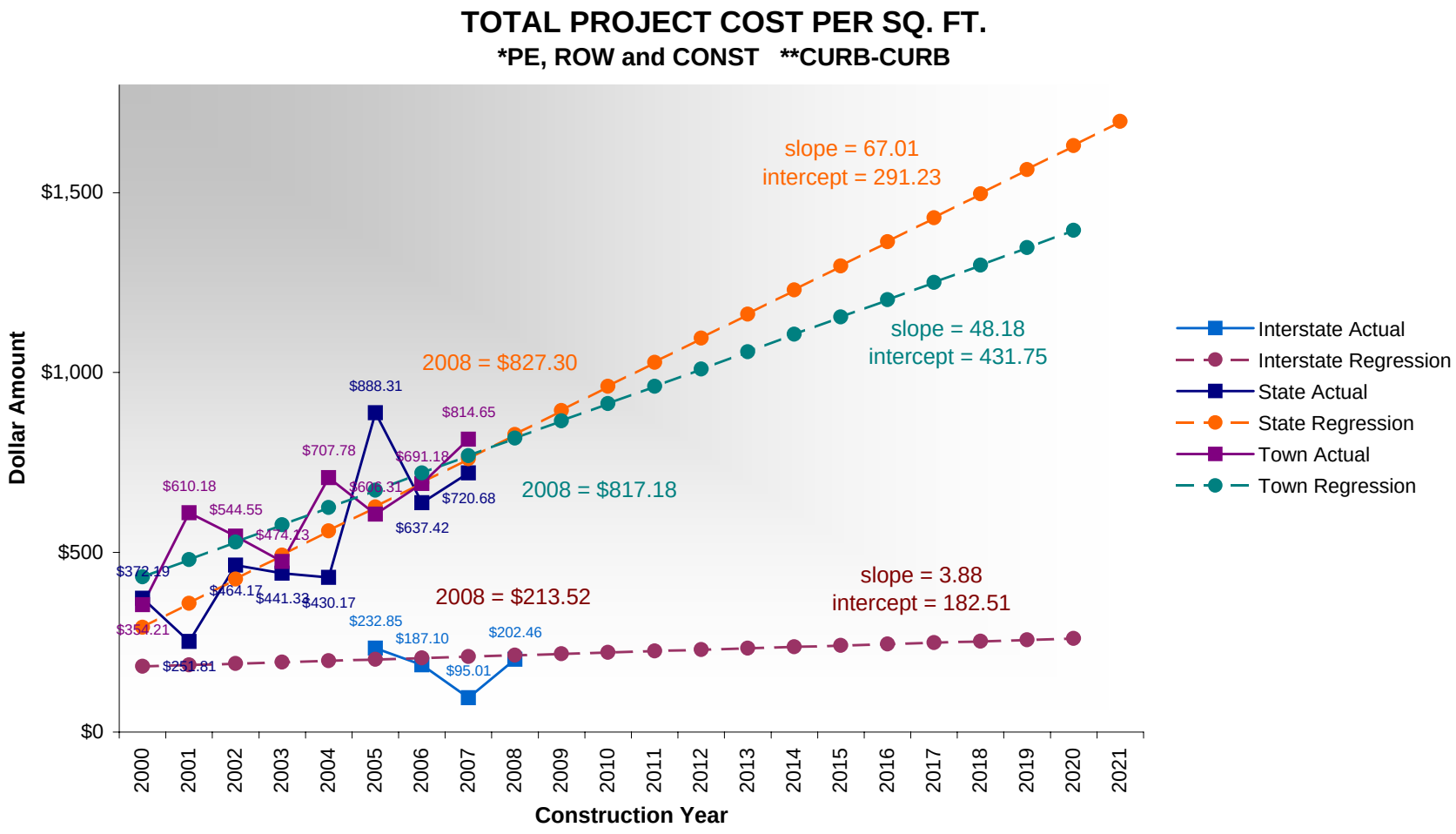
TOWN NAME	ROUTE NAME	BRIDGE NUMBER	OWNER	LAST PROJECT NUMBER	LAST PROJECT NAME	LENGTH	CURB-CURB WIDTH	OUT-OUT WIDTH	BRIDGE TYPE	YEAR BUILT	YEAR RECONSTR.	ANALYSIS YEAR	EXPENDED TO DATE - PE	EXPENDED TO DATE - ROW	EXPENDED TO DATE - CONST	EXPENDED TO DATE - TOTAL	SQ. FT. (CURB-CURB)	COST PER SQ. FT.	NOTE
ROCHESTER	C3035	00036	03	BRZ 1444 (20)	ROCHESTER	000118	0232	0256	WELDED PLATE GIRDER	2002	0000	2002	$193,761	$32,993	$1,508,026	$1,734,780	2737.60	$633.69	
ROYALTON	C2001	00003	03	AC BRZ 1444 (22)	ROYALTON	000398	0310	0413	WELDED PLATE GIRDER	2002	0000	2002	$371,712	$15,158	$6,375,450	$6,762,320	12338.00	$548.09	
THETFORD	C2003	00007	03	BRO 1444 (37) SA-16-1950	THETFORD	000123	0146	0150	TIMBER BEAM/ COV. BR	1867	2002	2002	$144,032	$166	$718,860	$863,058	1795.80	$480.60	
WOODSTOCK	C3050	00030	03	AC-BHO-1444 (26)	WOODSTOCK	000178	0135	0139	GALV. TIED ARCH	1900	2002	2002	$264,372	$8,985	$1,659,930	$1,933,287	2403.00	$804.53	
JERICHO	C3035	00031	03	BRO 1445 (22)	JERICHO	000050	0177	0190	PS/PT CONC SLAB	2002	0000	2002	$91,201	$29,202	$484,313	$604,716	885.00	$683.29	
LINCOLN	C3033	00044	03	PFH 016-2(1)	LINCOLN	000039	0184	0200	PS/PT CONCRETE SLAB	2002	0000	2002	$37,651	$0	$475,332	$512,983	717.60	$714.86	
MIDDLEBURY	C3033	00020	03	BRZ 1445 (19)	MIDDLEBURY	000096	0168	0193	WELDED PLATE GIRDER	2002	0000	2002	$172,495	$55,848	$1,054,865	$1,283,208	1612.80	$795.64	
RICHMOND	C2003	00010	03	BRZ 1445 (18)	RICHMOND	000247	0300	0340	2 SP CONT WLD PL GIR	2002	0000	2002	$428,361	$30,284	$2,479,153	$2,937,798	7410.00	$396.46	
BERLIN	C2002	00005	03	TH2 9328	BERLIN- MONTPELIER	000090	0298	0315	WELDED PLATE GIRDER	2002	0000	2002	$220,153	$46,361	$1,234,051	$1,500,565	2682.00	$559.49	
BARNET	C2008	00011	03	SA56/1947, TH2-0004	BARNET VILLAGE BR.	000096	0302	0381	2-SPAN CONT STL BM	1948	2002	2002	$85,499	$0	$439,605	$525,104	2899.20	$181.12	
BARNET	C2006	00054	03	BHO-1447(23)	BARNET,VT.TO MONROE,N.H.	000389	0276	0289	STEEL THRU TRUSS	1938	2002	2002	$145,528	$0	$3,547,511	$3,693,039	10736.40	$343.97	
DANVILLE	C3054	00040	03	BRO 1447(27)	DANVILLE- GREENBANKS HOLLOW	000078	0100	0143	MOD.QUEEN POST COVBR	1886	2002	2002	$82,151	$0	$340,727	$422,878	780.00	$542.15	
HARDWICK	C3031	00029	03	BRO 1447(21)	HARDWICK	000081	0153	0181	PRESTRESSED BOX BEAM	2002	0000	2002	$76,613	$4,573	$420,879	$502,065	1239.30	$405.12	
CAMBRIDGE	C2001	00005	03	BHO1448(30)	CAMBRIDGE	000064	0219	0245	ROLLED BEAM	1937	2002	2002	$63,520	$0	$239,041	$302,561	1401.60	$215.87	
JOHNSON	C2003	00004	03	SA-46-1959		000064	0101	0152	ROLLED BM W FALSE CB	1870	2002	2002	$0	$0	$125,869	$125,869	646.40	$194.72	
BRATTLEBORO	US5	00007	04	BHF 2000 (17)	BRATTLEBORO	000067	0586	0770	WELDED PLATE GIRDER	1938	2003	2003	$201,858	$0	$1,155,176	$1,357,034	3926.20	$345.64	
BRANDON	C2004	00012	03	BHZ 1443 (22)	BRANDON	000121	0120	0179	TOWN LATTICE COV BR	1838	2003	2003	$291,006	$20,703	$1,046,791	$1,358,500	1452.00	$935.61	
POULTNEY	C2003	00004	03	1753.76	COUNTY ROAD 18 OVER POULTNEY RIVER	000059	0383	0416	PRESTRESS CON BOX BM	2003	0000	2003	$234,838	$0	$236,738	$471,576	2259.70	$208.69	
NORTHFIELD	C3012	00054	03	TH3 - 9350	NORTHFIELD	000029	0115	0140	PRESTRESS CONC SLAB	2003	0000	2003	$84,091	$337	$0	$84,428	333.50	$253.16	
CAMBRIDGE	C2001	00004	03	BRO 1448 (21)	CAMBRIDGE	000075	0233	0272	WELDED PLATE GIRDER	1933	2003	2003	$258,104	$1,061	$619,481	$878,646	1747.50	$502.80	
MONTGOMERY	C3042	00041	03	BHO 1448 (26)	MONTGOMERY	000069	0120	0160	TOWN LATTICE COV BR	1883	2003	2003	$83,454	$0	$412,448	$495,902	828.00	$598.92	
CHESTER	VT103	00012	03	BRS025-1(35)	CHESTER	000112	0395	0418	CURVED WLD PLT GRDR	2004	0000	2004	$615,217	$117,691	$1,760,465	$2,493,373	4424.00	$563.60	
BRATTLEBORO	WILMS	00034	04	BHF 2000 (22)	TH378 WILMS ST OVER WHETSTONE BROOK	000099	0220	0245	ROLLED BEAM	1939	2004	2004	$70,436	$0	$354,844	$425,280	2178.00	$195.26	
ROCKINGHAM	FAS 0129	00009	03	BRF 0129(3)S	TENNEY BRIDGE	000132	0260	0340	WELDED PLATE GIRDER	2004	0000	2004	$263,083	$2,389	$1,771,491	$2,036,963	3432.00	$593.52	
CORINTH	FAS 0193	0010C	03	TH2 - 9352	CORINTH	000072	0229	0268	2 SPN CONT R C SLAB	1925	2004	2004	$149,779	$0	$578,263	$728,042	1648.80	$441.56	
BROOKLINE	C2001	00019	03	BHO 1442 (25)	BROOKLINE/NEWFANE	000194	0180	0190	STEEL THRU TRUSS	1928	2004	2004	$259,509	$25,746	$1,806,844	$2,092,099	3492.00	$599.11	
CHESTER	C2005	00011	03	BHO1442(32)	CHESTER	000116	0210	0235	(2) SP CONT ROLL BM	1940	2004	2004	$76,463	$0	$468,868	$545,331	2436.00	$223.86	
PITTSFORD	C3013	00031	03	BHO 1143 (36)	COOLEY COVER BRIDGE REHAB	000067	0120	0149	TOWN LATTICE COV. BR	1849	2004	2004	$79,500	$0	$355,886	$435,386	804.00	$541.52	
PROCTOR	C3006	00004	03	BHO 1443 (37)	PROCTOR-PITTSFORD	000117	0161	0180	TOWN LATTICE COV BR	1841	2004	2004	$193,056	$0	$1,499,441	$1,692,497	1883.70	$898.50	
HUNTINGTON	C3021	00034	03	BRO 1445 (21)	HUNTINGTON	000031	0156	0170	CONCRETE SLAB	2004	0000	2004	$92,495	$12,908	$391,139	$496,542	483.60	$1,026.76	
WATERBURY	C3006	00014	03	TH 3-9637 T-2-1954	WATERBURY	000039	0215	0240	PRESTRESS CONC SLAB	1954	2004	2004	$118,237	$0	$417,863	$536,100	838.50	$639.36	
WATERBURY	C2002	00035	27	BRO 1446 (26)	WATERBURY	000039	0282	0415	R.C. RIDGID FRAME	2004	0000	2004	$374,759	$231,903	$2,045,691	$2,652,353	1099.80	$2,411.67	
CAMBRIDGE	C3023	00029	03	BHO1448(31)C/2	CAMBRIDGE	000155	0097	0156	BURR ARCH w ML KNGPT	1887	2004	2004	$211,104	$0	$0	$211,104	1503.50	$140.41	
CAMBRIDGE	C3023	00029	03	BHO1448(31)C/2	CAMBRIDGE	000155	0097	0156	BURR ARCH w ML KNGPT	1887	2004	2004	$0	$0	$1,389,666	$1,389,666	1503.50	$924.29	
CAMBRIDGE	C3031	00030	03	BHO 1448(24)	CAMBRIDGE	000085	0120	0133	ARCH/KINGPOST COV BR	1919	2004	2004	$182,205	$0	$541,494	$723,699	1020.00	$709.51	
NORWICH	FAS 0177	00046	03	TH2 9625	NORWICH	000100	0248	0273	2SP CONT.ROLLED BEAM	1950	2005	2005	$170,497	$0	$656,498	$826,995	2480.00	$333.47	
CAVENDISH	C2004	00012	03	CAVENDISH	BHO 1442 (22)	000101	0111	0131	STEEL PONY TRUSS	1905	2005	2005	$188,358	$20,938	$833,764	$1,043,060	1121.10	$930.39	
PUTNEY	C3043	00030	03	PUTNEY STP EH02 (4)	HI-LO BIDDY STONE ARCH	000034	0130	0160	MASONRY ARCH	1906	2005	2005	$32,823	$0	$200,579	$233,402	442.00	$528.06	
BARRE CITY	C30GR	00011	04	HDP 9281(1)	BARRE CITY	000117	0220	0230	GALV PONY TRUSS	2005	0000	2005	$323,774	$17,803	$1,288,606	$1,630,183	2574.00	$633.33	
BETHEL	VT12	00031	03	BRF 0241 (33) C/2	BETHEL	000183	0287	0374	WELDED PLATE GIRDER	2006	0000	2006	$0	$0	$4,270,872	$4,270,872	5252.10	$813.17	
BETHEL	VT12	00031	03	BRF 0241 (33) C/2	BETHEL	000183	0287	0374	WELDED PLATE GIRDER	2006	0000	2006	$458,026	$246,387	$1,643,826	$2,348,239	5252.10	$447.10	
MONTPELIER	LANGD	00011	04	BRM 6400 (25)	MONTPELIER	000075	0266	0278	STEEL BEAM	2006	0000	2006	$132,602	$36,837	$1,543,437	$1,712,876	1995.00	$858.58	
SUNDERLAND	FAS 0114	00014	03	BRF 0114(2)	SUNDERLAND	000089	0216	0232	CURVED WLD PLT GIRD	2006	0000	2006	$277,717	$193,028	$1,193,643	$1,664,388	1922.40	$865.79	
CLARENDON	FAS 0127	00014	03	BRO 1443 (29)	CLARENDON	000087	0295	0325	ROLLED BEAM	2006	0000	2006	$223,488	$46,860	$1,439,033	$1,709,381	2566.50	$666.04	
LEICESTER	FAS 0160	00006	03	BRF 0160 (3)S	LEICESTER	000113	0265	0305	WELDED PLATE GIRDER	2006	0000	2006	$255,188	$91,520	$2,957,674	$3,304,382	2994.50	$1,103.48	
HARTFORD	FAS 0166	00008	03	BRO- BTN 2004 [1]	HARTFORD	000244	0296	0336	WELDED GRIDER	2006	0000	2006	$455,667	$72,362	$2,891,101	$3,419,130	7222.40	$473.41	
READSBORO	C3009	00005	03	FL-F2-60		000077	0149	0160	ROLLED BEAM	1939	2006	2006	$60,524	$0	$0	$60,524	1147.30	$52.75	
CLARENDON	C3016	00024	03	BRO 1443 (34)	CLARENDON	000063	0157	0187	PRESTRESS CONC SLAB	2006	0000	2006	$170,436	$18,988	$612,648	$802,072	989.10	$810.91	
MENDON	C2001	00003	03	BRO 1443(35)	MENDON	000114	0334	0364	WELDED PLATE GIRDER	2006	0000	2006	$246,042	$57,972	$1,714,181	$2,018,195	3807.60	$530.04	
WALLINGFORD	C3060	00050	03	BRO 1443(31)	WALLINGFORD	000073	0138	0164	PRESTRESSED BOX BEAM	1928	2006	2006	$157,200	$17,259	$650,652	$825,111	1007.40	$819.05	
TUNBRIDGE	C3045	00033	03	BHO 1444 (42)	TUNBRIDGE	000069	0164	0164	MULTI KING PT TRUSS	1883	2006	2006	$109,886	$0	$418,910	$528,796	1131.60	$467.30	
VERSHIRE	C3045	00020	03	BRO 1444 (32)	VERSHIRE	000032	0157	0170	CONCRETE SLAB	2006	0000	2006	$60,043	$9,350	$452,028	$521,421	502.40	$1,037.86	
MORRISTOWN	C30BS	00053	04	BRZ 1446 (15)	MORRISTOWN	000103	0148	0173	WELDED PLATE GIRDER	2006	0000	2006	$116,597	$2,026	$616,356	$734,979	1524.40	$482.14	
JOHNSON	C2002	00006	03	AC BHO 1448 (18)	JOHNSON	000145	0200	0222	STEEL THRU TRUSS	1928	2006	2006	$232,022	$27,664	$2,710,877	$2,970,563	2900.00	$1,024.33	
MONTGOMERY	C3035	00024	03	BRO 1448 (20)	MONTGOMERY	000089	0144	0170	WELDED GIRDER	2006	0000	2006	$136,887	$25,141	$630,833	$792,861	1281.60	$618.65	
CHARLESTON	C3041	00016	03	BRO 1449 [22]	CHARLESTON	000057	0216	0230	PRESTRESSED BOX BEAM	2006	0000	2006	$193,764	$37,936	$604,732	$836,432	1231.20	$679.36	
WOODSTOCK	US4	00050	03	BHF020-2(32)	WOODSTOCK	000203	0340	0375	3SP CONT PRECST BOXB	1939	2007	2007	$406,362	$75,659	$4,631,478	$5,113,499	6902.00	$740.87	
RANDOLPH	VT12	00042	03	BRF O241 (29)		000204	0300	0423	2 SPN CONT CURV GIRD	2007	0000	2007	$556,630	$243,188	$4,453,121	$5,252,939	6120.00	$858.32	
WARREN	FAS 0188	00007	03	BHF 0188(7) SA12-1945	WARREN	000064	0237	0270	STEEL BEAM	1947	2007	2007	$233,545	$0	$743,618	$977,163	1516.80	$644.23	
CAVENDISH	C3029	00045	03	BRO 1442(23)	CAVENDISH	000106	0147	0187	GALV PONY TRUSS	2007	0000	2007	$239,956	$16,563	$1,335,413	$1,591,932	1558.20	$1,021.65	
WEATHERSFIELD	C3020	00066	03	AC BHO 1442 (29)	WEATHERSFIELD	000130	0130	0144	TOWN LATTICE COV BR	1840	2007	2007	$218,532	$4,746	$958,099	$1,181,377	1690.00	$699.04	
GRANVILLE	C3023	00015	03	BRO 1444 (34)	GRANVILLE	000037	0177	0190	CONCRETE SLAB	2007	0000	2007	$121,933	$24,659	$681,495	$828,087	654.90	$1,264.45	
HUNTINGTON	C3004	00042	03	BRO 1445 (29)	HUNTINGTON	000186	0220	0316	2SPN CONT CUR GIR	2007	0000	2007	$320,950	$53,070	$3,067,430	$3,441,450	4092.00	$841.02	
BRADFORD	C3027	00022	03	STP 1447 (28)	BRADFORD	000109	0157	0160	STEEL PONY TRUSS	1934	2007	2007	$201,937	$0	$1,462,846	$1,664,783	1711.30	$972.82	
ORLEANS VILLAGE	C2003	00061	03	BRO 1449 (29)	BARTON	000114	0240	0316	WELDED PLATE GIRDER	2007	0000	2007	$248,369	$53,488	$1,377,396	$1,679,253	2736.00	$613.76	
TROY	C3012	00008	03	TH-3730	TROY BHO 1449(30)	000095	0116	0116	TIMBER TRUSS	1910	2007	2007	$65,809	$0	$474,564	$540,373	1102.00	$490.36	

Average Cost (Interstate Bridge Program)	$280.61	per sq. ft. deck
Average Cost (State Highway Bridge Program)	$479.44	per sq. ft. deck
Average Cost (Town Highway Bridge Program)	$595.21	per sq. ft. deck

Section V – Inflationary Trends

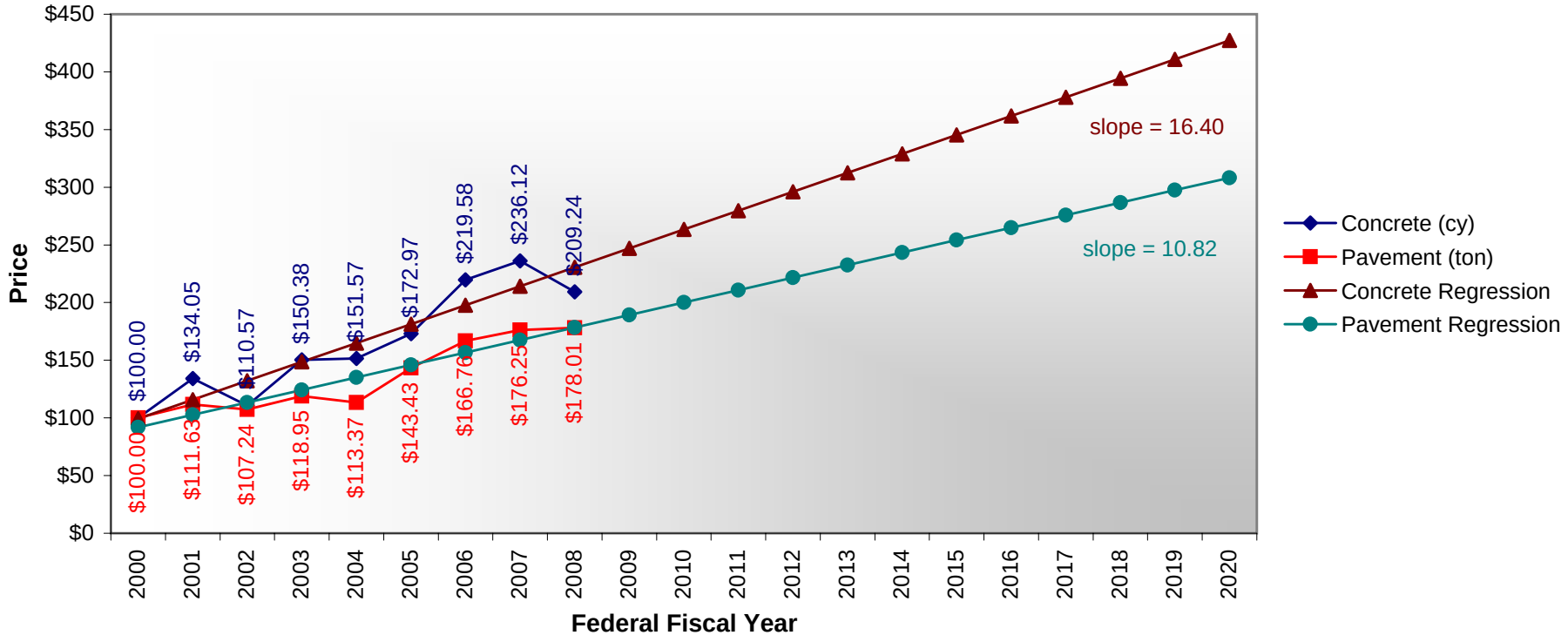

Federal Aid System - Bridge Construction Unit Cost
Unit = Deck Area = Length * Width (out to out)
Unit Cost
$400.00
$350.00
$300.00
$250.00
$200.00
$150.00
$100.00
$50.00
$0.00
$100.00
$67.72
$35.23
$88.87
$88.98
$138.58
$129.92
$144.09
$113.39
$207.87
$178.74
$207.09
slope = 12.81
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year
Actuals
Linear Regression


Off System - Bridge Construction Unit Cost
Unit = Deck Area = Length * Width (out to out)
Unit Cost
$350.00
$300.00
$250.00
$200.00
$150.00
$100.00
$50.00
$100.00
$126.39
$101.10
$96.09
$129.17
$199.31
$160.42
$110.42
$239.58
$140.97
$164.58
$205.56
slope = 8.41
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year
Actuals
Linear Regression


TOTAL PROJECT COST PER SQ. FT.
*PE, ROW and CONST **CURB-CURB
Dollar Amount
$1,500
$1,000
$500
$0
Construction Year
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
slope = 67.01
intercept = 291.23
slope = 48.18
intercept = 431.75
slope = 3.88
intercept = 182.51
2008 = $827.30
2008 = $817.18
2008 = $213.52
$888.31
$814.65
$707.78
$691.18
$610.18
$544.55
$720.68
$637.42
$474.13
$441.33
$430.17
$232.85
$187.10
$202.46
$95.01
Interstate Actual
Interstate Regression
State Actual
State Regression
Town Actual
Town Regression

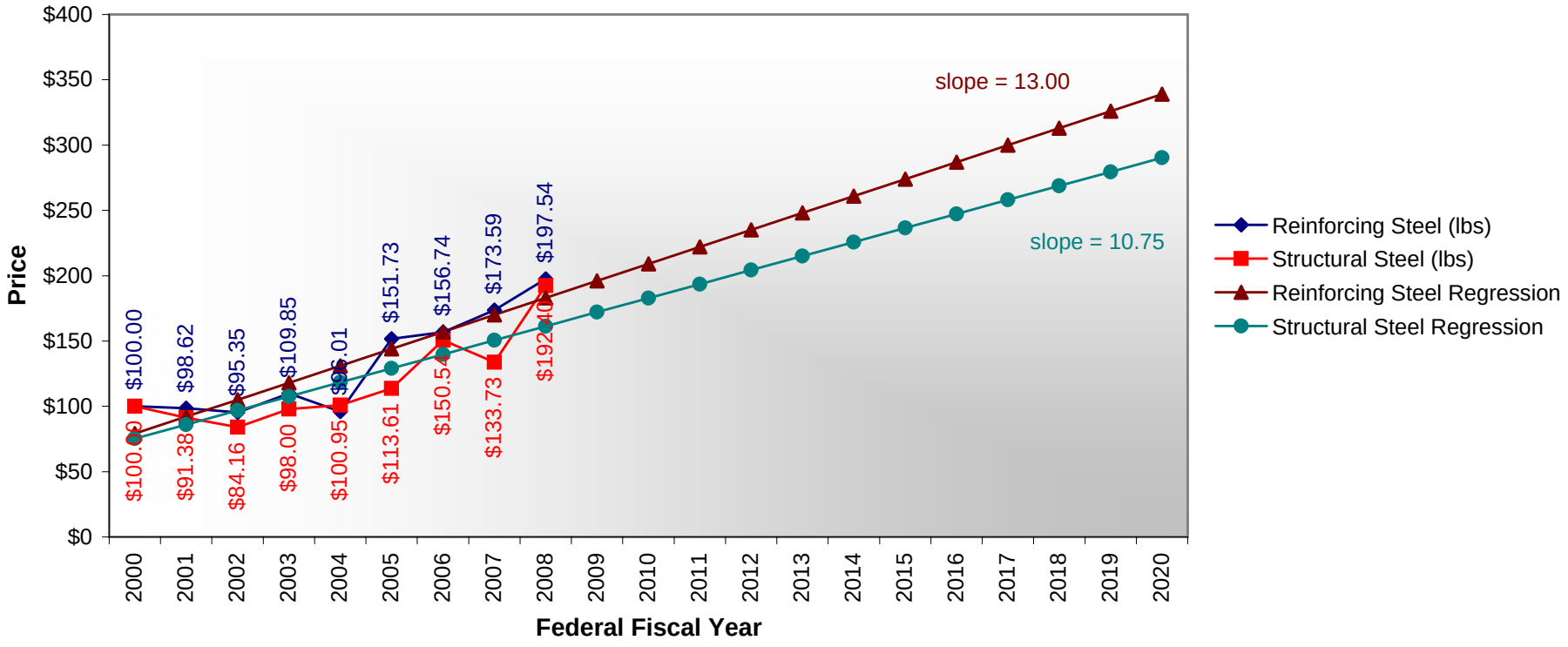
Normalized Unit Costs and Linear Regression Trends

*Concrete and Pavement



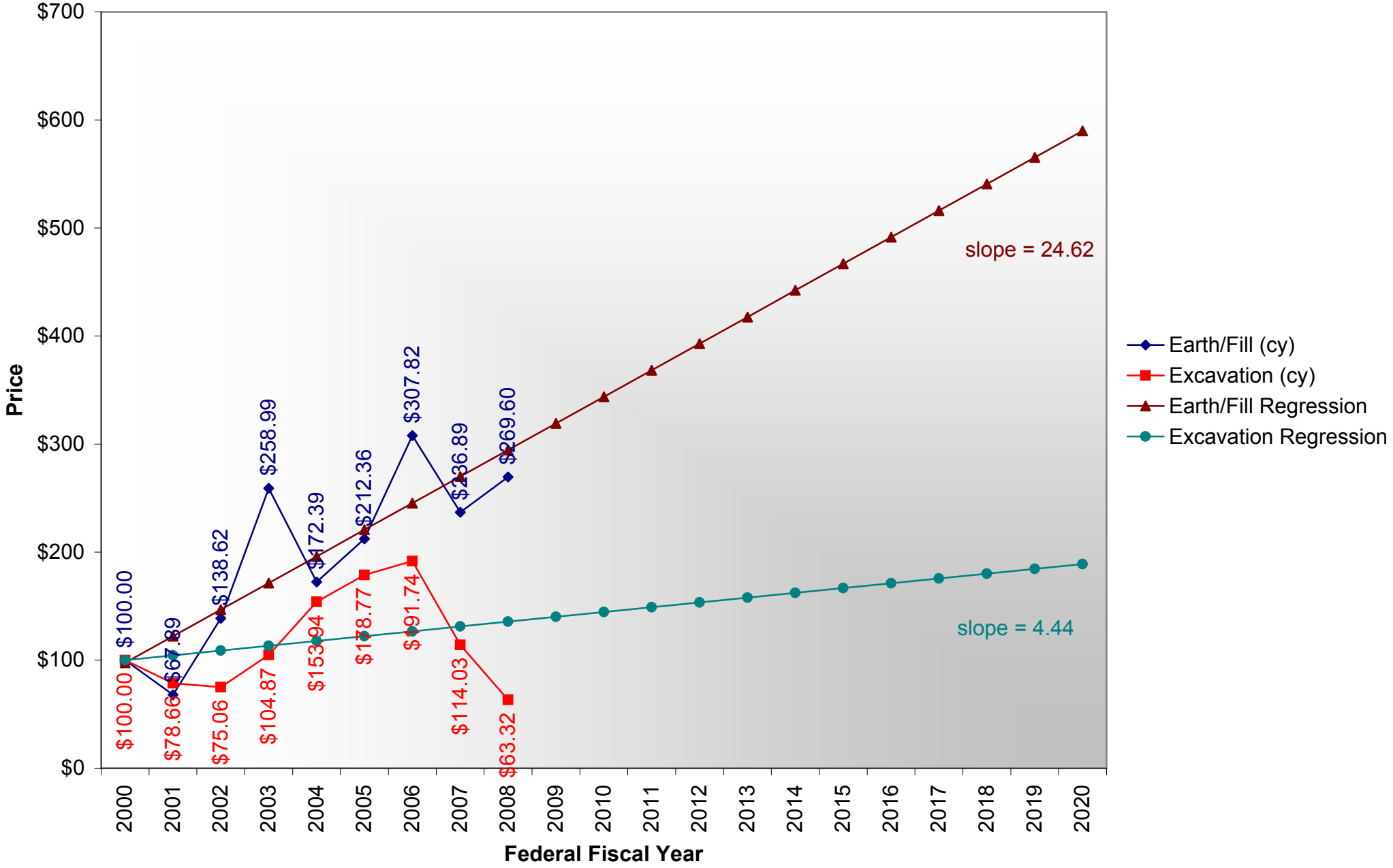
Normalized Unit Costs and Linear Regression Trend

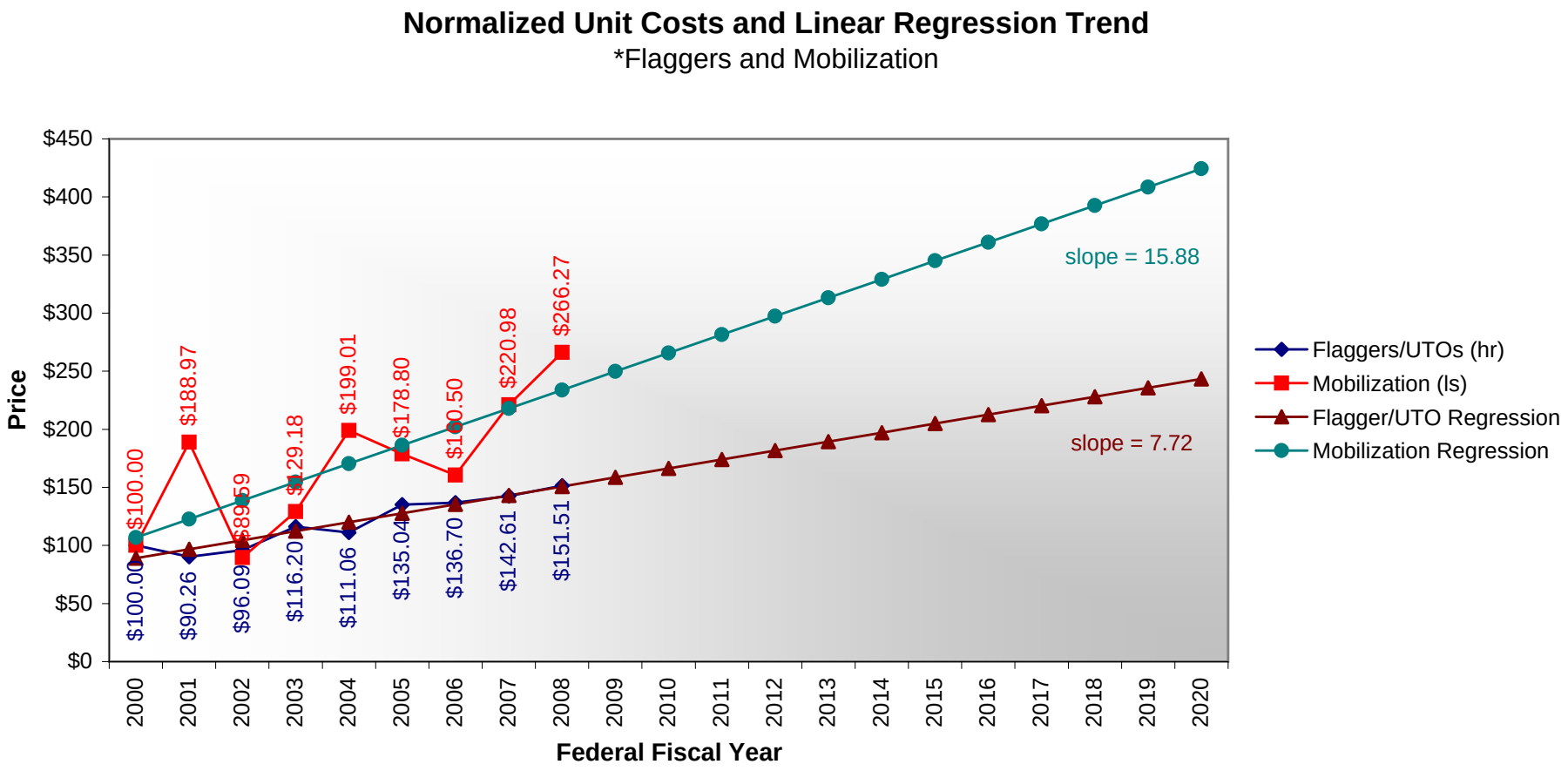
*Reinforcing Steel and Structural Steel



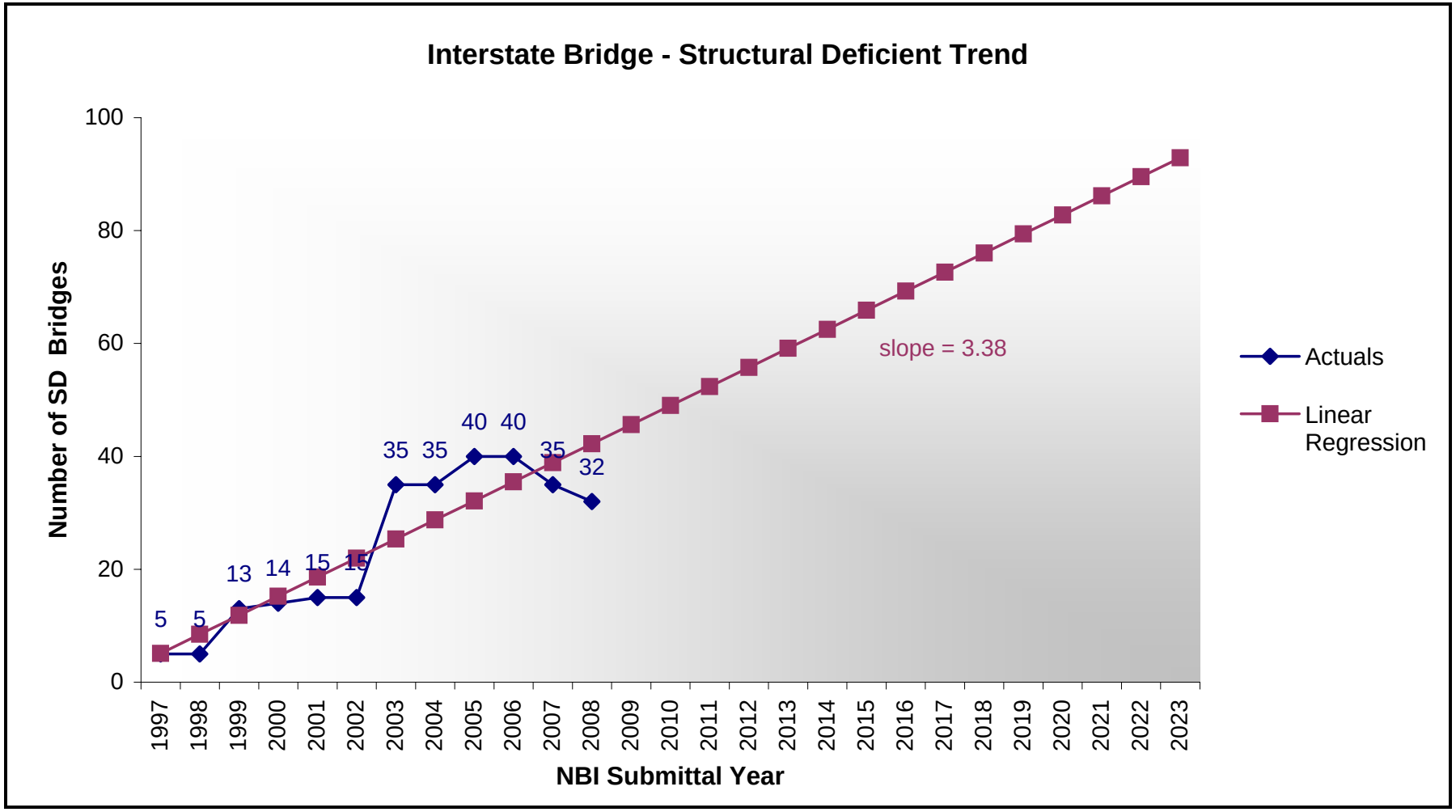
Normalized Unit Costs and Linear Regression Trends

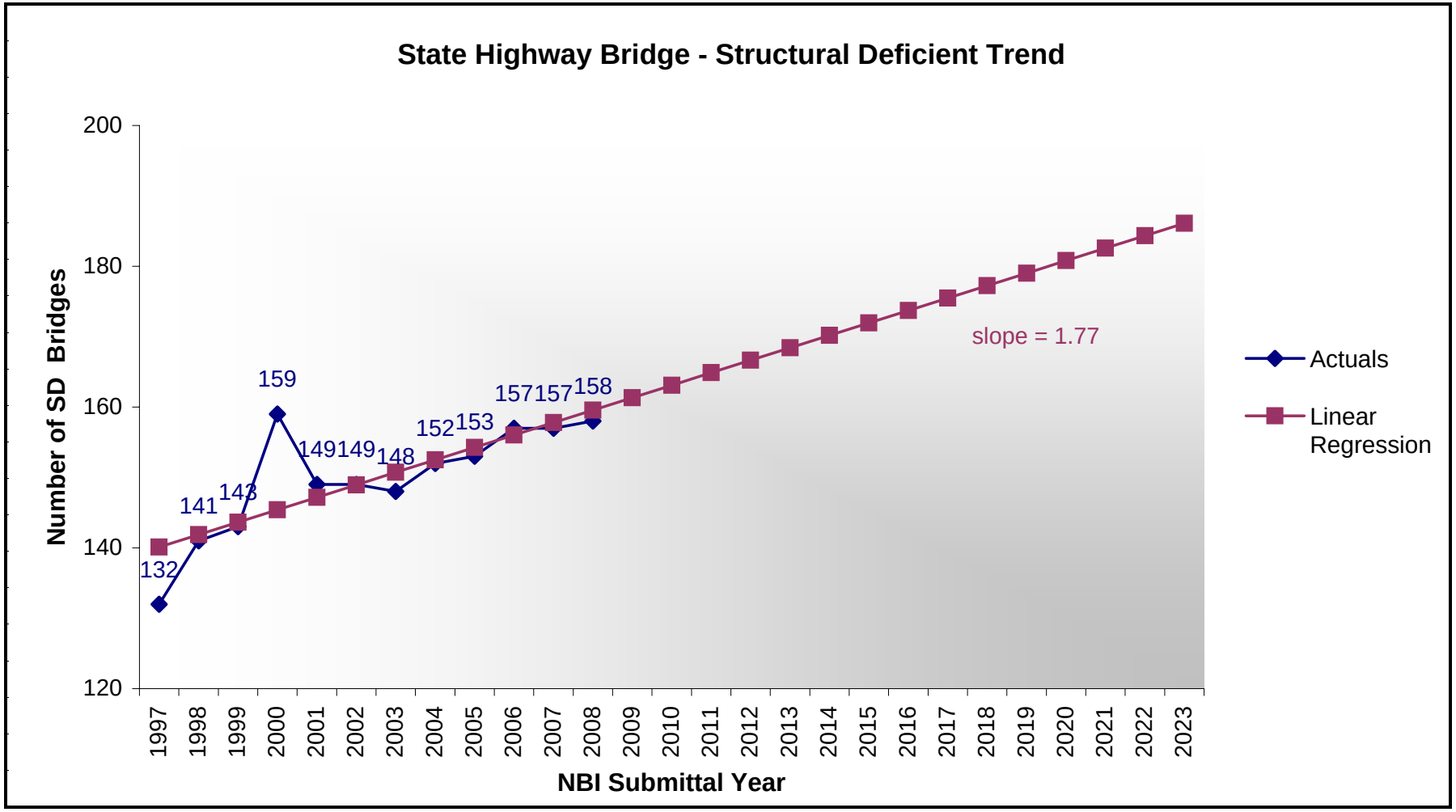
*Earth/Fill and Excavation

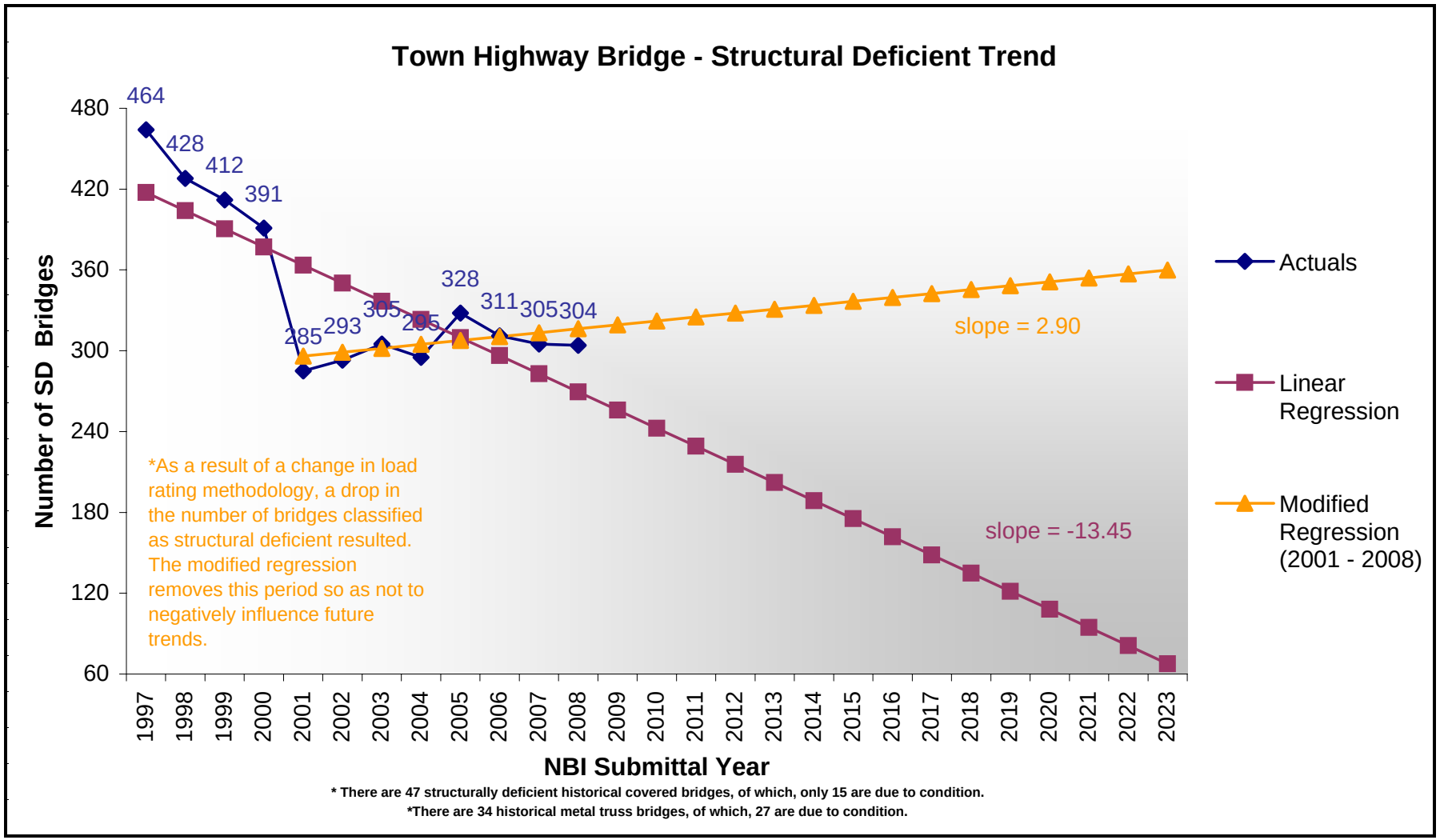



Normalized Unit Costs and Linear Regression Trend
*Flaggers and Mobilization
Price
$450
$400
$350
$300
$250
$200
$150
$100
$50
$0
$100.00
$188.97
$89.59
$129.18
$199.01
$178.80
$160.50
$220.98
$266.27
$100.00
$90.26
$96.09
$116.20
$111.06
$135.04
$136.70
$142.61
$151.51
slope = 15.88
slope = 7.72
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Federal Fiscal Year
Flaggers/UTOs (hr)
Mobilization (ls)
Flagger/UTO Regression
Mobilization Regression

Section VI – Condition 'Structural Deficiency' Trends

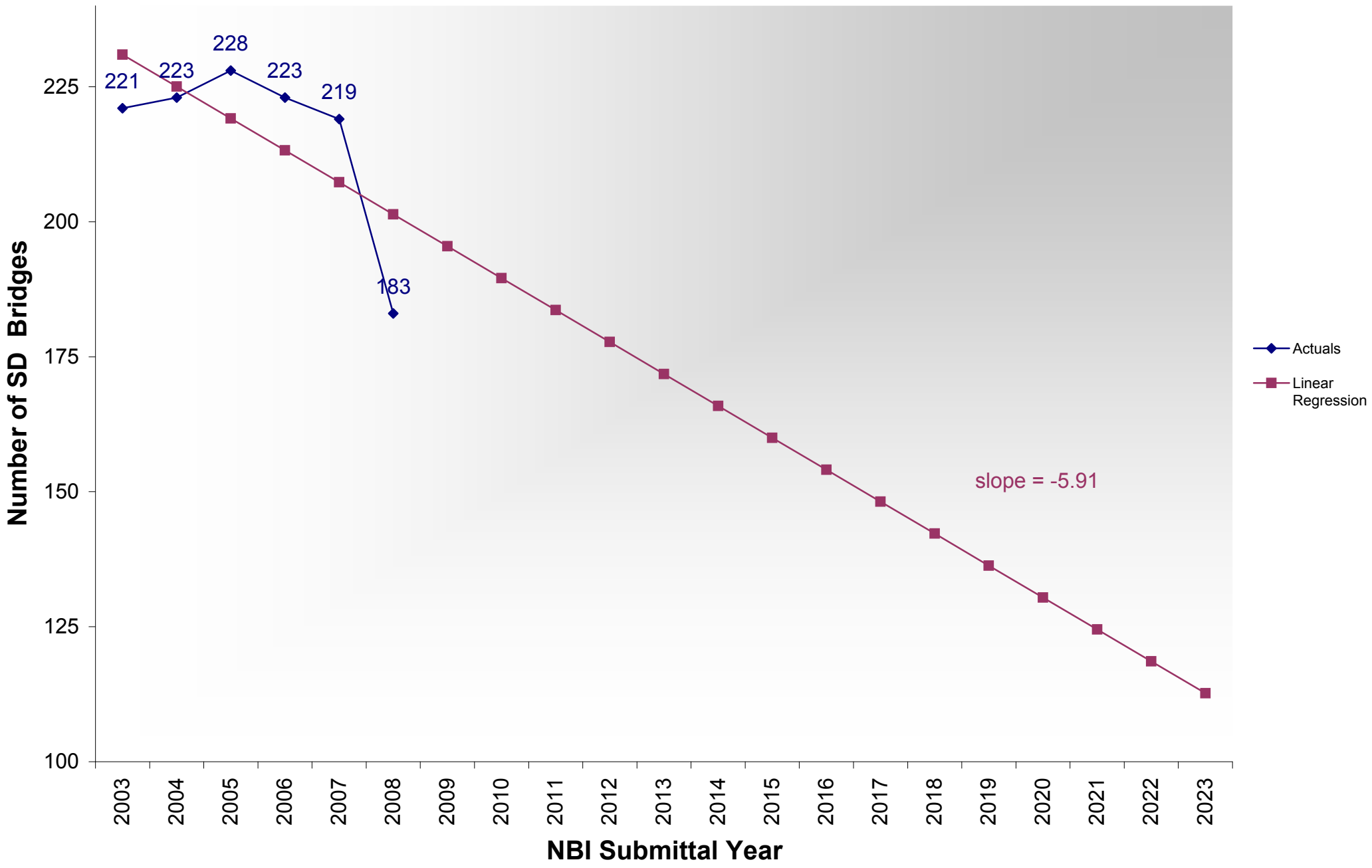

Interstate Bridge - Structural Deficient Trend
Number of SD Bridges
100
80
60
40
20
0
5
5
13
14
15
15
35
35
40
40
35
32
slope = 3.38
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
NBI Submittal Year
Actuals
Linear Regression


State Highway Bridge - Structural Deficient Trend
Number of SD Bridges
200
180
160
140
120
132
141
143
159
149
149
148
152
153
157
157
158
slope = 1.77
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
NBI Submittal Year
Actuals
Linear Regression

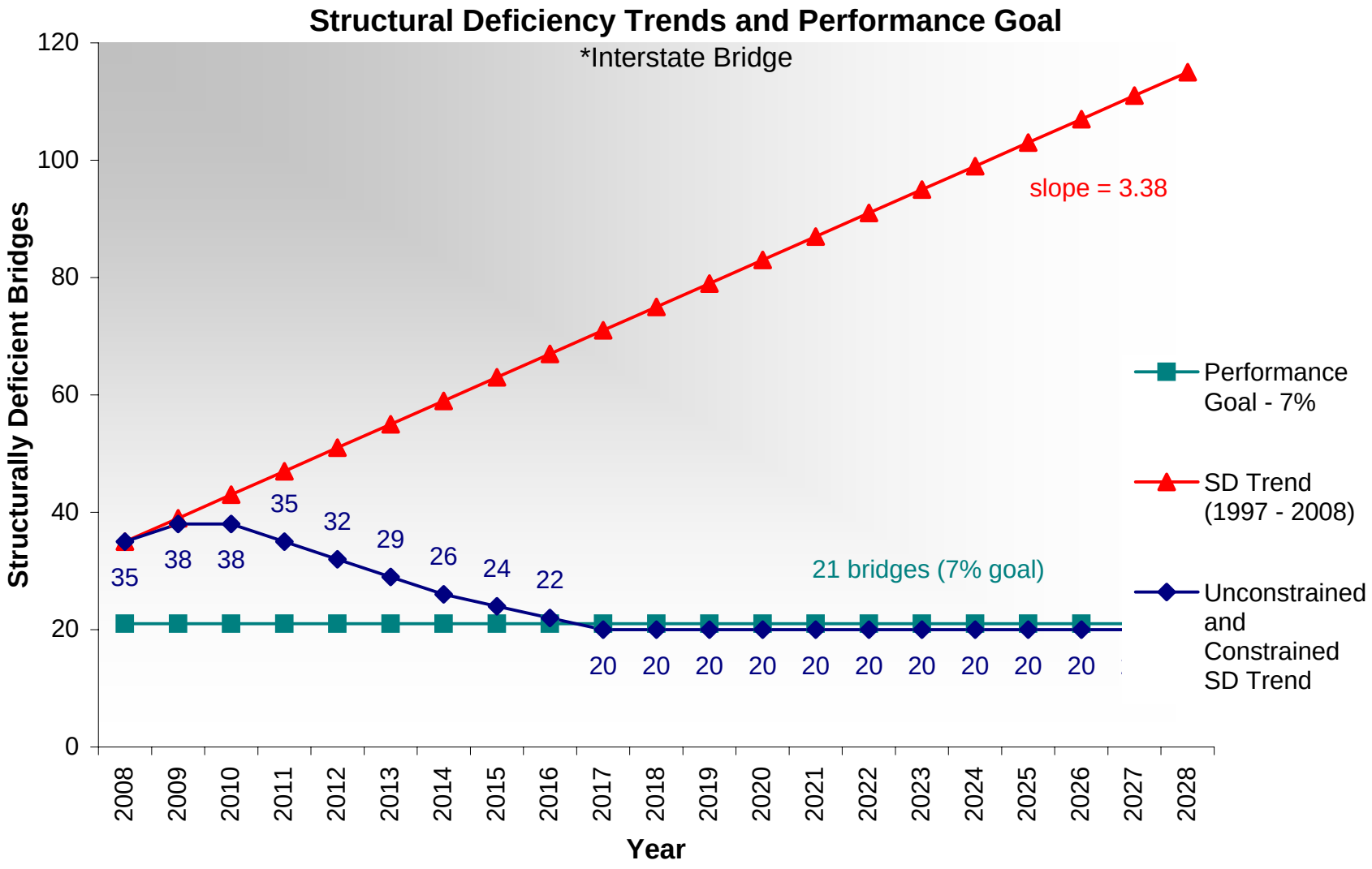


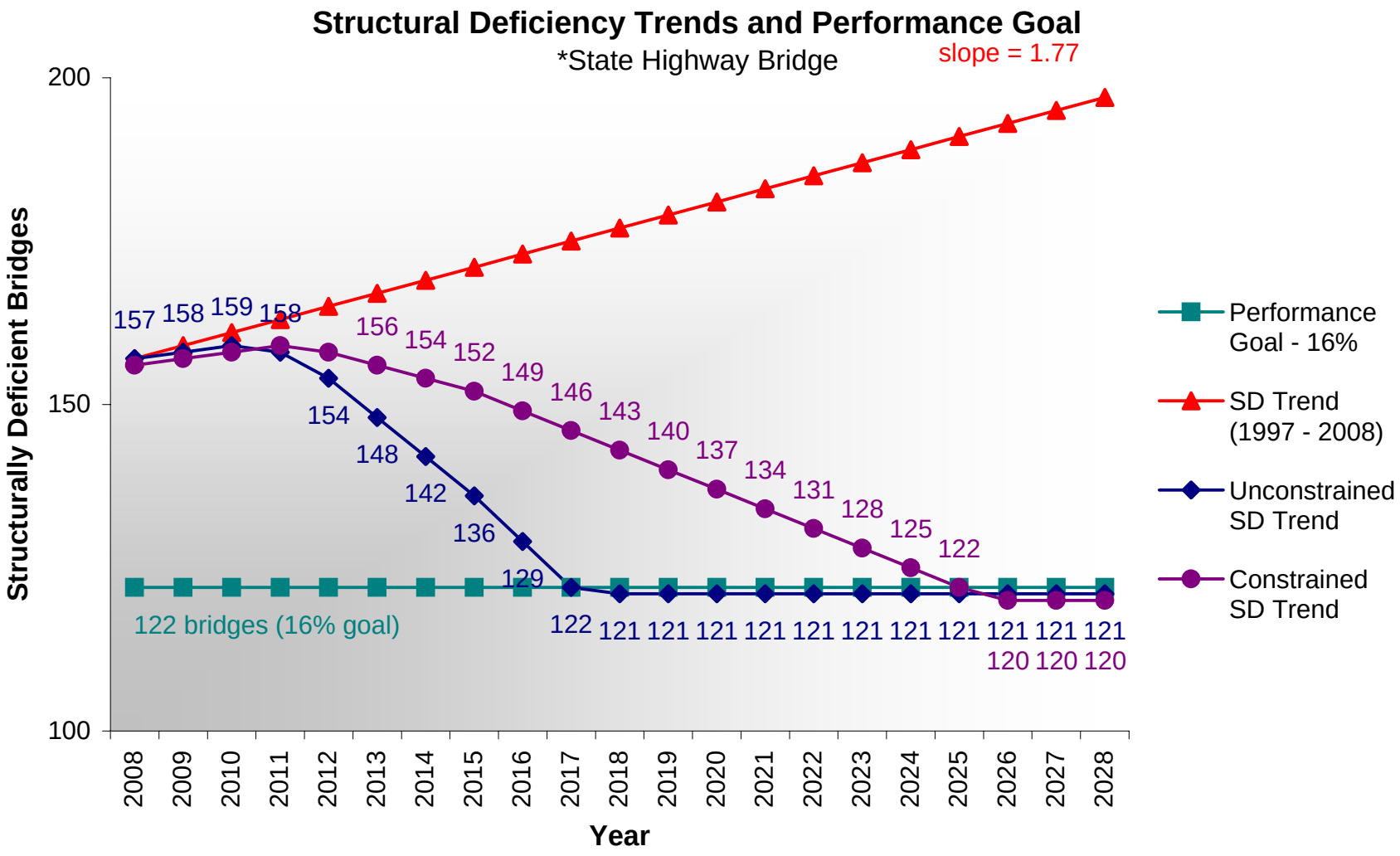
*** There are 47 structurally deficient historical covered bridges, of which, only 15 are due to condition.**
***There are 34 historical metal truss bridges, of which, 27 are due to condition.**

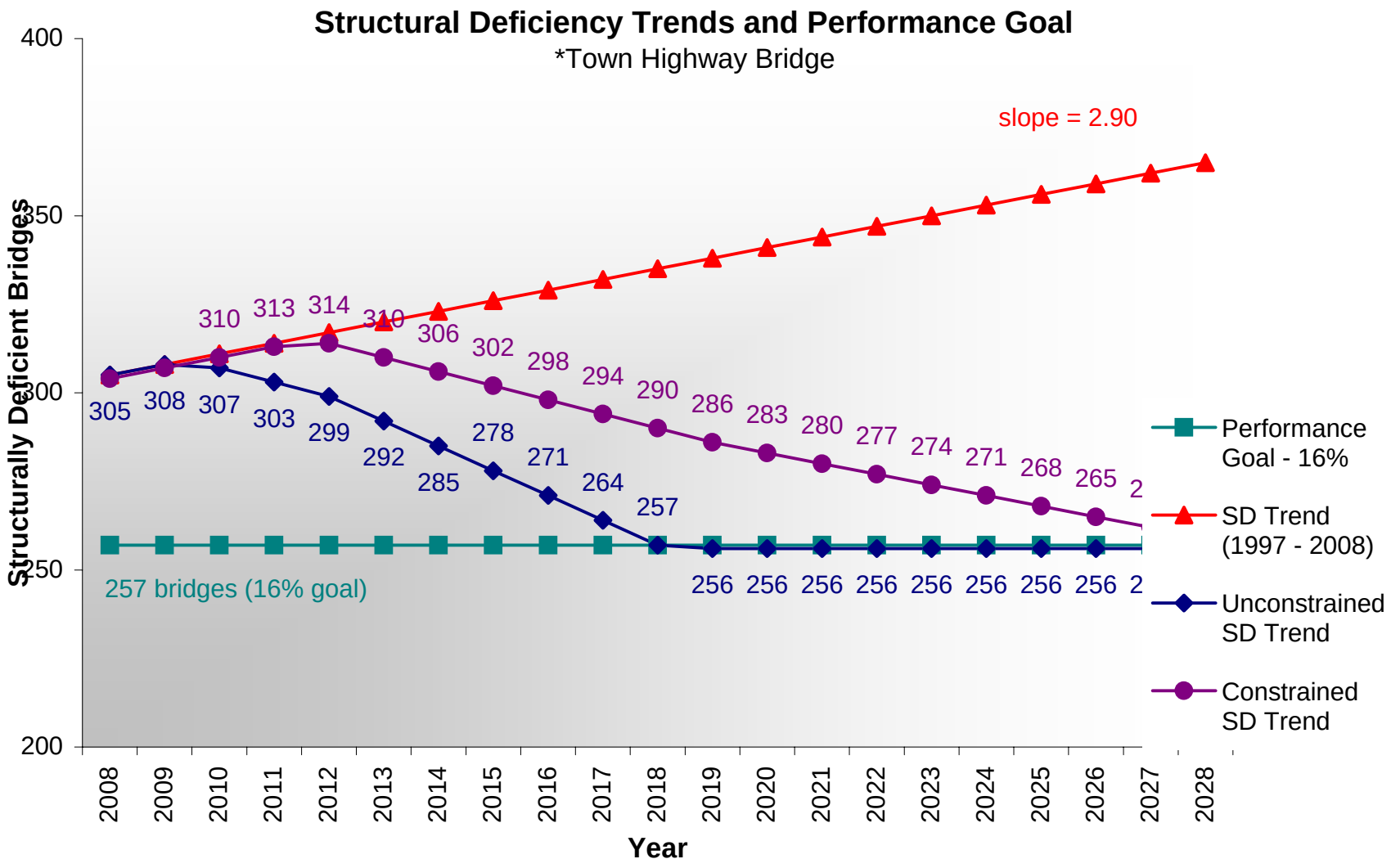
"Short" Bridge - Structural Deficient Trend

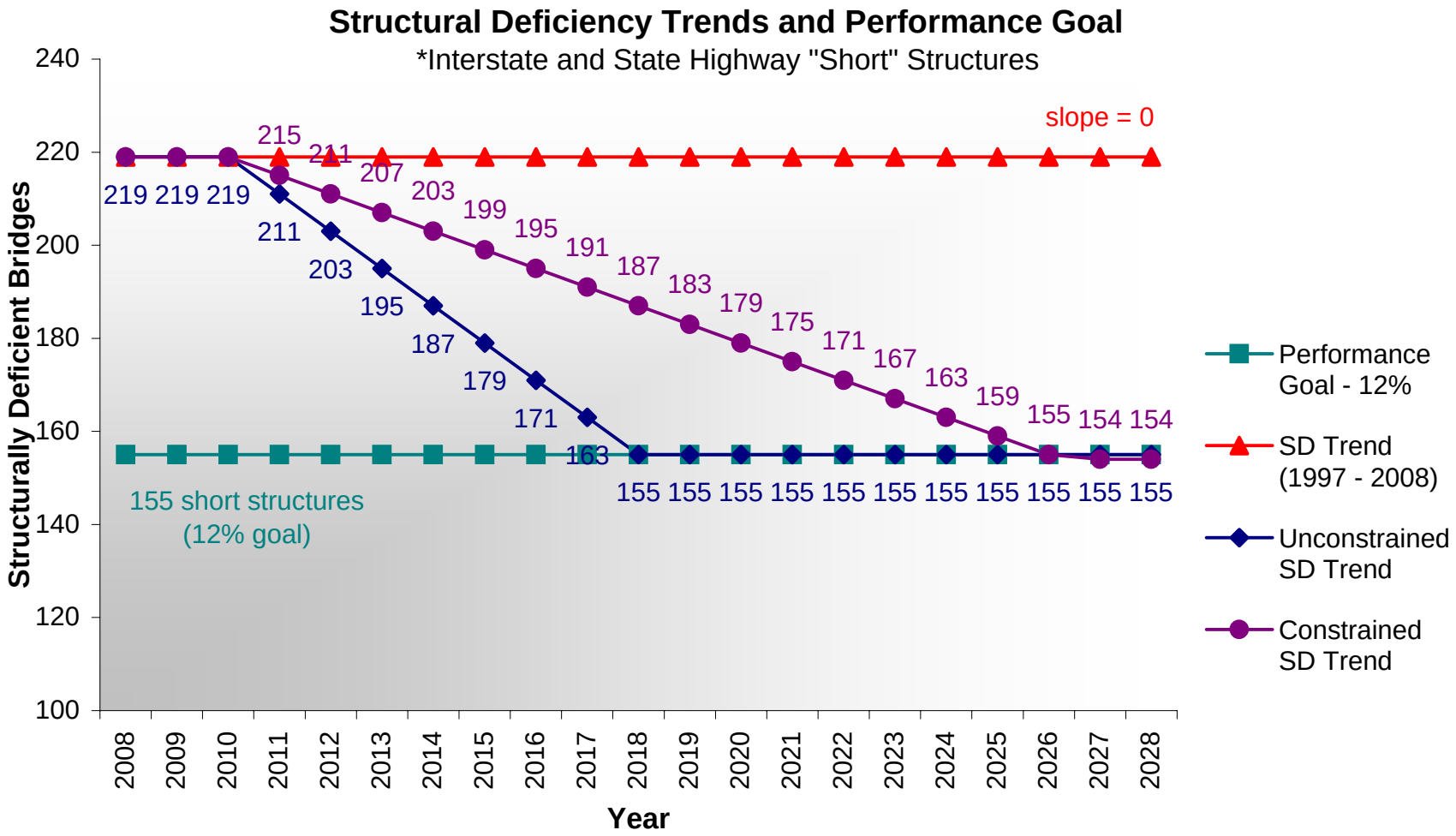


Section VII – Deficiency Trends and Performance Goals

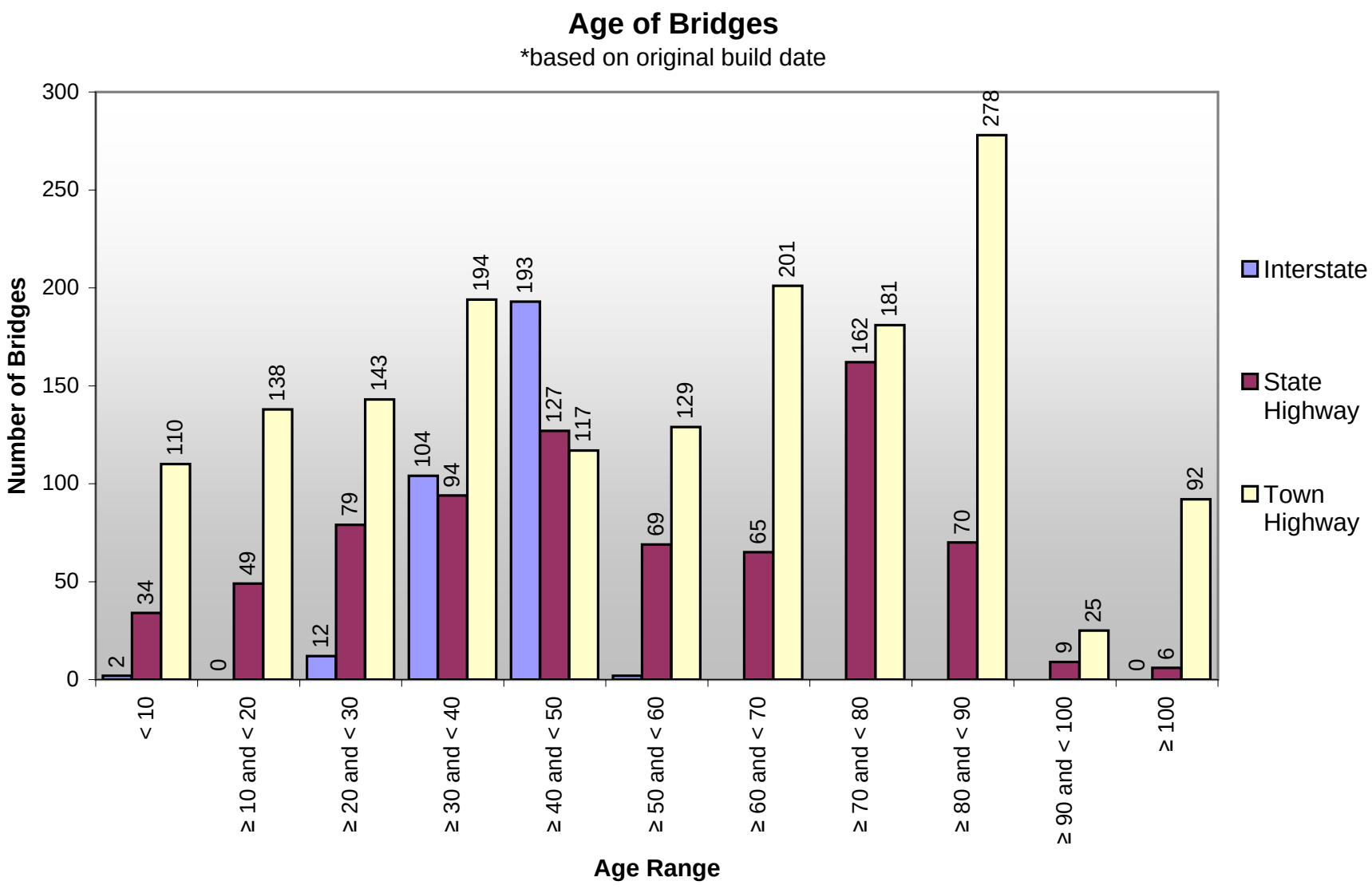

Structural Deficiency Trends and Performance Goal
*Interstate Bridge
Structurally Deficient Bridges
120
100
80
60
40
20
0
slope = 3.38
35
38
38
35
32
29
26
24
22
21 bridges (7% goal)
20
20
20
20
20
20
20
20
20
20
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
Year
Performance Goal - 7%
SD Trend (1997 - 2008)
Unconstrained and Constrained SD Trend

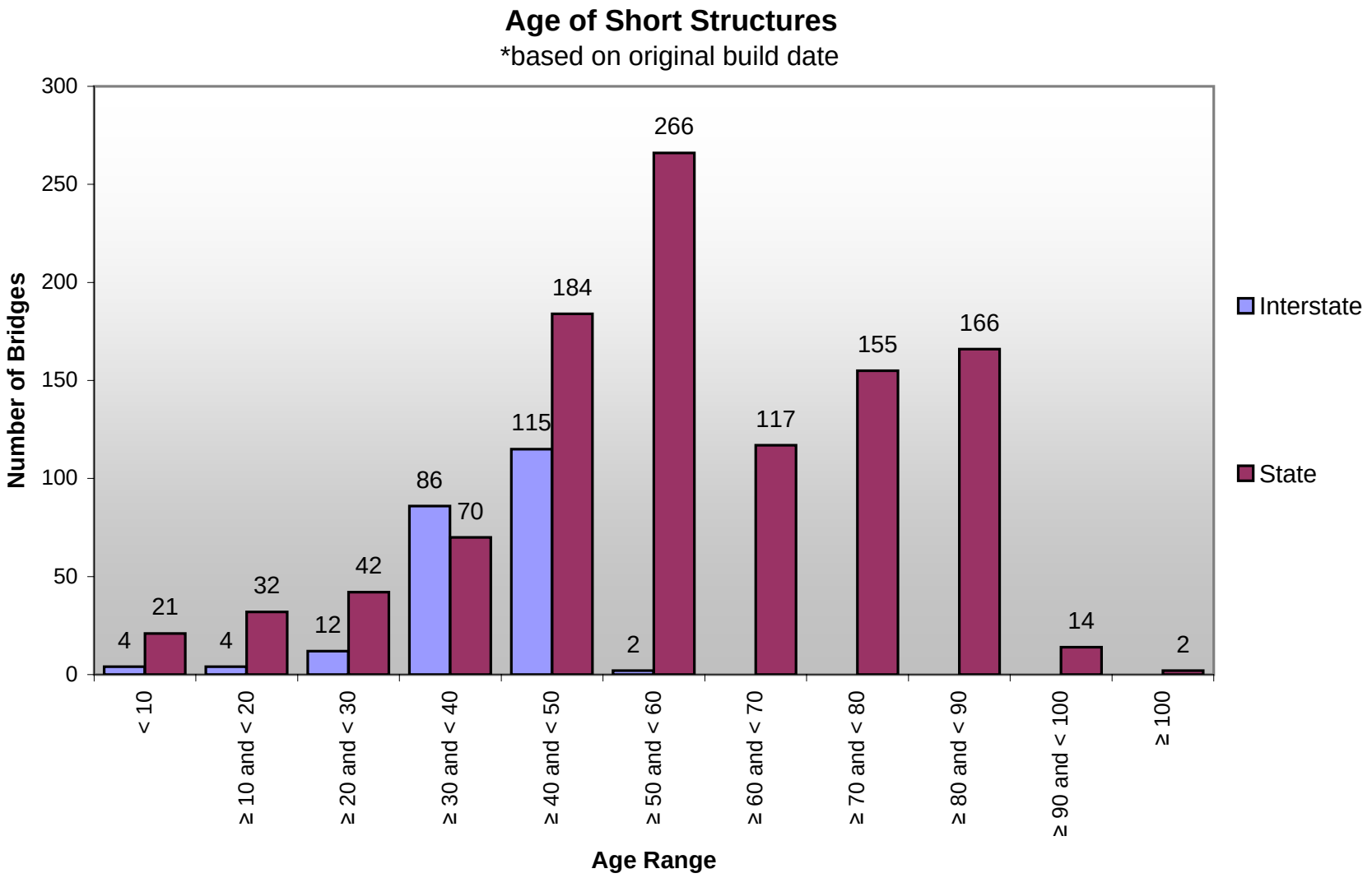

Structural Deficiency Trends and Performance Goal
*State Highway Bridge
slope = 1.77
Structurally Deficient Bridges
200
150
100
157 158 159 158
156 154 152 149 146 143 140 137 134 131 128 125 122
154 148 142 136 129 122 121 121 121 121 121 121 121 121 121 121 121
120 120 120
122 bridges (16% goal)
2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028
Year
Performance Goal - 16%
SD Trend (1997 - 2008)
Unconstrained SD Trend
Constrained SD Trend


Structural Deficiency Trends and Performance Goal
*Town Highway Bridge
slope = 2.90
Structurally Deficient Bridges
400
350
300
250
200
310
313
314
310
306
302
298
294
290
286
283
280
277
274
271
268
265
305
308
307
303
299
292
285
278
271
264
257
256
257 bridges (16% goal)
Performance Goal - 16%
SD Trend (1997 - 2008)
Unconstrained SD Trend
Constrained SD Trend
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
Year

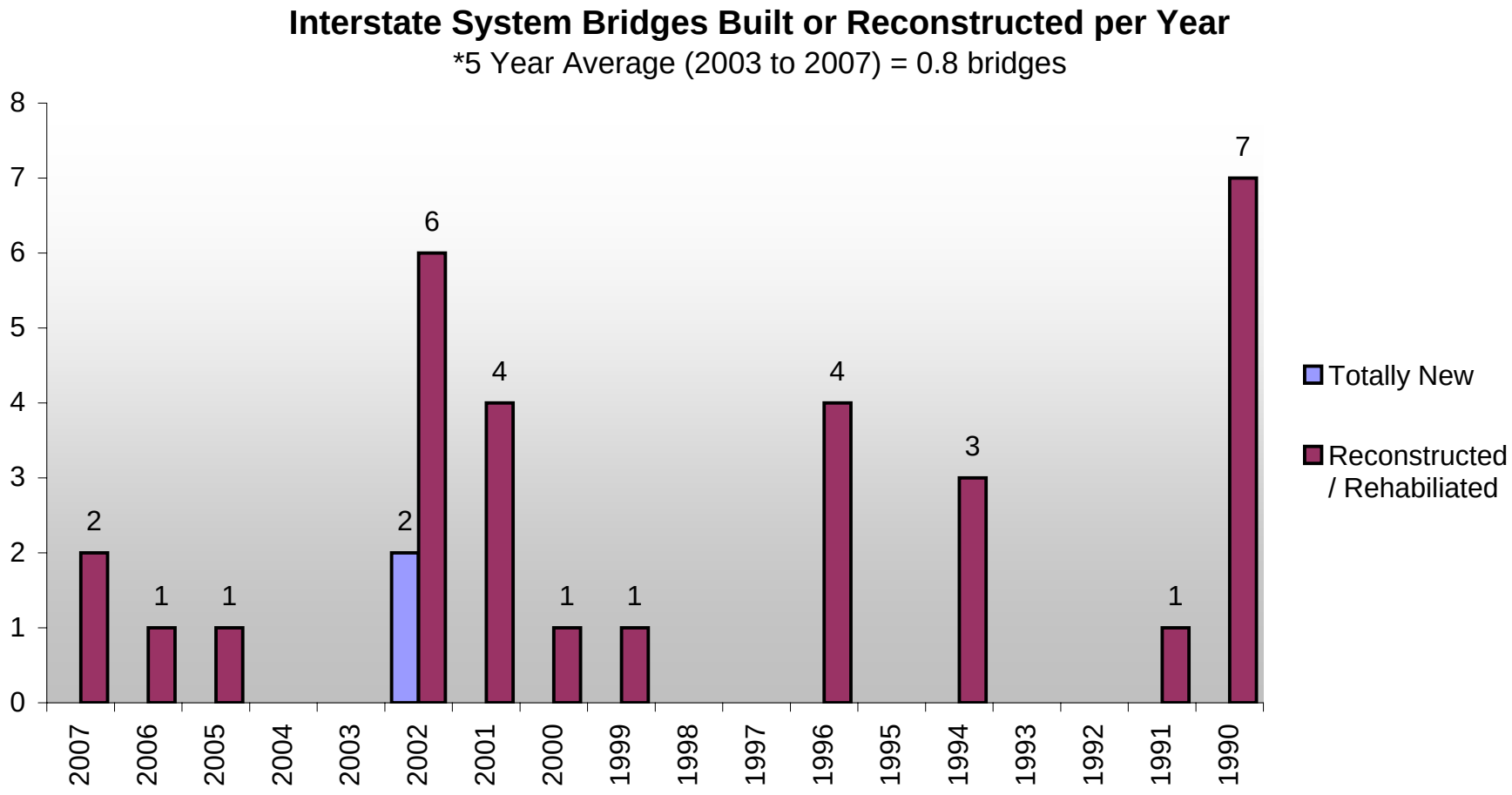

Structural Deficiency Trends and Performance Goal
*Interstate and State Highway "Short" Structures
Structurally Deficient Bridges
Year
slope = 0
155 short structures
(12% goal)
Performance Goal - 12%
SD Trend (1997 - 2008)
Unconstrained SD Trend
Constrained SD Trend

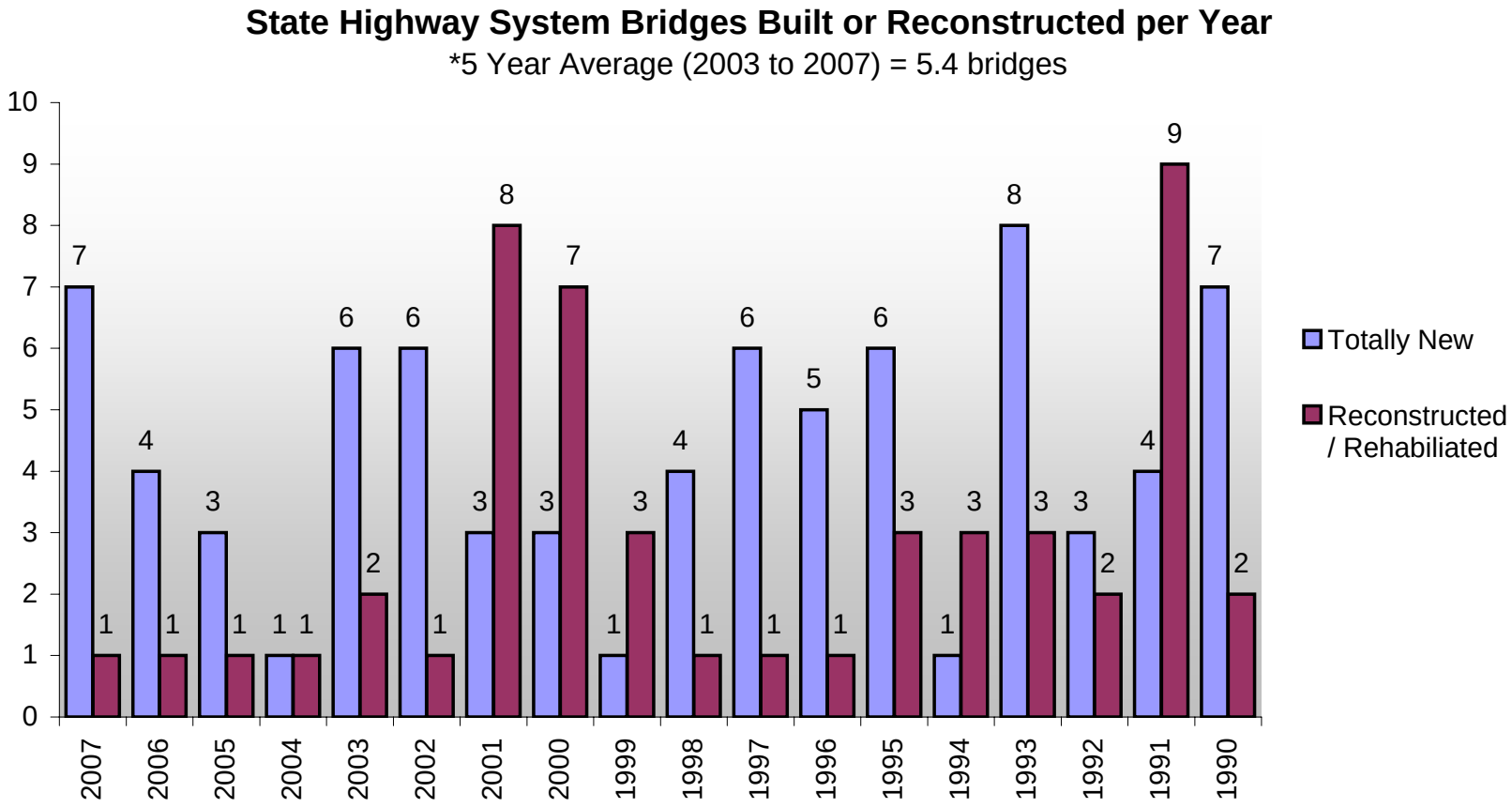
Section VIII – Age History

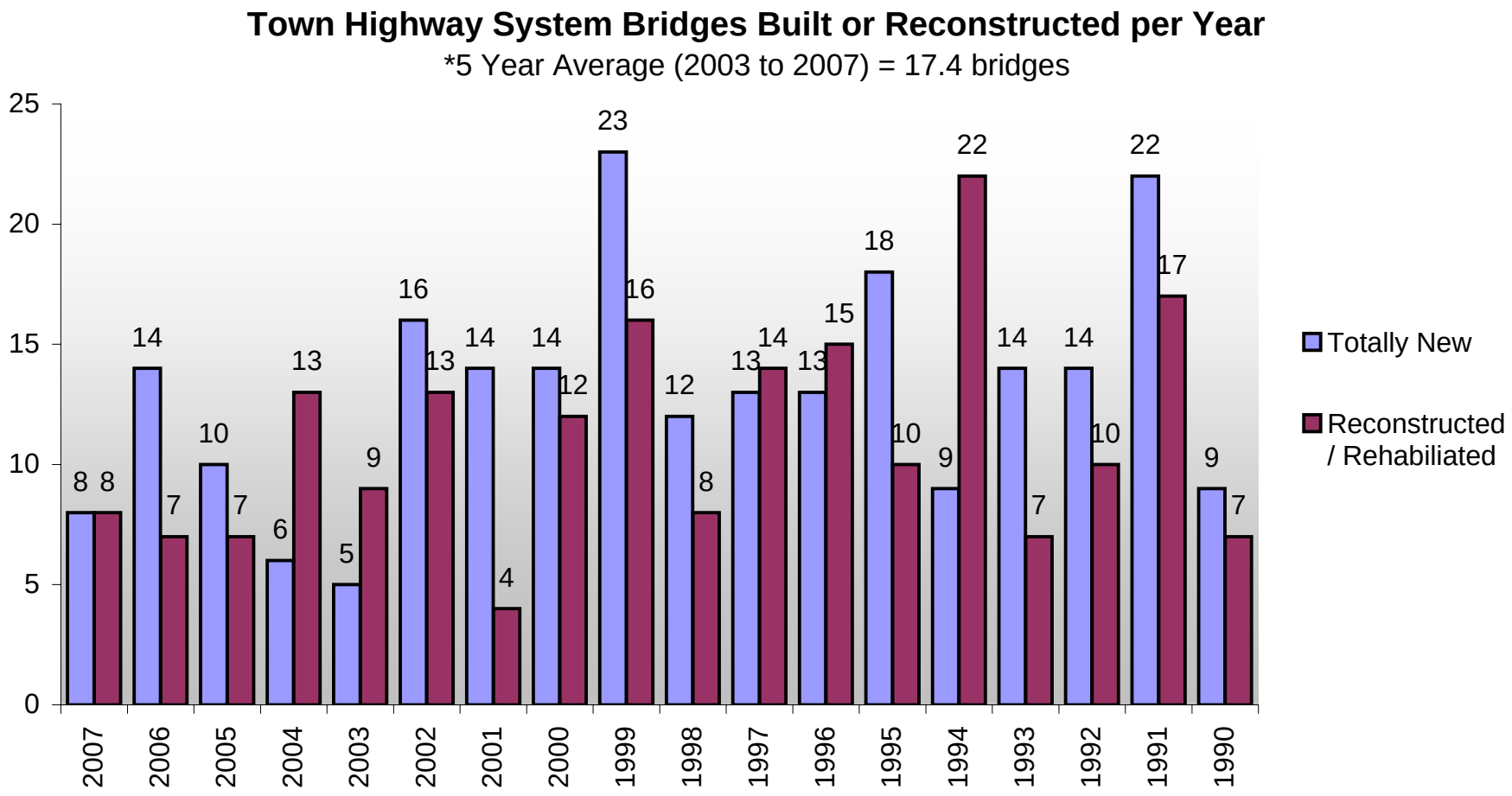

Age of Bridges
*based on original build date
Number of Bridges
300
250
200
150
100
50
0
2
34
110
0
49
138
12
79
143
104
94
194
193
127
117
69
129
65
201
162
181
70
278
9
25
0
6
92
< 10
≥ 10 and < 20
≥ 20 and < 30
≥ 30 and < 40
≥ 40 and < 50
≥ 50 and < 60
≥ 60 and < 70
≥ 70 and < 80
≥ 80 and < 90
≥ 90 and < 100
≥ 100
Age Range
Interstate
State Highway
Town Highway

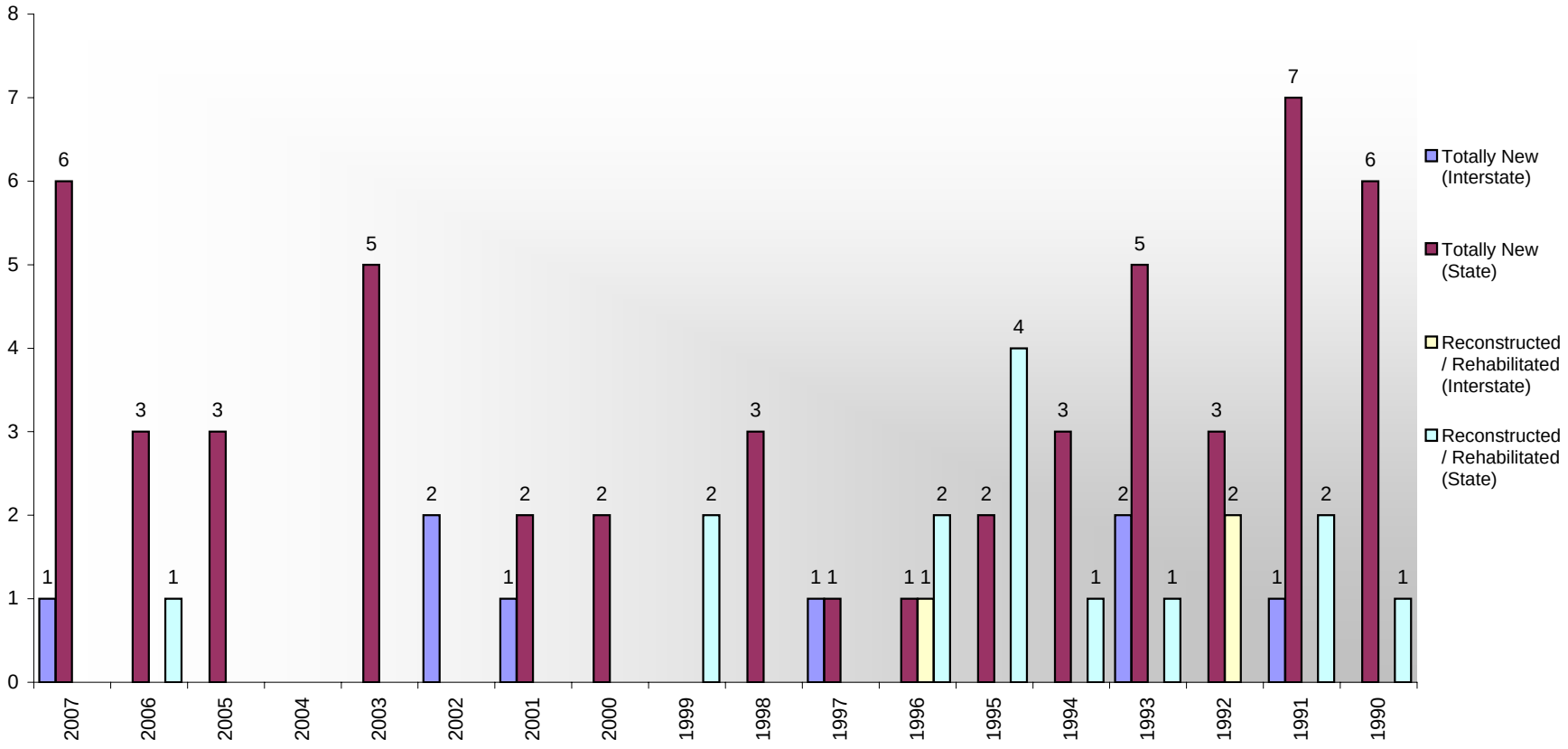

Age of Short Structures
*based on original build date
Number of Bridges
300
250
200
150
100
50
0
4
21
4
32
12
42
86
70
115
184
2
266
117
155
166
14
2
< 10
≥ 10 and < 20
≥ 20 and < 30
≥ 30 and < 40
≥ 40 and < 50
≥ 50 and < 60
≥ 60 and < 70
≥ 70 and < 80
≥ 80 and < 90
≥ 90 and < 100
≥ 100
Age Range
Interstate
State

Section IX – Construction History


Interstate System Bridges Built or Reconstructed per Year
*5 Year Average (2003 to 2007) = 0.8 bridges
8
7
6
5
4
3
2
1
0
2
1
1
2
6
4
1
1
4
3
1
7
2007
2006
2005
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
Totally New
Reconstructed / Rehabiliated


State Highway System Bridges Built or Reconstructed per Year
*5 Year Average (2003 to 2007) = 5.4 bridges
10
9
8
7
6
5
4
3
2
1
0
2007
2006
2005
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
Totally New
Reconstructed / Rehabiliated


Town Highway System Bridges Built or Reconstructed per Year
*5 Year Average (2003 to 2007) = 17.4 bridges
25
20
15
10
5
0
8 8
14 7
10 7
6 13
5 9
16 13
14 4
14 12
23 16
12 8
13 14
13 15
18 10
9 22
14 7
14 10
22 17
9 7
2007
2006
2005
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
Totally New
Reconstructed / Rehabiliated

Interstate & State Highway System Bridges Built or Reconstructed per Year

*5 Year Average (2003 to 2007) = 3.8 bridges