

A photograph of a riverbank with a concrete bridge structure and several concrete pillars in the water. The bridge is made of concrete blocks and is partially submerged. The water is greenish and has some ripples. There are trees and bushes on the bank. The text '2030/Bridge Needs' is overlaid in yellow. Below it, the names 'Karl H. Frank', 'José Weissmann(UTSA), and Rob Harrison' are overlaid in white.

2030/Bridge Needs

Karl H. Frank
With a Lot of Help From
José Weissmann(UTSA), and Rob Harrison

2030 Committee

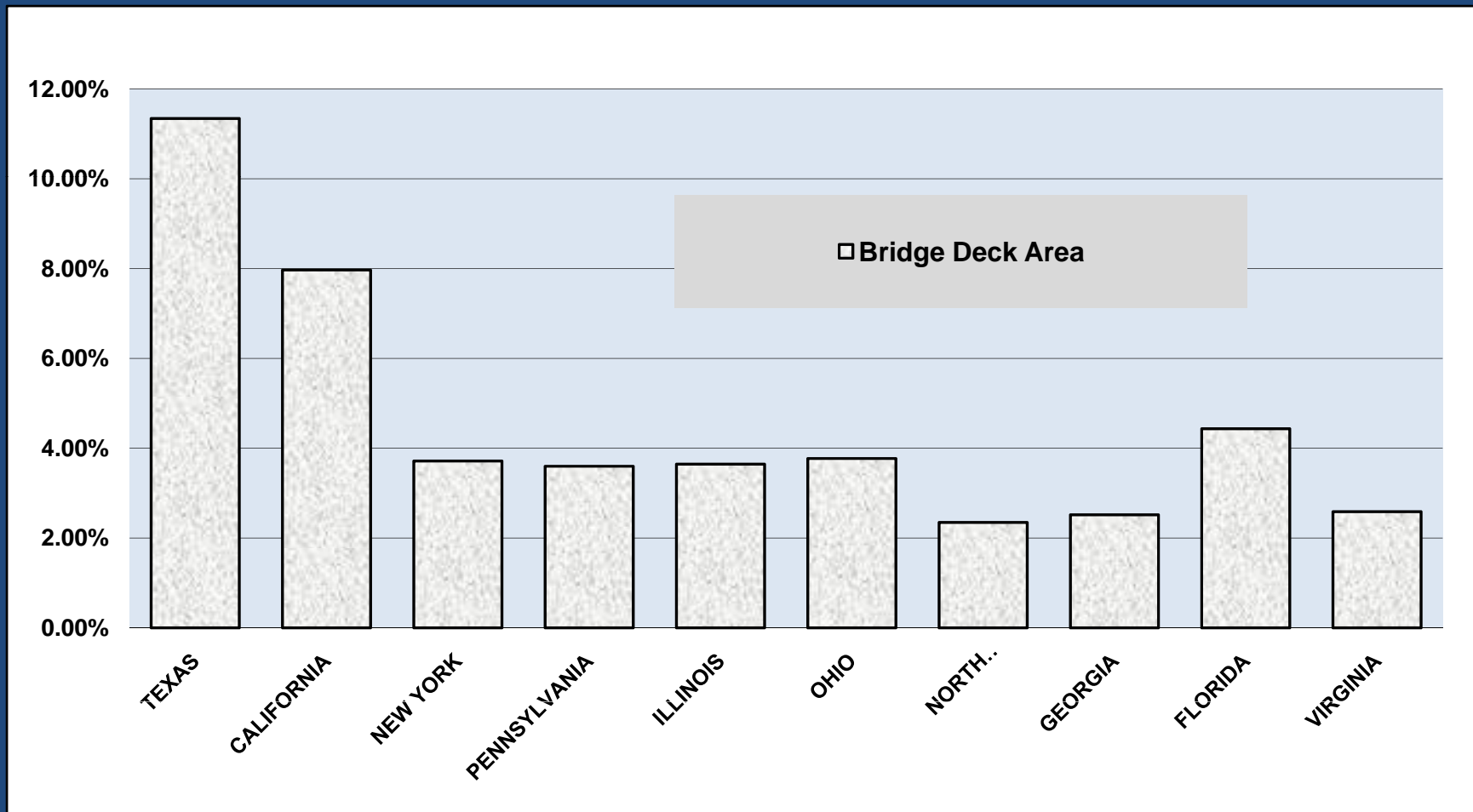
In May 2008, Texas Transportation Commission Chair Deirdre Delisi, at the request of Texas Governor Rick Perry, appointed a volunteer committee of 12 experienced and respected business leaders designated as the 2030 Committee. The Committee's charge was:

to provide an independent, authoritative assessment of the state's transportation infrastructure and mobility needs from 2009 to 2030.

Bridge Needs

- Current Inventory
 - Bridge Funding
 - Bridge Age
- Estimated Bridge Annual Costs
 - Maintenance
 - Inspection
- Estimation of Bridge Replacement
 - Replacement
 - Repair
- New Construction

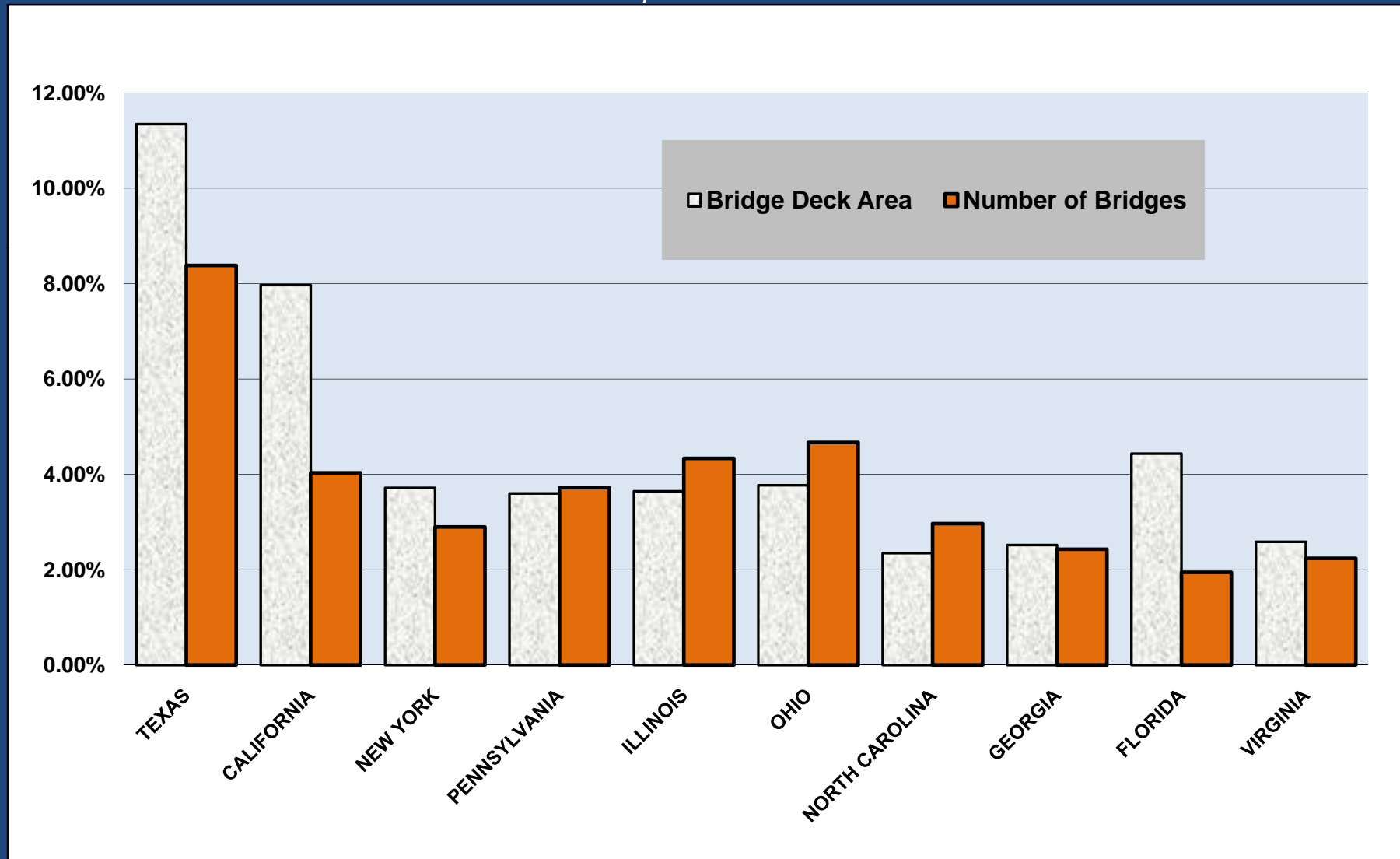
Bridge Deck Distribution Among Peer States



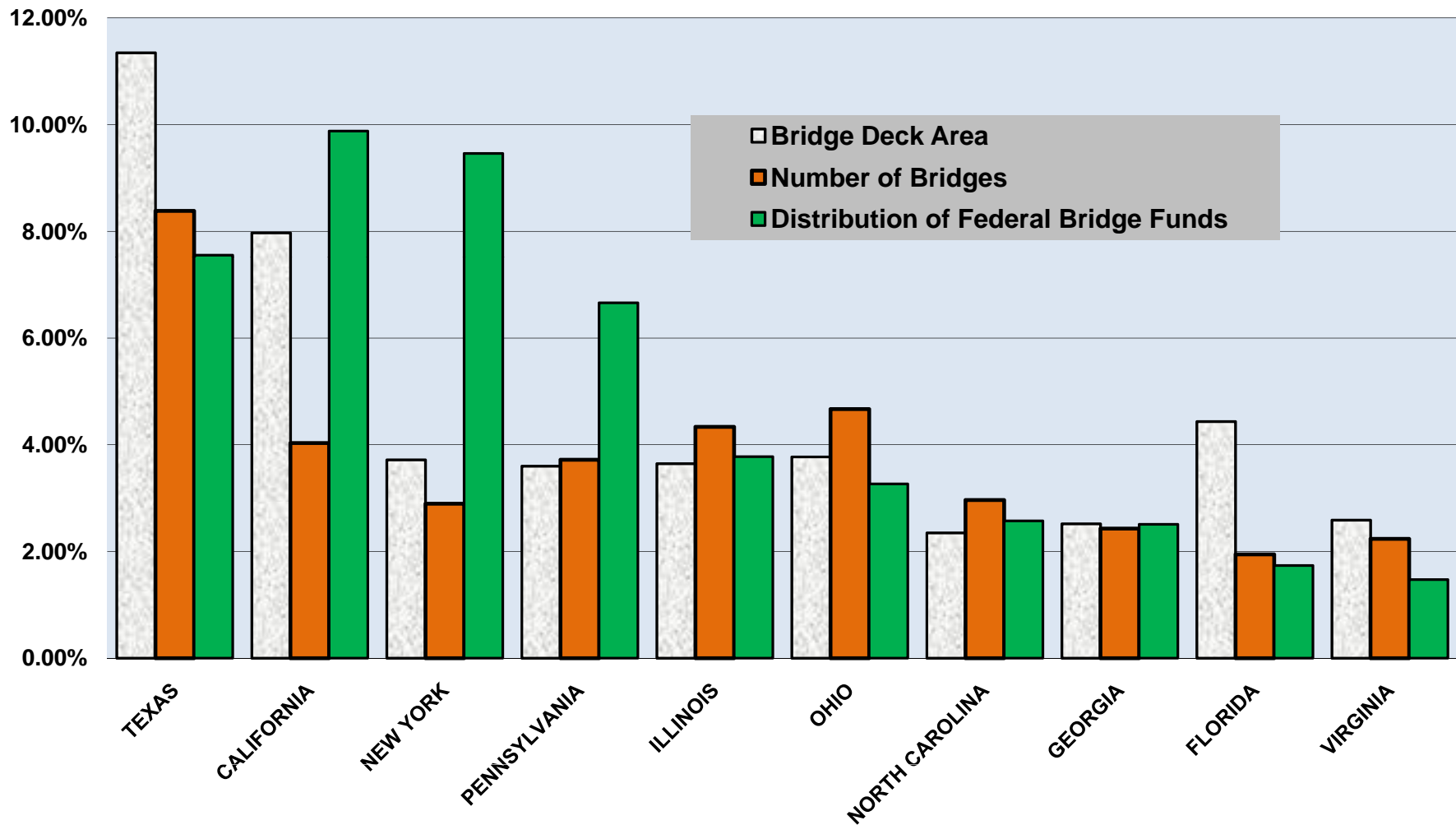
Number of Bridges

600,000 Total U.S.

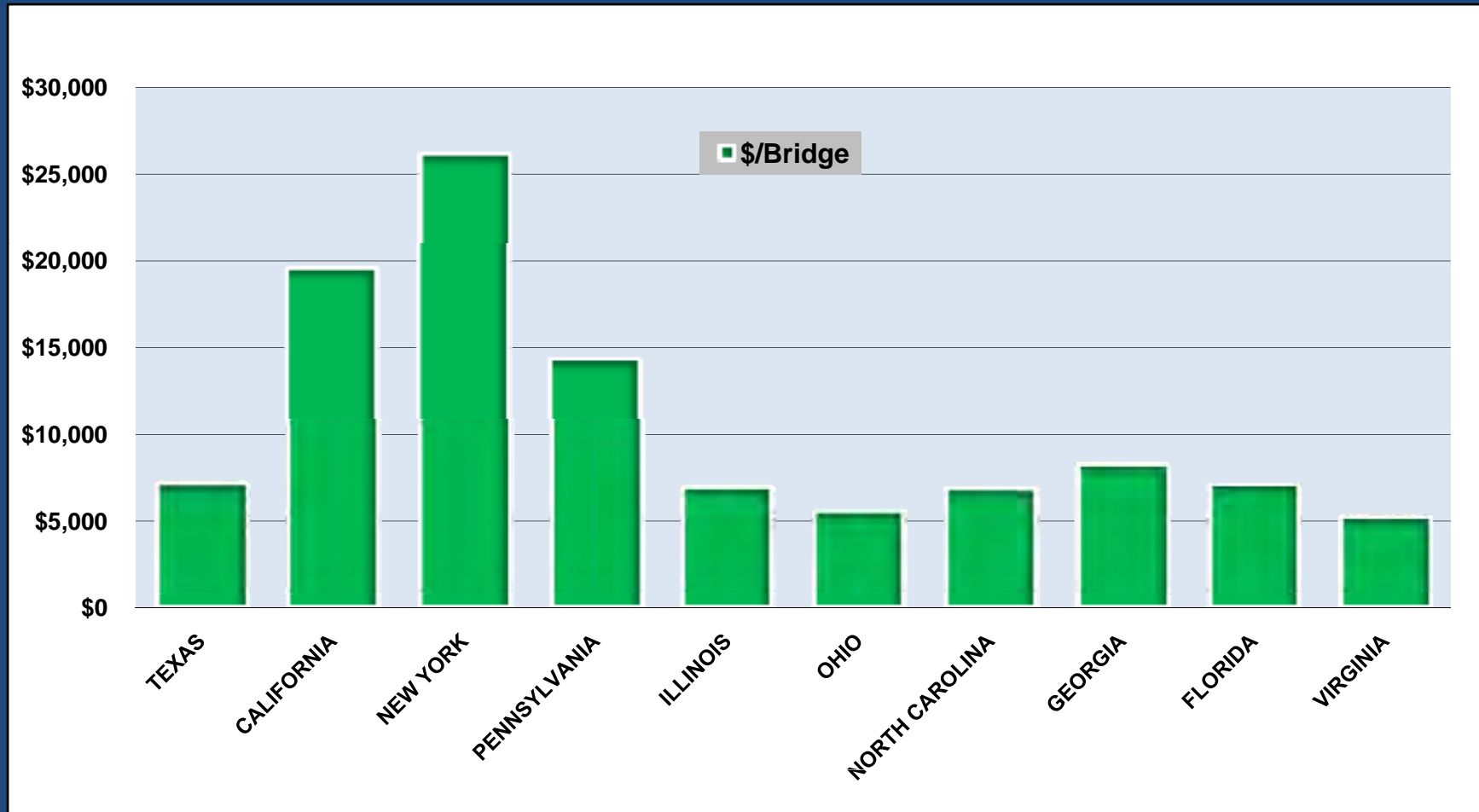
50,000 Texas



Bridge Federal Funding



Federal Funding/Bridge



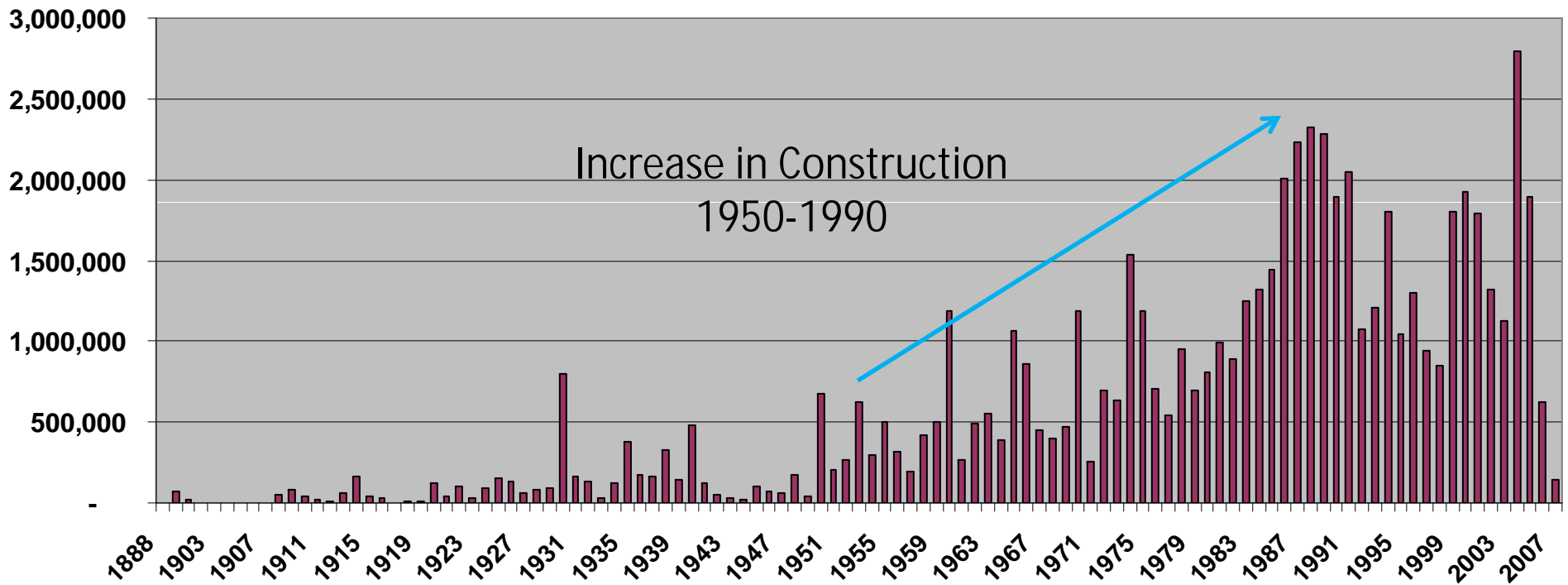
Texas Situation

- Largest Bridge Owner in the Country by a factor of 2
- Receives Less Funding than California, New York, and Illinois (**Bridge Welfare States**).
- Funding per Bridge is About Peer Average if Eliminate Welfare States
- Future Federal Funding is Likely to Remain at Present Level
- Bridge Needs Must be Meet with State's Funds

Bridge Inventory

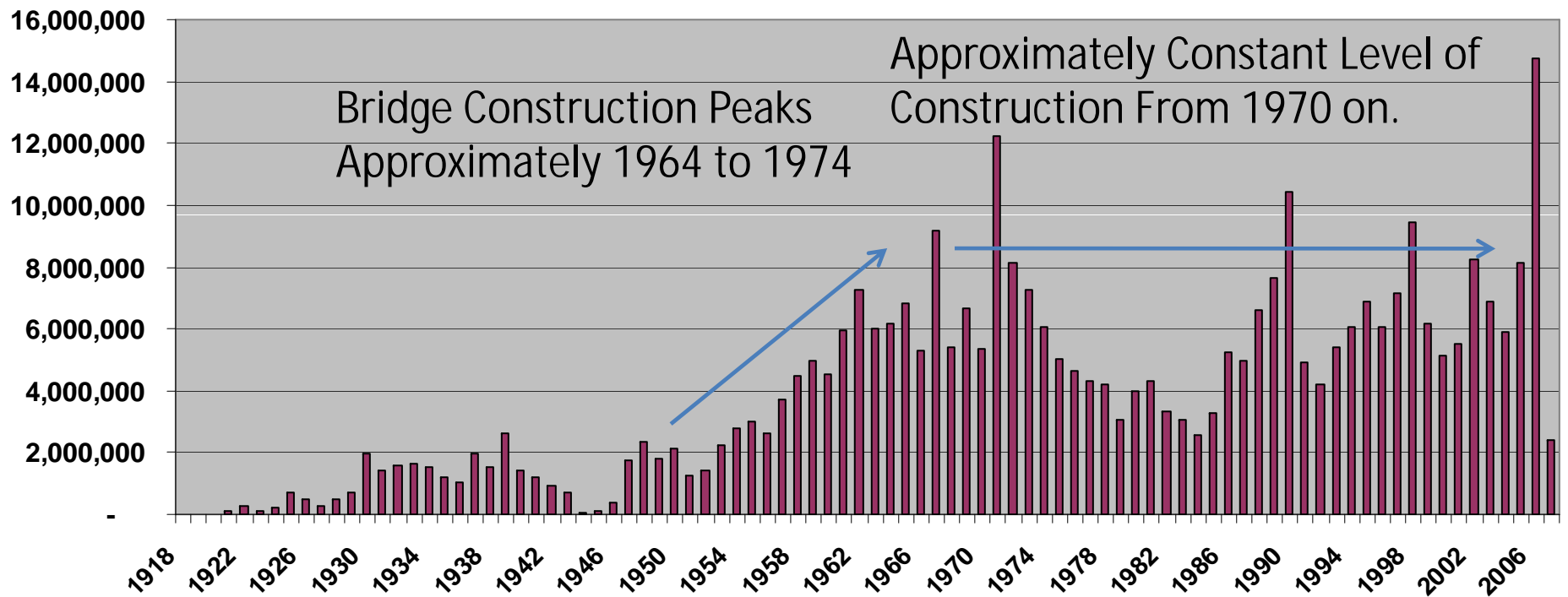
- Off System
 - 17,567 Bridges (33% of State Total)
 - Oldest 110 years
- On System
 - 33,500 Bridges (66% of State Total)
 - Oldest 90 years

Off System Deck Area (sqft) Distribution by Year Built



Total Deck Area: 64.8 million sqft
17,567 Records

On System Deck Area (sqft) Distribution by Year Built



Total Deck Area: 352 million sqft

33,500 Records

Bridge Population Ages and Cost Implications

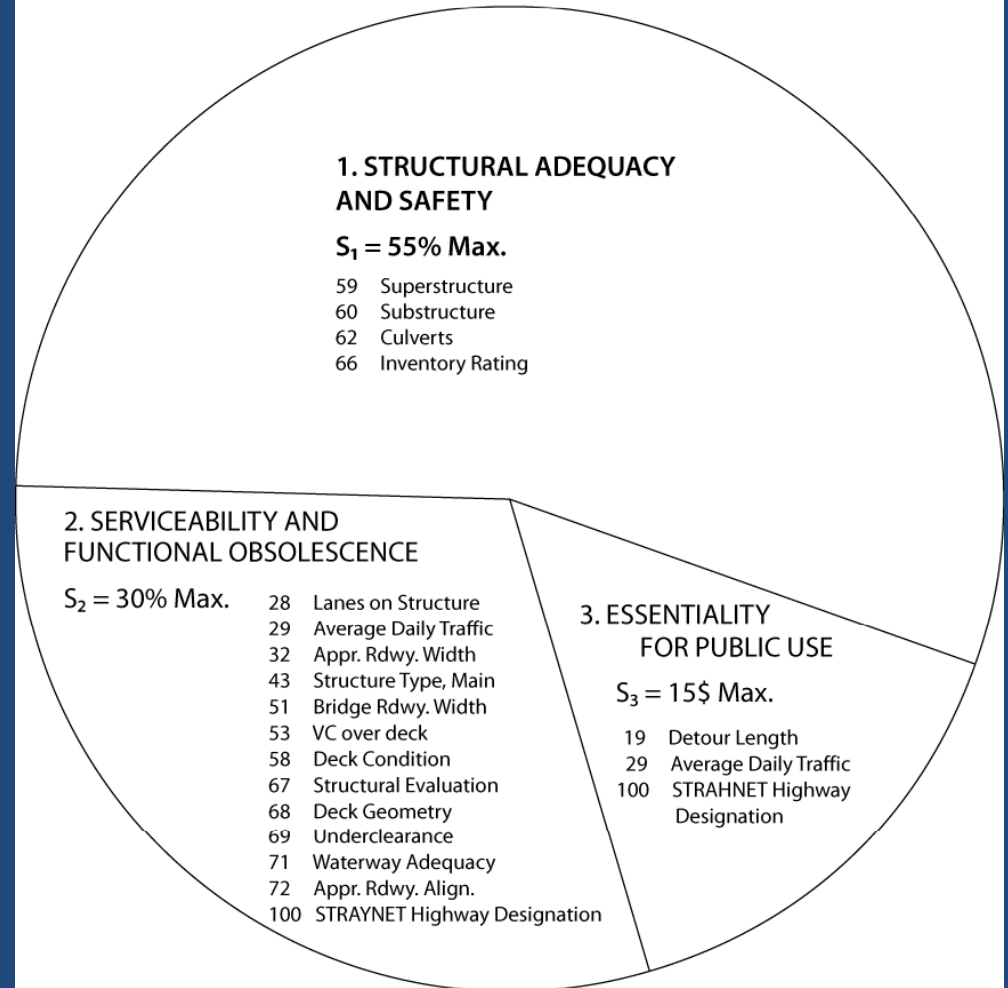
Assuming Replacement and Maintenance Cost are a Function of Bridge Age:

- Peak in On System in Construction 1964
 - Replacement and Maintenance Costs will Level Out Before 2030
- Off System while Older Construction Peaks Later- 1990
 - Replacement and Maintenance Costs will Continue to Increase

Sufficiency Rating FHWA Criteria

$$\text{SUFFICIENCY RATING} = S_1 + S_2 + S_3 - S_4$$

Sufficiency rating shall not be less than 0% nor greater than 100%



1. STRUCTURAL ADEQUACY AND SAFETY

$S_1 = 55\%$ Max.

- 59 Superstructure
- 60 Substructure
- 62 Culverts
- 66 Inventory Rating

2. SERVICEABILITY AND FUNCTIONAL OBSOLESCENCE

$S_2 = 30\%$ Max.

- 28 Lanes on Structure
- 29 Average Daily Traffic
- 32 Appr. Rdwy. Width
- 43 Structure Type, Main
- 51 Bridge Rdwy. Width
- 53 VC over deck
- 58 Deck Condition
- 67 Structural Evaluation
- 68 Deck Geometry
- 69 Underclearance
- 71 Waterway Adequacy
- 72 Appr. Rdwy. Align.
- 100 STRAYNET Highway Designation

3. ESSENTIALITY FOR PUBLIC USE

$S_3 = 15\%$ Max.

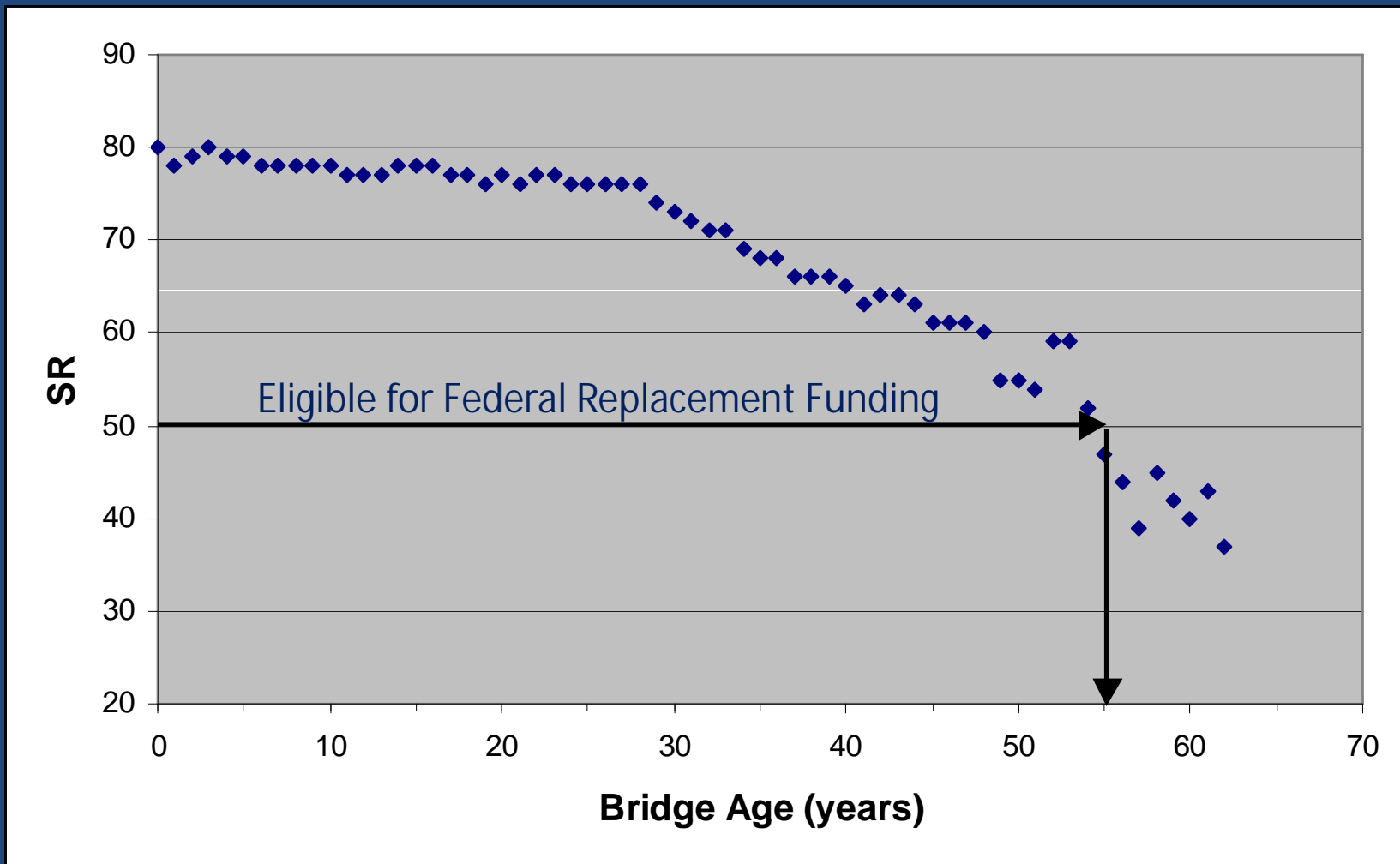
- 19 Detour Length
- 29 Average Daily Traffic
- 100 STRAHNET Highway Designation

4. SPECIAL REDUCTIONS

$S_4 = 13\%$ Max.

- 19 Detour Length
- 36 Traffic Safety Features
- 43 Structure Type, Main

Estimation of Bridge Life Replacement or Major Repair



Sufficiency Rating vs. Bridge Age-Interstate Urban Bridges

Bridge Replacement Life

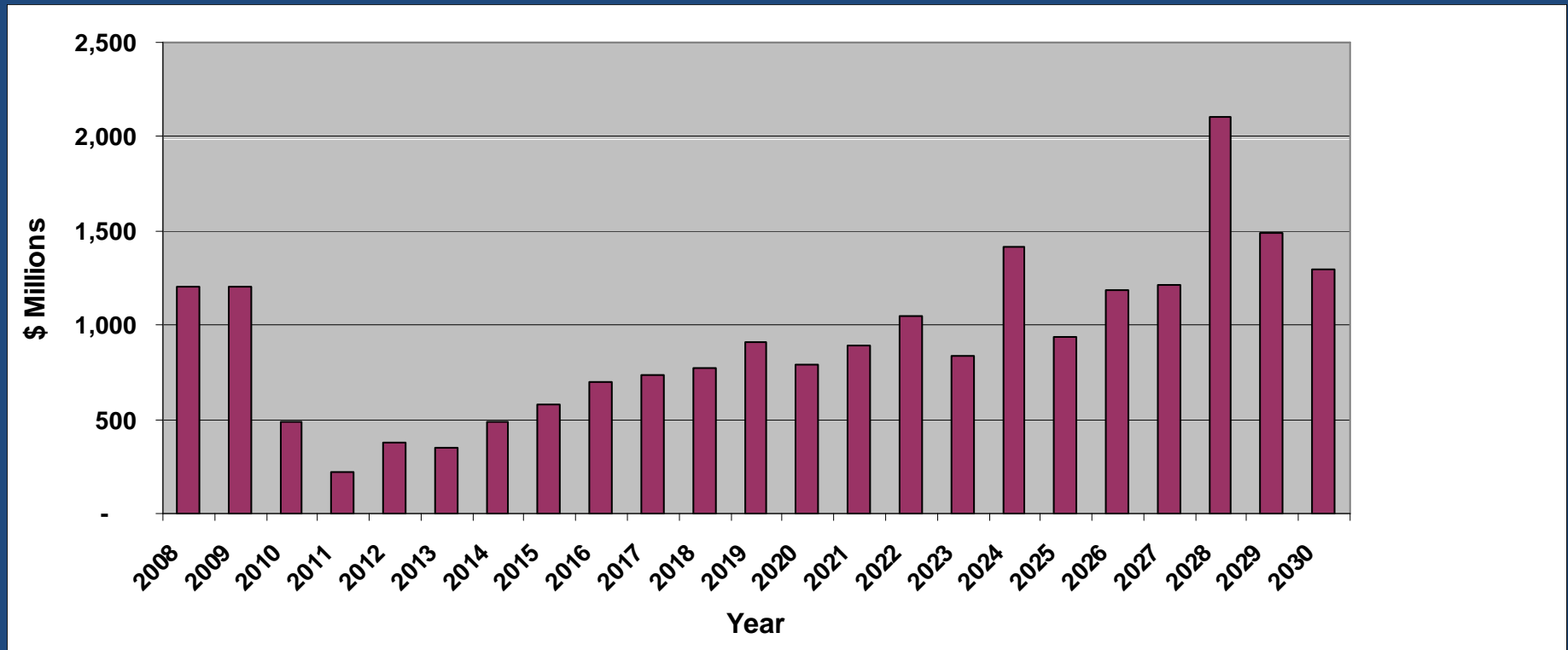
- Based Upon Estimated Time to Sufficiency Rating of 50
 - 10% Probability Life is Less Than Estimated
- On System
 - 55 years
- Off System
 - 50 years



Replacement Bridge Cost Estimates

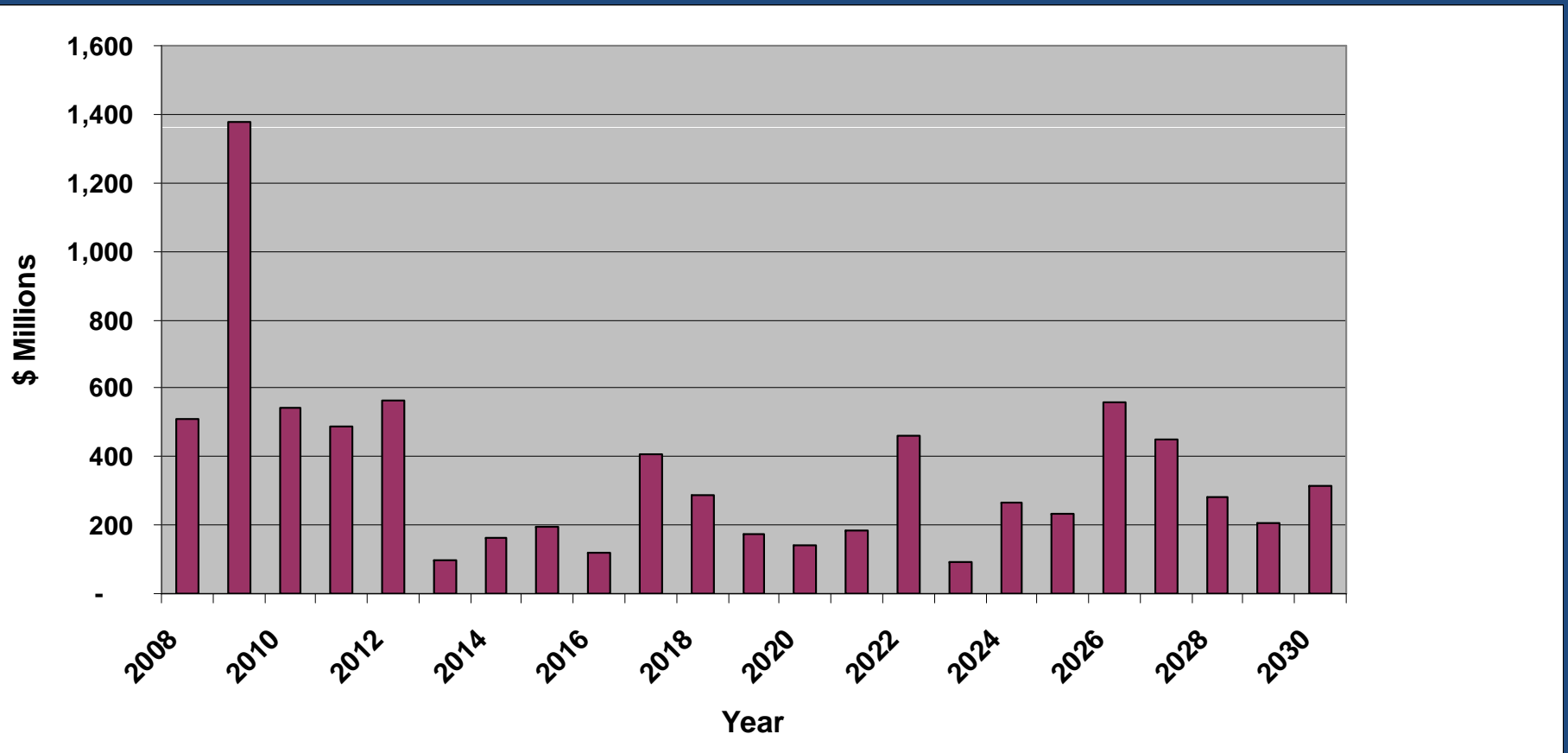
- Rehabilitation
 - \$120/sq. ft.
- Replacement
 - \$194/sq. ft.
 - FHWA cost-\$69/ sq. ft. (Does not include engineering, mobility, and approach work)
- Expansion Factor of 2 for Off System Bridges
- No Expansion in On System Since Included in Mobility Costs
- Special Large Bridges Considered Separately

Annual Replacement Costs On System Bridges Total \$21.2 Billion



All Costs in 2008 Dollars

Annual Replacement Costs Off System Bridges Total \$8.1 Billion



Additional Bridges for Mobility

- Based Upon Mobility Scenarios Generated by TTI
 - Mobility Costs Include Bridge Construction Costs But Do Not Give Number or Types of Bridges, Just Lane Miles
 - Used Data From Existing Systems to Estimate Relationship Between Lane Miles and Number of Bridges
- Estimate of the Number of New Bridges Used to Estimate Future Maintenance and Inspection Costs

Typical Data Used to Estimate Number of Bridges From Mobility Lane Miles Ft. Worth District

Functional Class	Lane-Miles	# Bridges	Ratio Bridges/Mile
Urban Arterial	1,073	256	0.2385
Urban Freeway	827	580	0.7015
Rural Principal Arterial	919	199	0.2166
Rural Interstate	307	168	0.5473

Increase in Bridges From Mobility Scenarios

Scenario	Current Funding Trend	Maintain Economic Competitiveness	Prevent Worsening Congestion	Reduce Congestion
Lane Miles Added	17,600	39,270	55,450	65,300
Number of Bridges Added	5,845	13,042	17,768	21,421

On Going Bridge Costs

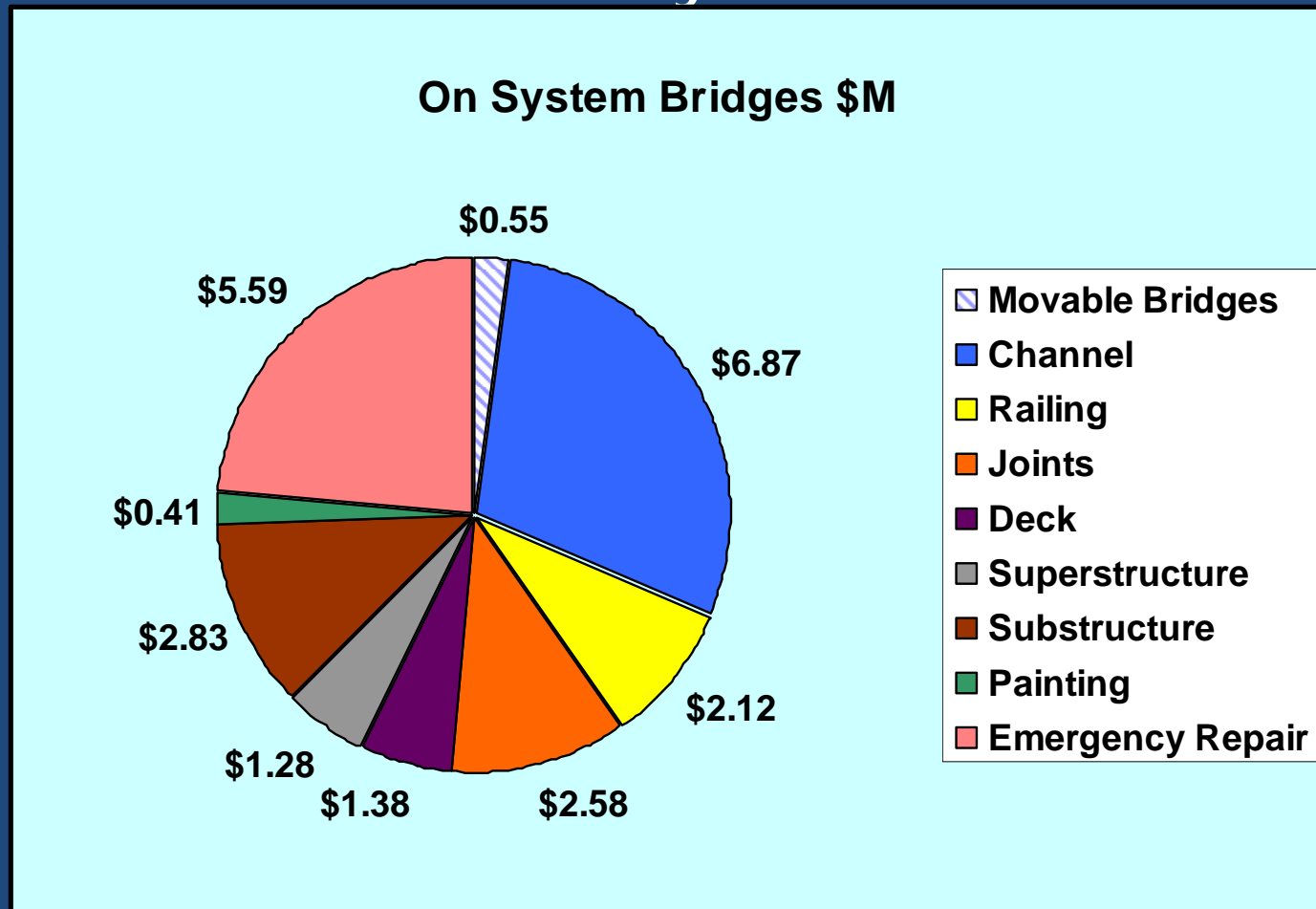
- Inspection-2 year Frequency of Inspection
 - ½ of Total Bridges In Each Year
 - Non Fracture Critical \$1,500/Bridge
 - Fracture Critical Dependent Upon Number of Details- Average: \$8,000/Bridge



Ongoing Annual Costs Inspection

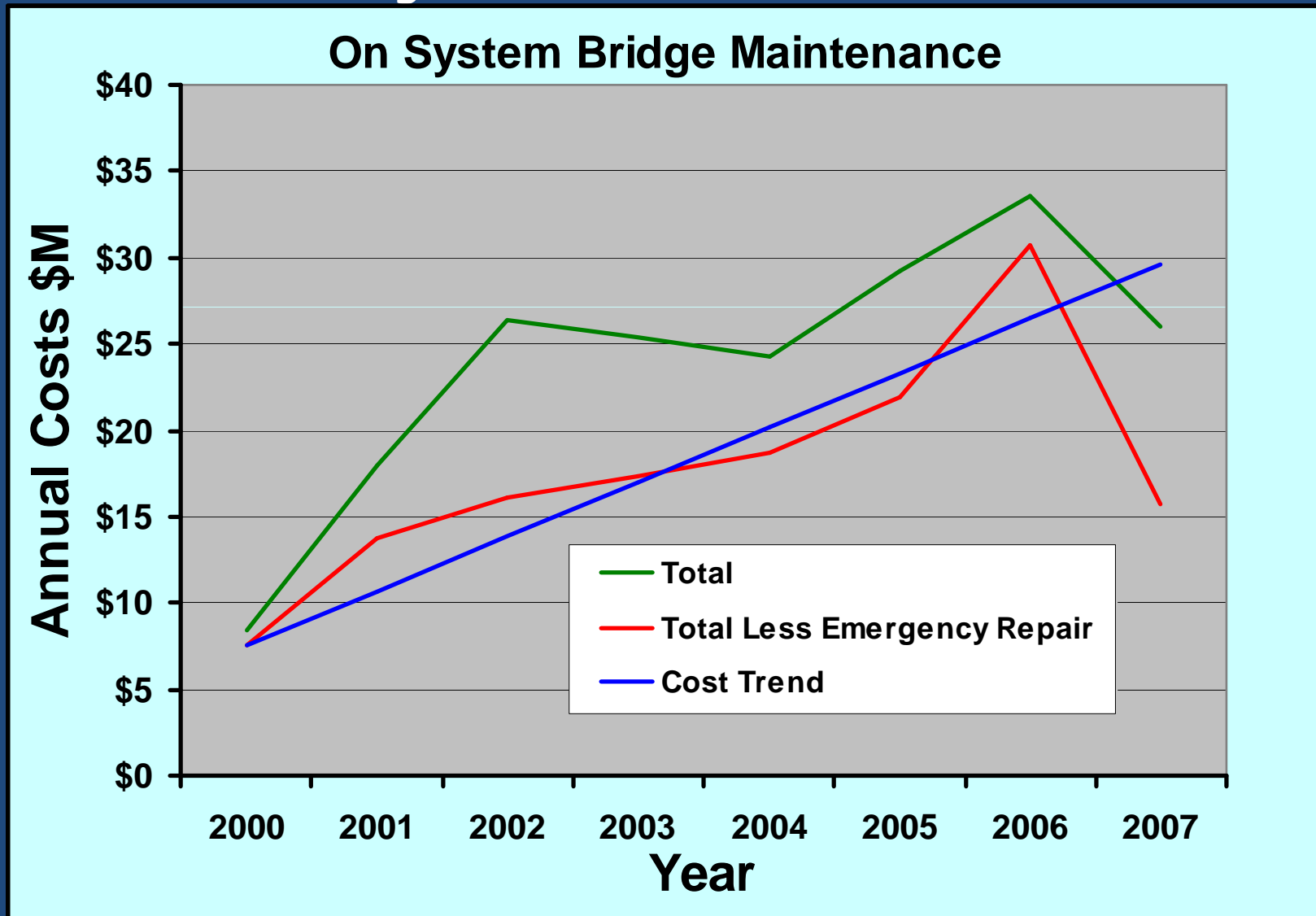
System	Fracture Critical		Non Fracture Critical		Underwater Diver Inspection		Inspection Costs
	Number of Bridges	Annual Costs \$M	Number of Bridges	Annual Costs \$M	Number of Bridges	Annual Costs	
On	378	\$1.5	33,126	\$24.8	603	\$1.7	\$28.0
Off	357	\$1.4	17,211	\$12.9	193	\$0.5	\$14.9
					Total All Bridges		\$42.8

Ongoing Costs Maintenance On System Bridges Average Annual Cost Last 8 years

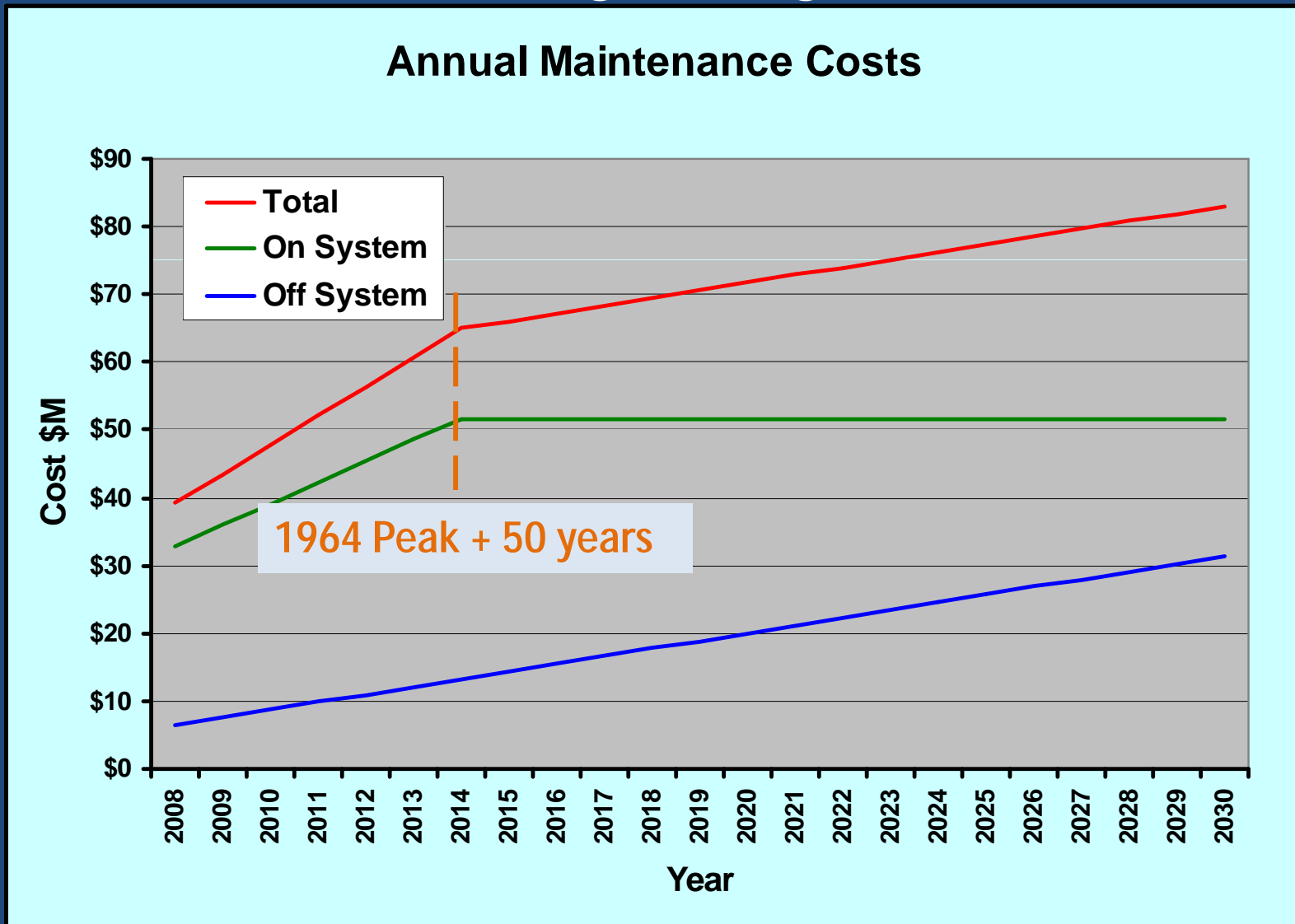


Emergency Costs Held Constant at \$5.6 M in Projections

Analysis of Past Years



Estimated Annual Maintenance Costs Existing Bridges



Estimated Total and Annual Cost

Cost Category	Total to 2030 \$ millions	Average Annual Cost \$ millions
Replacement On System	\$19,918	\$905
Replacement Off System	\$7,804	\$355
Replace Special and Large Bridges	\$6,107	\$278
Inspection Existing On System	\$615	\$28
Inspection Existing Off System	\$327	\$15
Maintenance Existing On System	\$1,123*	\$51
Inspection Mobility Bridges	\$170	\$8
Maintenance Mobility Bridges	\$63	\$3
Total Full Funding	\$36,127	\$1,643

* Off System Total Maintenance: \$435M not Included

Committee Recommendations:

- Replace on-system structurally deficient and substandard for load only bridges by 2012.
- Replace remaining structurally deficient substandard for load only and functionally obsolete bridges by 2030.
- Increase inspection and maintenance activities to maintain safety and extend life.
- Investment needed: \$36 billion total; \$1.6 billion per year

Estimates Versus Present Funding



The Difference

- Bridge Replacement
 - Present (2007): \$490 M
 - Needed: \$1,538 M
 - Increase Required: \$1,048M
- Bridge Maintenance
 - Present (2007): \$26 M
 - Needed: \$51 M
 - Increase Required: \$15 M

Sun Rise or Sunset? Just Need Adequate Funding



Austin American Statesman

Today

**TxDOT FUNDING: More money for transportation?
Not this session-Stimulus cash forestalls changes in
how state pays for roads.**

- The net result of this, some legislators say, is a state transportation kitty artificially propped up with borrowed money, steeped in debt payments and potentially headed for disaster. The state, according to a study released in December, needs to spend about \$14.3 billion annually on transportation over the next 22 years .