

Asset Sustainability Index

A Beta Version Using Existing State Data

Project Scope



- ▶ Describe Australian sustainability indices
- ▶ Can we replicate them here?

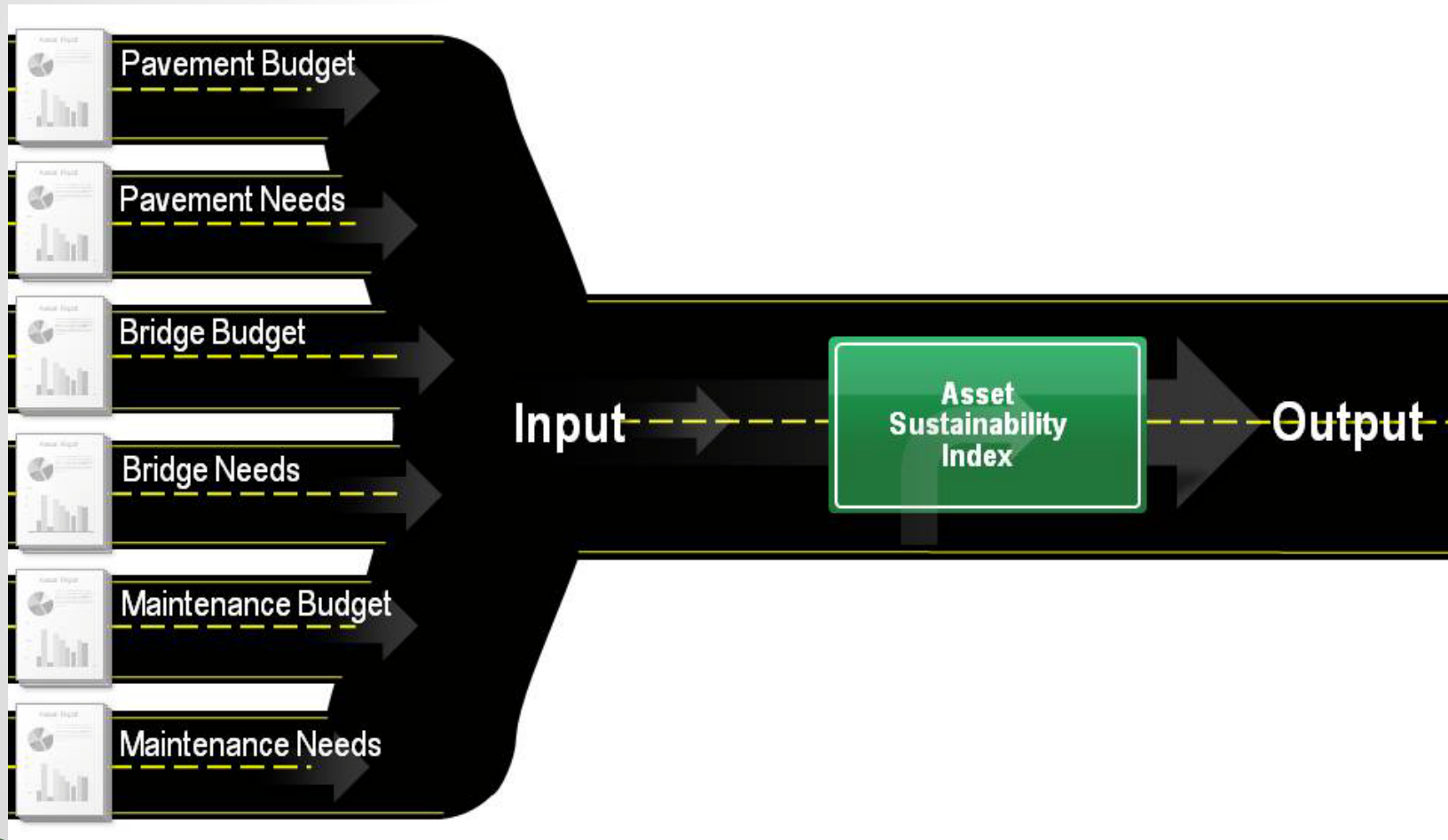
Project Intent

- ▶ Test another tool to communicate the magnitude of investment need
- ▶ Summarize asset management data into one financial index to be tracked over time
- ▶ Develop a leading indicator, as opposed to lagging indicators
- ▶ Illustrate the story of what happens if we continue on this path
- ▶ Do we leave a legacy or a liability for our children?

Project Approach

- ▶ Use existing state data
- ▶ Don't require any new data sets
- ▶ Pull data from standard agency documents, management system reports

Budget/Need = Index



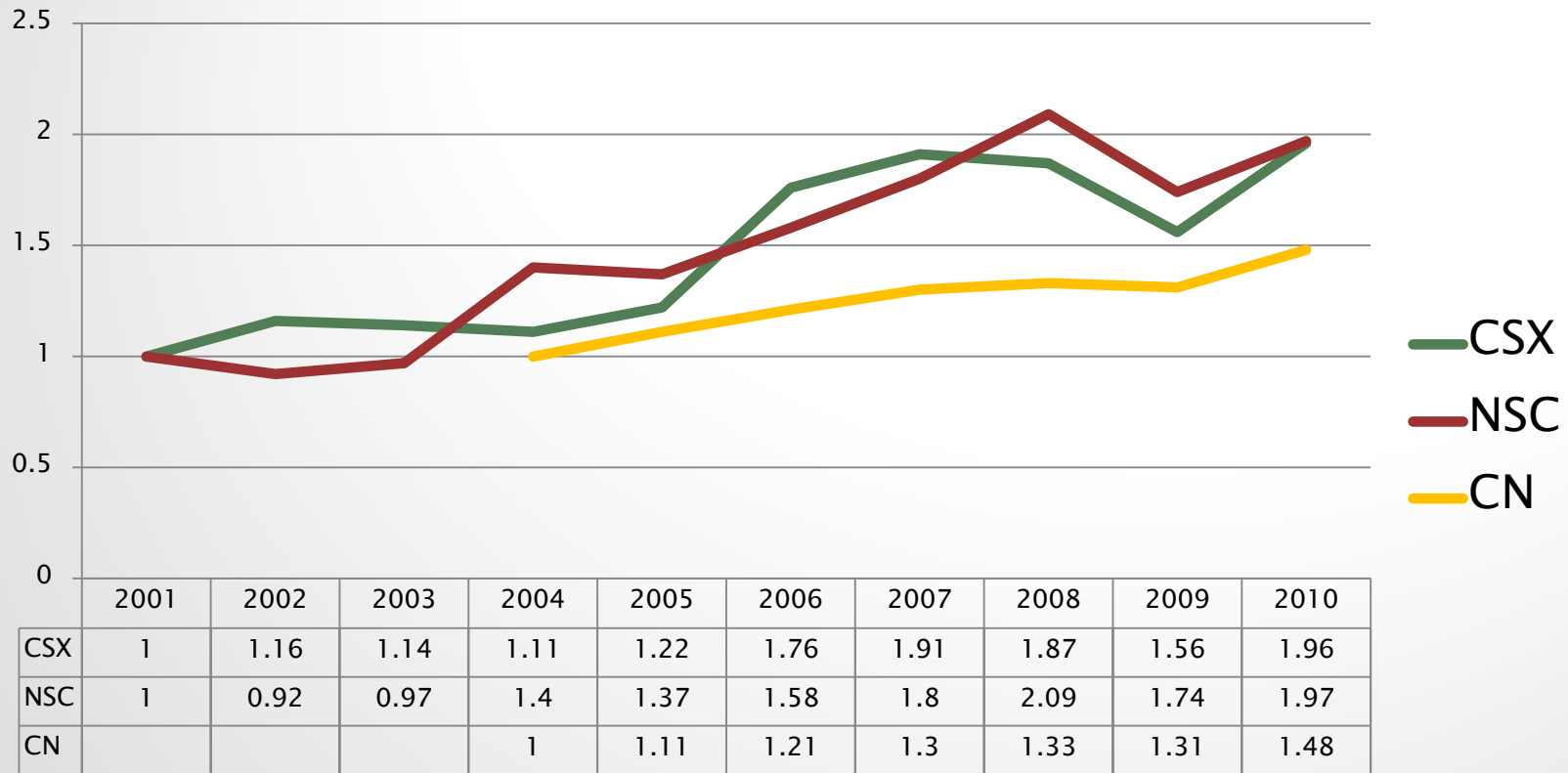
Simple Concept – Complex Practice

- ▶ ‘Need’ must be credible
 - Based on sound inventory
 - Credibly forecast at least 10 years
 - Relates to publicly perceived need
 - Requires a valid long-term fiscal forecast
 - Treatment program is comprehensive enough to lead to the lowest whole life cost for the entire network
 - Preservation
 - Preventive
 - Reactive
 - Rehabilitative
 - Replacement

Private Sector Parallels

- ▶ Sustainability of capital is a standard reporting element for publicly traded corporations
- ▶ Corporations must tell their investors whether they are creating long-term future capital liability
- ▶ Balance sheets must reflect future investment need
- ▶ Forecasting level of investment adequacy is a minimum competency

Class I RR Capital Investment



Buffet's BNSF Epiphany

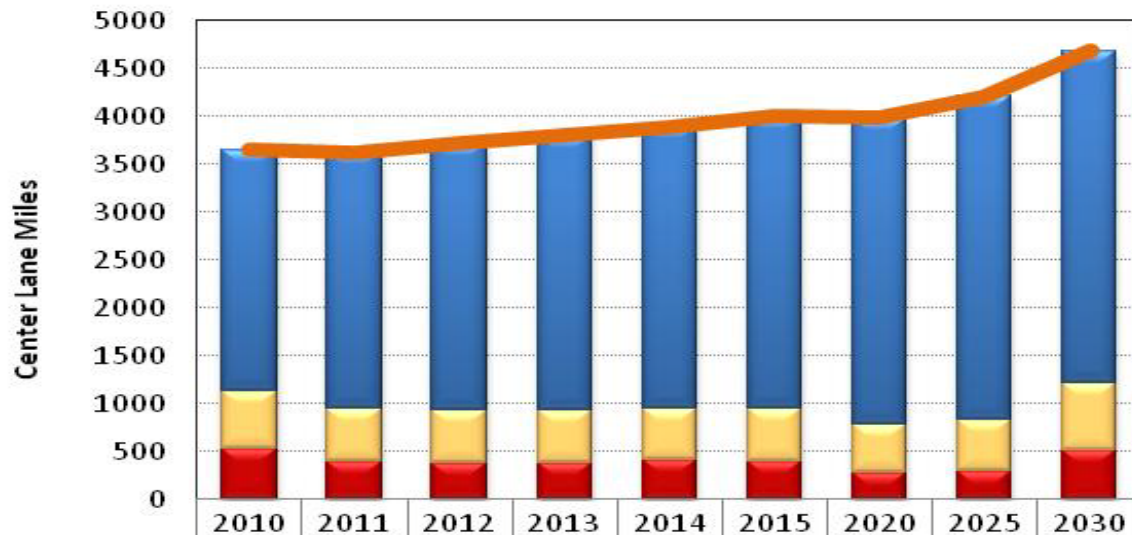
"All of this adds up to a huge responsibility," he wrote in his shareholders letter. "We are a major and essential part of the American economy's circulatory system, obliged to constantly maintain and improve our 23,000 miles of track along with its ancillary bridges, tunnels, engines and cars. In carrying out this job, we must anticipate society's needs, not merely react to them. Fulfilling our societal obligation, we will regularly spend far more than our depreciation, with this excess amounting to \$2 billion in 2011. I'm confident we will earn appropriate returns on our huge incremental investments. Wise regulation and wise investment are two sides of the same coin."

Can We Produce These Metrics?

- ▶ Yes
- ▶ The reports of mature US asset management practitioners include elements to produce sustainability indices
- ▶ These data sometimes are explicit, sometimes only inherent

Utah DOT Investment Backlog

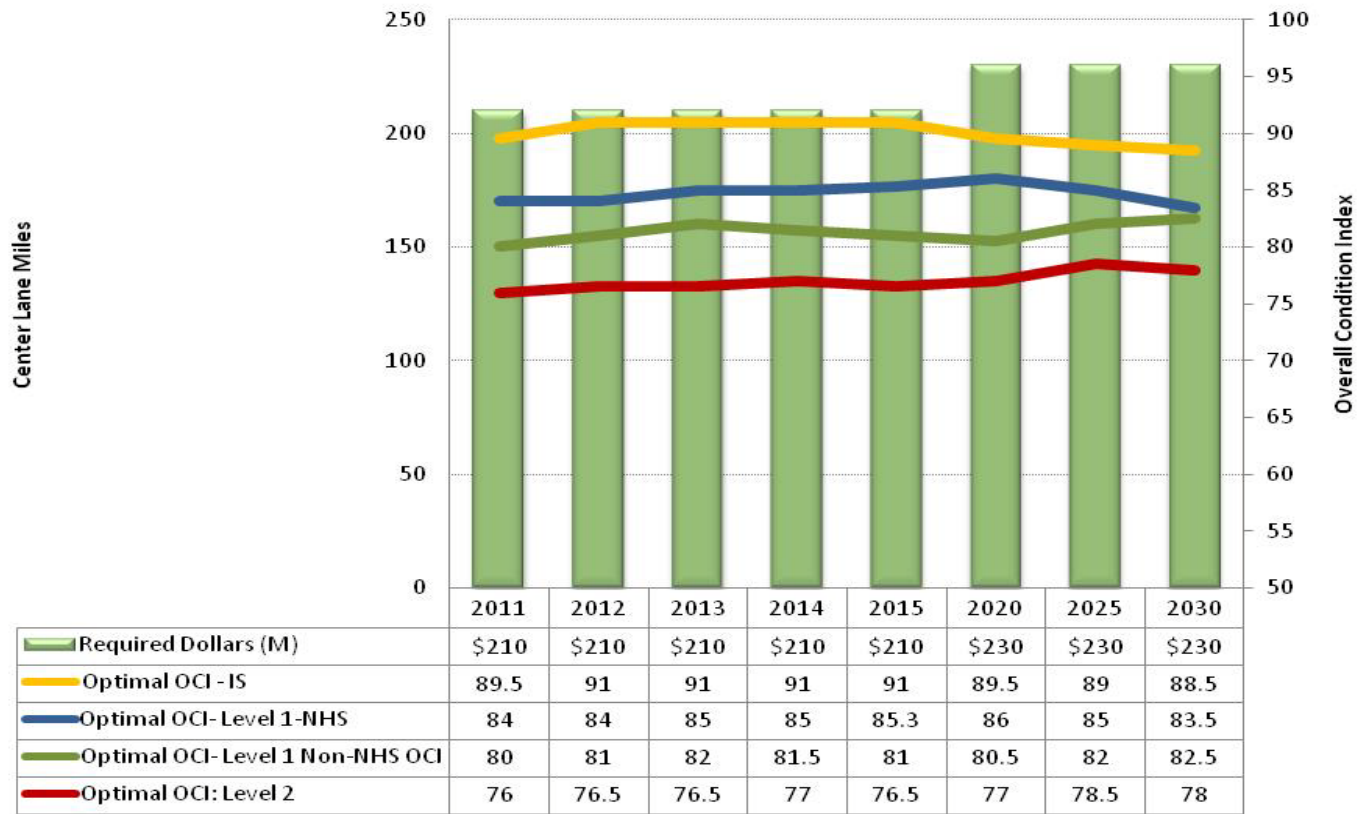
BackLog -Interstate, NHS and Non-NHS



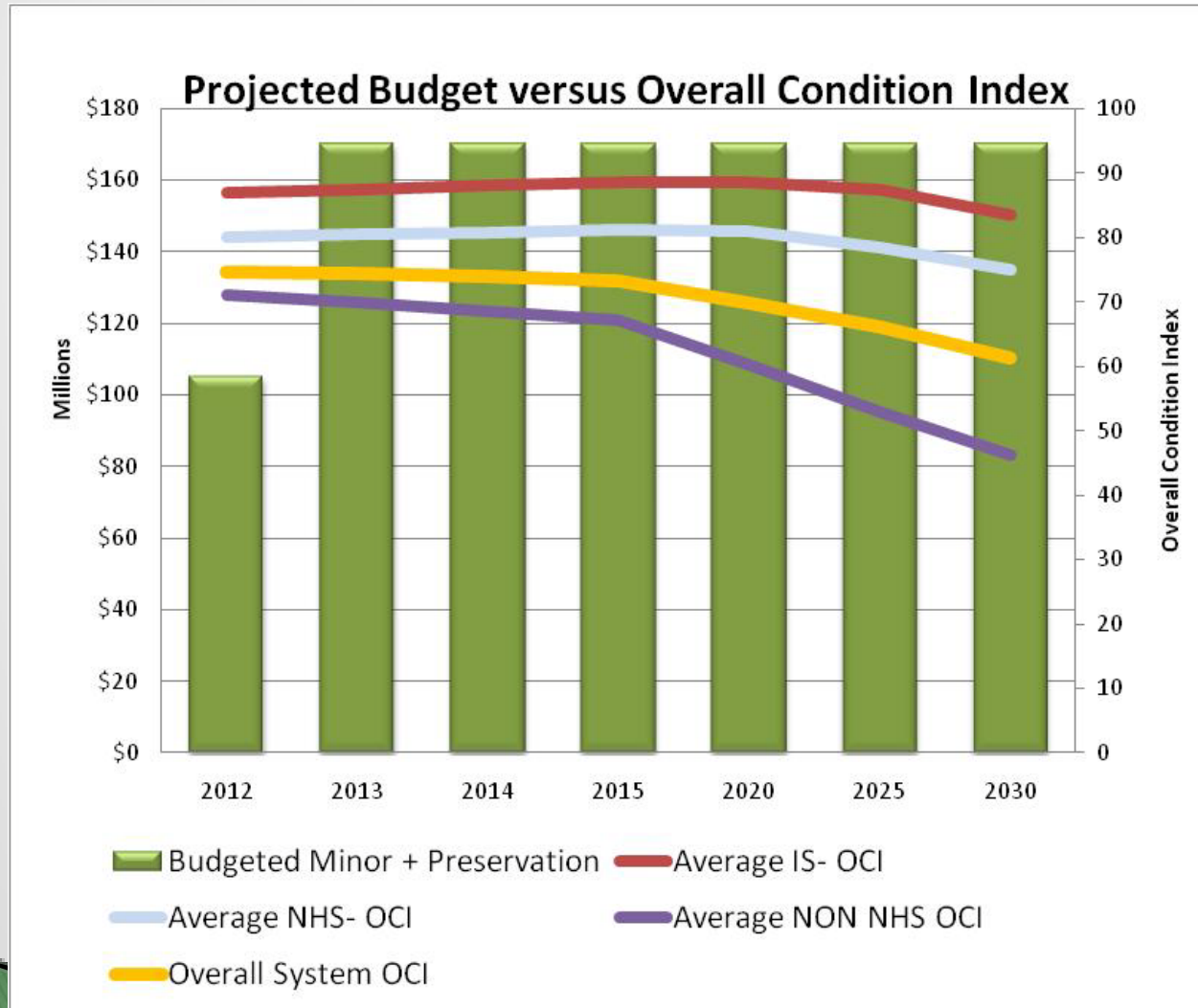
Non-NHS CLM (No Work Done)	2530	2684	2791	2868	2948	3055	3213	3380	3465
NHS CLM (No Work Done)	602	555	560	549	529	545	493	542	701
Interstate CLM (No Work Done)	523	392	371	386	416	401	281	293	519
Total CLM In Backlog	3655	3632	3722	3802	3892	4000	3987	4214	4685

Optimal UDOT Pavement \$

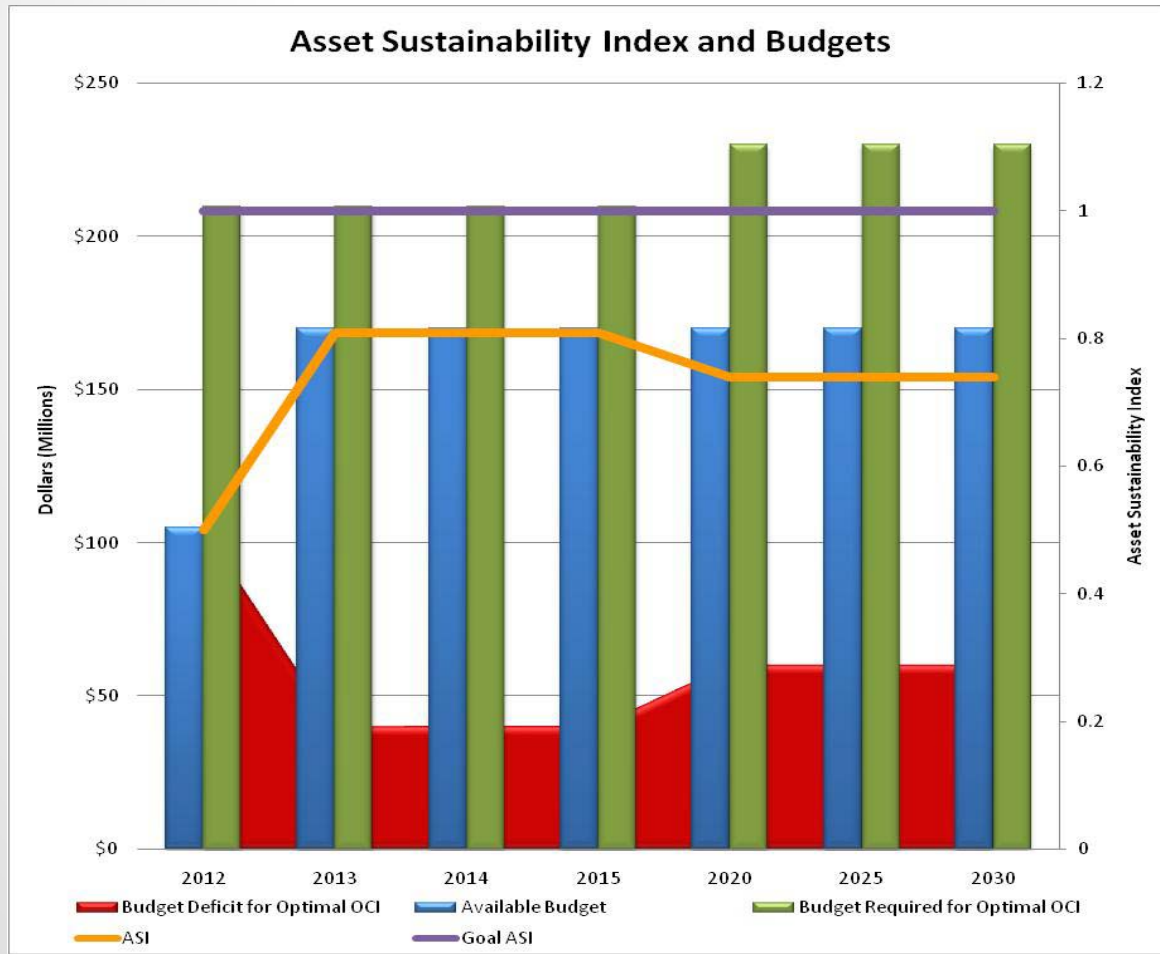
Budget Required for Optimal OCI: Interstate, NHS, Non-NHS and Level 2



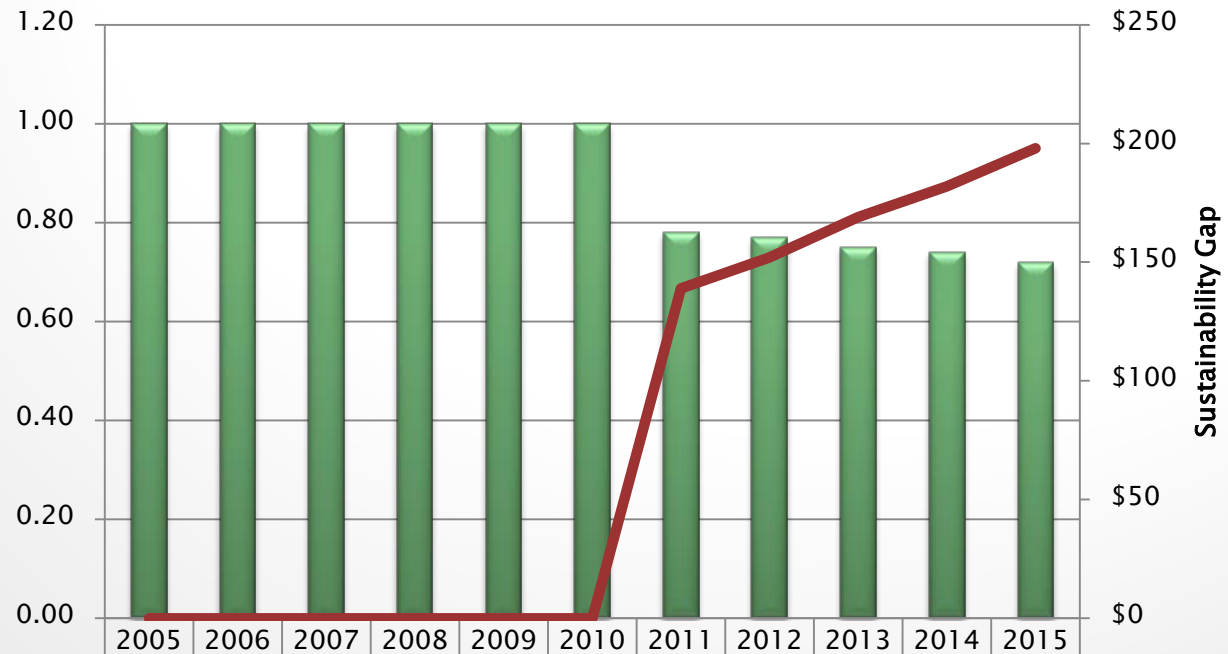
Utah Pavement Forecast



UDOT Ratio, Investment Gap



Ohio Pavement Sustainability Gap

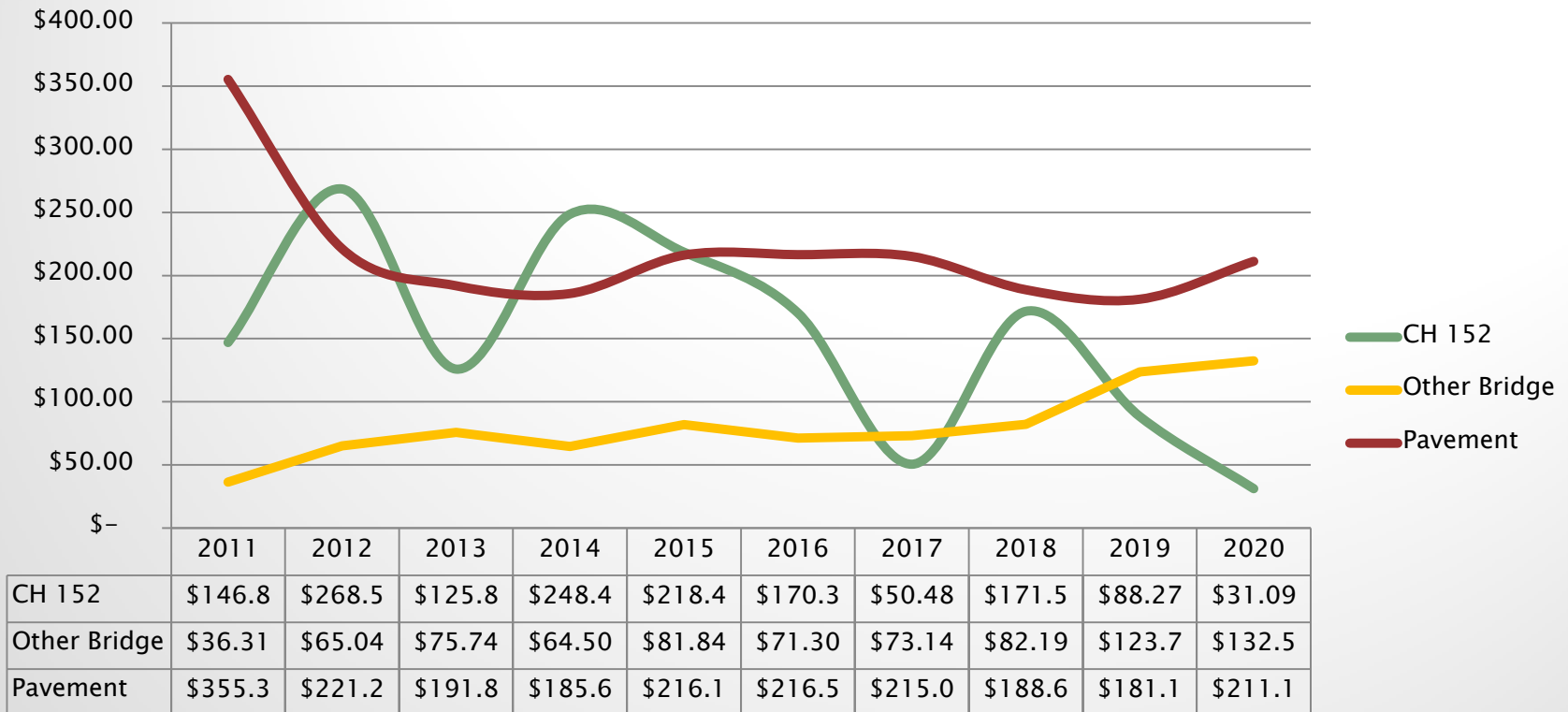


Pavement Sustainability Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.78	0.77	0.75	0.74	0.72
Sustainability Gap	\$0	\$0	\$0	\$0	\$0	\$0	\$139	\$152	\$169	\$182	\$198

Pavement Sustainability Ratio
 Sustainability Gap

MnDOT Investment Trends

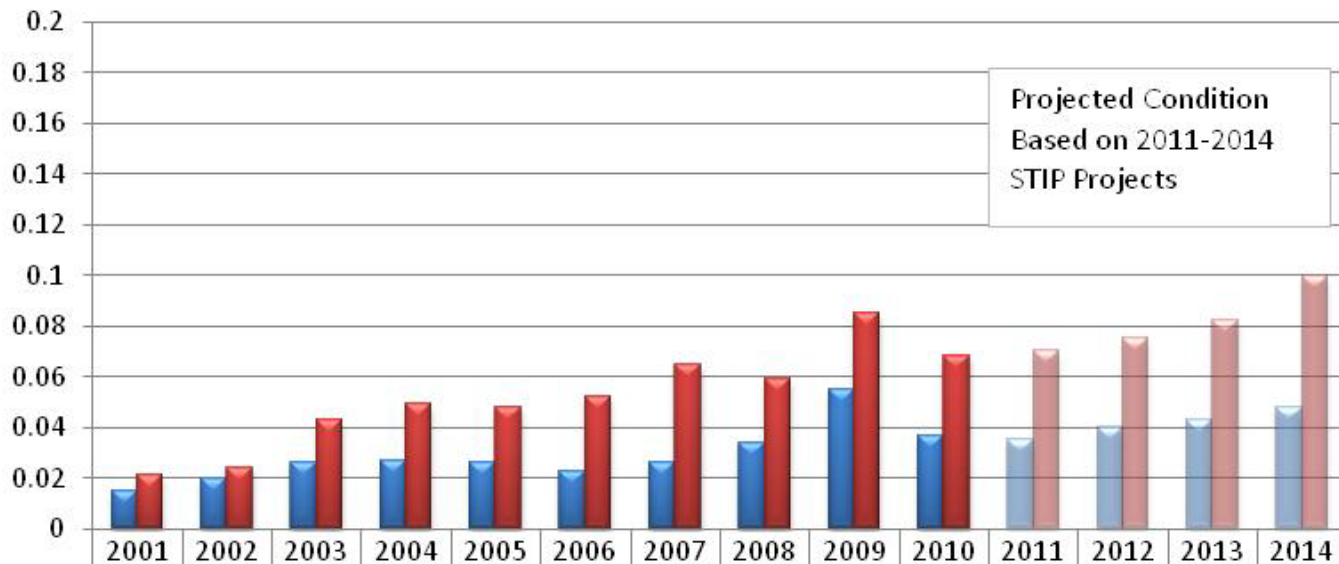
MnDOT Long-Range Program Expenditure Estimates



Source: MnDOT

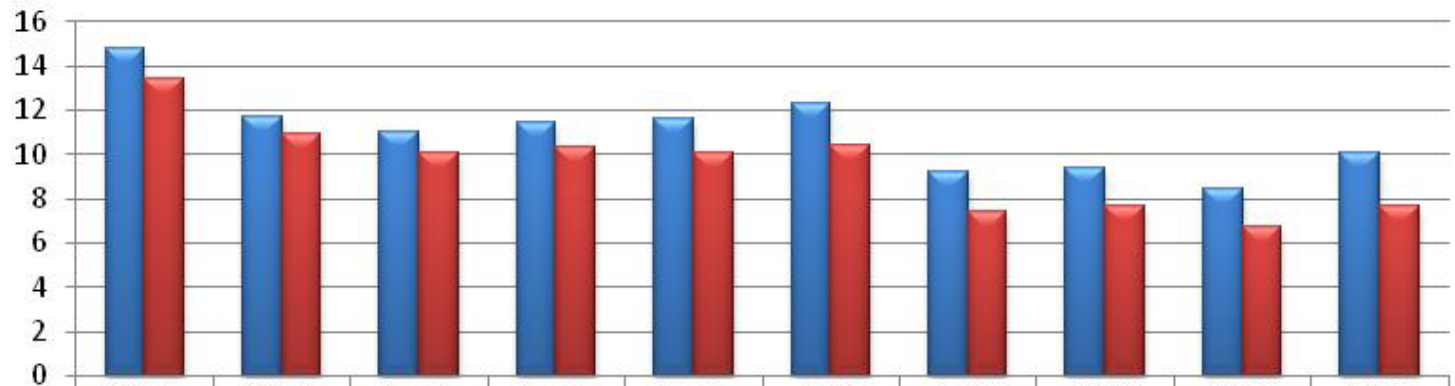
MnDOT's Pavement Forecast

Statewide "Poor" Ride Quality Index



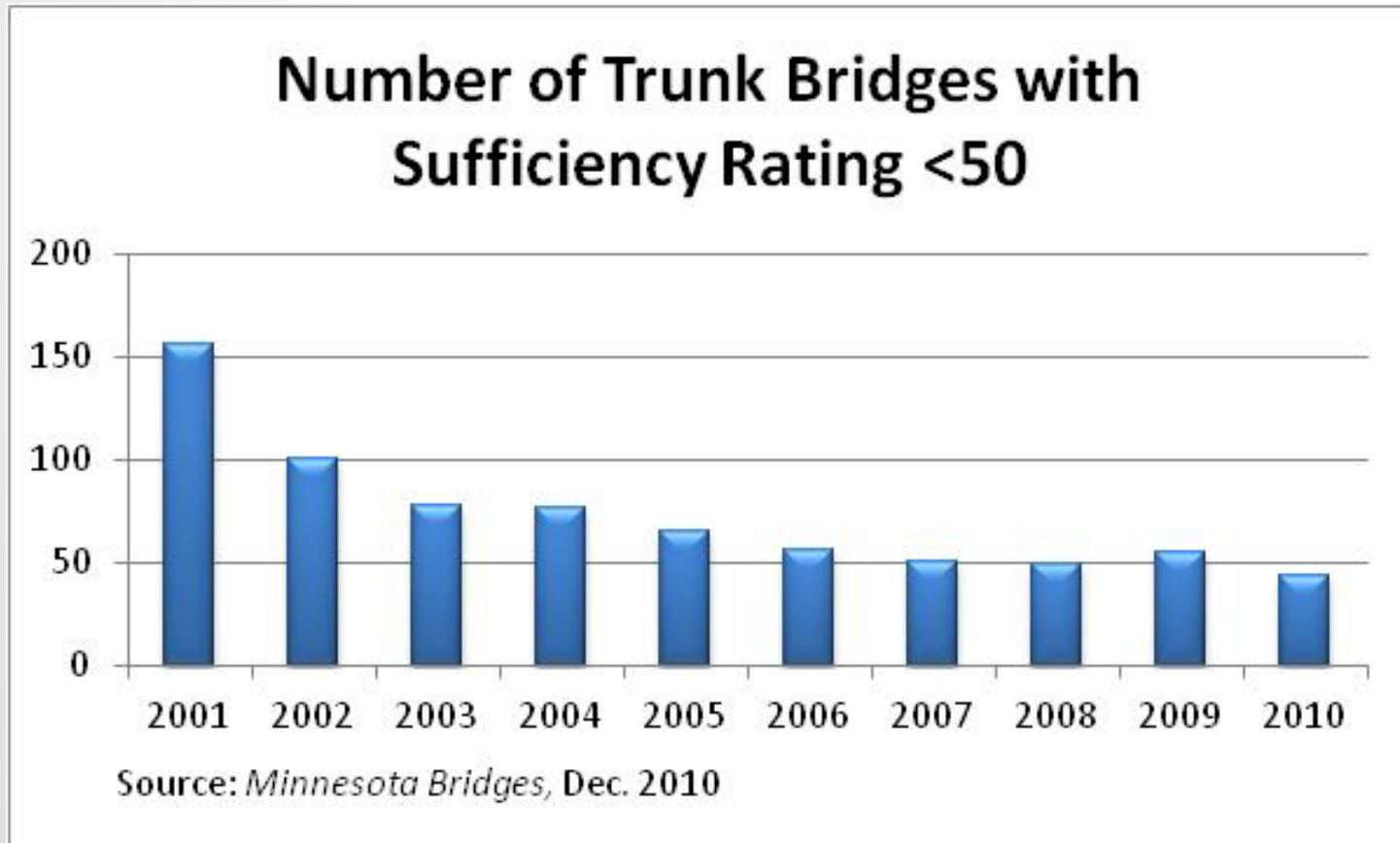
Declining Value of Pavements

Minnesota Statewide Pavement Average Remaining Service Life



	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Principal Arterial	14.8	11.7	11	11.4	11.6	12.3	9.2	9.4	8.4	10.1
Non-Principal Arterial	13.4	10.9	10.1	10.3	10.1	10.4	7.4	7.7	6.7	7.7

MnDOT's Falling Bridge Deficiencies



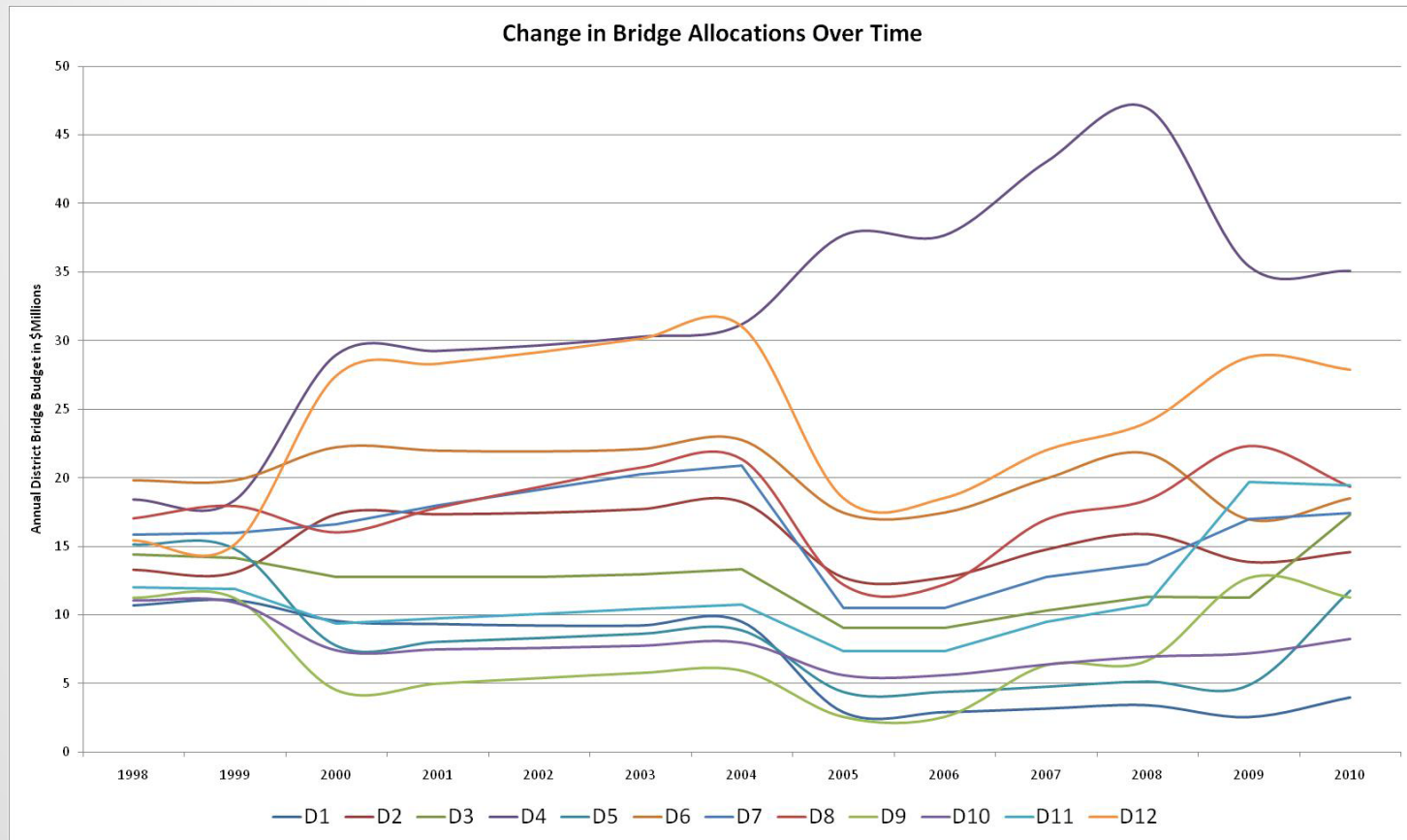
Ohio Bridge Indices

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Bridge Budget	\$175.00	\$174.47	\$174.40	\$180.00	\$185.00	\$190.00	\$196.00	\$201.88	\$141.00	\$141.00
GA Sustainabilty Ratio	0.80	0.85	0.860	0.86	0.88	0.89	0.90	0.90	0.91	0.92
FC Sustainability Ratio	0.99	0.98	0.97	0.98	0.98	0.98	0.99	0.99	1.00	1.00
WS Sustainability Ratio	1.00	1.00	1.00	0.99	0.99	0.99	1.00	0.99	1.00	1.00
Paint Sustainabilty Ratio	0.95	0.94	0.96	0.96	0.99	1.01	1.02	1.02	1.02	1.03
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Bridge Budget	\$170.41	\$185.00	\$193.00	\$204.89	\$211.00	\$224.00	\$235.00	\$247.00	\$259.00	\$272.00
GA Sustainabilty Ratio	0.93	0.94	0.95	0.96	0.97	0.98	0.99	1.00	1.01	1.02
FC Sustainability Ratio	1.00	1.00	1.01	1.01	1.01	1.00	1.00	0.99	0.99	0.99
WS Sustainability Ratio	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Paint Sustainabilty Ratio	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04

Ohio Bridge by District

Ohio DOT Floor Condition 'Heat Map'														
DISTRICT	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	98.5%	98.6%	99.0%	98.5%	98.6%	99.2%	99.4%	99.4%	99.8%	99.8%	99.8%	99.8%	99.1%	99.8%
2	98.9%	98.6%	97.5%	97.4%	97.2%	96.4%	96.4%	96.2%	96.4%	96.9%	96.9%	96.6%	96.8%	95.6%
3	96.6%	96.5%	95.7%	96.0%	96.1%	96.1%	96.2%	96.4%	96.4%	96.5%	96.3%	96.7%	97.4%	97.9%
4	86.7%	82.3%	81.0%	78.2%	79.6%	80.4%	82.0%	82.5%	89.7%	90.7%	92.3%	92.5%	93.6%	94.9%
5	95.8%	96.0%	98.1%	98.6%	98.4%	98.5%	98.8%	99.0%	98.9%	99.0%	98.5%	98.4%	98.6%	97.1%
6	99.5%	99.4%	99.3%	99.2%	99.4%	99.5%	99.6%	99.7%	99.7%	99.6%	98.9%	99.0%	98.6%	98.3%
7	97.3%	97.1%	96.6%	96.9%	97.2%	97.3%	97.3%	97.1%	97.0%	97.2%	97.3%	96.7%	97.1%	97.8%
8	98.7%	98.4%	97.3%	97.6%	97.4%	97.6%	96.6%	96.7%	97.0%	96.8%	97.4%	97.8%	98.1%	98.7%
9	98.2%	98.2%	98.2%	98.1%	98.2%	98.4%	98.4%	98.4%	97.9%	97.1%	97.0%	97.8%	97.6%	97.6%
10	99.5%	98.5%	96.3%	97.6%	97.4%	98.4%	97.9%	98.4%	97.6%	97.7%	98.3%	99.1%	99.2%	99.3%
11	97.9%	97.2%	97.0%	96.4%	96.6%	96.5%	98.2%	97.7%	97.7%	97.5%	97.3%	97.2%	97.3%	96.0%
12	85.1%	84.4%	83.9%	90.7%	92.0%	91.6%	93.4%	93.9%	94.4%	94.6%	94.9%	96.0%	96.3%	96.4%
Statewide	95.1%	94.3%	93.7%	94.2%	94.5%	94.7%	95.1%	95.3%	96.3%	96.5%	96.7%	96.9%	97.2%	97.3%

Ohio Tradeoffs Over Time

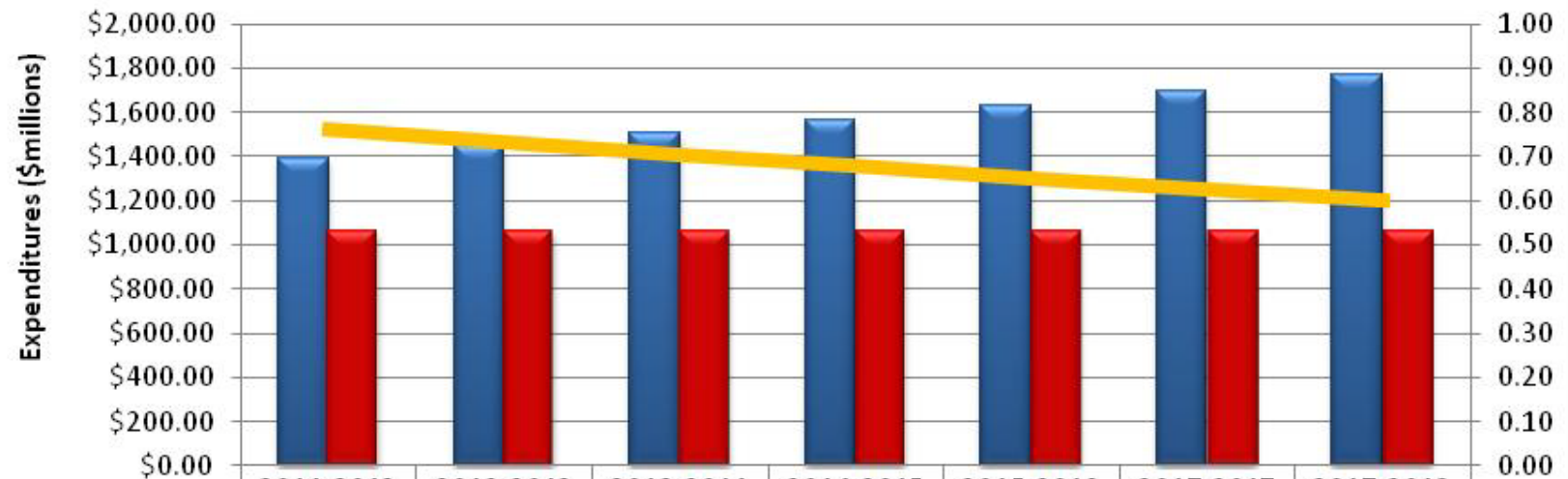


NCDOT Index Granularity

Bridge Conditions			Interstate		Primary		Secondary		Statewide
			2010	State Average	2010	State Average	2010	State Average	Average
	Element	Performance Measures	Target	Score	Target	Score	Target	Score	
Bridge Deck	Concrete	% of decks rated greater than or equal to 6	85	85	80	79	75	84	82
	Timber		85	NA	80	86	75	88	88
	Steel Planks		85	NA	80	71	75	84	84
	Open Grid Steel		85	NA	80	50	75	33	47
Superstructure	Concrete	% of superstructure rated greater than or equal to 6	90	81	85	60	80	65	62
	Steel		90	89	85	82	80	81	82
	P/S Concrete		90	96	85	95	80	94	94
	Timber		90	NA	85	43	80	69	68
Substructure	Timber	% of substructure rated greater than or equal to 6	90	NA	85	40	80	42	42
	Concrete Pile		90	80	85	75	80	81	77
	Steel Pile		90	91	85	84	80	81	82
	Concrete Piers		90	91	85	81	80	82	82
Other	NBIS Culverts	Condition Rating >=6	85	86	85	86	85	89	87
	Non-NBIS Culverts	Condition Rating = Good	80	84	80	74	80	56	71
	Overhead Sign Structures	Condition Rating = Good	95	95	95	93	95	88	92

NC Sustainability Index

NCDOT Maintenance Sustainability Index



	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2017-2017	2017-2018
Maintenance Needs	\$1,392.85	\$1,447.56	\$1,506.66	\$1,568.24	\$1,632.40	\$1,699.26	\$1,768.93
Expenditures	\$1,062.55	\$1,062.55	\$1,062.55	\$1,062.55	\$1,062.55	\$1,062.55	\$1,062.55
Asset Sustainability Index	0.76	0.73	0.71	0.68	0.65	0.63	0.60

■ Maintenance Needs
 ■ Expenditures
 — Asset Sustainability Index

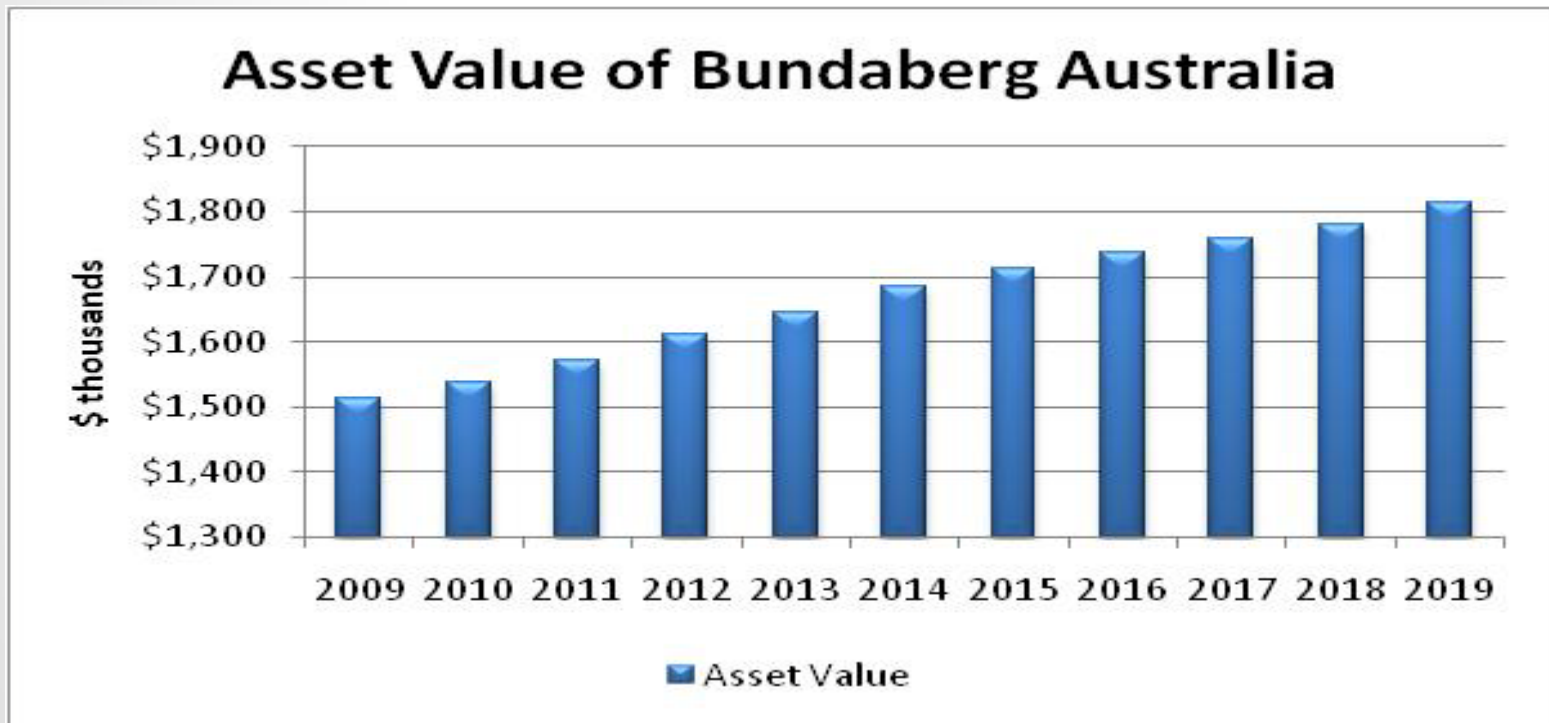
Sustainability Elements Exist

- ▶ The message: We can do this
- ▶ We can add to the public discourse credible forecasts of the consequence of current investments
- ▶ We can illustrate the size, the impact of our investment deficits
- ▶ We can illustrate the liability we are leaving

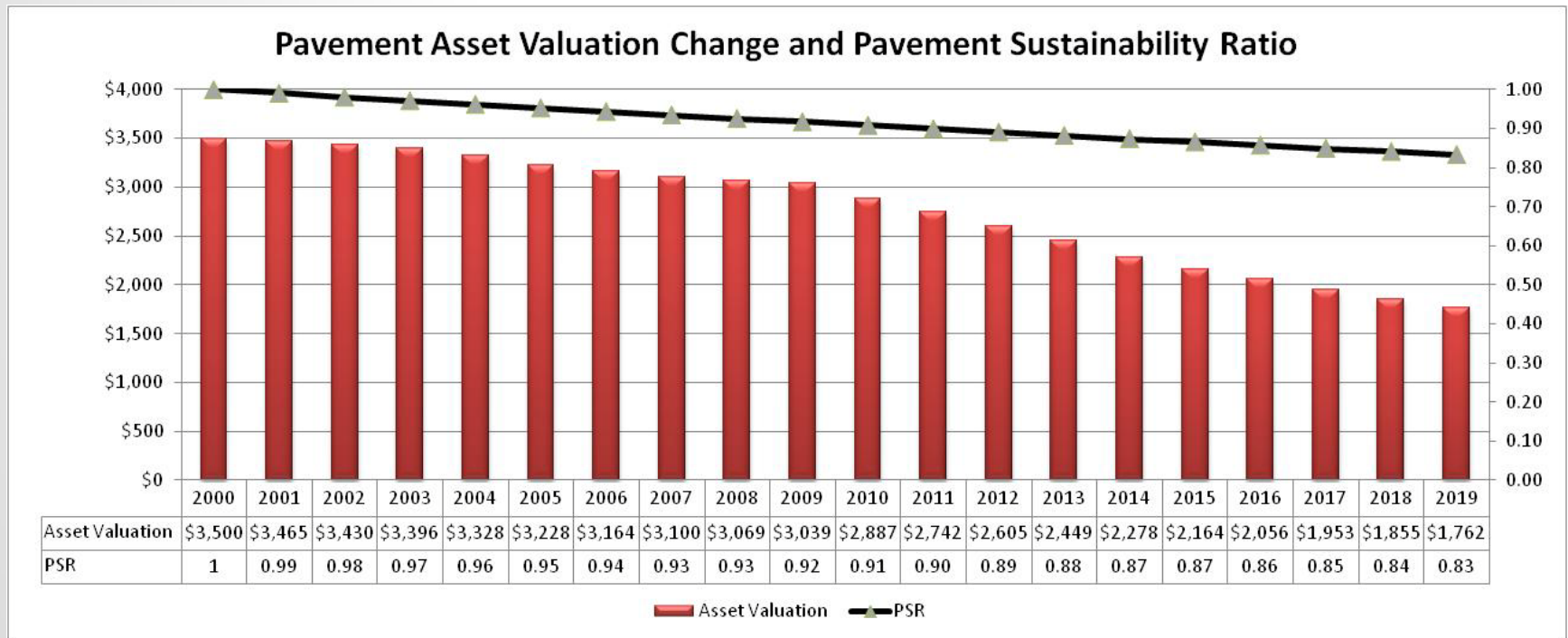
Additional Insight: Asset Valuation

- ▶ GASB 34, a missed opportunity
- ▶ Not used much
- ▶ GASB looks backward, not forward
- ▶ British, Australians tracking asset value more closely
- ▶ Like an investment fund manager they consider whether they are growing investor equity or losing investor equity
- ▶ Do we leave inter-generation legacy or liability?

Rising Asset Valuation



Declining Asset Values



Conclusions

- ▶ Data exist to produce financial sustainability metrics
- ▶ They can add to the public discourse of intergenerational equity and legacy
- ▶ They can illustrate the future consequences of current actions