

# WV Needs Assessment

Presented to: Blue Ribbon Commission

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# HIGHWAY & BRIDGE NEEDS OVERVIEW

- Methodology
- Results and Expectations
- How to Incorporate in Review
  - HERS-ST  Roadway Needs
  - NBIAS  Bridge Needs
  - Combine to determine full needs picture for highway network

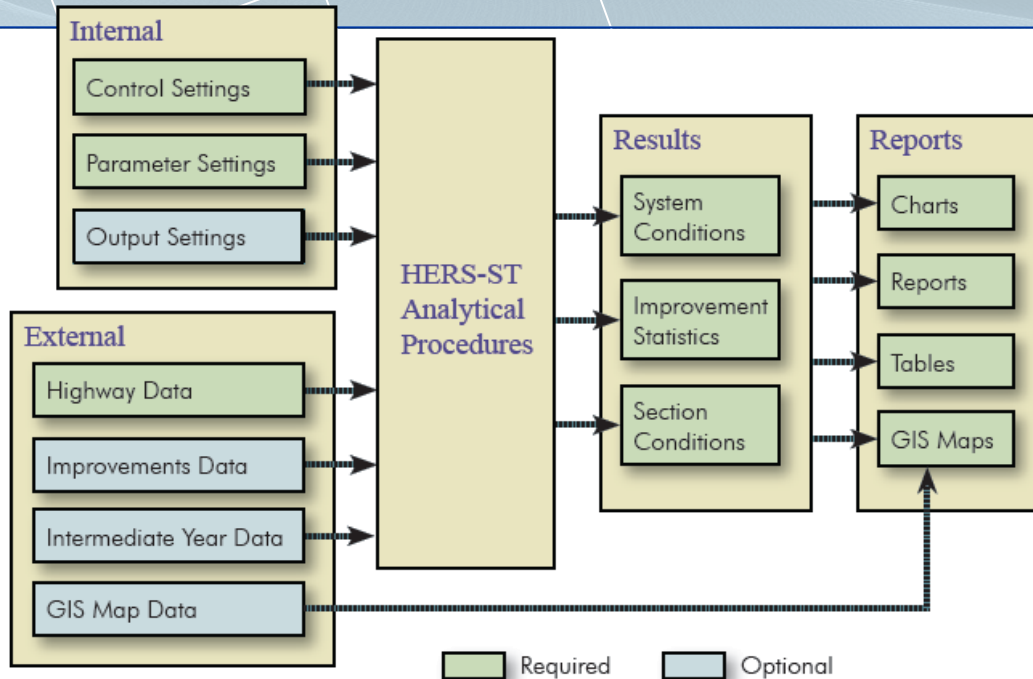
# HIGHWAY OVERVIEW

## ■ HERS-ST

- Highway Economic Requirements System - State Version
- Estimates future highway investment needs based on benefit/cost evaluations
  - Pavement needs
    - Resurface, reconstruct
  - Capacity needs
    - Add/widen lanes, shoulders
  - Alignment needs
    - Vertical and horizontal alignments
- Needs based on deficiency and feasibility
- Operates on existing network



# HIGHWAY OVERVIEW



HERS-ST will help you answer...

- How do changes in investment levels affect the condition and performance of the highway system?
- What levels of investment are needed to maintain current highway performance?
- What is the cost of implementing all potential improvements in which benefits > costs?
- What are reasonable performance targets given funding, and other objectives?

## INPUTS

- Improvement Costs
  - Unit costs per lane mile
- Run Specifications
  - Settings and objectives of the model run
- Parameters
  - Policy decisions on how to maintain the roadways
- Deficiency Levels
  - Minimum tolerable conditions and design standards

# HIGHWAY OVERVIEW

- What Isn't HERS-ST?
  - It is not a transportation model
  - It doesn't estimate demand, you estimate demand for it
  - It doesn't assign traffic through a network
  - It doesn't re-route trips when capacity is added



# BRIDGE OVERVIEW

- NBIAS
  - National Bridge Investment Allocation System
  - Estimates future bridge needs
  - Results shown as
    - Number of bridges
    - Improvement cost per improvement type
  - Needs categorized by improvement types:
    - Replacement
    - Widening
    - Raising
    - Strengthening
  - What level of funding is needed to address all needs?
    - By functional classification
    - Backlog and Accruing



# BRIDGE OVERVIEW

- What Isn't NBIAS?
  - NBIAS does not identify new location roadway/bridge needs
    - State Transportation Improvement Program (STIP)
  - Not a Transportation Model



# HIGHWAY AND BRIDGE NEEDS ANALYSIS

- What level of funding is needed to address all needs?
- What needs can be addressed under a budget constraint?





# NEEDS ANALYSIS

## Draft Derivation of Suggested HERS and NBIAS Constrained Funding Levels

All Figures in \$2007

### A WVDOT Highway Fund Expenditure Estimates Forecast and Historical Funding Comparison

	(000)	Notes
1 25 year revenue estimate (all SRF)	\$ 23,530,000	WSA "high" forecast
2 Annual Average	\$ 941,200	25 year period - less than historic average see below
3 FY99-FY08 SRF	\$ 11,090,100	WSA historical revenue and expenditure memo (minus bonds)
3 WV SRF Revenue FY99-FY03 average	\$ 1,055,200	WSA historical revenue and expenditure memo
4 WV SRF Revenue FY04-FY08 average	\$ 1,030,850	WSA historical revenue and expenditure memo
5 WV SRF Revenue FY99-FY08 average	\$ 1,043,026	WSA historical revenue and expenditure memo

### B Reductions to Forecast for HERS and NBIAS Constrained Needs Analysis

1 SRF Revenues	\$ 1,164,937	WVDOT FY2009 6-year road program
2 Routine maintenance		30% Analysis of WVDOT FY2009 6-year road program
3 Takedown for new construction		5% WVDOT FY2009 6-year road program
4 Debt Service		5% WSA historical revenue and expenditure memo
5 Total		40%
6 Estimated Bridge and Highway Const Budget (FY2009)	\$ 698,962	Using 6 year program
7 Estimated NBIAS and HERS Budget (from Forecast)	\$ 564,720	Using WSA Revenue Estimate

### C Highway - Bridge Split

1 HERS Annual Highway Unconstrained Needs	\$ 1,092,750	WSA Analysis
3 <b>HERS % of Total Needs - Consistent with WV Policy</b>	<b>82%</b>	
4 NBIAS Unconstrained Bridge Needs	\$ 99,240	WSA Analysis
6 <b>NBIAS % of Total Needs - Consistent with WV Policy</b>	<b>18%</b>	
3 Total	\$ 1,191,990	

### D Constrained Funding Estimate for Highway Needs Analysis

1 25 year est minus new roads, admin, minor maintenance	\$ 564,720	
2 <b>Est Highway HERS Budget</b>	<b>\$ 463,070</b>	Recommended for HERS Analysis
3 <b>Est NBIAS Budget</b>	<b>\$ 101,650</b>	Recommended for NBIAS Analysis

# RESULT SUMMARY

- Overview of 25-Year Constrained Budget Estimate for Highway and Bridge Needs

**Budget**      Highways = \$463 M annually  
                    Bridge = \$101 M annually

**Highways** = \$11.1 Billion

- \$9.8 Billion for Federal-Aid Roads
- \$1.3 Billion for Local Road

**Bridges** = \$2.4 Billion

- \$300 Million on Coal Resource Transportation System (CRTS) Bridges
- \$2.1 Billion on Non-CRTS Bridges

# HIGHWAY RESULTS

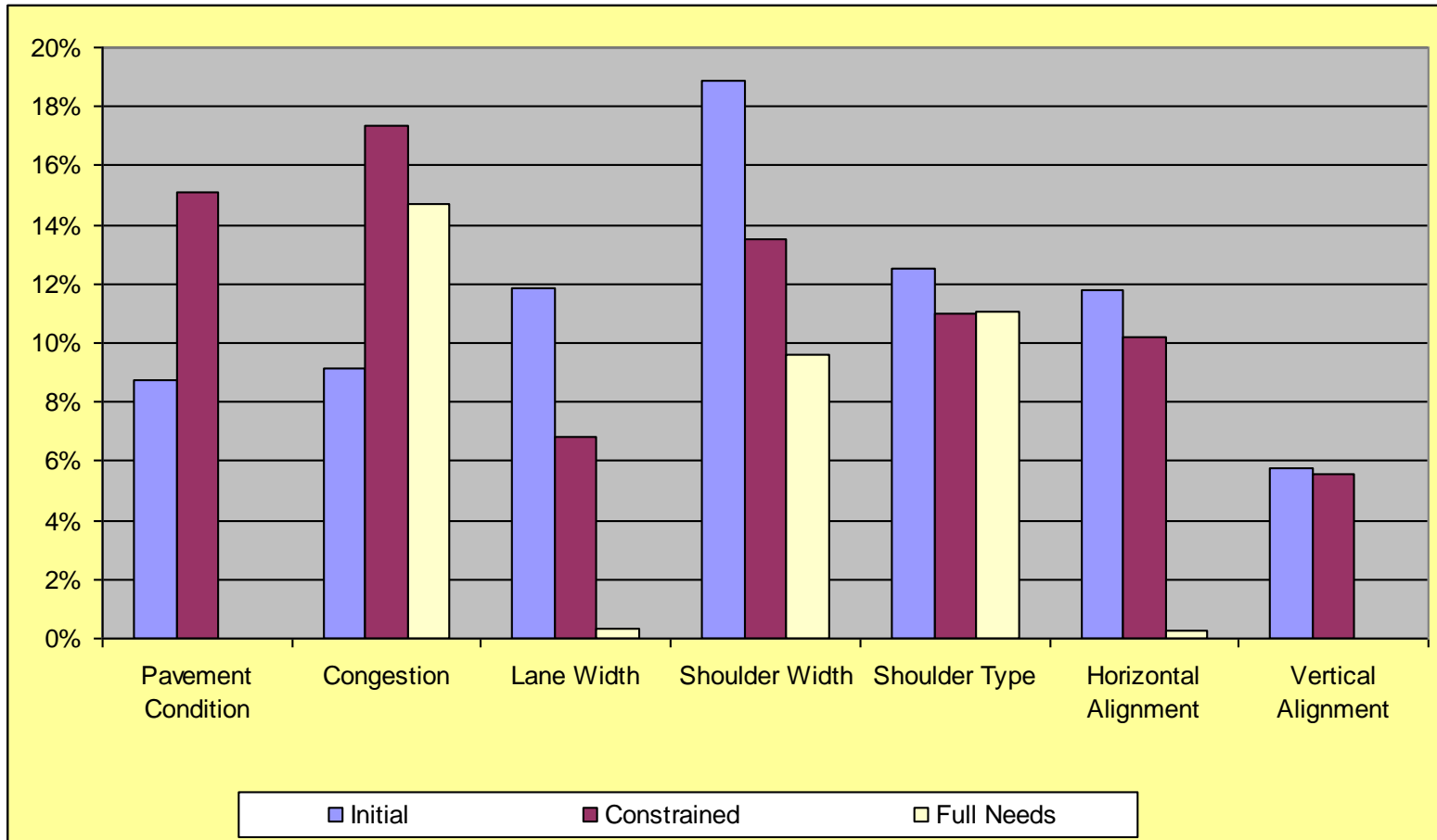
## Constrained vs. Unconstrained Needs

	Improvement Cost (\$M)			Lane Miles Improved		
	Federal Aid	Local	State Total	Federal Aid	Local	State Total
<b>CONSTRAINED</b>						
Expansion	\$ 4,483	\$ -	\$ 4,483	2,475	-	2,475
Modernization	\$ 1,330	\$ 655	\$ 1,985	1,152	479	1,631
Preservation	\$ 3,768	\$ 762	\$ 4,530	12,063	3,271	15,334
	\$ 9,581	\$ 1,417	\$ 10,998	15,690	3,750	19,440
<b>UNCONSTRAINED</b>						
Expansion	\$ 7,944	\$ -	\$ 7,944	3,402	-	3,402
Modernization	\$ 13,010	\$ 1,956	\$ 14,966	8,583	1,431	10,014
Preservation	\$ 11,565	\$ 2,276	\$ 13,840	27,926	9,766	37,692
	\$ 32,518	\$ 4,232	\$ 36,750	39,911	11,197	51,108

*Only Improves Existing Highway System – No System Expansion*

# HIGHWAY RESULTS

HERS Results – Percent Deficient Roads, Weighted by VMT



# BRIDGE NEEDS

## Improvement Cost (\$ M)

	Non-CRTS	CRTS	State Total
<b>Replacement</b>	\$ 1,240.9	\$ 155.0	\$ 1,395.9
<b>Raising</b>	\$ 1.1	\$ -	\$ 1.1
<b>Widening</b>	\$ 116.5	\$ 14.2	\$ 130.7
<b>Strengthening</b>	\$ 6.7	\$ -	\$ 6.7
	<b>\$ 1,365.2</b>	<b>\$ 169.2</b>	<b>\$ 1,534.4</b>
<b>Maintenance</b>	\$ 812.8	\$ 133.9	\$ 946.7
	<b>\$ 2,178.0</b>	<b>\$ 303.1</b>	<b>\$ 2,481.1</b>

## Bridges Improved

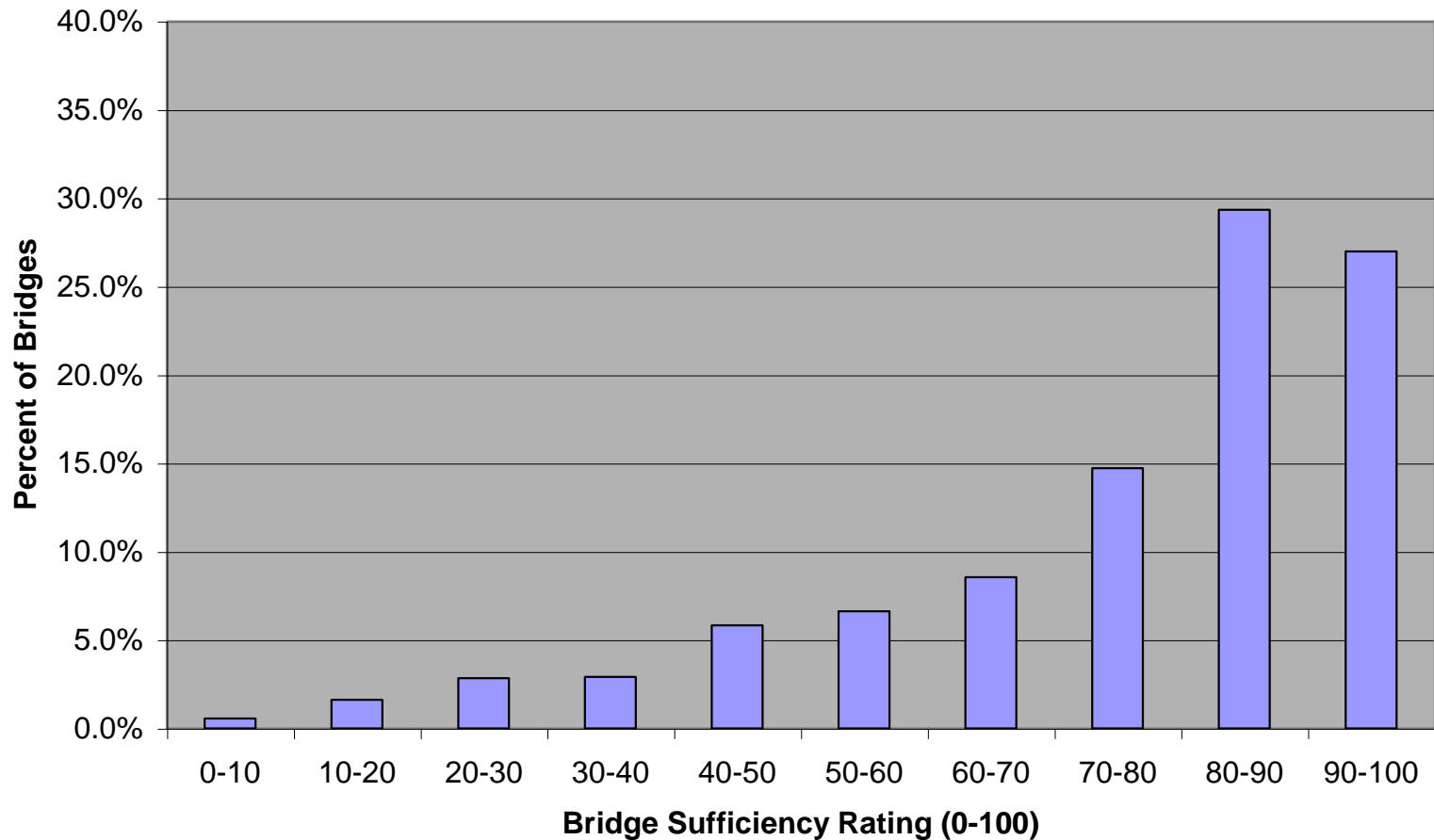
	Non-CRTS	CRTS	State Total
	727	87	814
	1	-	1
	522	55	577
	8	-	8
	<b>1,258</b>	<b>142</b>	<b>1,400</b>

- **6,243 State-Owned Bridges**

- 740 Urban (12%) and 5,503 Rural (78%)
- 667 CRTS bridges (11%)

# EXISTING BRIDGE - SUFFICIENCY RATINGS

## 2007 Existing Conditions



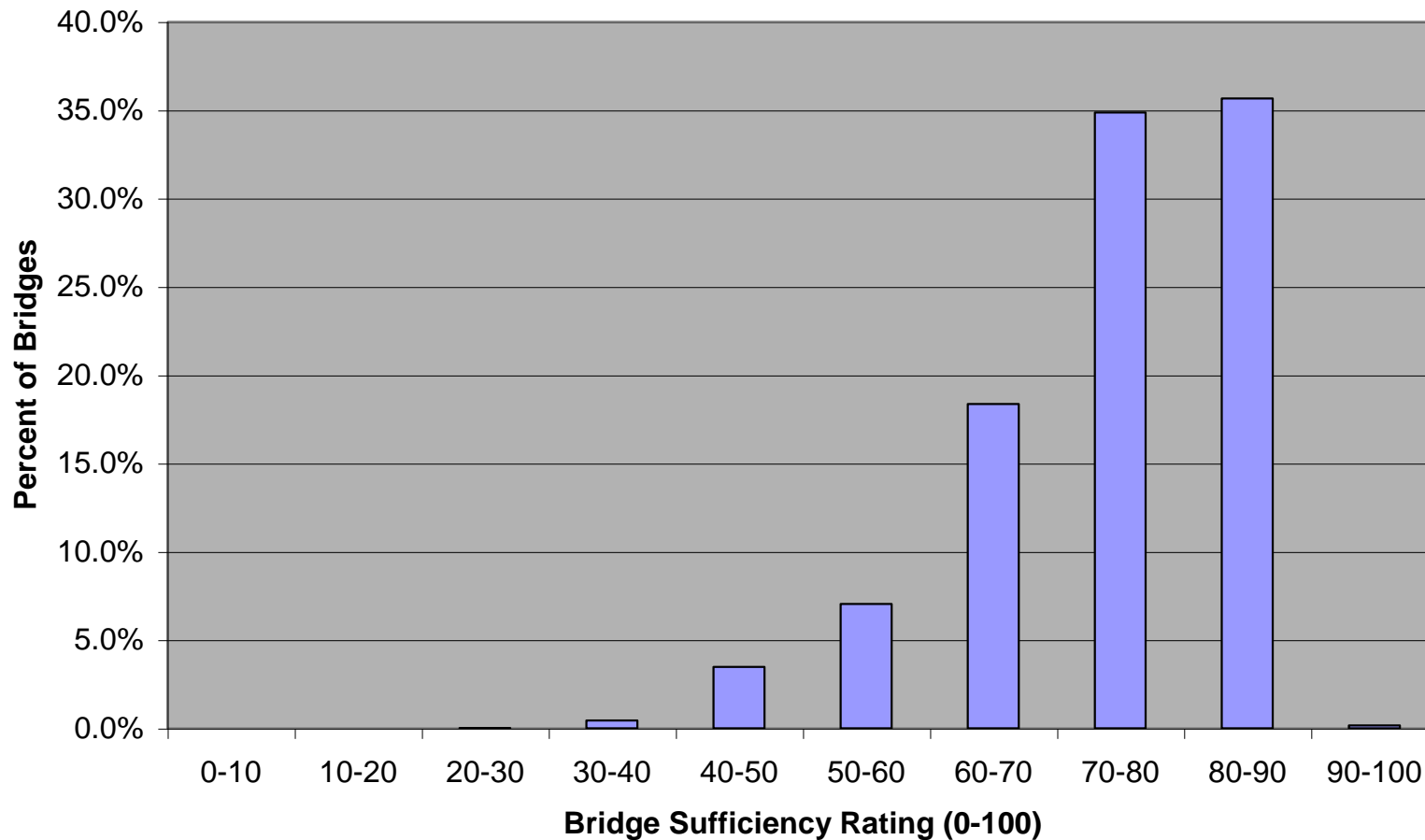
# BRIDGE RESULTS - SUFFICIENCY RATINGS

## 2032 Unconstrained Conditions (\$125M maximum per year)

### Federal Participation

< 80 Rehabilitation

< 50 Replacement



# Highway Assumptions/Inputs

cost in thousands		Reconstruction		Resurface		Shoulder Improvements	Add Lanes		Alignment		
		Lane Widening	Pavement	Lane Widening	Pavement		Normal Cost	High Cost	Normal Cost	High Cost	
Rural	Interstate	Flat	2,101	848	1,538	300	56	2,471	3,115	3,115	12,822
		Rolling	2,442	869	1,832	321	92	2,795	3,913	3,913	13,550
		Mountainous	3,278	1,006	2,580	354	141	3,878	8,864	4,987	15,239
	Principal Arterials	Flat	1,786	740	1,348	263	41	2,137	2,767	2,767	11,316
		Rolling	2,113	761	1,624	293	68	2,424	3,382	3,382	12,115
		Mountainous	2,390	862	1,842	320	107	2,856	8,015	15,327	15,327
	Minor Arterials	Flat	1,251	623	870	218	45	1,532	2,026	2,026	10,173
		Rolling	1,536	672	1,120	235	66	1,816	2,634	2,634	11,642
		Mountainous	2,085	768	1,613	260	101	2,508	7,355	13,625	13,625
	Collectors	Flat	1,251	623	869	215	45	1,532	1,970	1,970	9,855
		Rolling	1,450	633	1,051	229	59	1,668	2,464	2,464	11,280
		Mountainous	1,965	717	1,520	250	94	2,261	6,747	12,669	12,669
	Local	Flat	976	486	678	168	35	1,195	1,536	1,536	7,687
		Rolling	1,131	493	820	178	46	1,301	1,922	1,922	8,798
		Mountainous	1,533	559	1,185	195	73	1,764	5,262	9,882	9,882
Urban	Interstates/ Expressways	Small Urban	4,638	2,426	3,894	588	108	5,529	16,785	10,365	24,570
		Small Urbanized	4,900	2,447	3,990	696	143	5,937	18,234	11,221	27,479
		Large Urbanized	7,142	4,006	5,558	934	539	9,174	34,094	18,017	51,507
	Principal Arterials	Small Urban	3,955	1,580	3,551	378	84	4,478	11,811	7,629	16,660
		Small Urbanized	4,120	1,598	3,639	447	112	4,718	12,662	8,132	18,376
		Large Urbanized	5,192	2,344	4,578	563	361	6,156	17,783	10,016	20,926
	Minor Arterials/ Collectors	Small Urban	2,847	1,394	2,543	324	71	3,302	9,626	6,021	14,927
		Small Urbanized	2,943	1,410	2,560	368	87	3,436	10,098	6,299	16,622
		Large Urbanized	3,674	1,885	3,195	451	237	4,441	13,678	8,411	18,479
	Local	Small Urban	2,249	1,101	2,009	256	56	2,609	7,605	4,757	11,792
		Small Urbanized	2,325	1,114	2,022	290	68	2,714	7,977	4,976	13,131
		Large Urbanized	2,903	1,489	2,524	357	187	3,508	10,805	6,645	14,598



# Highway Assumptions/Inputs

- Limit number of lanes available to add for each FC (total for both directions)
  - 8 lanes for interstates and arterials, 5 rural collectors, 6 urban collectors)
- Volume/Capacity (V/C) ratios are constant at high FC (example), fluctuate by terrain in lower FC.
- Focus on PSR for the pavement ratings (0 to 5.0 scale)

# Bridge Assumptions/Inputs

Cost per square foot (rounded)

Type	FC	REPL COST	WIDENING COST	RAISE COST	STRENGTH COST
CRTS	all	\$495.00	\$350.00	\$175.00	\$120.00
System	1,2,11,12,14	\$450.00	\$315.00	\$160.00	\$80.00
System	6,7,8,9,16,17,19	\$333.00	\$233.00	\$118.00	\$59.00

- Used lower MTCs on the lower FCs to detour NBIAS from improving
  - Example = local road,  $\leq 400$  AADT has 8.5 ft vertical clearance MTC
- Lower AADT bridges have smaller geometrics than larger bridges for MTCs
  - Example = minor collector  $\leq 400$  AADT has 7 ft lane width, but all other AADT levels on minor collectors have 8 ft lane width
- CRTS bridges had heavier load rating standards