

# Relevance & Quality of Data

2007 Transportation Planning Symposium  
Spokane, Washington

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Director of Enterprise Risk Management

November 14, 2007



**Washington State**  
**Department of Transportation**

### Figure 1. Transportation Policy Goals

- » **Preservation:** To maintain, preserve and extend the life and utility of prior investments in transportation systems and services;
- » **Safety:** To provide for and improve the safety and security of transportation customers and the transportation system;
- » **Mobility:** To improve the predictable movement of goods and people throughout Washington State;
- » **Environment:** To enhance Washington's quality of life through transportation investments that promotes energy conservation, enhance healthy communities and protect the environment;
- » **Stewardship:** To continuously improve the quality, effectiveness and efficiency of the transportation system.

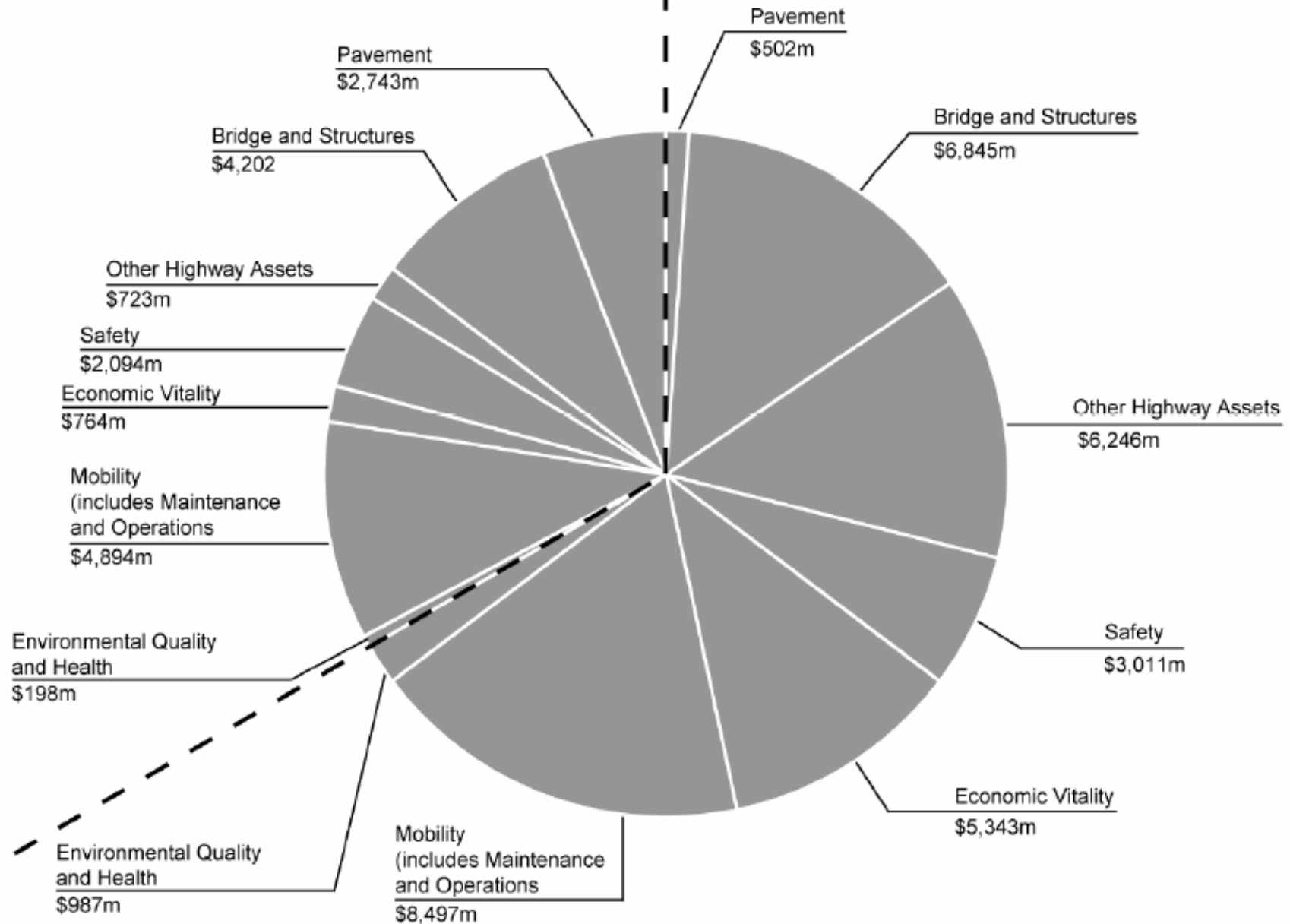
Source: RCW 47.01.012

# Major Risks

- Not enough funding to meet transportation goals & objectives in Transportation Policy Plan
- Inflation
- Revenue shortfall
- Managing expectations and the need for clear and understandable performance outcomes
- Lack of complete information on asset inventories and their condition
- Controlling the scope of work

**Funded \$15,618 million**

**Unfunded (WTP Target) \$31,430 million**



# WSDOT Construction Inflation Index

YEAR	CALENDAR YEAR INDEX [1]			FISCAL YEAR INDEX [2]		
	1987=100	1970=1.00	CHANGE	1987=100	1970=1.00	CHANGE
2000	145.60	4.318	6.67%	141.05	4.423	7.10%
2001	144.80	4.294	-0.55%	145.20	4.553	2.94%
2002	147.90	4.386	2.14%	146.35	4.589	0.79%
2003	149.80	4.442	1.28%	148.85	4.668	1.71%
2004	154.40	4.579	3.07%	152.10	4.770	2.18%
2005	183.60	5.445	18.91%	169.00	5.299	11.11%
2006	221.30	6.563	20.53%	202.45	6.348	19.79%
2007	227.25	6.739	2.69%	224.28	7.033	10.78%
2008	230.72	6.842	1.53%	228.99	7.181	2.10%
2009	232.39	6.892	0.72%	231.56	7.261	1.12%
2010	236.89	7.025	1.94%	234.64	7.358	1.33%

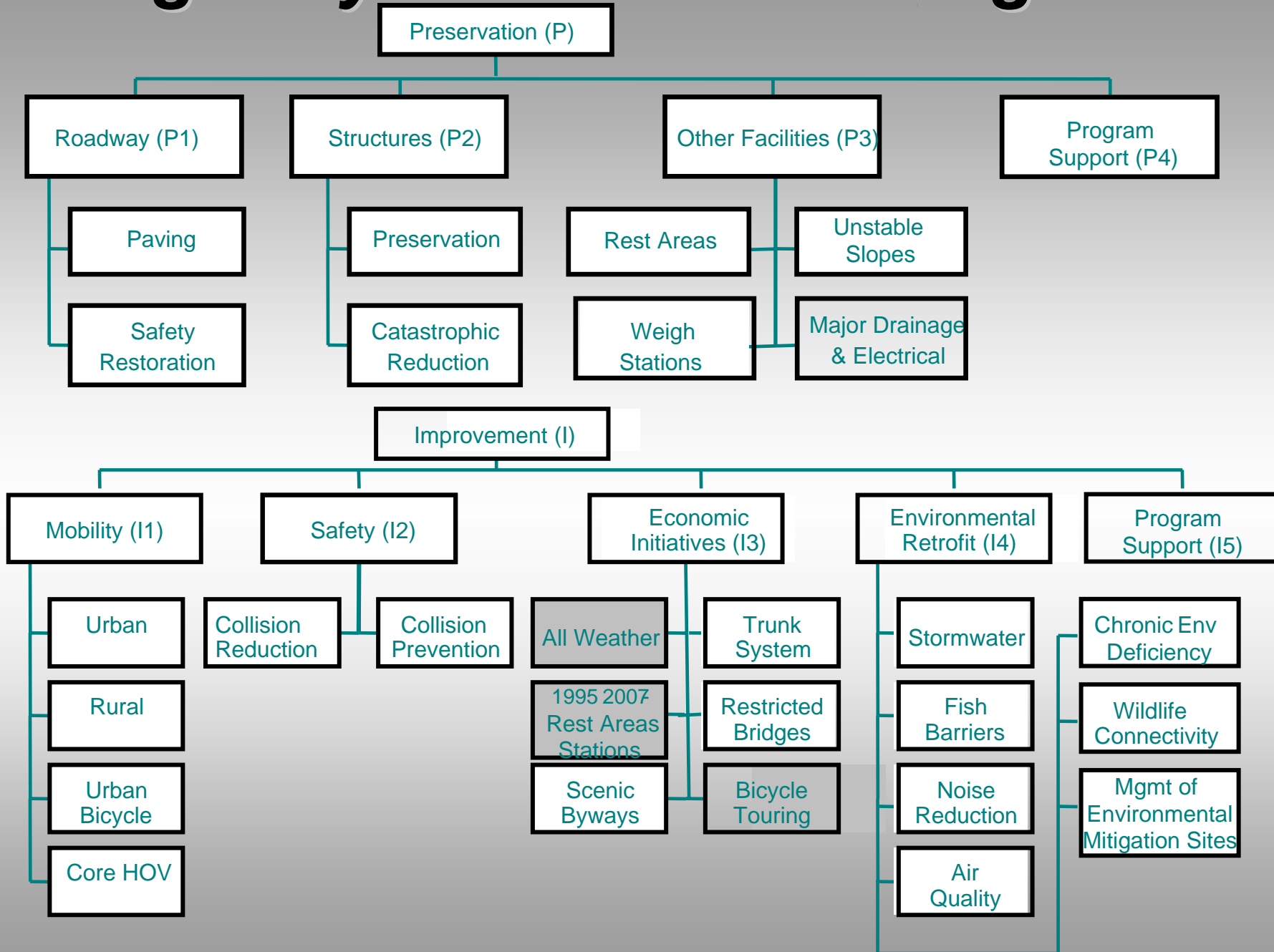
[1] The calendar year index through 2006 is FHWA's composite index for federal-aid highway construction. The forecast is that index extrapolated based on Global Insight's projected growth rates for the variable CCIHY&ST (Highway Construction Cost Index) in the forecast dated 2nd quarter 2007.


[2] Fiscal year index was created by averaging two years from the calendar year index.

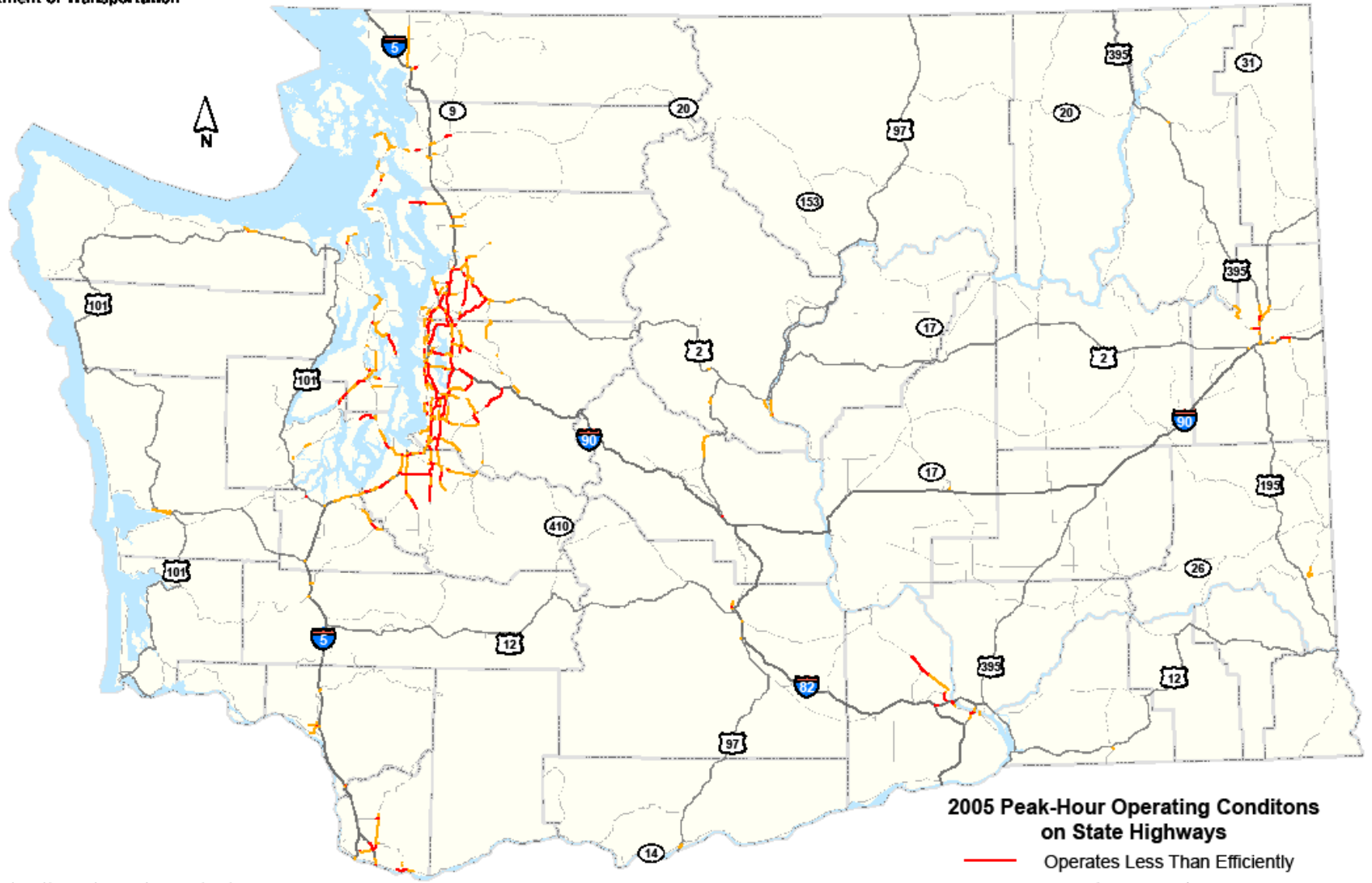
# What Does Stewardship Mean?

- Efficiency – Change in performance per dollar spent
- Effectiveness - Does it work as planned?
  - Certain performance assumptions are made for benefit cost calculation to use in prioritizing projects
  - WSDOT has begun measuring everything it builds against those performance assumptions

# Highway Construction Program



 Strategy no longer active



These conditions do not reflect the impact of congestion associated with local roads, additional impacts associated with ramps, interchanges, weather, special events, construction, collisions or incidents.

**2005 Peak-Hour Operating Conditions  
on State Highways**

- Operates Less Than Efficiently
- Operates Efficiently

Analysis/Map Developed by:  
Systems Analysis and Program Development (October 2007)



# Tabular Analysis of Puget Sound

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X											
1	RNB0936S								2009 - 2011 BIENNIUM HIGH ACCIDENT LOCATION ANALYSIS																									
2									SOCIETAL COST FOR STATE RESPONSIBILITY LOCATIONS																									
3									SORTED BY STATE ROUTE AND MILEPOST																									
4	REGION: NORTHWEST							ACCIDENT DATA FROM 01/01/2005 THROUGH 12/31/2006																										
6	UNDER 23 U.S. CODE, SECTION 409, THIS DATA CANNOT BE USED IN DISCOVERY OR AS EVIDENCE AT TRIAL IN ANY ACTION FOR DAMAGES																																	
7	AGAINST STATE, TRIBAL OR LOCAL GOVERNMENT THAT INVOLVES THE LOCATIONS MENTIONED IN THIS DATA.																																	
9																																		
10	HAL				BEGIN	END		PROP	POSS	EVID	DISAB																							
11	SEQ NO	STATE ROUTE			SRMP	SRMP	LENGTH	ACCS	ACCS	ACCS	ACCS	FATL	TOTL	MNTHS	INV	E	F	R				AVG DLY	COST	SEV										
69	127471	525			5.25	5.38	0.13	20	11	2	1	0	34	24	D	NW	1	6				16,413	\$965,000	1.9										
70	129071	542			2.70	2.84	0.14	13	5	2	1	0	21	24	B	NW	2	5				12,584	\$820,500	1.0										
71	000051	2			12.87	13.11	0.24	25	8	1	1	0	35	24	B	NW	1	5				22,053	\$885,000	0.2										
72	500662	5 P2	15375		0.00	0.08	0.08	14	1	1	1	0	17	24	I	NW	5	4				4,908	\$706,500	5.0										
73	* 501502	5 R1	17481		0.07	0.21	0.14	13	12	1	1	0	27	24	D	NW	5	4				10,183	\$923,000	4.1										
74	500512	5 P1	18618		0.06	0.30	0.24	15	4	1	1	0	21	24	I	NW	5	4				16,204	\$770,000	0.7										
75	* 501562	5 R1	19428		0.06	0.29	0.23	3	1	1	1	0	6	24	D	NW	5	4				7,949	\$668,000	0.3										
76	* 500592	5 P1	25299		0.03	0.15	0.12	5	1	1	1	0	8	24	I	NW	5	4				3,187	\$675,000	5.2										
77	006921	9			92.35	92.37																												
78	303811	18			20.20	20.28																												
79	207351	96			4.50	4.79																												
80	013772	99 LX	02297		0.40	0.49																												
81	* 503182	167 Q1	02178		0.02	0.33																												
82	022591	410			24.73	24.97																												
83	* 125781	516			1.89	2.15																												
84	* 407601	516			3.58	3.67																												
85	026802	522 LX	02315		0.10	0.22																												
86	027731	527			8.37	8.47																												
87	220361	531			8.52	8.69																												
88	* 500942	5 Q1	16597		0.00	0.23																												
89	* 500362	5 P1	16598		0.06	0.25																												
90	* 403112	5 CI	17717		0.51	0.72																												
91	* 501692	5 R5	18198		0.39	0.49	0.10	7	1	0	1	0	9	24	D	NW	5	4				5,556	\$644,500	1.7										
92	* 501042	5 Q1	18997		0.03	1.43	1.40	11	4	0	1	0	16	24	I	NW	5	4				11,351	\$718,500	1.0										
93	* 501052	5 Q1	19432		0.15	0.43	0.28	7	2	0	1	0	10	24	I	NW	5	4				9,683	\$664,500	0.3										

Attributes of 07-09 Projects							
OID	PIN	PROJTITLE	ROUTE	PHASE	BEGSR	ENDSR	BE
1	100099M	Island Transit Park and Ride Development	000	CN,PE,RW	0	0	
23	100243A	US 2/FOREST SERVICE ROAD VIC TO MONEY CREE	002	CN,PE	43.11	46.02	
25	100253K	US 2/INDEX-GALENA RD VICINITY-UNSTABLE SLOP	002	CN,PE	36.28	36.3	
26	100254C	US 2/SUNSET FALL SLIDE	002	CN,PE	36.78	36.85	
27	100256S	US2/WESTERN BOUNDARY OF MT BAKER NATIONA	002	CN,PE	36.94	37.06	
28	100257S	US 2/BNRR VIC WEST OF EAGLE FALLS CREEK-UN	002	CN,PE	38.5	38.55	
30	100261S	US 2/STREAM BRIDGE VIC WEST OF MONEY CREEK	002	CN,PE	44.2	44.21	
31	100263B	US 2/SKYKOMISH VICINITY-UNSTABLE ROCK SLOP	002	CN,PE	48.27	48.33	

# GIS Analysis of Puget Sound

05-07 Potential Safety Improvements  
Based on 2001 - 2002 Collision Data



07-09 Potential Safety Improvements  
Based on 2003-2004 Collision Data



09-11 Potential Safety Improvements  
Based on 2005-2006 Collision Data



## Northwest Region

Washington State  
Department of Transportation  
Biennial Trends determined by those locations that had  
reporting offenders in all years (within 10 miles)  
Analysis: Developed by  
GIS & PC Office 2007

Washington State Department of Transportation  
GIS & PC Office  
2007  
DRAFT  
This map is for informational purposes only. It is not intended to be used as a legal document. It is subject to change without notice.

# Tabular Corridor Analysis

Attributes of Traffic Counts AADT (1:24k, All Directions)

OBJECTID *	SR	RRT	RRQ	AADT	SRID	ARM	SRMP	AB	TI
1	003	Q1	03668	1320	003Q103668	0.01	0.01	A	Nor
2	003	P2	04796	2968	003P204796	0.01	0.01	A	Nor

Attributes of Roadway Shoulder

OBJECTID *	SRID	SHOULDERWIDTHLEFT	SHOULDERWIDTHRIGHTCENTER	BEGINSRMP
27890	002	0	4	74.15 <
27891	002	0	2	73.98 <

Attributes of 07-09 Projects

OID	PIN	PROJTITLE	ROUTE	PHASE	BEGSR	ENDSR	BE
1	100099M	Island Transit Park and Ride Development	000	CN,PE,RW	0	0	
23	100243A	US 2/FOREST SERVICE ROAD VIC TO MONEY CREEK	002	CN,PE	43.11	46.02	
25	100253K	US 2/INDEX-GALENA RD VICINITY-UNSTABLE SLOP	002	CN,PE	36.28	36.3	

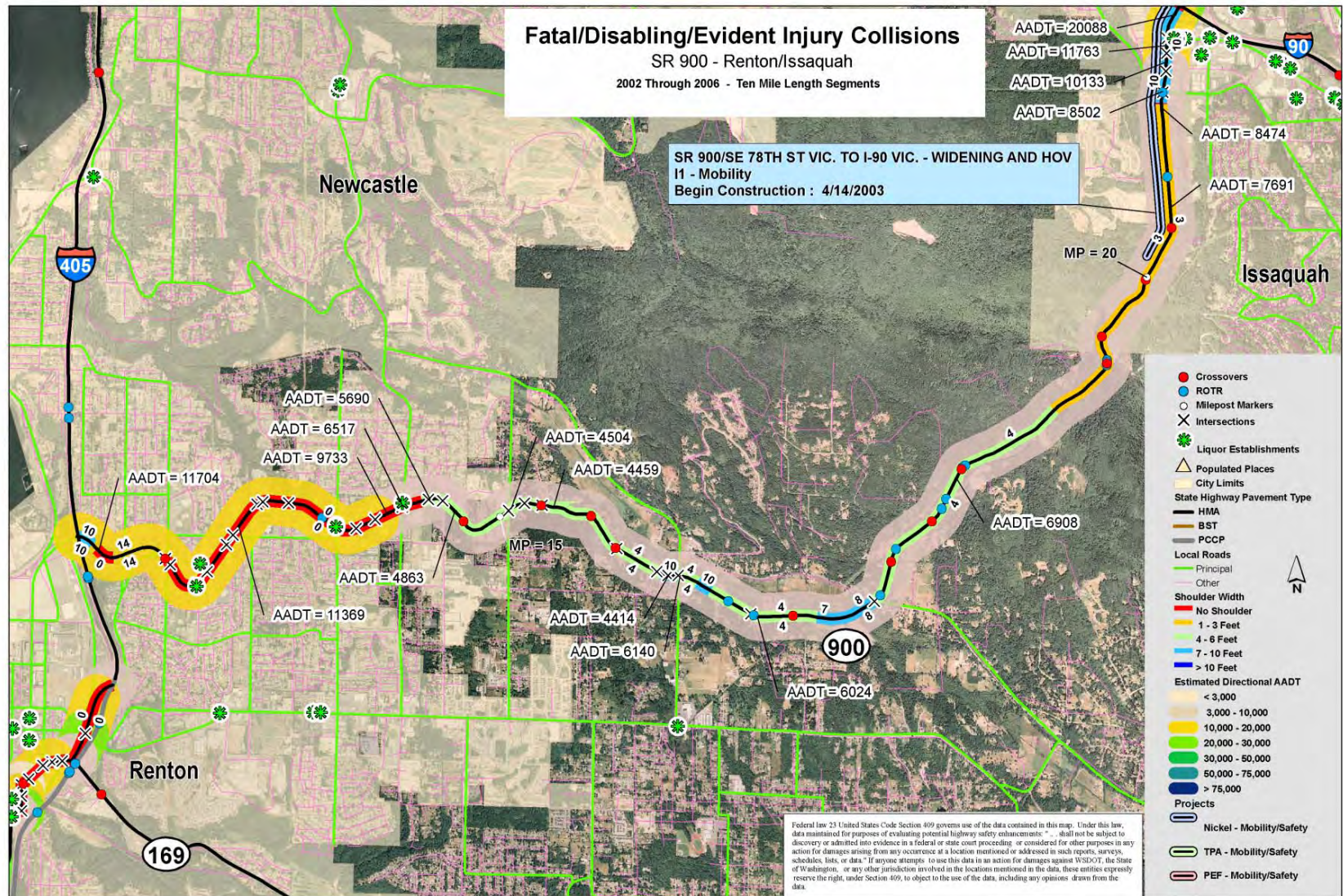
Attributes of EXIST PAVENEBT DCR 07-09 WSPMS 2005 Final (November 2005) Events

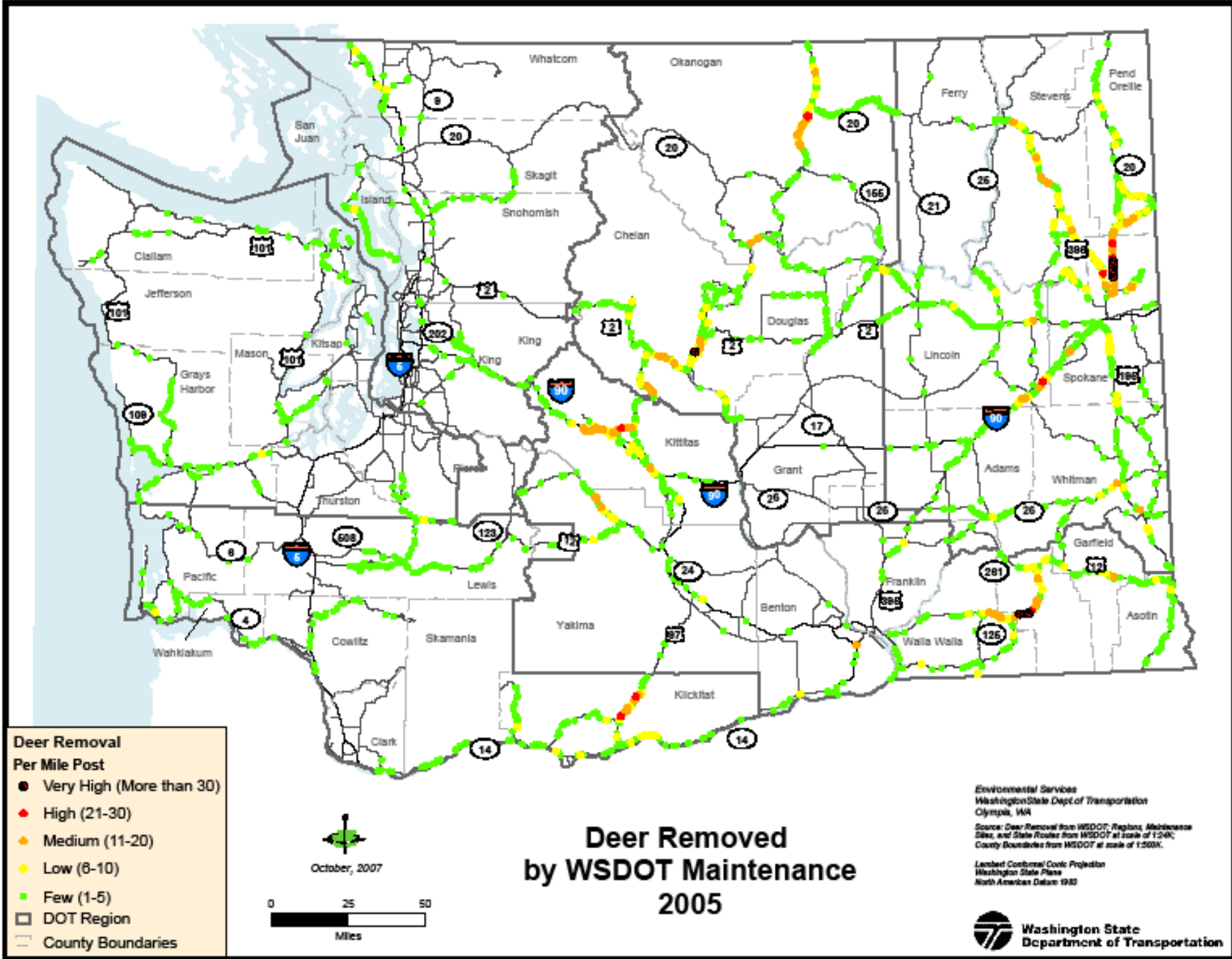
OID	SR	SRTXT	DUE_GROUP	PAVEMENT	BARM	EARM	REGION	FC	PIN	RELATED_RO
99	2	002	Future Due	ACP	0	0.31	Northwest	U1		
100	2	002	Future Due	ACP	2.58	3.96	Northwest	U1		
101	2	002	Future Due	ACP	4.8	5.15	Northwest	U1		

Attributes of 07-09 Projects (CN Start after July 1, 2007)

OID	PIN	PROJTITLE	ROUTE	FUNDTYPE
1	100099M	Island Transit Park and Ride Development	000	05 TPA
23	100243A	US 2/FOREST SERVICE ROAD VIC TO MONEY CREEK VIC - PAVING	002	Federal,State
25	100253K	US 2/INDEX-GALENA RD VICINITY-UNSTABLE SLOPE	002	Federal,State
26	100254C	US 2/SUNSET FALL SLIDE	002	Federal,State
27	100256S	US2/WESTERN BOUNDARY OF MT BAKER NATIONAL FOREST VIC	002	Federal,State
28	100257S	US 2/BNRR VIC WEST OF EAGLE FALLS CREEK-UNSTABLE SLOPE	002	Federal,State
30	100261S	US 2/STREAM BRIDGE VIC WEST OF MONEY CREEK CAMPGROUND	002	Federal,State
31	100263B	US 2/SKYKOMISH VICINITY-UNSTABLE ROCK SLOPE	002	Federal,State
32	100280D	US 2/VICINITY TYE RIVER BRIDGE-UNSTABLE SLOPE	002	Federal,State
35	200200R	US 2/GOODWIN RD. CASHMERE AREA - SIGNAL	002	Federal,State

# Corridor Analysis With GIS

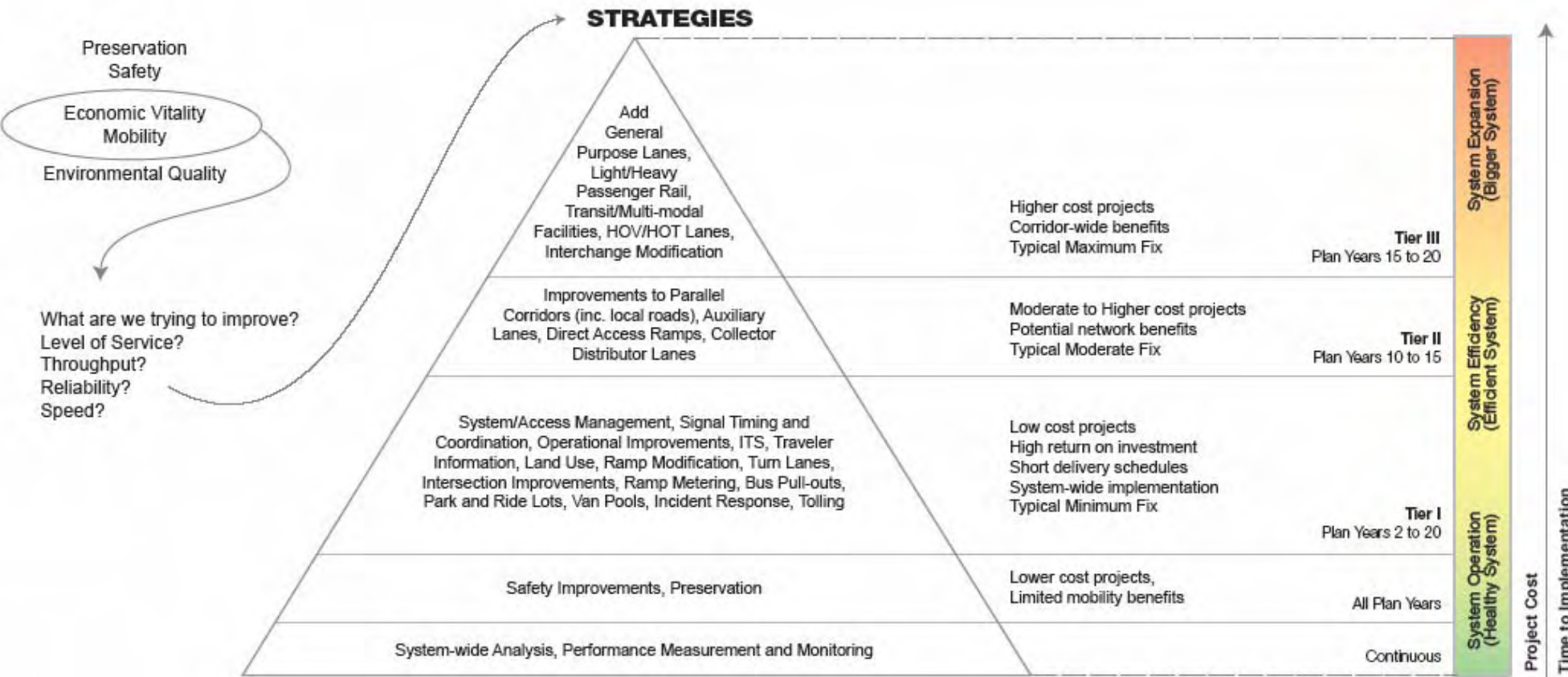




# Implementation Plan

The Highway System Plan will include an implementation plan that provides general prioritization of improvements;

- Top Priority: System Preservation, Safety and Environmental
- Tier I Operational Improvements, Access Management
- Tier II Minor Capacity and Higher Cost Operational Improvements
- Tier III Major Capacity Adding Investments



# Technical Expert Assistance (Risk Avoidance)

- Established technical experts to assist our office with the following steps;
  - Issue development
  - Performance goal & measure
  - Needs criteria (data specific & based performance goal)
  - Strategy development
  - Benefit cost parameters
  - Prioritization approach

# Pavement Management Strategies

## Flexible Pavement Management

- Utilize Lowest Life Cycle Approach
- Periodic Maintenance (crack sealing, failure repair).
- Resurfacing with Chip Seal or Hot Mix Asphalt when at Lowest Life Cycle.
- Surfacing Treatment Determined by Pavement Condition, Expected Traffic Loads, Underlying Soil Conditions

## Rigid Pavement Management

- Periodic Maintenance (failure repair).
- Dowel Bar retrofit where cost effective to extend service life
- Replace pavement at end of useable life
- Implementation Approach:
  - Address emergent segments as stand alone projects
  - Replace or Rehabilitate Concurrently with Major Projects such as HOV lanes or other Expansion Projects.

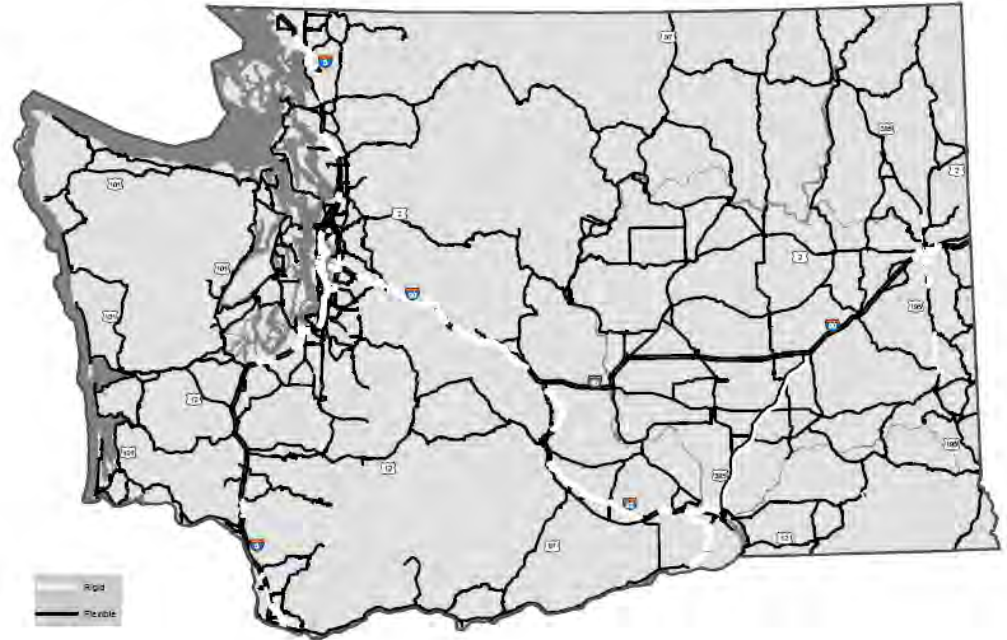


Table 1. Annual Vehicle Miles Traveled in 2005 (in billions)

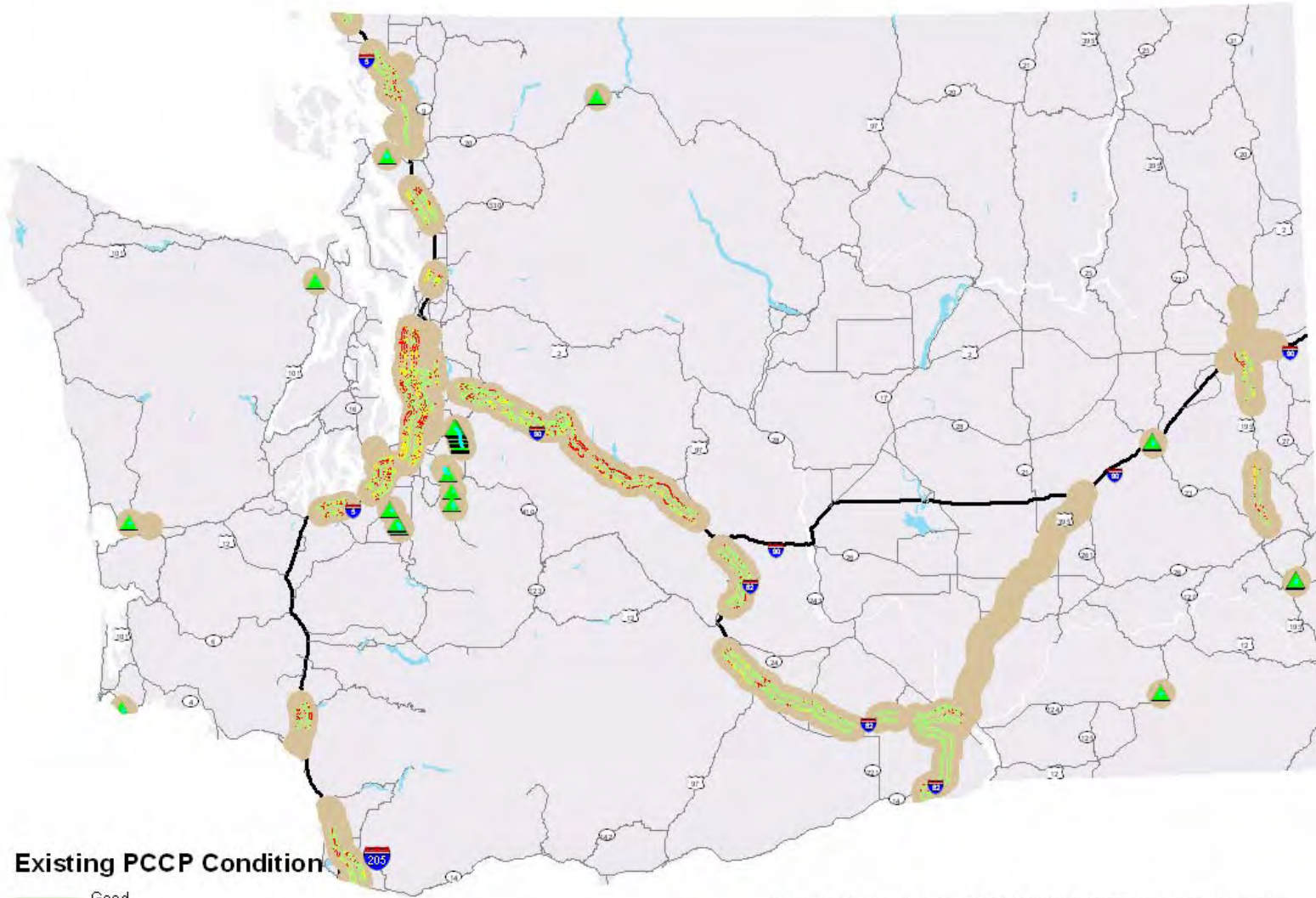
	Lane Miles	% Lane Miles	Miles	%
BST/Chip Seal	4,332	21.6%	1.1	3.5%
HMA	13,214	65.8%	21.7	68.7%
PCCP	2,537	12.6%	8.8	27.8%

## Concrete (Rigid ) Pavement Preservation Needs:

175 lane miles should be dowel bar retrofitted in the next decade.

600 lane miles should be replaced in the next ten years.

# Portland Cement Concrete Pavement Condition



## Existing PCCP Condition

- Good
- Needs Dowel Bar
- Needs Replacement
- ▲ 12\_21PCCP\_y2 Events

## Existing PCCP



**DRAFT**

*This map is based on preliminary PCCP data collected in 2004. This data is incomplete and does not include SR 395. More data collection and analysis is required by the Pavement Management Division on some highway segments around the state.*

g:\p\work\high\c:\ba\12\_20pccp\3tr

# Highway Structures Management Strategies

## Structures Preservation

- Routine Periodic Maintenance
- Extend Structures Service Life by Employing Cost Effective Measures at Appropriate Timing:
  - Steel Bridge Painting
  - Application of Deck Protective Systems
  - Scour Repair
  - Repair of Severely Deteriorated Members

## Structures Replacement

Replace structures that have reached the end of a cost effective service life:

Priorities are Weight Restricted Bridges on the Interstate System, Weigh Posted Bridges on high volume freight routes and bridges at risk.

## Seismic Protection

Retrofit Existing Bridges using the following priority:

- Interstate and Non-Interstate Bridges in High Risk Seismic Zones
- Interstate Bridges in Moderate Risk Zones
- Non-Interstate Bridges in Moderate Risk Zones

Table 2. State Owned Structures Inventory

	No. Bridges	Sq. Feet
Vehicular Bridges (over 20 ft. long)	2973	44,264,566
Structures less than 20 ft. long	309	n/a
Border Bridges (maintained by border state)*	6	n/a
Culverts greater than 20 ft. in length	84	n/a
Pedestrian Structures	57	249,730
Tunnels and Lids	38	739,381
Ferry Terminal Structures	44	237,968
Railroad Bridges	84	n/a
Buildings (I-5 Convention Center)	1	n/a
<b>Total</b>	<b>3596</b>	

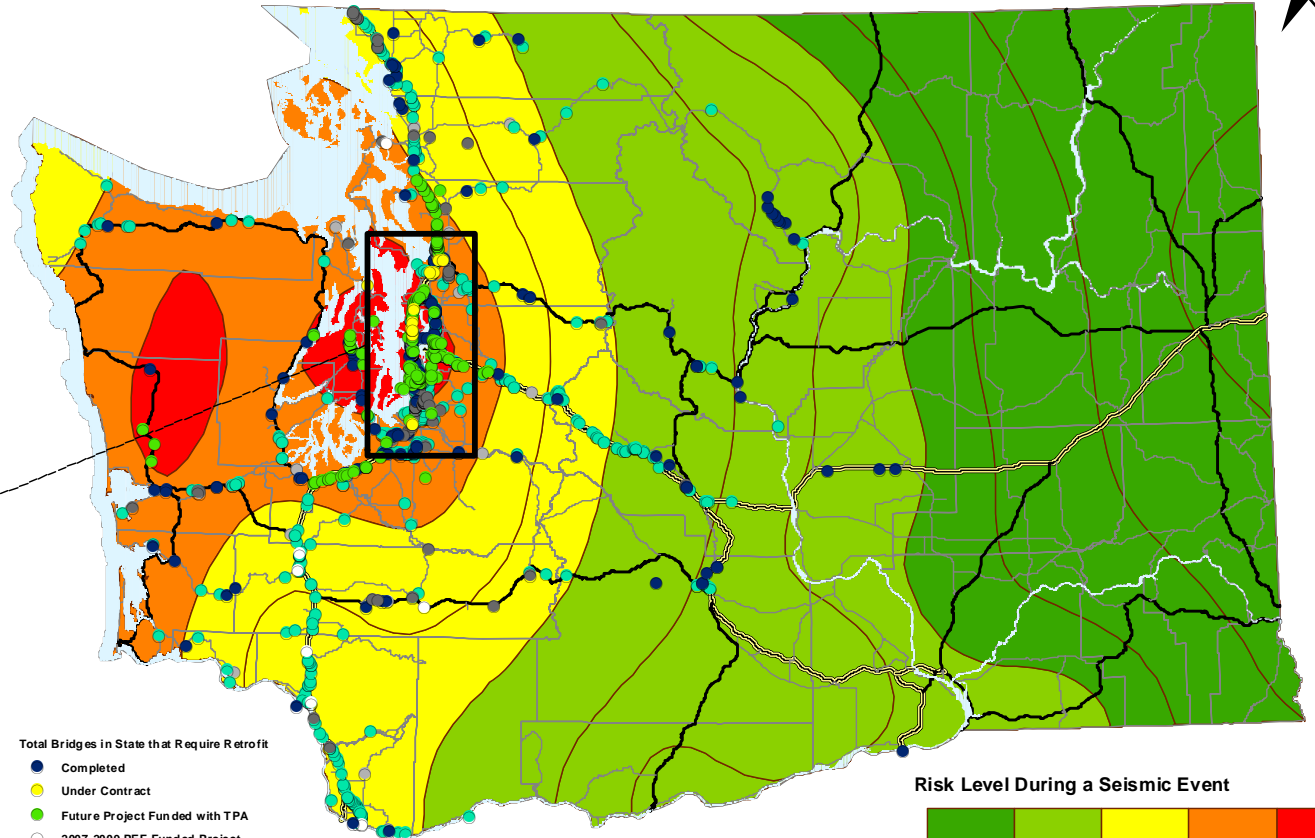
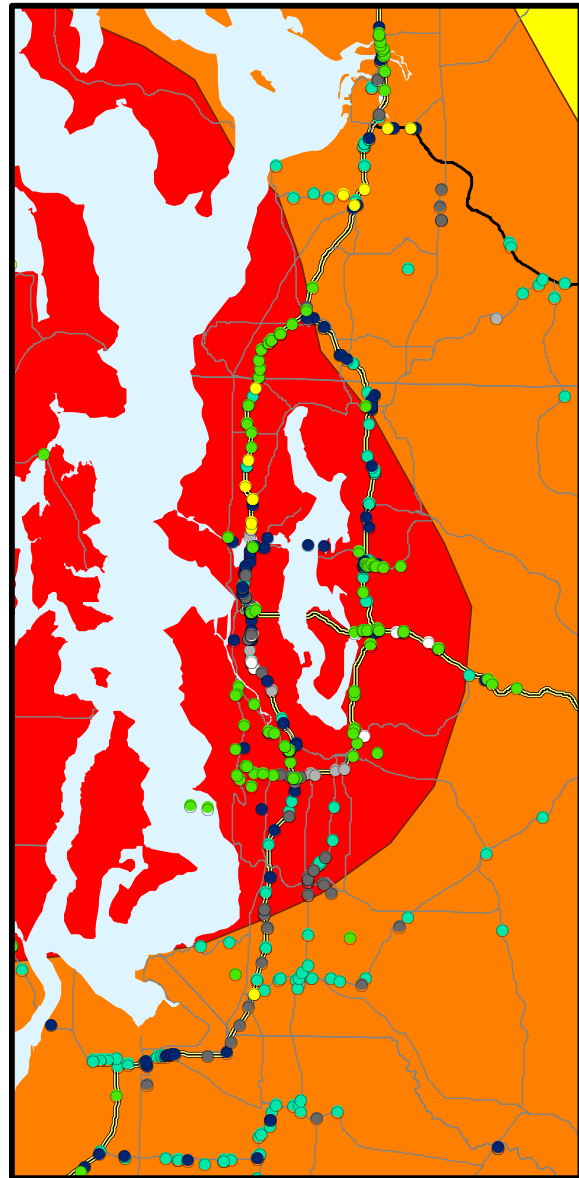
\* Maintenance and preservation costs are shared by the states  
 Source: WSDOT Bridge and Structures Office - June 2006

Table 3. Bridge Structural Condition Ratings

		2000	2001	2002	2003	2004	2005	2006
Good	A range from no problems to some minor deterioration of structural elements.	84%	85%	87%	86%	87%	89%	88%
Fair	All primary structural elements are sound but may have deficiencies such as minor section loss, deterioration, cracking, spalling, or scour.	11%	11%	10%	11%	10%	9%	9%
Poor	Advanced deficiencies such as section loss, deterioration, cracking, spalling, scour, or seriously affected primary structural components. Bridges rated in poor condition may be posted with truck weight restrictions.	5%	4%	3%	3%	3%	2%	3%

Source: Gray Notebook, June 30, 2006

# Risk Level During a Seismic Event

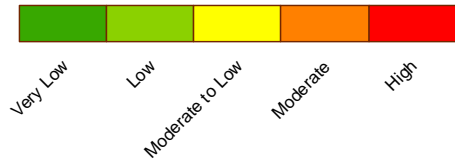


**Total Bridges in State that Require Retrofit**

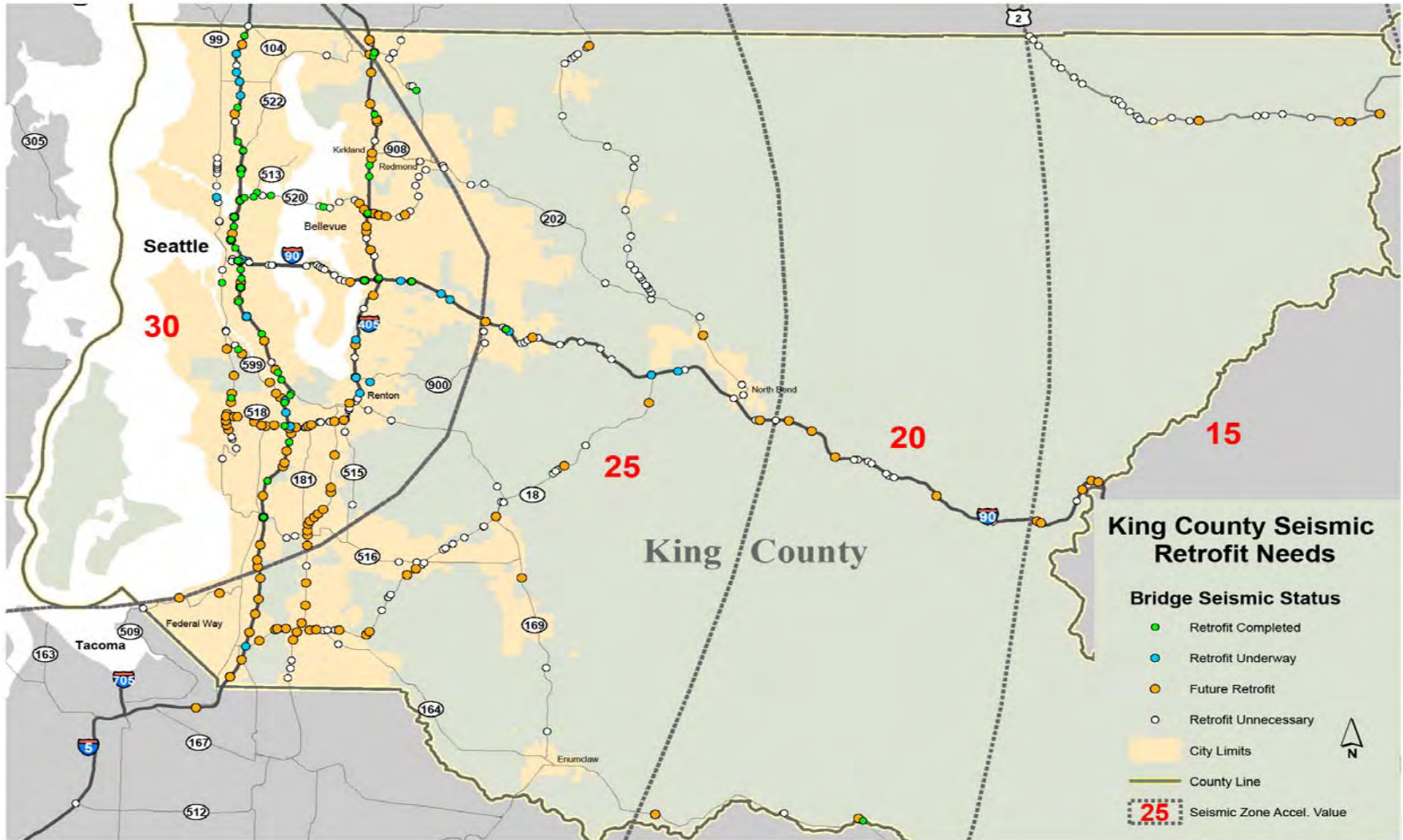
- Completed
- Under Contract
- Future Project Funded with TPA
- 2007-2009 PEF Funded Project
- HSP Proposed Investment 2007-2026
- Future Project Funded with PEF
- Requires Retrofit - Not Funded

\* PEF - Pre-existing Funds  
 TPA - Transportation Partnership Account

**Risk Level During a Seismic Event**



# Seattle / King Co Seismic



# Improving Highway Safety (Capital Investment)

Approaches to Improving Highway Safety are lead by the Strategic Highway Safety Plan and include;  
Continuing Corridor Safety Program

Reduce the Risk of Run off the Road Collisions and Improve the Roadside:

- Install Guardrail where needed
- Flatten Slopes
- Remove Fixed Objects from the roadside
- Install Shoulder Rumble strips
- Widen Shoulders

Improve intersections:

- New Signal Systems
- New Roundabouts
- New or Better Lighting
- Turn Lanes

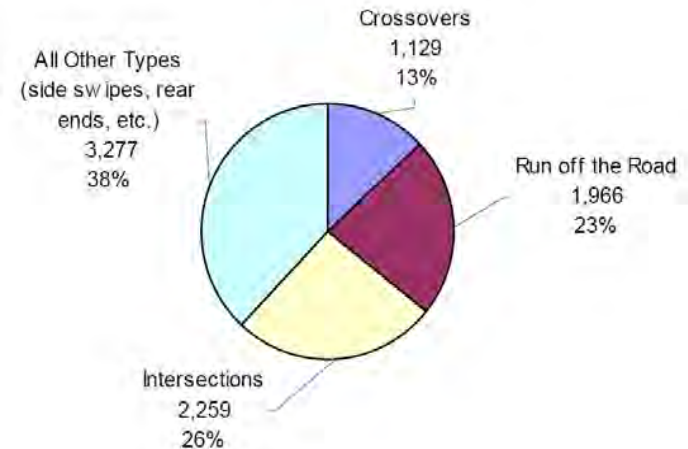
- Complete Median Crossover Prevention Program on Interstate and Non-interstate Highways
- Reduce the Risk of Crossover Collisions on Two Lane Highways by Installing Rumble Strips
- Provide Passing Opportunities on Rural Highways by Constructing Passing Lanes where cost effective
- Eliminate At-grade intersections where warranted
- Provide Adequate Pedestrian Facilities
- Improve work zones
- Modernize Highway Safety Features and Geometrics

Figure 5. Washington Motor Vehicle Total Fatalities and Fatality Rates 1910-2005



Sources: Washington State Highway Transportation Commission, Washington State Patrol, Fatality Analysis Report System (FARS), Office of Financial Management, Dept. of Licensing, WSDOT

## Total Fatal & Disabling Collisions 1999-2005



# Implementation of Highway Safety Improvements

- All Highway projects will contain some level of safety improvement
- System Preservation Projects will provide basic safety such as installation or upgrade of signing, striping, guardrail and other minor items as well as minor spot improvements.
- Bridge Replacement projects will be constructed to modern standards where cost effective to accommodate safety needs.
- Capacity expansion projects will be constructed to modern standards and address all collision risk issues within the project limits.
- A low cost enhancement approach is assumed to continue to respond to emergent safety needs.

# Mitigating Environmental Impacts

Environmental elements are considered part of every project's design, construction, operation and maintenance.

Highway construction projects are designed to:

- Treat storm water by removing sediments and metals
- Protect the quality of groundwater
- Control erosion of banks and reduce surface run-off
- Provide fish passage and enhance habitat connections
- Build barriers to reduce noise on neighborhoods
- Replace and improve wetland functions
- Protect cultural and historic resources
- Minimize air pollution
- Allow habitat connectivity for wildlife

WSDOT plans to continue investing in stand-alone environmental retrofit projects to fix existing impacts from previous highway construction.

These projects are funded to:

- Remove culverts that keep fish from reaching upstream habitat
- Reduce highway noise in areas not addressed by past construction projects
- Treat storm water
- Fix stretches of highway that suffer repeated flooding or stream bank erosion