

Implementation of the HSM

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Presentation Outline

- Why is WSDOT implementing the HSM?
 - Target Zero
 - Sustainable Transportation Business Practices
- What is needed?
 - Executive Support and Endorsement
 - Resources
 - Policy Development
 - Training
 - Tools
- Challenges and Lessons Learned

Target Zero

Washington State's Strategic Highway Safety Plan 2010

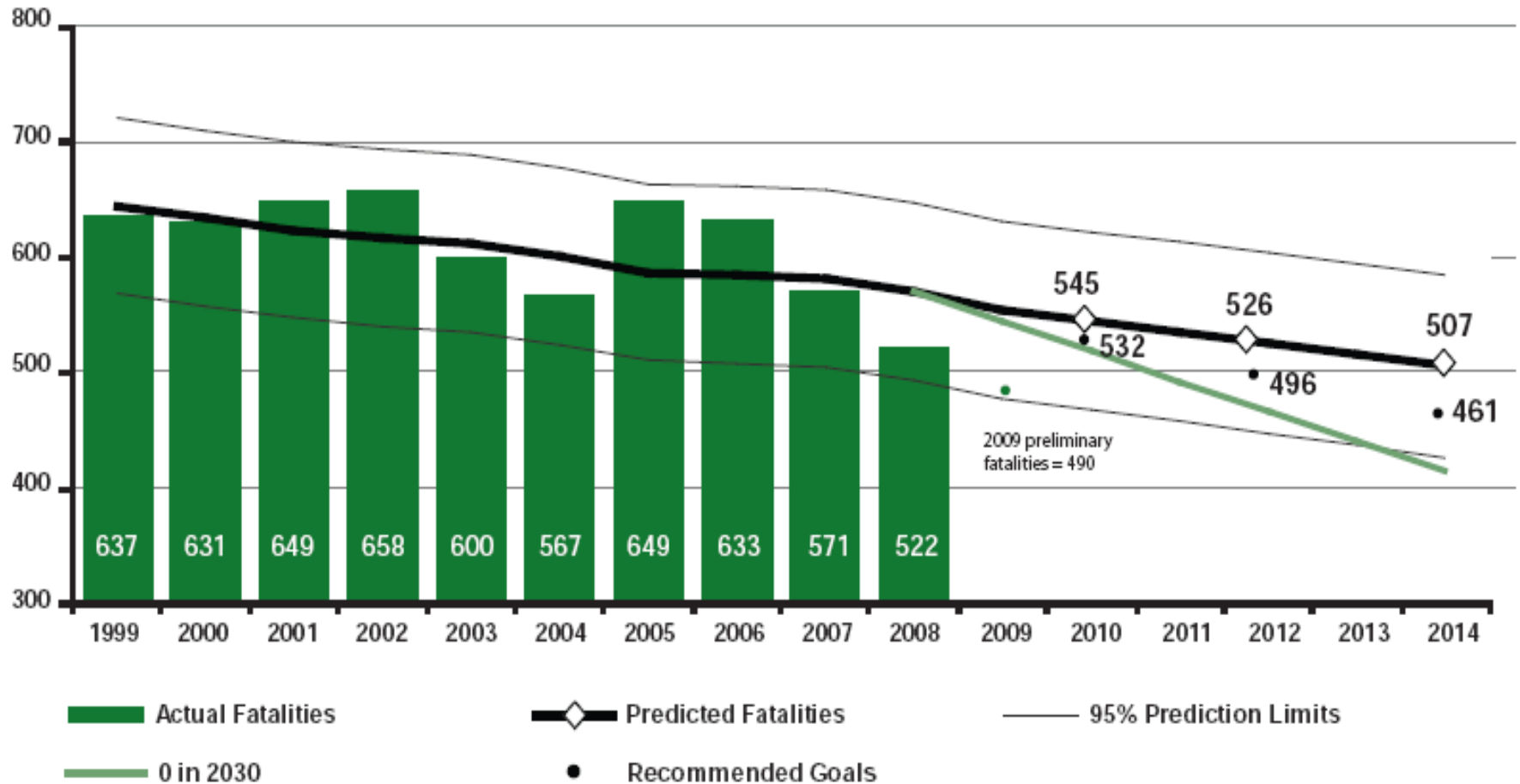
Zero Deaths | Zero Serious Injuries | 2030



Achieve zero traffic deaths and zero serious injuries in Washington State by the year 2030

www.targetzero.com

All Washington Traffic Fatalities: Trends, Forecasts, and Goals



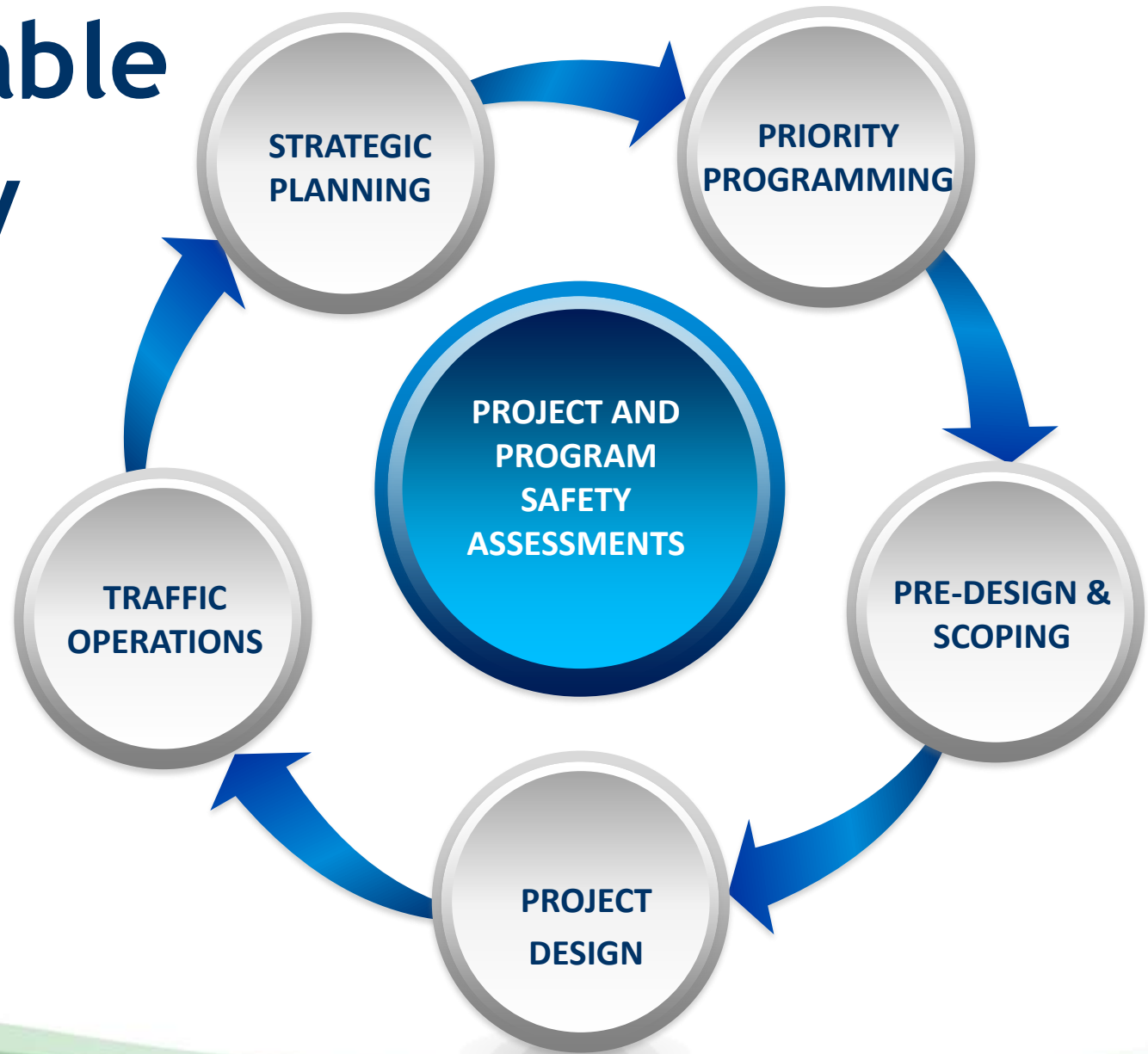
Source: Washington Traffic Safety Commission - Fatality Analysis Recording System (FARS)

Sustainable Transportation Business Practices

- Draft Secretary's Executive Order E 1082.00
 - “My expectation is that each employee will incorporate sustainability into our daily decision making and actions”
 - Includes section on Sustainable Highway Safety

Sustainable Highway Safety

Safety
assessment at
all levels
using
quantitative
analysis to
develop cost
effective
solutions

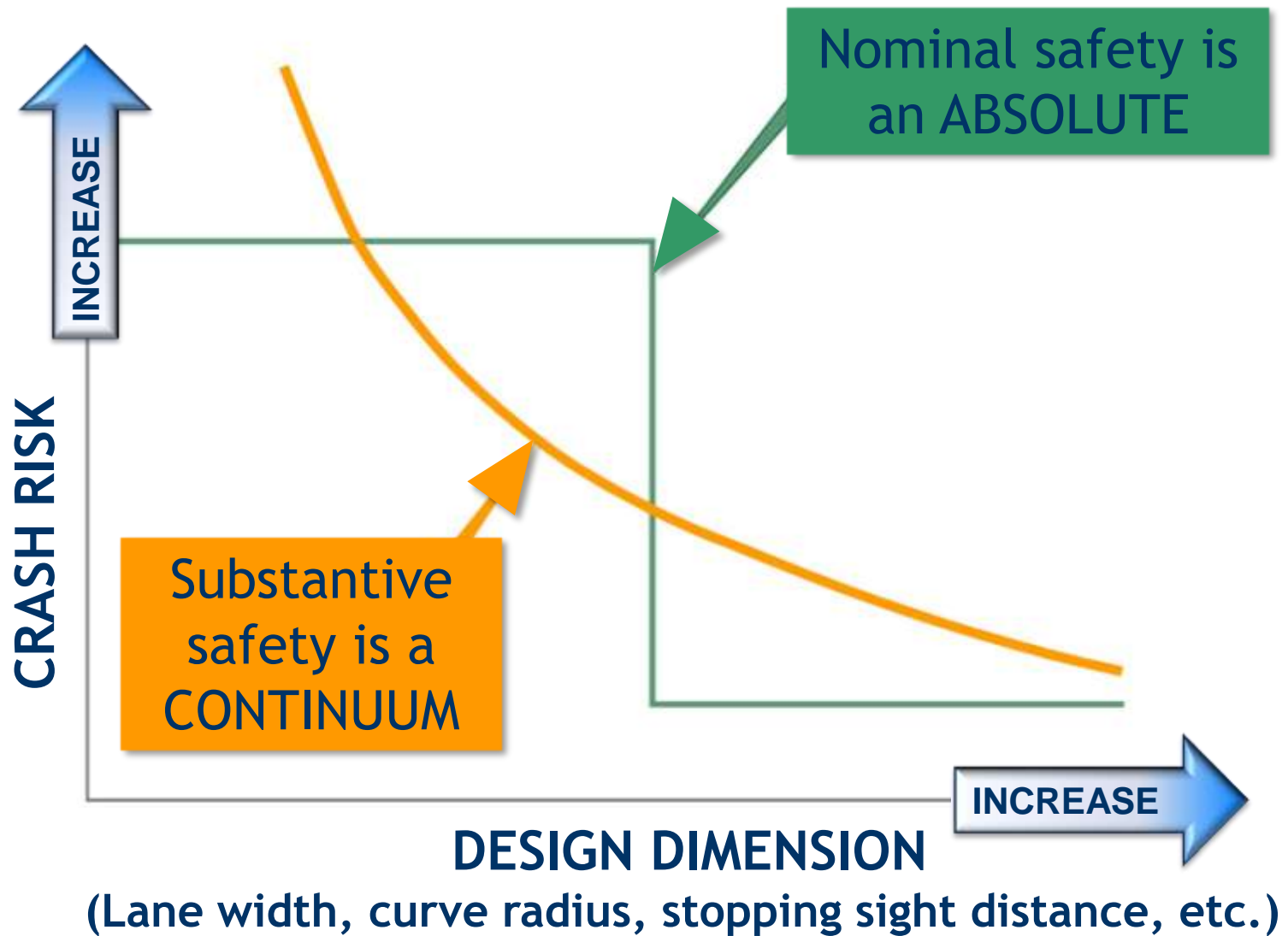


Goals of Sustainable Highway Safety

- Create an enduring highway safety culture within WSDOT around the sustainable safety principles and practices using the AASHTO Highway Safety Manual and Safety Analyst software
- Develop the necessary core competencies and knowledge
- Identify, prioritize, resource, and collect the data necessary to achieve the target zero goals
- Integrate the Sustainable Safety tools, principles, and highway safety decision-making processes into each role, responsibility, process, interaction, and operation within WSDOT

What is different?

- In the past we were doing what is called a “Standards Based Design” or what the HSM calls “Nominal Safety”
- We are moving more to a “Performance Based Design” or what the HSM calls “Substantive Safety”



The HSM provides insights to designers faced with design exception decisions

Design will use the HSM for

Safety Projects

- To determine where the crash hot spots are.
- To help determine why crashes are happening.
- To help determine what countermeasures will effectively counter those crashes

Corridor & Project Analyses

- To help pick the preferred alternative design for a corridor or a project based on the predicted crash rates of the alternatives.

Design Deviations

- To predict the crash rates of each alternative and to help weigh the safety risks of each.

Other Uses

Improvement Project Design

- To determine the safety performance of competing designs. (i.e. low cost channelization, traffic signal or roundabout)

IJR Policy Point 3

- Collision analysis for before and after a new or modified Interchange.
- And, analyze the affected local roadway system.

Work Zone Design

- To determine the best work zone design.
- Or, at least know the risk of a design.

What is needed for implementation?

Executive Endorsement

Recommendation

Endorse SafetyAnalyst and the HSM methodologies for identifying sites with the greatest potential for safety improvement for all phases of the project development process (Planning, Scoping, Pre-Design, Design, and Operations). Purchase annual statewide site licenses for the AASHTOWare Software SafetyAnalyst. Develop and deploy the SafetyAnalyst Implementation Plan in alignment with WSDOT's HSM Implementation Plan.

Adopted by Highway Safety Executive Committee on December 2, 2010

Signature: _____

John C. Milton

Date: _____

1/5/11

John C. Milton, Ph.D., P.E.

Highway Safety Executive Committee Chair

WTP
HSP

Sustainable Highway Safety

Target
Zero

Highway Safety Executive Committee

Highway Safety Work Group

Highway Safety Issues Group

HSIG Committees

CMF Committee

Design Manual Comm.

HSM Users Group

Training Committee

Roadside Features Inventory Program

**Intersection Analysis Location Review
Panel**

Safety Analyst Implementation team

Rural Roads Committee

Highway Safety Executive Committee (HSEC)

John Milton, Ph.D., P.E.

Director, Enterprise Risk Management Division
(Chair)

Jay Alexander

Director, Program Management Division

Pasco Bakotich III, P.E.

Director, Development Division

Kathleen Davis

Director, Highways & Local Programs

John Nisbet, P.E.

Director, Traffic Operations Division

Brian Smith, AICP

Director, Strategic Planning Division

Highway Safety Executive Committee (HSEC)

- ❑ Provides executive support to the Safety Program
- ❑ Approves expenditures of funds in the Safety Program
- ❑ Resolves organizational, policy and procedural issues as necessary
- ❑ Supports an environment of collaboration and cooperation
- ❑ Approves and supports resource commitment to the implementation of the Sustainable Highway Safety Program

Needed Resources

- Financial resources are needed to implement the HSM and Safety Analyst
 - Training
 - Purchase copies of the HSM
 - Purchase Safety Analyst
 - \$'s to gather the additional data needed
- Dedicated resources
 - WSDOT has just begun to dedicate resources solely for the implementation of the HSM and Safety Analyst
 - IT Staff time to transfer data into Safety Analyst

Policy changes

- Programming changes
 - Identification and prioritization of Safety projects
 - Preservation project changes
 - Other programs
- Design Manual changes
 - Safety Projects
 - Basic Safety
 - Design Decisions and Exceptions
 - Project/Corridor Analysis
 - Interchange Justification Reports

Design Manual Revisions

- **Collision Analysis Locations (CALs), Collision Analysis Corridors (CACs), Intersection Analysis Locations (IALs):** Sites identified through a system-wide analysis that have a high-severity collision history. These sites are created with the intent to modify, where appropriate, specific highway elements that are focused on addressing the contributing factors of the identified high-severity collisions.
- The following documentation should be completed:
 - Include an analysis of the crash history to identify contributing factors.
 - Identify which of the 4 E's (Engineering, Enforcement, Education and Emergency Services) will best address the contributing factors, if Engineering solutions are selected to address the contributing factors, then consider countermeasures that include operational, low-cost, and high-cost solutions.
 - Select the recommended countermeasure based on a benefit/cost analysis.

Training

- HSM Training
- Safety Analyst Training

Core Competencies by Functional Area

A

- Denotes primary responsibility to task, leads activities related to functional aspects, these tasks may be correlated to other functional leads tasks. In these cases multiple owners may exist.

B

- Denotes secondary responsibility, often supports activities by provision of data or expertise. These functions are typically needed throughout the tasks. An office that has limited function with the tasks, but uses the outcomes in critical applications may be identified as a B (e.g., risk management uses deviations in court)

C

- Denotes a significant interest role, often provides input throughout tasks, may be needed from time to time, but not necessary to the day to day functioning.

D

- Denotes a limited interest role, may use the information from time to time, but not necessary to day to day functioning.

Program Activity	Highway Safety Activity	WSDOT HQ Functional Offices							
		STCDO	Planning	Program Management	Design	Traffic Operations	Risk /Safety Management	Strategic Assessment	Local Programs
Data	Data collection	A	C	C	B	B	C	C	C
	Data Integration	A	C	B	B	B	C	B	C
Planning	System Planning	B	A	A	B	B	C	C	B
	Corridor Planning	B	A	A	B	B	C	C	B
	Developer Services	B	A	B	A	A	C	C	B
Programming	Screening	B	B	A	B	A	A	C	C
	Diagnosis	C	B	A	B	A	A	C	C
	Countermeasure Selection	D	B	A	A	A	A	C	C
	Economic Evaluation	D	C	A	A	A	B	B	C
	Prioritization	D	C	A	A	A	B	B	B
Pre Design	Scoping	D	B	A	A	A	B	C	C
	Environmental Planning	D	C	B	A	B	C	C	C
	Context Sensitive Design/Solutions	D	C	B	A	A	A	C	A
Design	Complete Streets	C	C	B	A	B	B	C	A
	Design Evaluations	D	D	C	A	B	B	D	C
	Deviations	D	D	B	A	B	B	D	C
	Corridor Analysis	D	D	B	A	B	B	D	C

Training

- Executive management training for Sustainable Safety and HSM implementation
- Senior manager training (2 days)
- Technical Staff training (2 days)
- IAL project review panel/training
- SafetyAnalyst and NCHRP 17-45 training
- Human Factors training

- Collision analysis training
- Hands on HSM training

Sustainable Highway Safety Tools

- Safety Analyst
- Collision Analysis Tool (CAT) “WSDOT developed”
- Simplified Spreadsheets
- Road Safety Assessments
- Roadside Features Inventory
- Design Documentation Templates
- Safety Project Scoping Flowchart

Keep it simple, make it useful

- Use visual tools such as GIS to show results of SafetyAnalyst, contributing factors and crash type analysis for decision makers
- Simplify HSM spreadsheets, including automated Part C worksheets for all corridor types
- Modify design policy to allow for quantitative analysis as the means for determining appropriate design levels
- Start from a base level design
- Drive out liability fears

SR 161 MP 4 - MP 13 Eatonville Vicinity Safety Analyst

November 8, 2010

Most Severe Injury Type

2004 - 2009 Collision Data

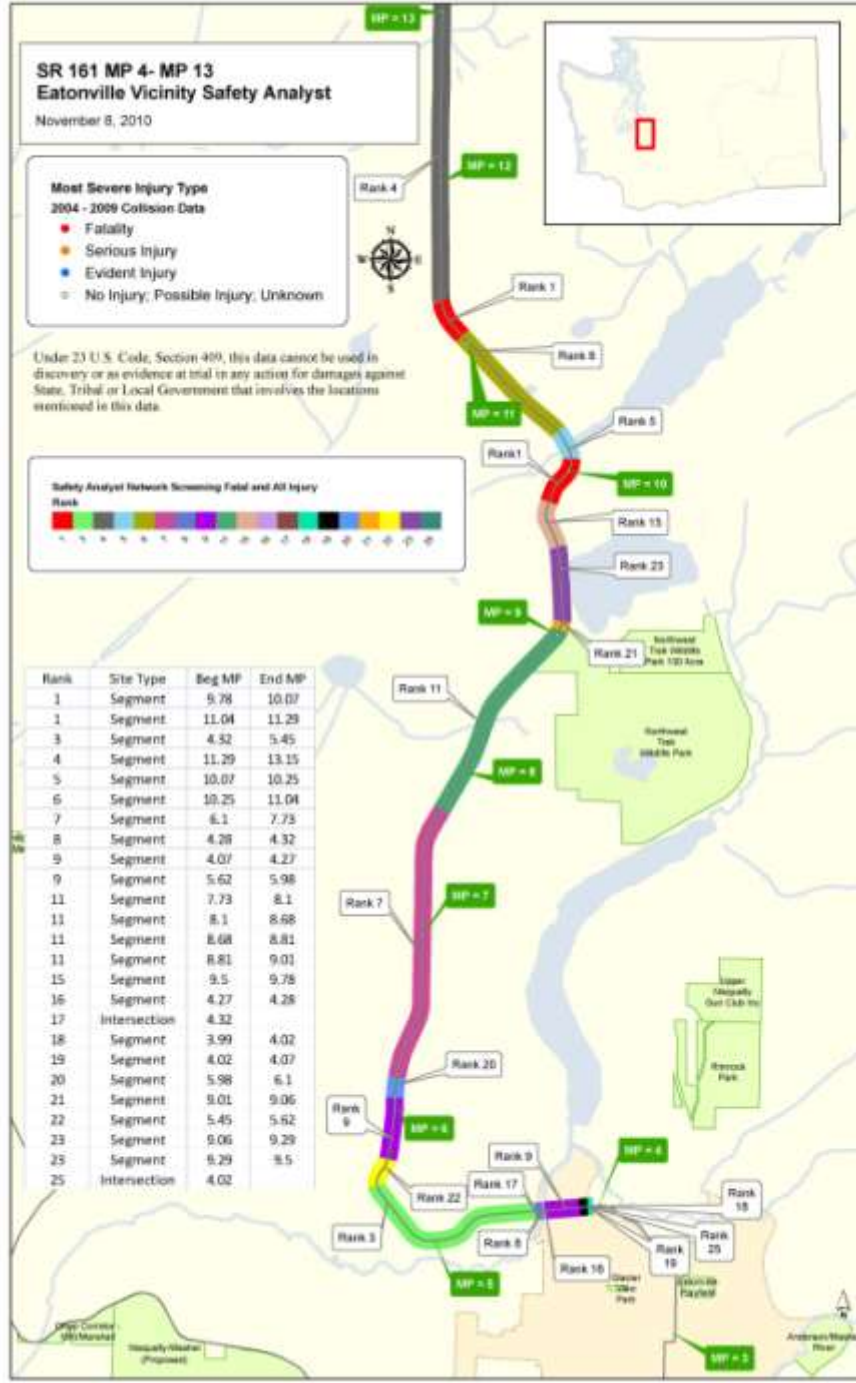
- Fatality
- Serious Injury
- Evident Injury
- No Injury, Possible Injury, Unknown

Under 23 U.S. Code, Section 409, this data cannot be used in discovery or as evidence at trial in any action for damages against State, Tribal or Local Government that involves the locations mentioned in this data.

Safety Analyst Network Screening Fatal and All Injury Rank



Rank	Site Type	Beg MP	End MP
1	Segment	9.78	10.07
1	Segment	11.04	11.29
3	Segment	4.32	5.45
4	Segment	11.29	13.15
5	Segment	10.07	10.25
6	Segment	10.25	11.04
7	Segment	6.1	7.73
8	Segment	4.28	4.32
9	Segment	4.07	4.27
9	Segment	5.62	5.98
11	Segment	7.73	8.1
11	Segment	8.1	8.68
11	Segment	8.68	8.81
11	Segment	8.81	9.01
15	Segment	9.5	9.78
16	Segment	4.27	4.28
17	Intersection	4.32	
18	Segment	3.99	4.02
19	Segment	4.02	4.07
20	Segment	5.98	6.1
21	Segment	9.01	9.06
22	Segment	5.45	5.62
23	Segment	9.06	9.28
23	Segment	9.28	8.5
25	Intersection	4.02	



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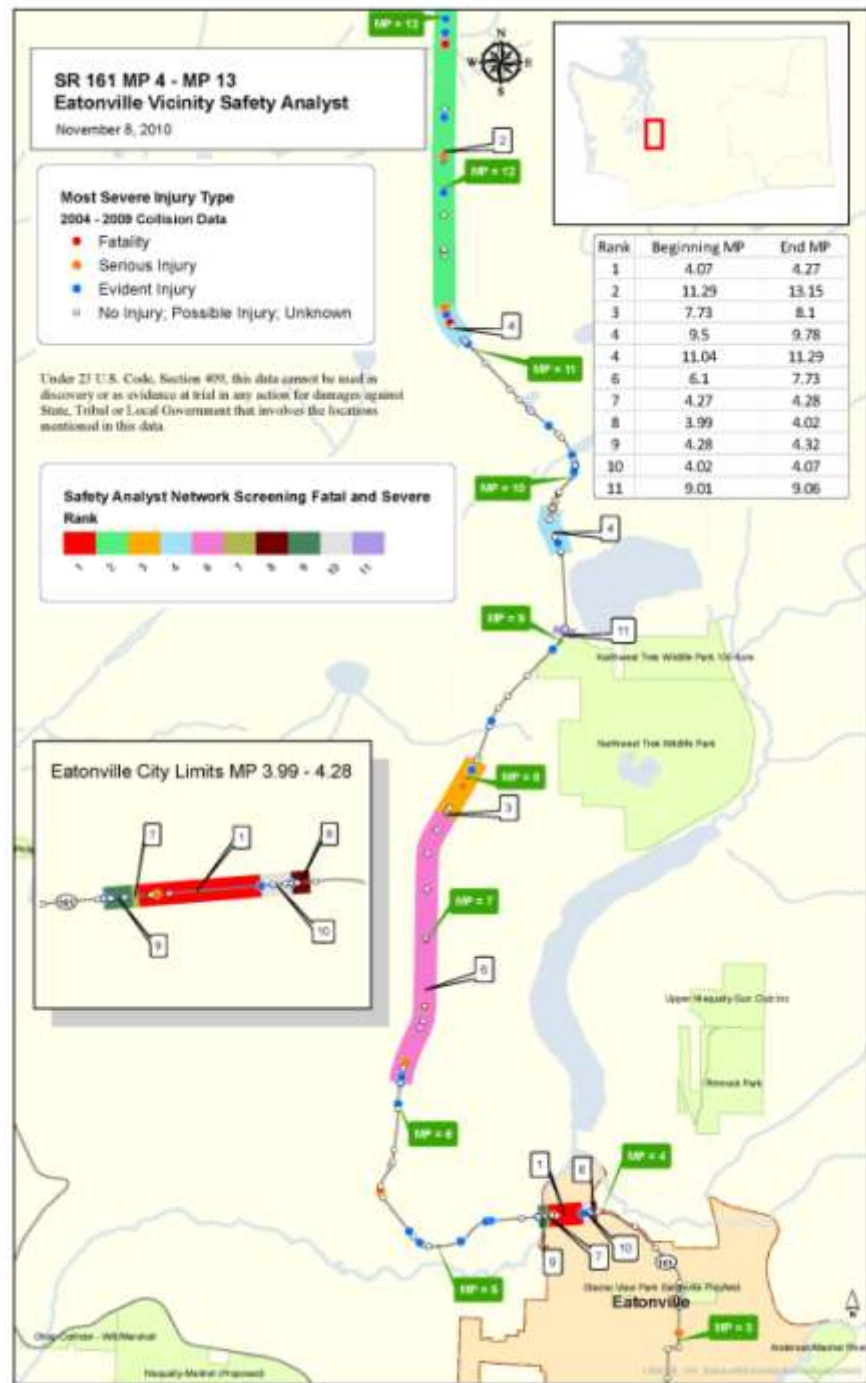
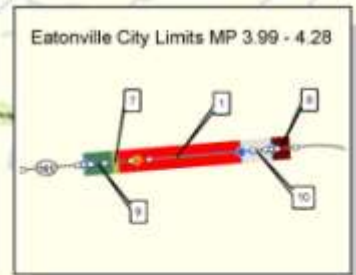
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Safety Analyst Network Screening Fatal and Severe Rank



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4	11.04	11.29
6	6.1	7.73
7	4.27	4.28
8	3.99	4.02
9	4.28	4.32
10	4.02	4.07
11	9.01	9.06

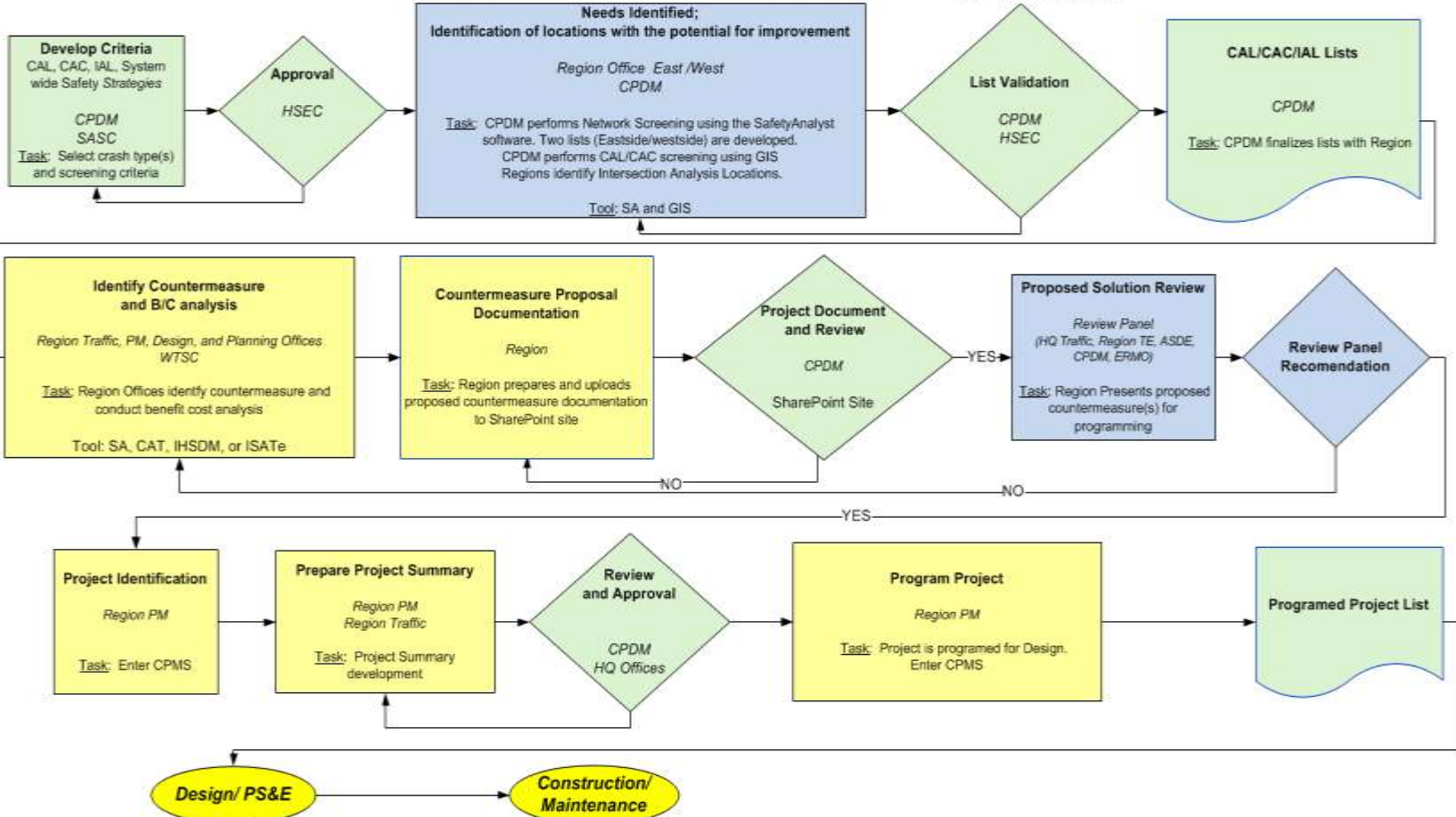


DRAFT

Safety Scoping Process for State Routes

- Acronyms Used:**
 CPDM – Capital Program Development & Management Office
 HSEC – Highway Safety Executive Committee
 SA – Safety Analyst
 GIS – Graphic Information System
 PM – Program Management
 BiC – Benefit Cost
 CPMS – Capital Program Management System
 IHSDM – Interactive Highway Safety Design Model
 ISATe – Enhanced Interchange Safety Analysis Tool
 TE – Traffic Engineer
 ASDE – Assistant Design Engineer
 ERMO – Enterprise Risk Management Office
 SASC – SafetyAnalyst Steering Committee
 CAT – Collision Analysis Tool

HQ
 Region
 HQ & Region



Design/ PS&E → Construction/ Maintenance

Jay Alexander
 Program Management Division Director

John C. Milton
 Enterprise Risk Management Director

John Nisbet
 State Traffic Engineer
 Traffic Operations Division Director

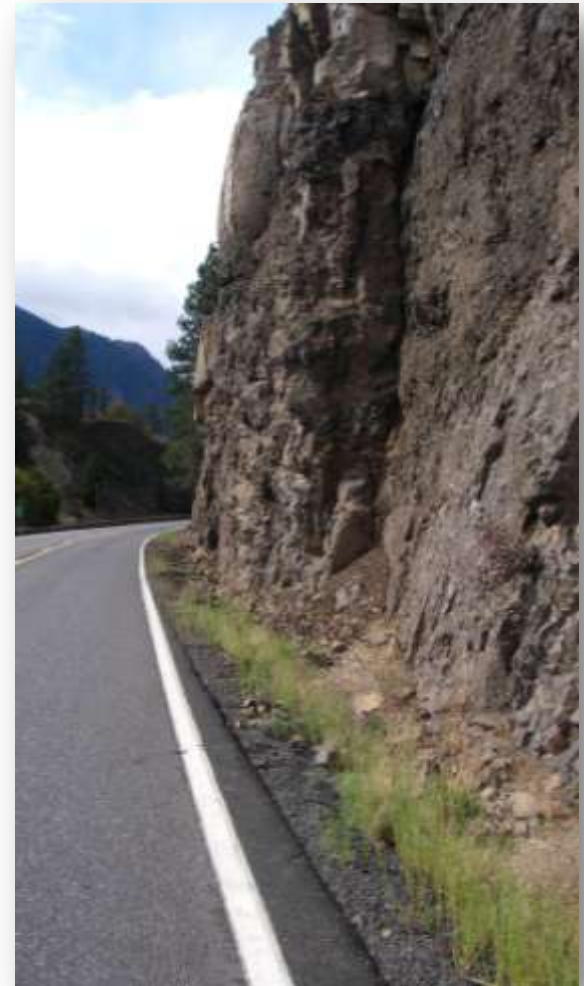
Pasco Bakotich III
 State Design Engineer
 Development Division Director

Sustainable Highway Safety Review Panel

- Expert review panel
 - Accepts or rejects project proposals
 - Shares knowledge and experience around the state
 - Multidiscipline members
 - Assists with improving consistency

Implementation efforts

- HSEC and HSIIG efforts
- Safety Analyst Software Tools
- Design Matrix Review Committee
- Roadside Feature Inventory Program (RFIP)
- HSM and Safety Analyst Training
- Safety Assessments
- CMF Usage at WSDOT
- WSDOT SPF Development (Penn State Research)



Challenges

- Keep all Sustainable Highway Safety efforts focused and on schedule
- Keep the implementation of the HSM and Safety Analyst scalable
- Manage tort exposure concerns
- Get Engineers comfortable using engineering judgment versus just applying standards
- Selecting and consistently applying the CMF's
- Budget reductions

Challenges

- Staff reductions
- Safety Analyst is very much data driven, there were challenges getting our data into it
- Cross walking WSDOT data into Safety Analyst data format

Lesson's Learned

- Appropriate training at the right time
- Timely development of design policy to allow for program and project considerations
- Development of tools
- Technical leads for each discipline
- IT and data office resource availability
- Provide the additional financial resources
- Keep implementation scalable, positive and productive

Next Steps

- Refinement of the implementation plan
- Team to continue working on selecting WSDOT approved CMF's and deviation process
- Work with Model Inventory of Roadway Elements (MIRE) on gathering minor leg counts
- Continue to expand use of Safety Analyst
- Continue with the development of more tools
- Develop hands-on training
- Develop users group to share knowledge

HSM Contacts

Safety Analyst-Implementation

Scott Zeller 360-705-7253

Crash Modification Factors

Mike Dornfeld 360-705-7288

Highway Safety Manual Training

Dan Sunde 360-704-6332

Safety Project Scoping Guidance

Matt Neeley 360-705-7143

Questions?