SAFE SPEEDS, SPEED MANAGEMENT, AND THE ROLE BIG DATA CAN PLAY

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Scientific Excellence to Serve Others

OVERVIEW

The toXcel team has supported local, state, and tribal jurisdictions on behalf of FHWA in developing speed management action plans using various data sources, including big data sources like cellular and connected vehicle data

- What role does speed play in VA crashes?
- How are speed limits set?
- How do we get to Safe Speeds?
- What does a comprehensive approach to SM look like?
- How can big data be used in speed management?
- How can we streamline countermeasure selection?
- How can we combine data sources to prioritize SM projects?
- How can we leverage big data to track KPIs

SPEED RELATED CRASHES IN VIRGINIA

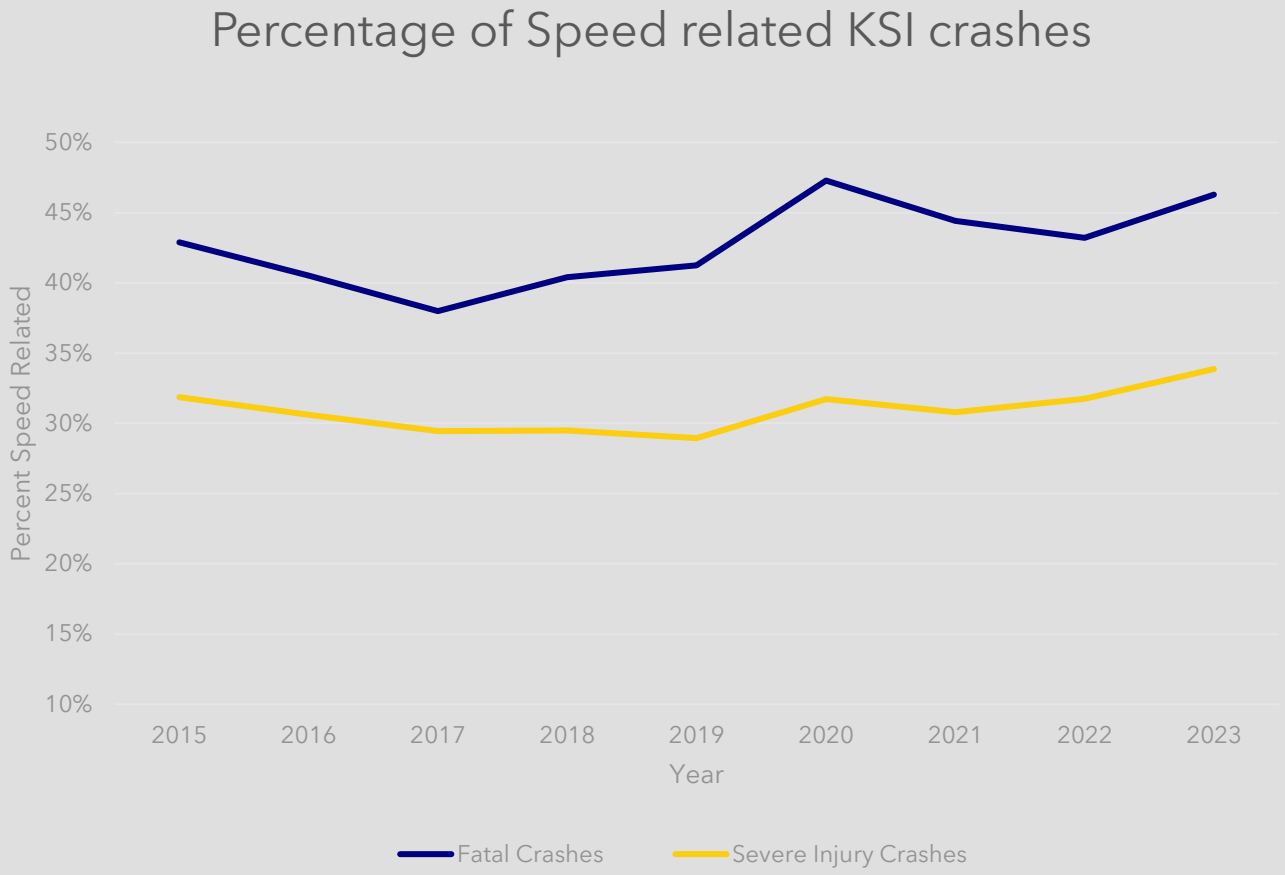
42%

Percent of Fatalities involving speed (2015-March 2023)

Fatal: 338.9/yr

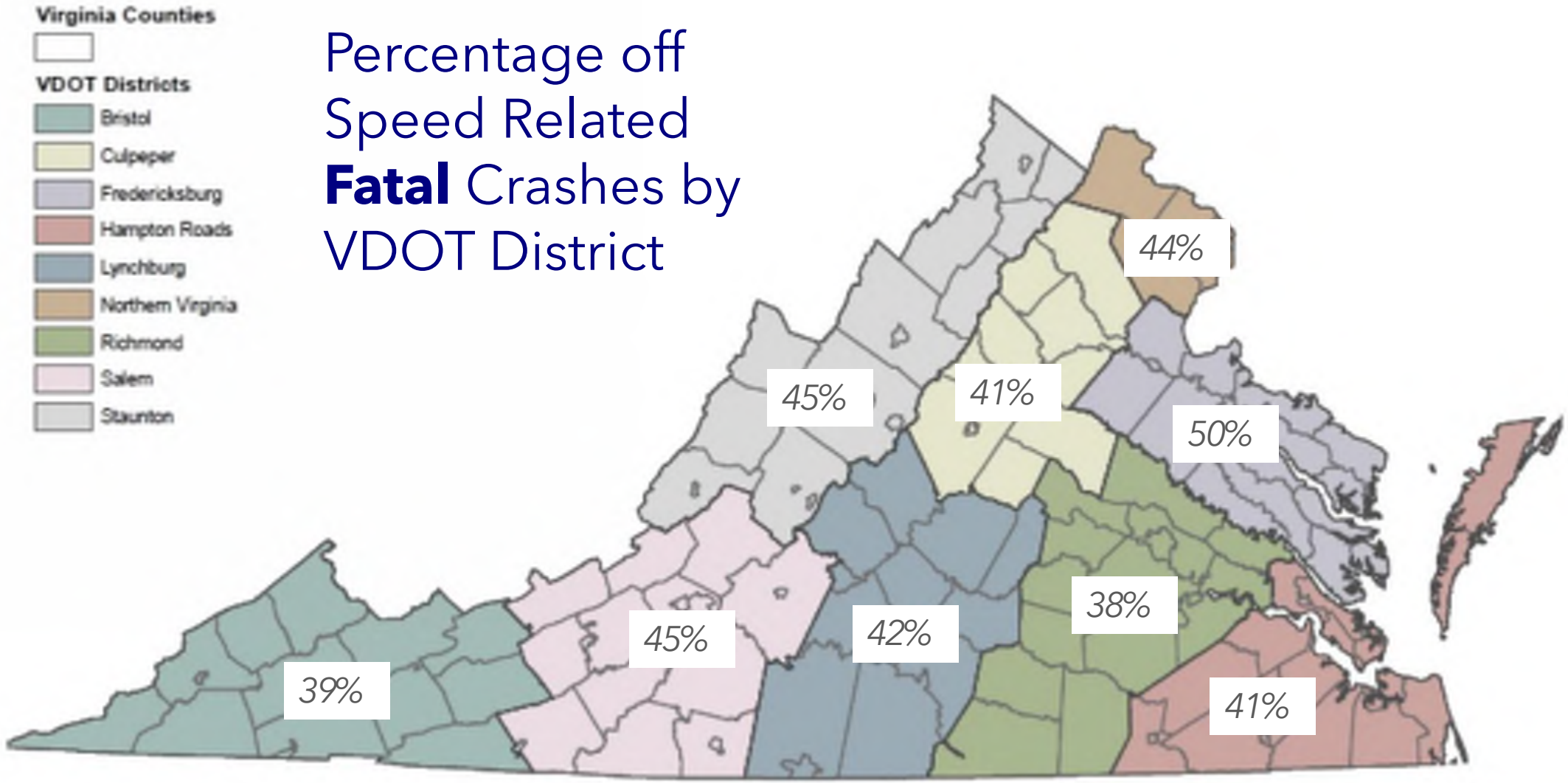
Severe Injury: 1,866.8/yr

Average fatal and severe injury speed related crashes each year (2015-2022)



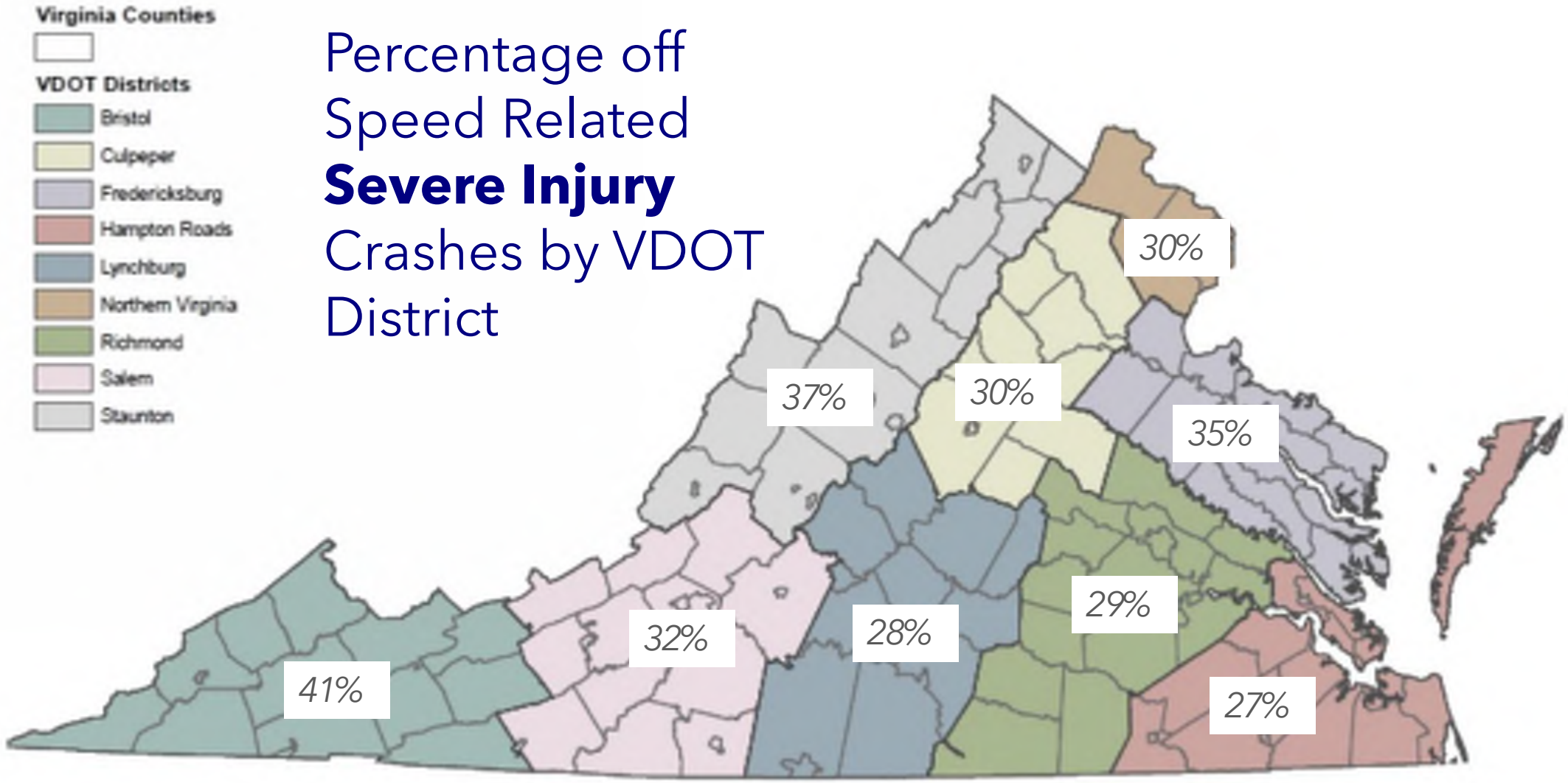
Source: VDOT Crash Portal Data

SPEED RELATED CRASHES IN VIRGINIA



Source: VDOT

SPEED RELATED CRASHES IN VIRGINIA



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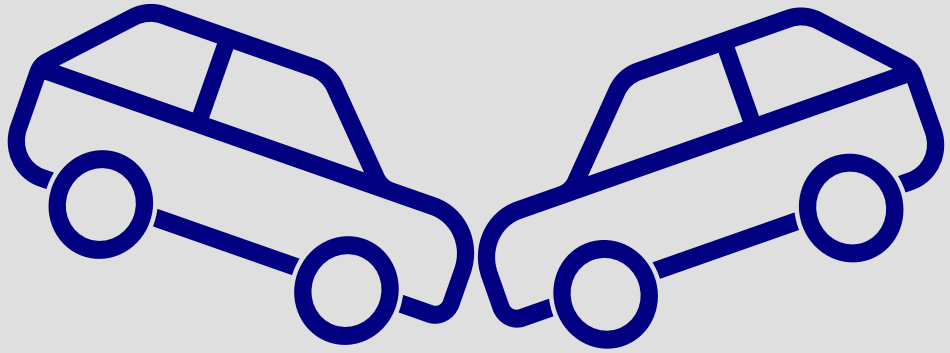
SPEED RELATED CRASHES



Speed Related Contributing Factors:

- Exceeding the posted speed limit
- Driving too fast for conditions

Speed Management:

- Define speed, speeding, and safety relationship
- Apply road design and engineering for appropriate speeds
- Set safe & reasonable speed limits
- Enforce and deter speeding using targeted technology
- Communicate effectively to high-risk drivers
- Engage traffic safety stakeholders for support and leadership

Source: USDOT SMAP

SPEED LIMIT SETTING

Engineering Approach

- Operating Speed Method
- Road Risk Method

Optimization

- Minimize societal cost including travel time, operating cost, crashes, noise, and air pollution
- Injury Minimization or Safe System Approach

Source: USLIMITS2 Presentation

METHODS FOR SETTING SPEED LIMITS

Engineering Approach:

- Two-step process for setting speed limits.
- Base speed limit determined based on factors like 85th percentile speed, design speed, etc.
- Adjustments made based on traffic and infrastructure conditions.
- Two approaches within the engineering approach: Operating Speed Method and Road Risk Method.

Expert System Approach:

- Speed limits set using a computer program.
- Program simulates the judgment and behavior of speed limit experts.
- Knowledge base contains accumulated knowledge and experience.
- Inference procedures apply knowledge to specific situations.

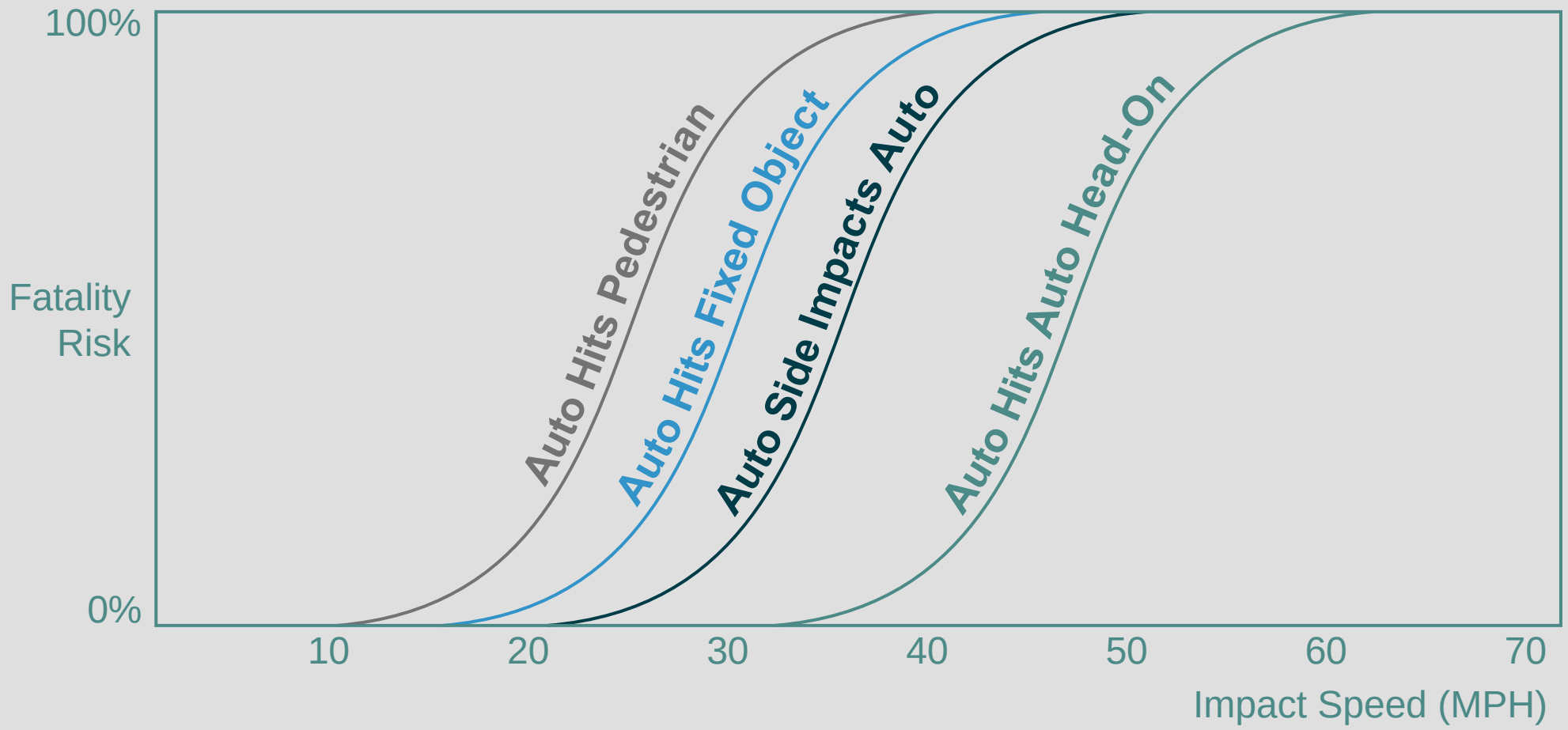
Optimization:

- Speed limits set to minimize societal costs of transport.
- Factors considered: travel time, vehicle operating costs, road crashes, traffic noise, and air pollution.
- Determination of optimal speed limits.

Injury Minimization or Safe System Approach:

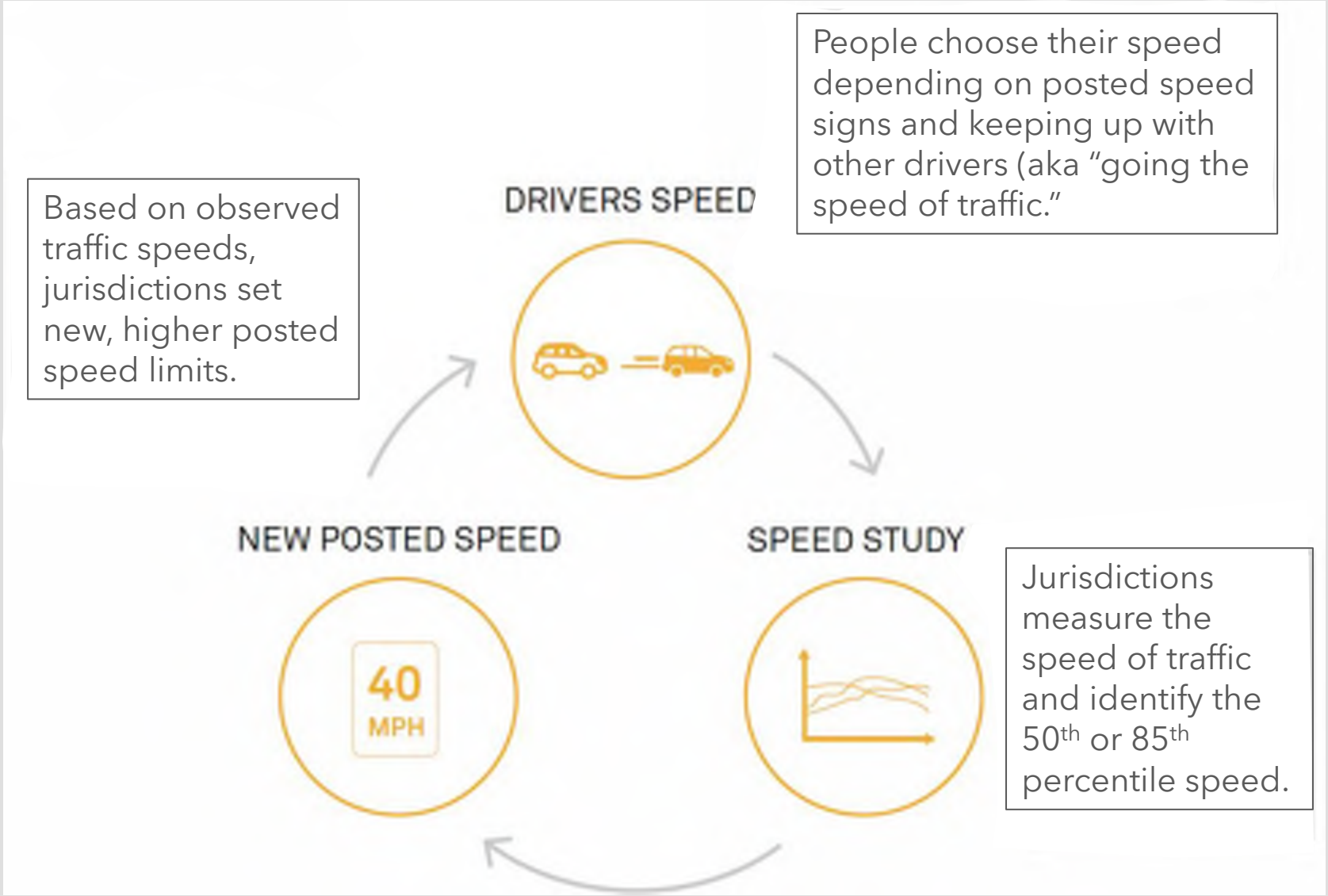
- Speed limits set based on crash types, impact forces, and human body tolerance.
- Focus on minimizing injuries and ensuring safety.

SAFE SPEEDS – SPEEDS THAT ARE SAFE FOR ALL ROAD USERS



Source: FHWA

IS THE 85TH PERCENTILE SPEED A SAFE SPEED? PROBABLY NOT



Source: NACTO

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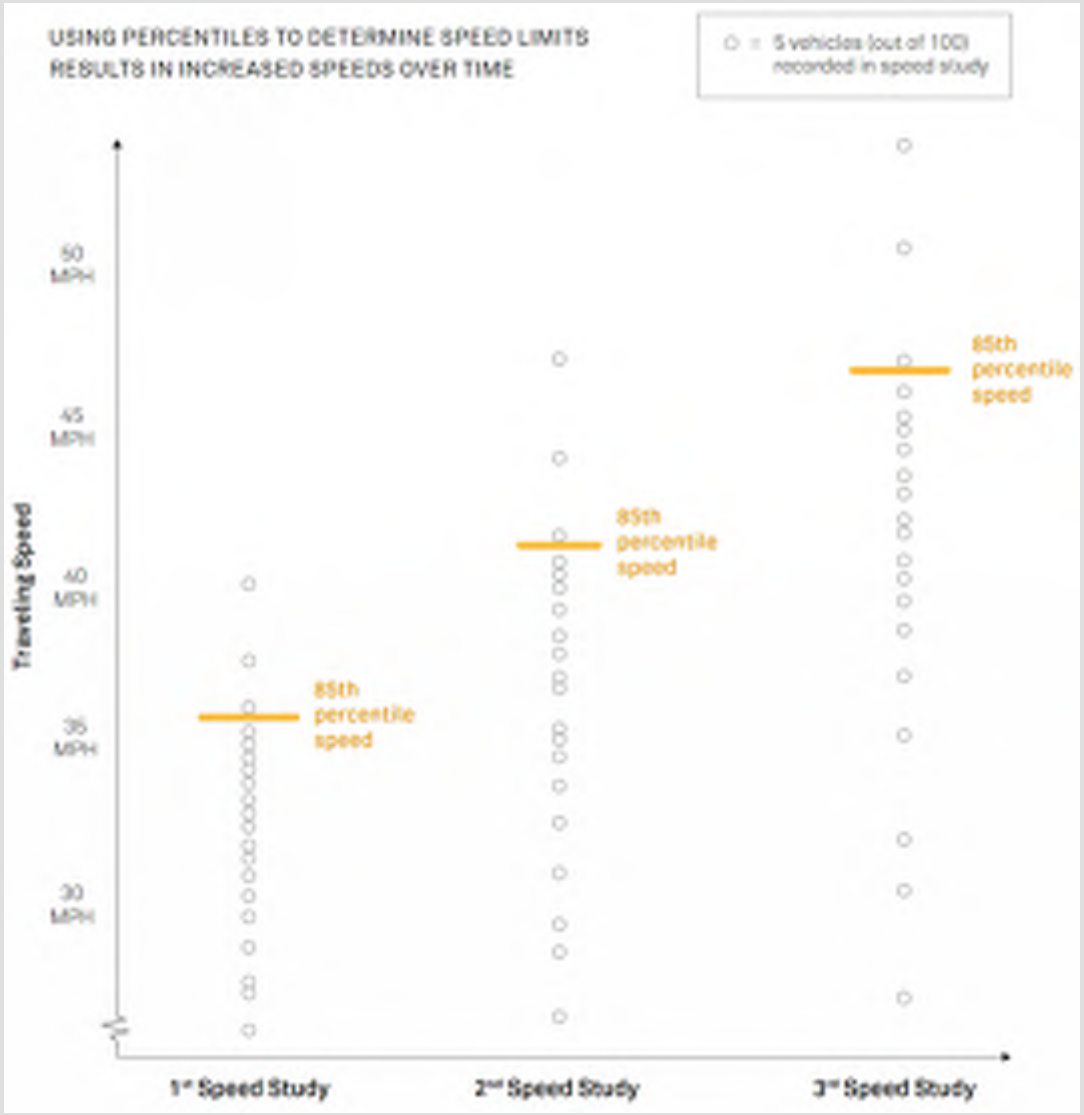


Source: NACTO

SPEED MANAGEMENT – A CASE STUDY IN BELLEVUE, WA

Collect Relevant Legislation & Guidance

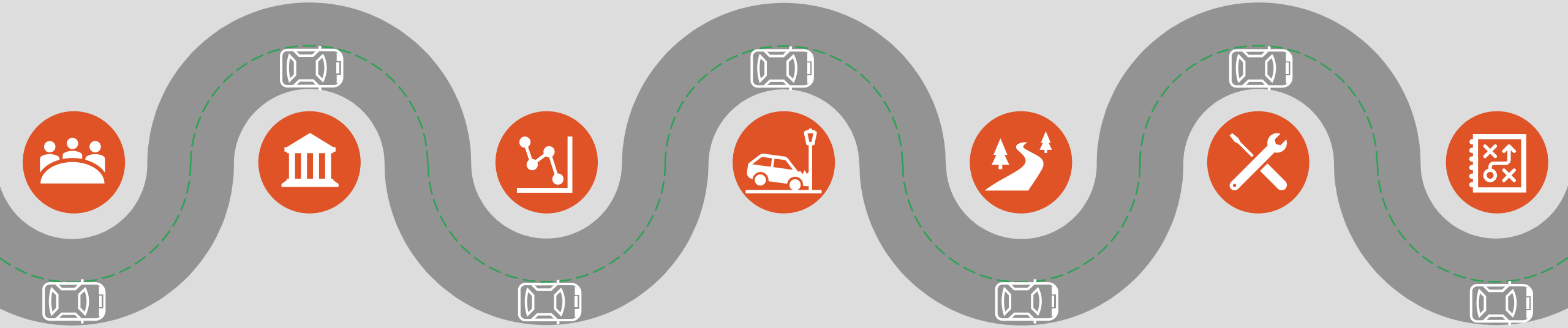
- Speed Limit Setting Guidance
- Speed Camera Legislation

Identify Speed Related Safety Concerns

- Speed-related crash hot-spots
- Speeds measured above safe speed

Develop Toolbox of Countermeasures

- Speed Trailers
- Public Outreach Campaign



Stakeholder Selection

- Local Transportation Officials
- Law Enforcement

Data Collection

- Speed Data
- Crash Data

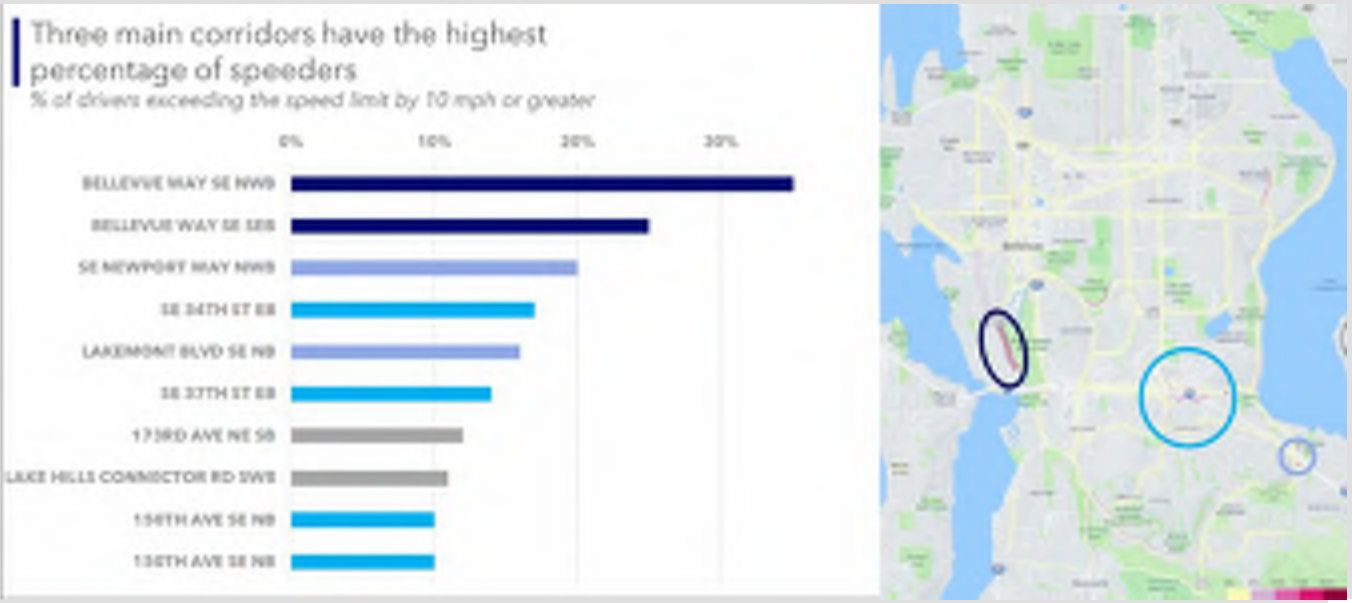
Identify Focus Typologies

- Roadway Context
- Access, Mobility, Speed

Create Action Items

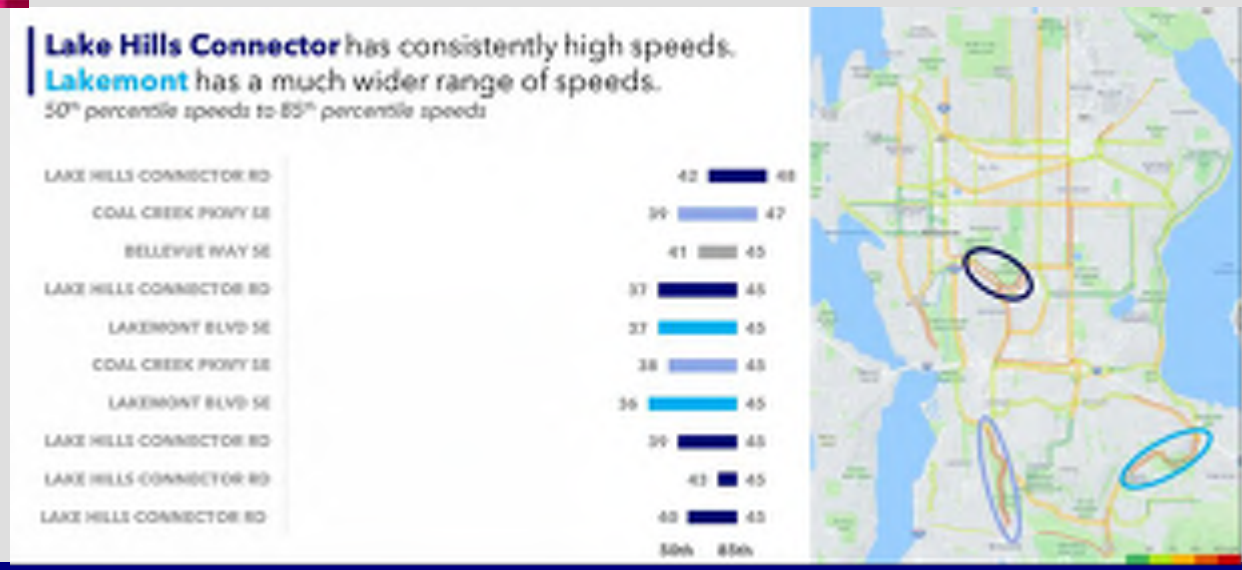
- Specific Actions
- Plan for implementation of each action

LEVERAGING BIG DATA TO IDENTIFY SPEED RELATED SAFETY CONCERNS



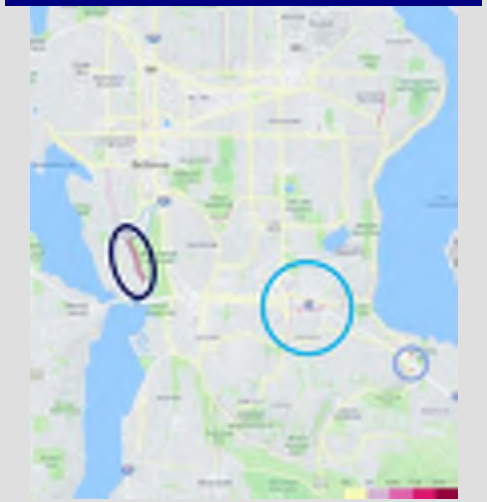
Identify corridors where drivers are going 10 MPH+ over the Speed Limit

Identify Speed Differential

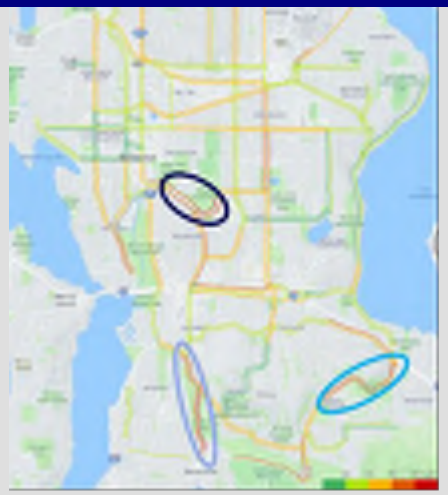


SPEED RELATED SAFETY CONCERNS

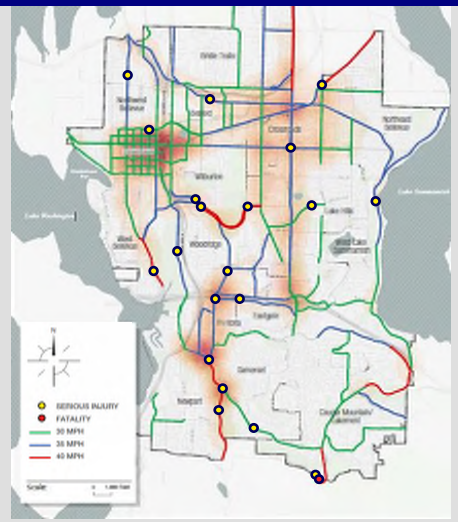
High % of Speeders



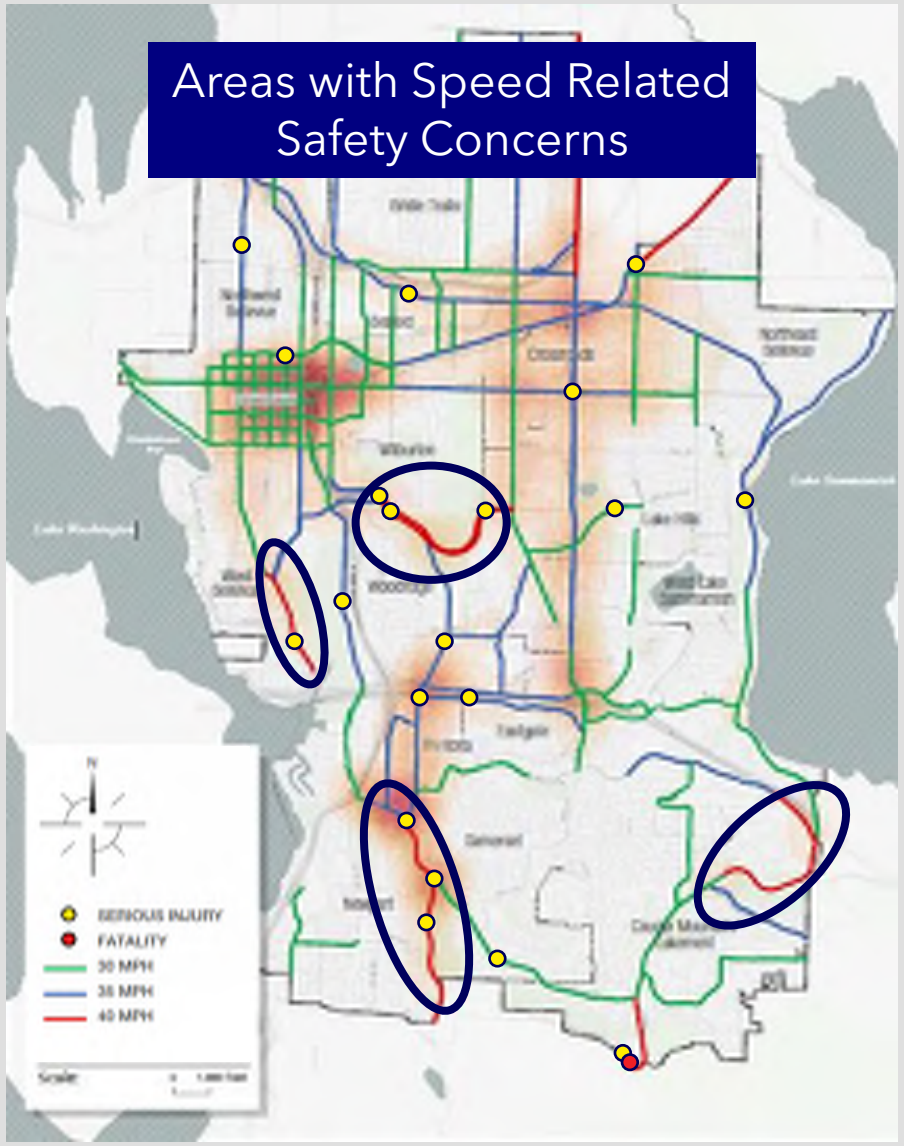
High Speed Differential



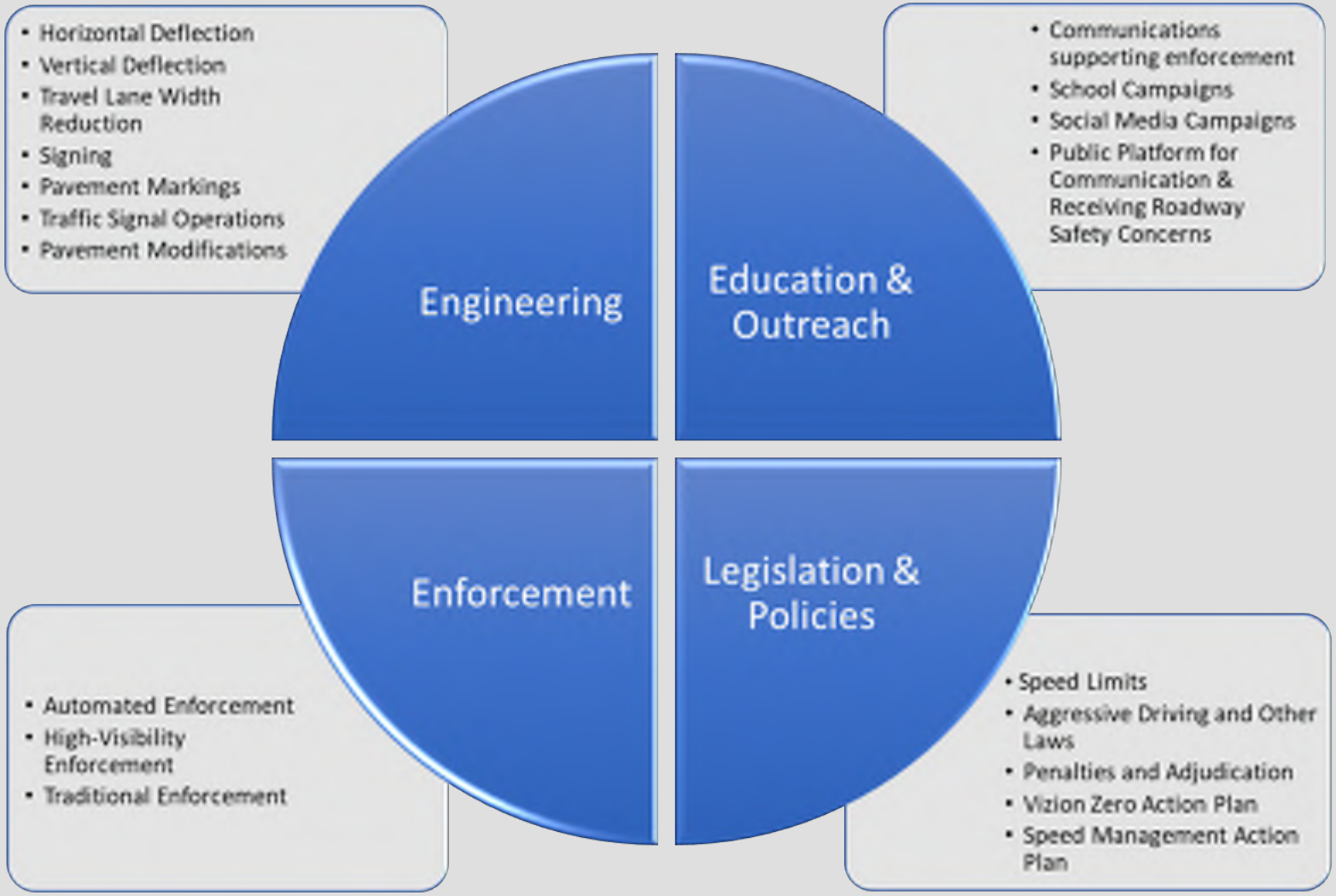
Speed Related Crashes



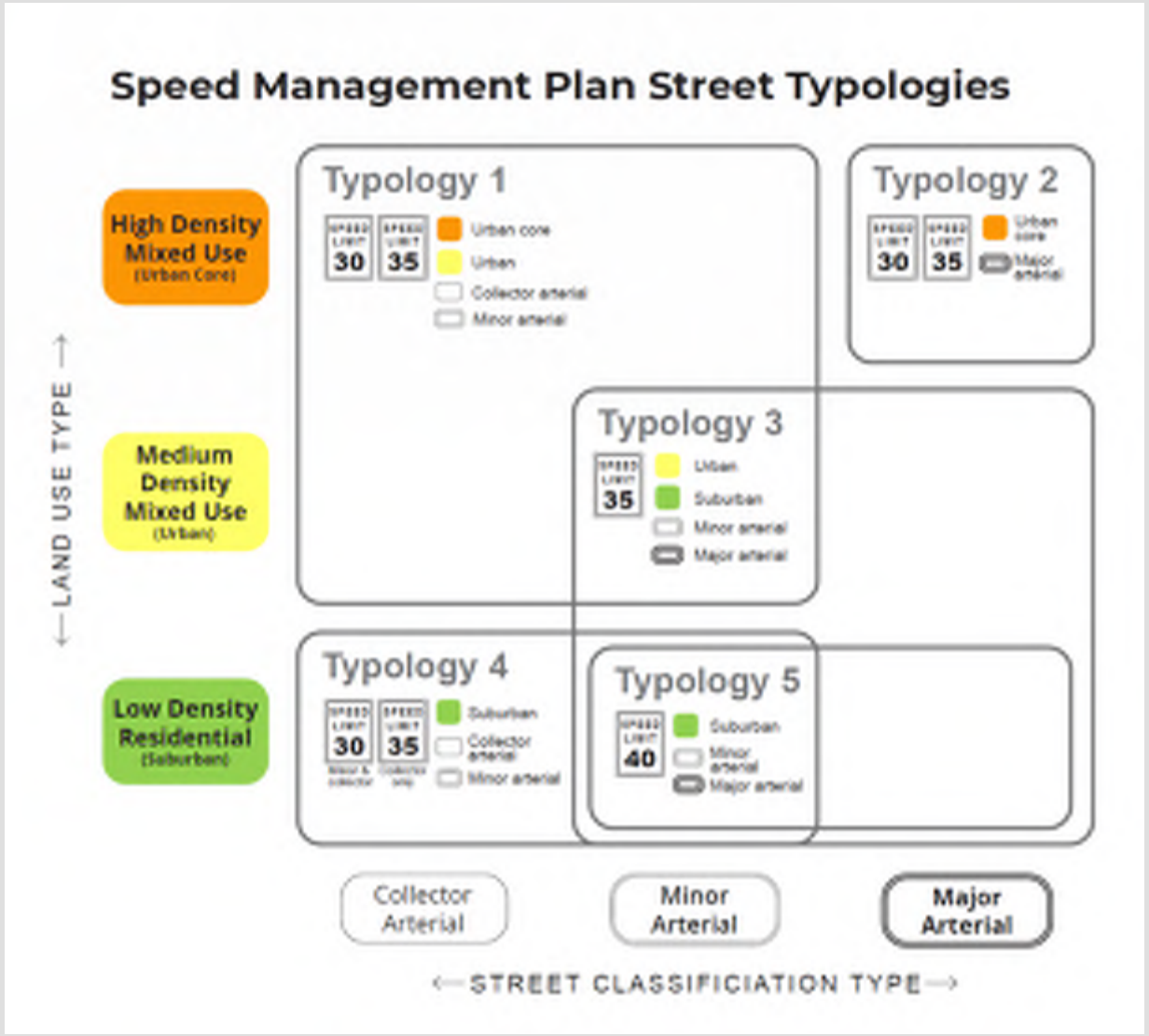
Areas with Speed Related Safety Concerns

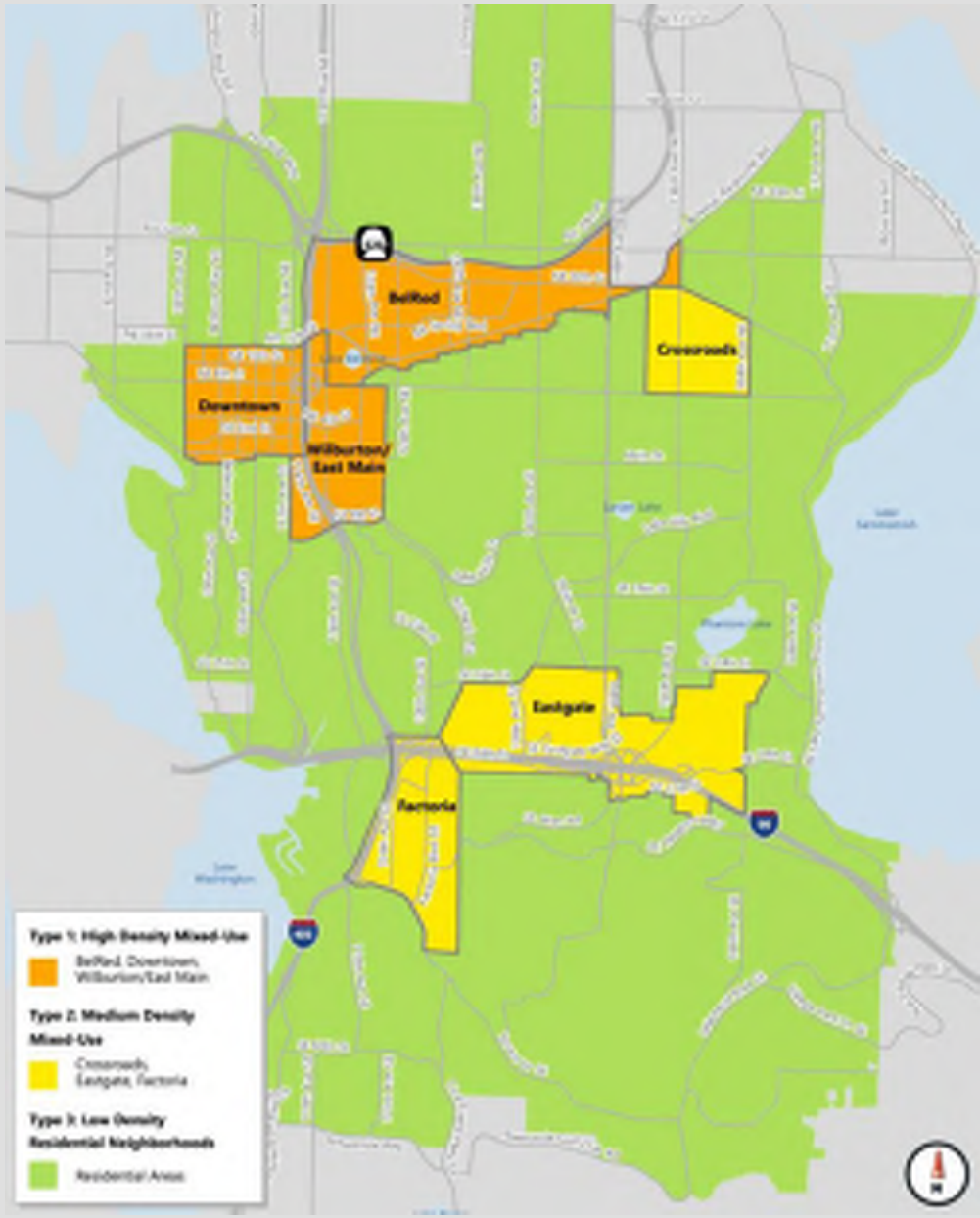


COUNTERMEASURE SELECTION



USING ROADWAY TYPOLOGIES TO STREAMLINE COUNTERMEASURE SELECTION





USING ROADWAY TYPOLOGIES TO STREAMLINE COUNTERMEASURE SELECTION

Speed Countermeasure Toolkit	Urban Core 30 MPH	Urban Core 35 MPH	Urban 30 MPH	Urban 35 MPH	Urban 40 MPH	Suburban 30 MPH	Suburban 35 MPH	Suburban 40 MPH
1. Engineering Strategy: Horizonal Deflection								
Lateral Shift	~	~	~	~		~	~	
2. Engineering Strategy: Vertical Deflection								
Raised Crosswalk	~	~	~	~		~	~	
Offset/Split Speed Table	~	~	~	~		~	~	
Raised Intersection	+	+	+	+		~	~	
Speed Cushion	+	+	+	+		~	~	
3. Engineering Strategy: Travel Lane Width Reduction								
Median Island	+	+	+	+	~	+	+	~
Travel Lane Width Reduction	+	+	+	+	+	+	+	+
4. Engineering Strategy: Signing								
Signs stating speeding ticket fine amount	+	+	+	+	+	+	+	+
5. Engineering Strategy: Pavement Markings/Modifications								
Advisory Speed marking ("SLOW", etc.)	+	+	+	+	~	+	+	~
6. Engineering Strategy: Speed Limit Setting/Signing								
Speed Feedback Signs	+	+	+	+	+	+	+	+
7. Engineering Strategy: Traffic Signal Operations								
Signal Coordination Set for Speed Limit	+	+	+	+	+	+	+	+
8. Enforcement Strategies								
Speed Safety Cameras (Automated Enforcement)	+	+	+	+	+	+	+	+
High Visibility Enforcement with Publicity Campaign	+	+	+	+	+	+	+	+

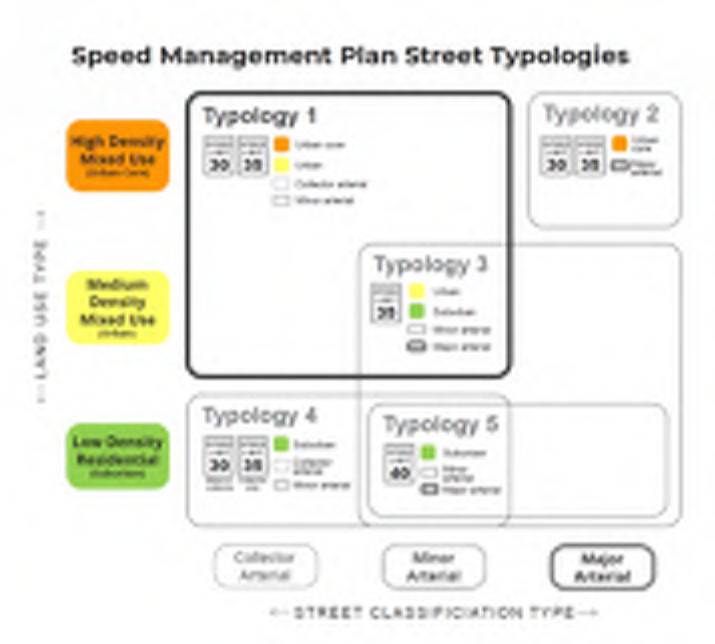
+ = Typically appropriate
~ = Sometimes appropriate;
No marking indicates inappropriate and shouldn't be used on the corridor.

USING ROADWAY TYPOLOGIES TO STREAMLINE COUNTERMEASURE SELECTION

Typology One:

Example: NE 10th Stree in Downtown Bellevue

Context			Functional Classification			Speed Limit		
Urban Core	Urban	Suburban	Major Arterial	Minor Arterial	Collector Arterial	30 MPH	35 MPH	40 MPH
X	X			X	X	X	X	



USING ROADWAY TYPOLOGIES TO STREAMLINE COUNTERMEASURE SELECTION

Typology One Example Countermeasures:

High Vis. Crosswalk

Raised Crosswalk

Lane Width Reduction

Corner Bulb-Out

High Vis. Enforcement

HFST

Median Island

On-Street Parking

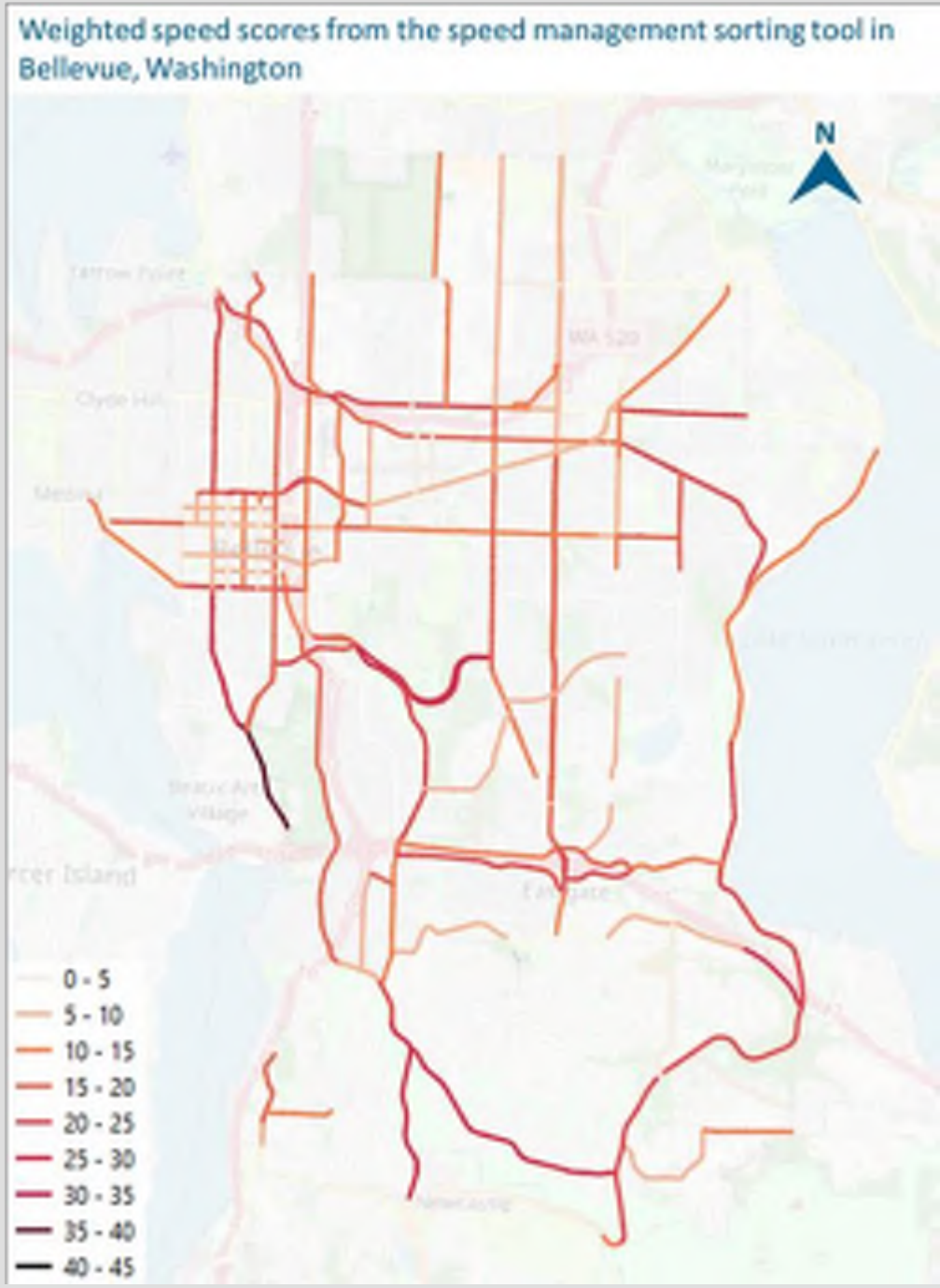
Road Diet

Speed Safety Cameras

Speed Feedback Sign

PRIORITIZING CORRIDORS

	PARAMETER
Crash Data	Along the HIN?
	# Serious Injury Crashes (10 years)
	# Fatal Injury Crashes (10 years)
Speed Data from ClearGuide	% of Speeders 10 mph+ over speed limit
	Speed Differential
Equity	Equity Composite Index
Bicycle & Pedestrian Information	Priority Bicycle Corridor
	Level of Traffic Stress
	Sidewalk Presence
	Crosswalk Presence



USING DATA TO MONITOR KEY PERFORMANCE INDICATORS

- Baseline year values
- Determine 2025 & 2030 goals
- Set interim check point values

	All Bellevue Arterials			Corridors Post-SM Measure Implementation
	2022 Base Year Values	2025 Goal	**2030 VZ Goal**	1-Year Post Implementation
Reduction in Speed Related KSI Crashes	**5.36 Cr/Year**	3.8 Cr/Year	**0 Cr/Year**	100% Reduction
% Drivers Exceeding Speed Limit 6+ MPH	**7.6%**	6.1%	**3.8%**	50% Reduction
% Drivers Exceeding Speed Limit 10MPH+	**2.3%**	1.6%	**0%**	100% Reduction
Gap in Level of Traffic Stress Goal in MIP	**46.2%**	32.3%	**0%**	Meets LTS Goal in MIP

ABOUT US

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