

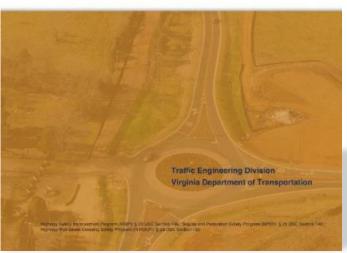
Highway Safety Improvement Program Systemic Application

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December 2016







- Coordinated with the 2012-2016
 Strategic Highway Safety Plan (SHSP)
- Involves a comprehensive, data driven approach
- Funds projects that implement countermeasure(s) to address severe crashes or systemic risk factors on any public road



HSIP Project Requirements:

- 1. Advance program purpose of reducing severe crashes, or risks to transportation users.
- 2. Address hazardous situations through good safety planning and identified by safety data driven network screening.
- 3. Comply with the VDOT design guidelines and standards.
- 4. Upgrade non-standard safety features to existing standards if related to the targeted crashes.



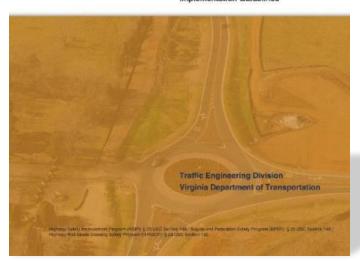
HSIP funds are available for two types of projects:

- 1) Locations or corridors where a known, 'substantive safety' problem exists as indicated by location-specific data on severe crashes; or
- 2) Locations where a risk based analysis has demonstrated the need for low-cost, widely implemented systemic countermeasures that target high-risk roadway features.









HSIP Implementation process involves:

- The identification of high risk locations
- An analysis of problems and countermeasures
- The prioritization and scheduling of improvement projects



Highway Safety Program (HSP)

Highway Safety Programs













Bicycle and Pedestrian Safety Program (BPSP)

Highway-Rail Grade Crossing Safety Program (H-RGCP)

Local Agency Safety Program (LASP)



Highway Safety Program (HSP)

HSP Traditional Projects

HSP Systemic **Projects**

Highway Safety Programs







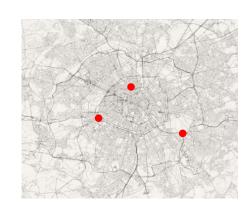




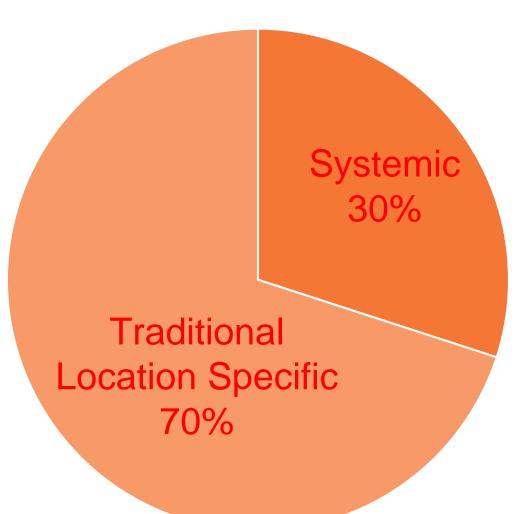


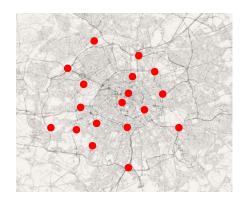


VDOT HSIP Program Funding Target



Traditional Location-Specific





Systemic



Systemic HSP Application Process

Step 1: Determine Focus

(crash and/or facility type)

- •Focus Crash Type (angle, rear-end, etc.)
- Focus Facility Type (unsignalized intersections, undivided corridors, etc.)

Step 2: Analyze Risk Factors

- •Determine what roadway elements are associated with those focus crash or facility types
- •Example risk factors can be found in the HSM

Step 3: Select Countermeasures •Select countermeasures to address the focus crash/facility type and corresponding risk factors.

Steps 4 - 8:
Determine number
of Locations

- •Select the total number of locations that have the selected risk factors present.
- Select a crash threshold.
- •Determine the number of locations that meet that threshold.
- Based on the available budget or other constraints, determine the deployment level estimate.

Step 9: Determine Targeted KAB Crashes •Determine the number of KAB crashes that will be addressed at the Systemic Improvement Deployment Locations.



Systemic Form Example



V-C	OT	Highway S Improveme	afety ent Progra	am			Proj	OFFICE USE ONLY lect #: xxxxxxxxxxx Receive #:xxxxxxxx HSIP File:xxxxxxxx		osalRev(7/15/14)
Systemic 1	mproveme	ents Prop	osals FY2	016-17					Repeat	
Agency:			Project Sponsor:			VDOT District:	Date Receiv	ed: Month x, 2016 Area Location	Stud	ly Period
street Address:			City, State, Zip:		VDOT Region		Small Urban (5,000 - 49,999		(Begin and End Dates)	
County	System	Traffic C	ontrol	Function	al Class Code	Email:		Fed. Sys. Code	Prog	ram Type
		No Traffic	Control	Urban	Interstate	Tel:		NHS	R	egular
Focus Crash Type	Risk Factor	Proposed System	ic Improvement	Total Locations	Crash Threshold (# crashes in # years)	Locations meeting threshold	Deployment Level Estimate (%)	No. of Systemic i		Targeted KAB Crashes (over 5 years)
Roadway_Departur e	Inadequate delineation (signs, pavement markings, delineators)	Curve warning warning, che		20	12 crashes in 5 years	10	50%	5		14
Focus Facility Type	Excessive speed	Transverse ru	imble strips	5	5 crashes in 5 years	5	80%	4		8
Curve	Excessive speed	Dynamic warning speed app	g sign for high- proaches	5	8 speed related crashes in 5 years	3	50%	2		8
			Cost: Comp	oute the econ	nomic cost of e					
Proposed Systemic Improvement Curve waning signs	Service Life	Total PE + \$5,000	Per Unit	Per Unit	Total	Contigency (10%)	Annual Maintenance	Total Present Value Cost	Years of Crash Data:	Discount Rate
(advance varning, cheurons, etc.)	20	\$ 6,000.00	s .	\$ 1,500.00	\$ 7,500.00	\$ 750.00	5 -	5 14,250.00		
Transverse rumble strips	6	\$ 6,500.00		S 1,500.00	\$ 6,000.00	\$ 600.00	s -	5 13,100.00	5	0.03
Dynamic varning sign for high-speed approaches	5	\$ 35,000.00	S 10,000.00	\$ 5,000.00	\$ 7,500.00	\$ 750.00	\$ 300.00	\$ 54,623.91		
Ber	nefit: Compute (the economic l	enefit of ea	ch improven	nent		Ben	efit-Cost Rati	io	
Proposed Systemic Improvement	CMF Value (For KAB Crashes)	Applicable Crash Types	Include CMF in Final Analysis? (yes/no)	Source	Notes	Include in Analysis? (yes/no)	Present Value of Benefit	Present Value of Cost	B/C by CMF	B/C Ratio
Curve warning signs (advance	143 0.84	All	No Yes	inghouse org/detail		Yes	\$ 1.979.537.30	\$ 14,250.00	138.9	
varning, chevrons,			No			163	3 1,373,337.30	3 14,230,00	130.9	
ransverse rumble trips			No							
	0		No No			No	s -	٠ .	0.0	138.9
Dynamic warning sign for high- speed approaches	0		No			No	☑ .	\$.	0.0	
	0		No No							
road and urban proj administration time shall include a minir	lution is required up lects 2. VDOT District to project managed b num of \$5,000 for VD	and Central Office or localities. Safety I	personnel charge	review and	Project Schedule (After STIP Approval)	Begin PE	Target Advert.	Begin Construction	Estimated Complete Date	Type of Plan
	inistrated by : or with Authority to E	vnend 10% Matchi	na Funds							
Signature or Sponso Name (Print)	and Additionly to t	Aprilio 1029 matchi		Signature				Date		
	oviding the 10 percei rogram@virginiadot		the sponsor shou	uld be able to sup		if state funding b	ecomes unavailat	ble. Please submit	an electronic	copy of this
Mailing	rvyrume vuganudot	y ana mawa paj	Counties, Tow							
Attn: HSP Systemic Mr. Raymond Khour State Traffic Enginee	r	al	County, Town an	d City Staff are req	uested to submit propo a project spansor. VD					
Virginia Department 1401 East Broad Stre	of Transportation et Richmond, Virgini	a 23219								



Enter general project information

		Highway Safety Improvement Progra	FOR OFFICE USE ONLY Project #: xxxxxxxxxxx Receive #:xxxxxxxxx	HSIP-Proposal Rev (7/15/14) Priority #:				
Virginia Depa	rtment of Transportation	HSIP File:xxxxxxxx	Filolity #.					
Systemic	Systemic Improvements Proposals FY2016-17 Date Received: Month x, 2016							
Agency:		Project Sponsor:		VDOT District:	Area Location Code	Study Period (Begin and End Dates)		
Street Address:		City, State, Zip:		VDOT Region:	Small Urban (5,000 - 49,999)			
County	System	Traffic Control	Functional Class Code	Email:	Fed. Sys. Code	Program Type		
		No Traffic Control	Urban Interstate	Tel:	NHS	Regular		



Enter focus crash and facility type

Focus Crash Type	Risk Factor	Proposed Systemic Improvement	Total Locations	Crash Threshold (# crashes in # years)	Locations meeting threshold
Roadway_Departure	Inadequate delineation (signs, pavement markings, delineators)	Curve warning signs (advance warning, chevrons, etc.)	20	12 crashes in 5 years	10
Focus Facility Type	Excessive speed	Transverse rumble strips	5	5 crashes in 5 years	5
Curve Excessive speed		Dynamic warning sign for high-speed approaches	5	8 speed related crashes in 5 years	3
	-				



Select the proposed systemic improvement

Focus Crash Type	Risk Factor	Proposed Systemic Improvement	Total Locations	Crash Threshold (# crashes in # years)	Locations meeting threshold
Roadway_Departure	Inadequate delineation (signs, pavement markings, delineators)	Curve warning signs (advance warning, chevrons, etc.)	20	12 crashes in 5 years	10
Focus Facility Type	Excessive speed	Transverse rumble strips	5	5 crashes in 5 years	5
Curve Excessive speed		Dynamic warning sign for high-speed approaches	5	8 speed related crashes in 5 years	3



Determine number of locations that will be treated.

Proposed Systemic Improvement	Total Locations	Crash Threshold (# crashes in # years)	Locations meeting threshold	Deployment Level Estimate (%)	No. of Systemic Improvement Deployments	Targeted KAB Crashes (over 5 years)
Curve warning signs (advance warning, chevrons, etc.)	20	12 crashes in 5 years	10	50%	5	14
Transverse rumble strips	5	5 crashes in 5 years	5	80%	4	8
Dynamic warning sign for high- speed approaches	5	8 speed related crashes in 5 years	3	50%	2	8



Enter targeted KAB crashes

Proposed Systemic Improvement	Total Locations	Crash Threshold (# crashes in # years)	Locations meeting threshold	Deployment Level Estimate (%)	No. of Systemic Improvement Deployments	Targeted KAB Crashes (over 5 years)
Curve warning signs (advance warning, chevrons, etc.)	20	12 crashes in 5 years	10	50%	5	14
Transverse rumble strips	5	5 crashes in 5 years	5	80%	4	8
Dynamic warning sign for high- speed approaches	5	8 speed related crashes in 5 years	3	50%	2	8



Calculate benefit-cost ratio

Benefit: Compute the economic benefit of each improvement								
Proposed Systemic Improvement	CMF Value (For KAB Crashes)	Applicable Crash Types	Include CMF in Final Analysis? (yes/no)	Source	Notes			
Curve warning	1.43	All	No	inghouse.org/detail	2 star CMF			
signs (advance	0.84	All	Yes	inghouse.org/detail				
warning, chevrons, etc.)			No					
Transverse rumble			No					
strips	0		No					
	0		No					
Dynamic warning sign for high-								
speed approaches	0		No					
specu approacties	0		No					
	0		No					



How CMF's are Applied

Quick Search

As noted on the CMF Clearinghouse:



- It is unlikely the full effect of each countermeasure would be realized.
- Unless the countermeasures act completely independently, multiplying several CMFs is likely to overestimate the combined effect.



How CMF's are Applied

As noted on the CMF Clearinghouse:

Max CMF multiplied = 3

Benefit-Cost Ratio									
Include in Analysis? (yes/no)	Present Value of Benefit	Present Value of Cost	B/C by CMF	B/C Ratio					
Yes	\$ 1,979,537.30	\$ 14,250.00	138.9						
No	s -	\$ -	0.0	138.9					
No	s -	s -	0.0						





Questions?

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