

Research Update: Bicycle and Pedestrian Topics

May 16, 2017 – Statewide Bicycle and Pedestrian Advisory Committee
Peter Ohlms, AICP
Research Scientist

Ped/Bike Research Update: TPRAC

- New: How's that Diet Working: Performance of Road Diets
 - Safety and operational performance
 - Other than the well-studied Lawyers Road
 - Fairfax County and possibly elsewhere
- New: Planning Corridors for Transit Signal Priority and Pedestrians
 - Planning-level analysis to identify Virginia corridors where transit operational measures are likely to work
 - Strategies to maintain pedestrian quality of service



Ped/Bike Research Update: TPRAC

- Lower-ranking / not planned
 - Assessment of Bicycle Infrastructure Projects
 - Next Stop – Improving Bus Stop Accessibility
 - Improving Inventory of Bicycle and Pedestrian Facilities Using Crowdsourced Data
- Completed: When Main Street Is a Highway
 - Case studies, transportation-land use recommendations
 - Related to VDOT Arterial Management Plan process
 - vtrc.virginiadot.org/PubDetails.aspx?id=298263



Ped/Bike Research Update: TPRAC

- Ongoing: Innovative Pavement Markings to Facilitate Bicycle Travel
 - Re-reviewed some data; analysis remains
- Ongoing: Assessing the Feasibility of a Pedestrian and Bicycle Count Program in Virginia
 - Survey underway of local governments, PDCs, MPOs
 - Interim report expected this summer



Ped/Bike Research Update: TASRAC

- Draft final: Development of a Toolbox of Pedestrian Systemic Safety Countermeasures for Widespread Deployment in Virginia
 - Ben Cottrell and Ram Venkatanarayana

#	Category	Countermeasure Name	Cost	CMF	Impact	Other Measures of Effectiveness (MOEs)
1	Signs, Markings	Pedestrian warning/zone signs	\$25/sign+\$45/installation(NDV2008);\$220-300 ea(PBS)	0.85-0.96(CMFCH)	Medium	Effective for yielding; CMFCH 2005 unrated study looks at ped+all crashes;Low effectiveness per R2011; per NDV2008, no significant improvement in either motorist or pedestrian MOEs.
2	Signs, Markings	(Pedestrian activated) RRFB (Rectangular Rapid Flashing Beacon) system	\$14-22K ea(RRFB)(PBS)	0.82 (D2015); 0.526 (NCHRP841)	High	20-94% improvement in driver yielding behavior; 3-10% reduction in collisions for all injury types; significant reduction in vehicle/ped conflicts and considered among the most effective for increasing ped safety;
3	Signs, Markings	Advance warning for motorists (ped-activated, flashing yellow beacons)		0.82 (D2015)		Highly effective per R2011; per NDV2008, ped activated flashing yellow beacon results in significant increase in motorists' yielding distance, significant reduction in percent of drivers blocking crosswalk, and significant improvement in driver yielding behavior.
4	Signs, Markings	Yield Here to Pedestrian signs			Medium	67% reduction in conflicts
5						

Ped/Bike Research Update: TASRAC

1	A	B	C	D	E
#	Category	Countermeasure Name	Source	Images	
1	Signs, Markings	Pedestrian warning/zone signs	VA MUTCD; NDV2008		
2	Signs, Markings	(Pedestrian activated) RRFB system	PBS; R2011	 <p>When implemented in appropriate locations, rectangular rapid flashing beacons, such as the one shown here, are a highly effective countermeasure for improving pedestrian safety.</p>	
3	Signs, Markings	Advance warning for motorists (ped-activated, flashing yellow beacons)	NDV2008	 <p>Figure 25. Overhead Flashing Beacons Tested in Las Vegas</p> <p>Figure 26. Activated Flashing Beacons Used in Las Vegas (Left) and San Francisco (Right)</p>	

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Additional Slides



Development of Toolbox for Pedestrian Systemic Safety Measures

Ram Venkatanarayana, Ph.D.

Ben Cottrell, P.E.

Motivation

- Mark Cole → TASRAC # 1 priority FY17
- Virginia Pedestrian Crash Assessment
 - 13% of total highway fatalities in 2014
- Focus on low-cost, systemic countermeasures
 - Design/infrastructure, traffic control



Literature

- TE memos
- Pedbikeinfo.org
- FHWA reports
- CMF Clearinghouse
- TRID (NCHRP/state reports, papers)



Toolbox - tabs

- Overview
- Selected Countermeasures
- Figures of Countermeasures
- Additional Countermeasures
- References



Overview

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PEDESTRIAN CRASH COUNTERMEASURES TOOLBOX

The spreadsheet provides a list of low-cost, systemic pedestrian crash countermeasures, their costs and benefits from the literature. The scope was limited to engineering countermeasures that were low cost (less than \$20,000 per installation), exhibiting potential for systemic deployment (avoiding narrow scope such as rail road crossings, or severely inhibiting access), non-temporary (such as for work zones), and not a focus of other special programs (such as Safe Routes To School). This project scope was focused on engineering countermeasures. Enforcement and driver/pedestrian education countermeasures were beyond the scope of this project.

SPEADSHEET TABS

The spreadsheet has five tabs:

Overview

This tab describes the spreadsheet, its purpose and how to use it.

Selected Countermeasures

The main feature of this spreadsheet is the “Selected Countermeasures” tab. This tabulation format closely mirrored results documented in one of the technical papers reviewed for this project (Kronenberg et al., 2014). The effort began with a table from the Kronenberg paper; then the table was revised and expanded. From the literature search, a total of 52 countermeasures were deemed relevant to the purpose and scope of this effort.

The countermeasures were categorized into one of these six groups:

- (1) Signs, Markings
- (2) Pedestrian Signals
- (3) Lighting

Selected Countermeasures

	A	B	C	D	E	F	G
1	#	Category	Countermeasure Name	Cost	CMF	Impact	Other Measures of Effectiveness (MOEs)
1	1	Signs, Markings	Pedestrian warning/zone signs	\$25/sign+\$45/installation(NDV2008);\$220-300 ea(PBS)	0.85-0.96(CMFCH)	Medium	Effective for yielding; CMFCH 2005 unrated study looks at ped+all crashes;Low effectiveness per R2011; per NDV2008, no significant improvement in either motorist or pedestrian MOEs.
2	2	Signs, Markings	(Pedestrian activated) RRFB (Rectangular Rapid Flashing Beacon) system	\$14-22K ea(RRFB)(PBS)	0.82 (D2015); 0.526 (NCHRP841)	High	20-94% improvement in driver yielding behavior; 3-10% reduction in collisions for all injury types; significant reduction in vehicle/ped conflicts and considered among the most effective for increasing ped safety;
3	3	Signs, Markings	Advance warning for motorists (ped-activated, flashing yellow beacons)		0.82 (D2015)		Highly effective per R2011; per NDV2008, ped activated flashing yellow beacon results in significant increase in motorists' yielding distance, significant reduction in percent of drivers blocking crosswalk, and significant improvement in driver yielding behavior.
4	4	Signs, Markings	Yield Here to Pedestrian signs			Medium	67% reduction in conflicts
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	H	I	J	K
1	Research Notes	Source(s)	Speed Range (Low: <=25; Med: 30-45; High: >45)	Location Type
1	Compliance noted but change not quantified (80-90% yielding overall) (No details on what specific signs are meant here; advanced sign? Peds/peds on xwalk/either with flashing lights);VA MUTCD W11-2, W16-2P and W16-2aP use flourescent yellow-green background (see figure 9B-3 (VA))	KWDW2015;PBS;NCHRP500;NDV2008;CMFCH;R2011	Any	Both
2	References PEDSAFE and FHWA-MUTCD; PBIC lit review cites Pedsafe II project in San Francisco, flashing beacons are highly effective (standard practice is to use RRFB in combination with crosswalks - either regular or high visibility); D2015 estimates RRFB CMF=0.82, expecting it to be similar to the advance warning for motorists via flashing yellow beacons.	KWDW2015;PBS;NDV2008;R2011	Any	Both
3	References PEDSAFE and FHWA-MUTCD; PBIC lit review cites Pedsafe II project in San Francisco, flashing beacons are highly effective (standard practice is to use RRFB in combination with crosswalks - either regular or high visibility); D2015 cites literature for CMF=0.82.	NDV2008;NCHRP500;R2011	Any	Both
4	SFMTA, cites walkinginfo.org; split out from "Advance stop or yield lines/red visibility curbs"; FHWA evaluates together with warning signs, SFMTA does not. Research indicates reduction in overall conflict, but does not specify reduction in collisions	KWDW2015	Any	Both
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Six Categories

1. Signs/Markings (1-16);
2. Pedestrian Signals (17-30);
3. Lighting (31-33);
4. Speed Management/Traffic Calming (34-39);
5. Design (40-50);
6. Transit (51-54)



	A	B	C	D	E
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1	#	Category	Countermeasure Name	Source	Images
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59 **Combo Images**

60 Advanced yield line, yield sign, pedestrian sign, RRFB, lighting and high-visibility crosswalk

61 PBIC-IL/Benjamin Cottrell

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89 Rumble strip, advanced pedestrian warning sign, RRFB, automated pedestrian detection sensor, lighting, pavement treatment (color)

90 PBIC-IL/Ramkumar Venkatanarayana

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1 Signs, Markings

2 Signs, Markings

3 Signs, Markings



Right)

Additional Countermeasures and References

	A	B	C	D
1	#	Countermeasure Name	Source(s)	Research Notes
2	1	School zone measures	PBS;NCHRP500	These countermeasures are already the focus of Safe Routes to School program
3	2	Street car measures	PBS	Very specific to locations with streetcars. Not a systemic solution for VA.
4	3	Work zone measures	PBS	Specific, temporary locations. Not permanent installations as safety countermeasures. See http://www.virginiadot.org/business/resources/wztc/2016_WZ_Ped_BikeGuide.pdf
5	4	Railroad crossing measures	PBS	This countermeasure is focused on railroads, which is not the main focus of this study (vehicle-pedestrian crashes).
6	5	Enforcement related measures	PBS;NCHRP500	This study focused on engineering measures that VDOT/City directly controls
7	6	Automated speed enforcement (ASE)	PBS;KWDW2015	SFMTA summary - Injury crash reductions studied for conspicuous, fixed camera, ASE programs (VA laws do not allow this countermeasure at this time). High costs.
8	7	Increase enforcement (along corridors for yielding in marked crosswalks)	KWDW2015	This study focused on engineering measures that VDOT/City directly controls
9	8	Driver Education related measures	PBS;NCHRP500	This study focused on engineering measures that VDOT/City directly controls
10	9	Sidewalks, Walkways, and Paved Shoulders	PBS;NCHRP500;CMFCH	Very high cost countermeasure; CMFCH paved shoulder cmf=0.29 (2005, unrated)

	A	B	C	
1	Short Description	Long Description	Notes	Link
2	BMP2014	Brewer, M., D. Murillo, A. Pate, Handbook for Designing Roadways for the Aging Population, FHWA, June 2014		https://safe
3	BPZD2013	Bushell, M.A., B.W.Poole, C.V.Zegeer, and D.A.Rodriguez, Costs for Pedestrian and Bicyclist Infrastructure Improvements: A Resource for Researchers, Engineers, Planners and the General Public, Prepared for FHWA, October, 2013	From spot checking, costs in this document seem to be the same as the pedbikesafe.org ; just that the costs are all in one place here.	http://www.Costs_Repo
4	CMFCH	CMF Clearinghouse	54 rated and 57 unrated CMFs for "pedestrian" search term	http://www

Next Step

Toolbox considered as part of Pedestrian
Safety Action Plan



Thanks to TRP and Commenters

- TRP: Mark Cole, John Bolecek, Peter Ohlms
– Stephen Read, Alexi Tsyganov
- Districts: Peter Hedrich, Nhan Vu, Rob Vilak,
Nathan Umberger



Thank you!

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We bring innovation to transportation.

Fostering Innovation in Pedestrian and Bicycle Transportation Pooled Fund Study

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Fostering Innovation in Pedestrian and Bicycle Transportation

Pooled Fund Study

<http://www.pooledfund.org/Details/Solicitation/1441>

Details: Pooled Fund Study

- Typically use 100% SPR dollars from VTRC's 25% share of VDOT's total SPR allocation
 - Sometimes from VTRC state funds
 - Sometimes from TMPD SPR dollars

If using either of these, VTRC Director makes the call – and your input is considered!



Details: Pooled Fund Study

- This PFS has a minimum commitment of \$25,000
- So far: D.C., Louisiana, Massachusetts, Maine, Ohio, Texas, Wisconsin
- Required commitment to begin: \$700,000
 - Or 28 states at the minimum contribution
 - But: “initial contribution target” is \$400,000
 - Initial call for participants closes May 31, 2017



Current Pooled Fund Studies

Name	FY 17 Budget	Lead	VTRC Contact
Midwest States Pooled Fund Crash Test Program	\$65,000 (St)	FHWA	K. Wright
Urban Mobility Study	\$25,000 (St)	Texas	C. McGhee
R&D and Deployment of System Operations Applications of Vehicle Infrastructure Integration	\$75,000 (St)	Virginia	C. McGhee
Regional Sustainable Pavement Consortium	\$25,000 (SPR)	Virginia	K. McGhee
Near Road Air Quality Research	\$10,000 (SPR)	Washington	M. Fitch
Improving Quality of Pavement Surface Distress	\$15,000 (SPR)	FHWA	K. McGhee
Regional and National Implementation of Mechanistic Empirical [Pavement] Design	\$25,000 (SPR)	FHWA	H. Nair
National Accessibility Evaluation	\$42,500 (SPR)	Minnesota	P. Ohlms
Transportation Management Consortium	\$30,000 (St)	FHWA	C. McGhee
No Boundaries Roadway Maintenance	\$10,000 (SPR)	Ohio	J. Williams
Biennial Asset Management Conference	\$6,000 (SPR)	Iowa	V. Nguyen
Contaminant Release from Storm Water Culvert Rehab Tech	\$35,000 (SPR)	Virginia	B. Donaldson
Recycled Materials Resource Center - 4th Generation	\$40,000 (SPR)	Wisconsin	E. Wallingford/ M. Fitch

Why this study?

- Transportation agencies are seeking ways to improve ped/bike safety and mobility and NCHRP cannot meet growing ped/bike research needs
- Will emphasize short-turnaround, practical research; topics TBD by participating states
 - Bicycle and pedestrian network planning
 - Safety
 - Design issues (e.g. flexibility, CMFs, connectivity)
 - Traffic control devices (experimenting)



Objectives

- Answer emerging questions about innovative facility design, planning, and implementation
- Research innovative traffic control devices to accelerate incorporation into MUTCD
- Facilitate data collection and reporting to update Federal, State, local, and other design guidelines
- Support rural multimodal transportation needs, regulatory streamlining, cost effectiveness and efficiencies, and multimodal investment analysis



Example topics for first 1-2 years



Example topics for first 1-2 years



Example topics for first 1-2 years



Example topics for first 1-2 years



Example topics for first 1-2 years



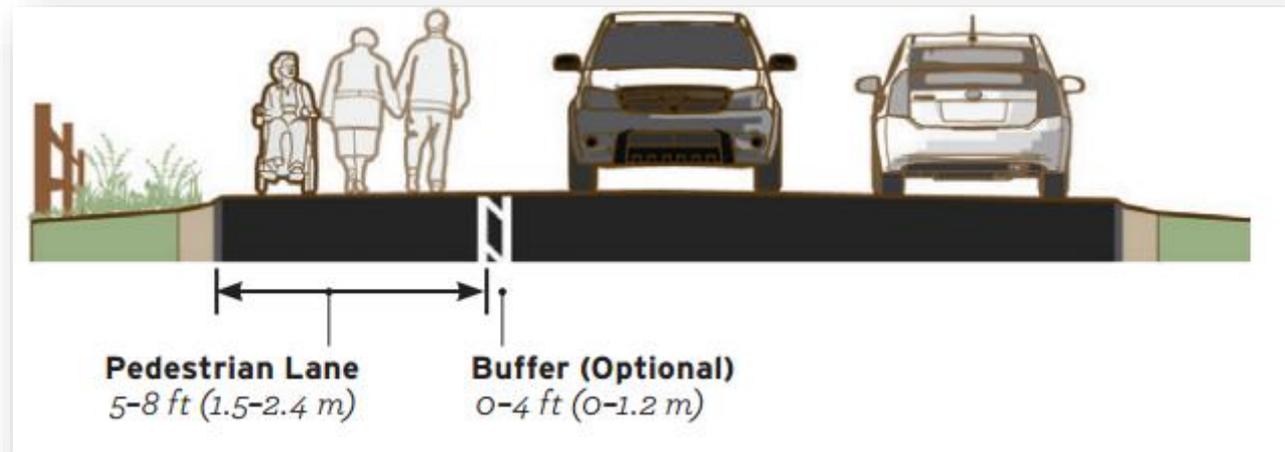
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Example topics for first 1-2 years



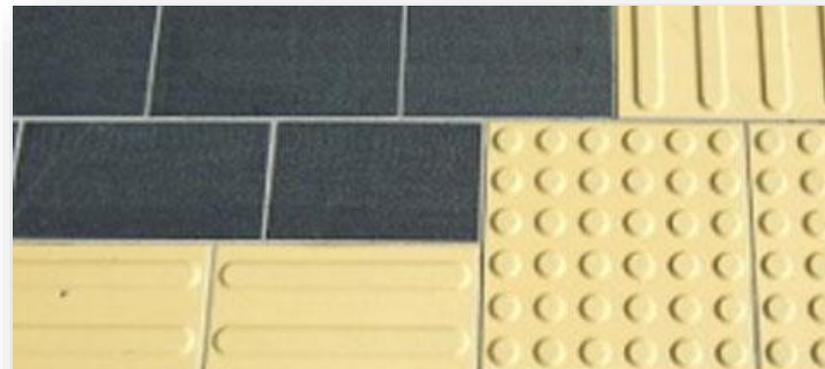
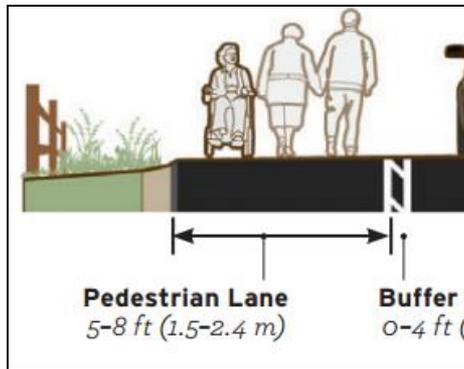
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https://www.fhwa.dot.gov/environment/bicycl e_pedestrian/publications/small_towns/fhwah ep17024_lg.pdf



Example topics for first 1-2 years



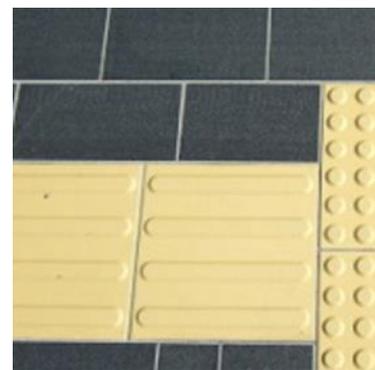
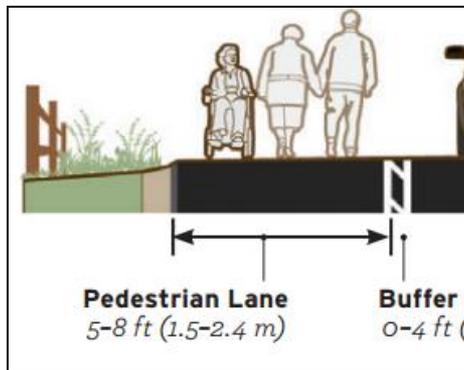
Example topics for first 1-2 years



9/20/2017

Image from <http://srikrishnaplasto.com/wp-content/uploads/2017/02/tactile-paving-indicate-stop.jpg>

Example topics for first 1-2 years



Fostering Innovation in Pedestrian and Bicycle Transportation Pooled Fund Study

Discussion