STEP

Safe Transportation for Every Pedestrian

EDC

Evaluating Road Diets: Recent Research and Case Studies

Peter Ohlms, Virginia DOT
Lance Dougald, Virginia DOT
John Bolecek, Virginia DOT
Nicole Wynands, Fairfax County DOT
Christine Mayeur, City of Alexandria
July 7, 2020

U.S. Department of Transportation
Federal Highway Administration

Meet the Panelists

Peter Ohlms
Virginia DOT

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Nicole Wynands
Fairfax County DOT

Christine Mayeur
City of Alexandria

Housekeeping

- ⇨ Submit your questions
- ⇨ Webinar archive: www.pedbikeinfo.org/webinars
- ⇨ Certificates and professional development hours
- ⇨ Follow-up email later today
- ⇨ Upcoming Webinar: MPO and DOT Partnership for Complete Streets Projects (July 29, 2020)

U.S. Department of Transportation
Federal Highway Administration

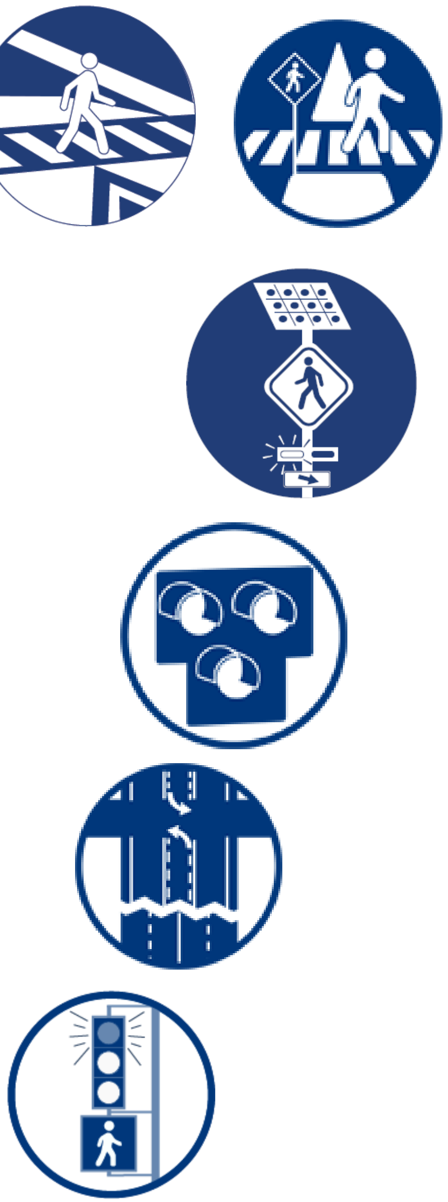
On-Ramp to Innovation
every day counts

Safe Transportation for Every Pedestrian (STEP)

The Spectacular Seven

STEP

Safe Transportation for Every Pedestrian




Pedestrian Hybrid Beacon (PHB)

SAFE TRANSPORTATION FOR EVERY PEDESTRIAN

COUNTERMEASURE TECH SHEET

High speeds and multiple lanes of traffic create challenges for pedestrians crossing at unsignalized locations.

PHBs can warn and control traffic at unsignalized locations and assist pedestrians in crossing a street or highway at a marked crosswalk.

PHBs can reduce pedestrian crashes by 55%

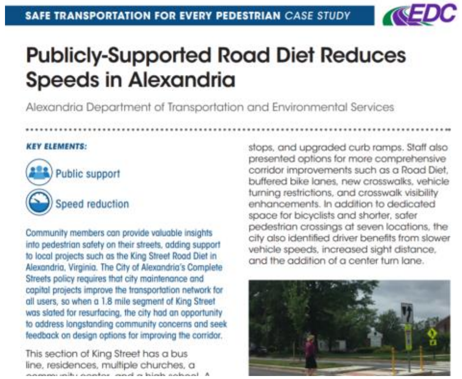
FEATURES:

• Beacons stop all lanes of traffic, which can reduce pedestrian crashes.

A Pedestrian Hybrid Beacon head consists of two red lenses above a single yellow lens. Unlike a traffic signal, the PHB rests in dark until a pedestrian activates it via pushbutton or other form of detection. When activated, the beacon displays a sequence of flashing and solid lights that indicate the pedestrian walk interval and when it is safe for drivers to proceed (see figure on back page).

The PHB is often considered for installation at locations

Tech Sheets & Case Studies


SAFE TRANSPORTATION FOR EVERY PEDESTRIAN CASE STUDY

EDC

Publicly-Supported Road Diet Reduces Speeds in Alexandria

Alexandria Department of Transportation and Environmental Services

KEY ELEMENTS:

Public support

Speed reduction

Community members can provide valuable insights into pedestrian safety on their streets, adding support to local projects such as the King Street Road Diet in Alexandria, Virginia. The City of Alexandria's Complete Streets policy requires that city maintenance and capital projects improve the transportation network for all users, so when a 1.8 mile segment of King Street was slated for resurfacing, the city had an opportunity to address longstanding community concerns and seek feedback on design options for improving the corridor.

This section of King Street has a bus line, residences, multiple churches, a

stops, and upgraded curb ramps. Staff also presented options for more comprehensive corridor improvements such as a Road Diet, buffered bike lanes, new crosswalks, vehicle turning restrictions, and crosswalk visibility enhancements. In addition to dedicated space for bicyclists and shorter, safer pedestrian crossings at seven locations, the city also identified driver benefits from slower vehicle speeds, increased sight distance, and the addition of a center turn lane.

VIDEOS

For More Information:

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https://safety.fhwa.dot.gov/ped_bike/step/resources/

VTRC
Virginia Transportation Research Council

We Bring Innovation to Transportation

How's That Diet Working?

Performance of Virginia Road Diets

Peter Ohlms, AICP, *Research Scientist*

Lance Dougald, *Senior Research Scientist*

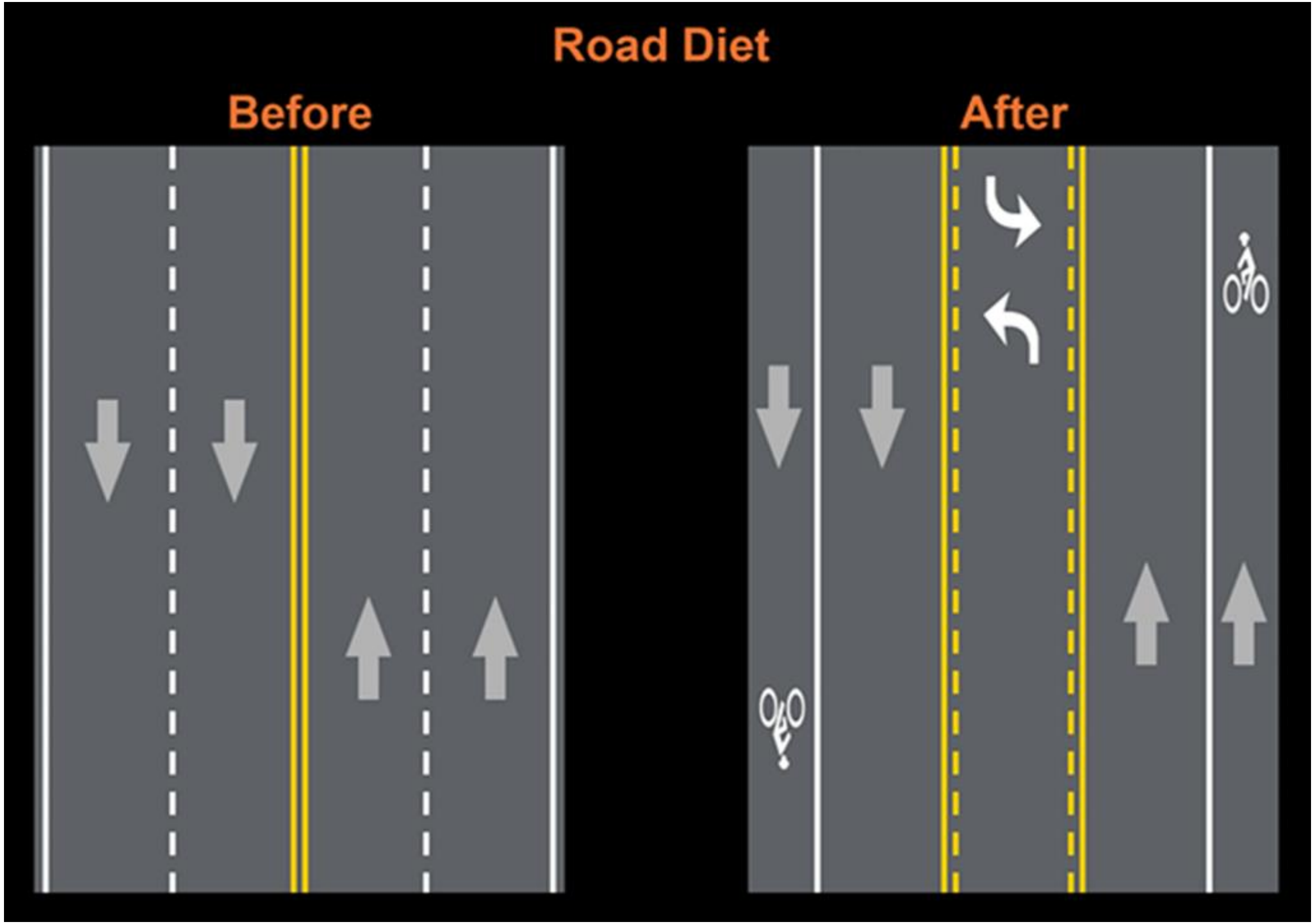
Safe Transportation for Every Pedestrian Webinar, July 7, 2020

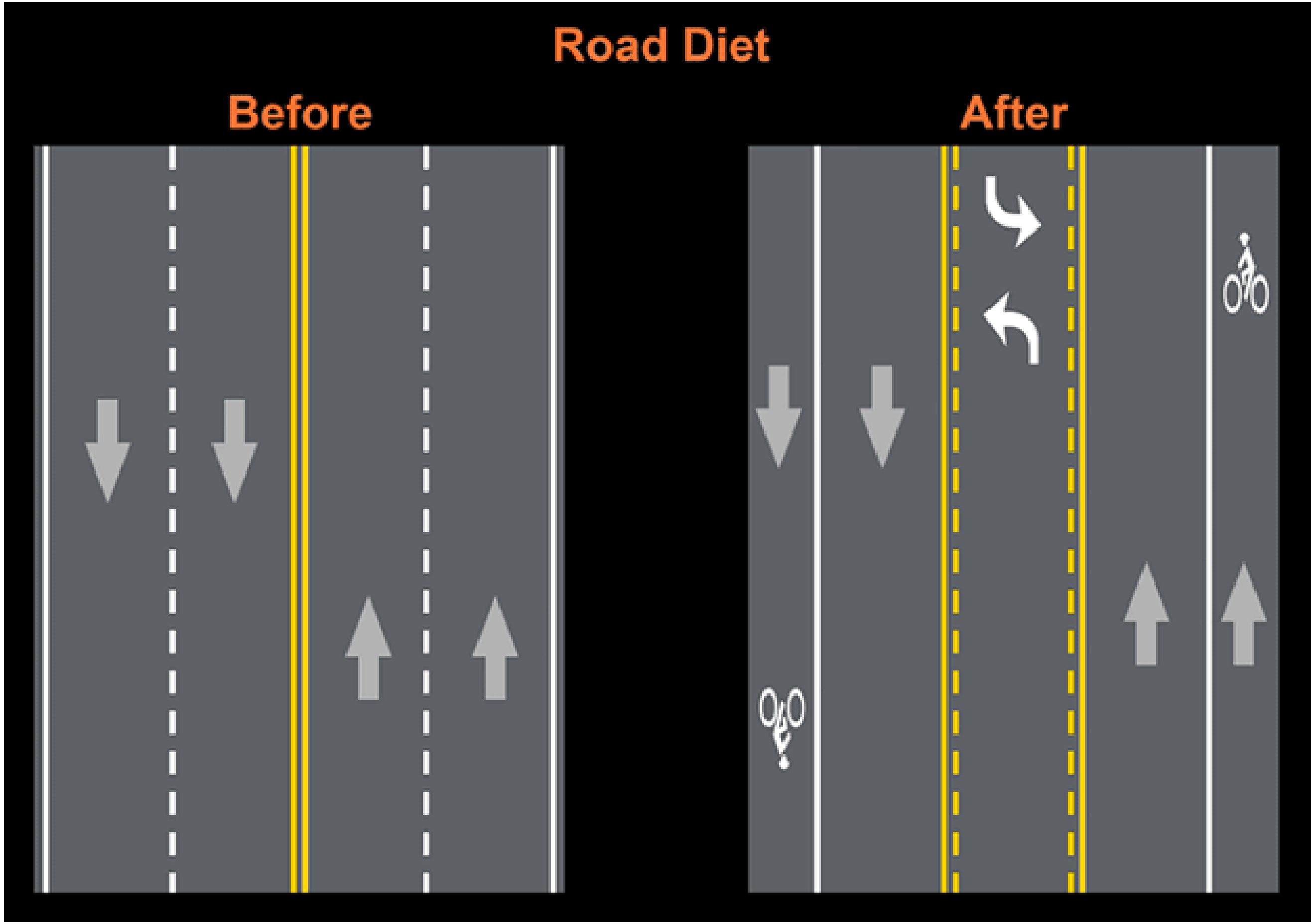
Road(diet)map

- Overview and definitions
- What the research says
- Virginia inventory
- Analysis example

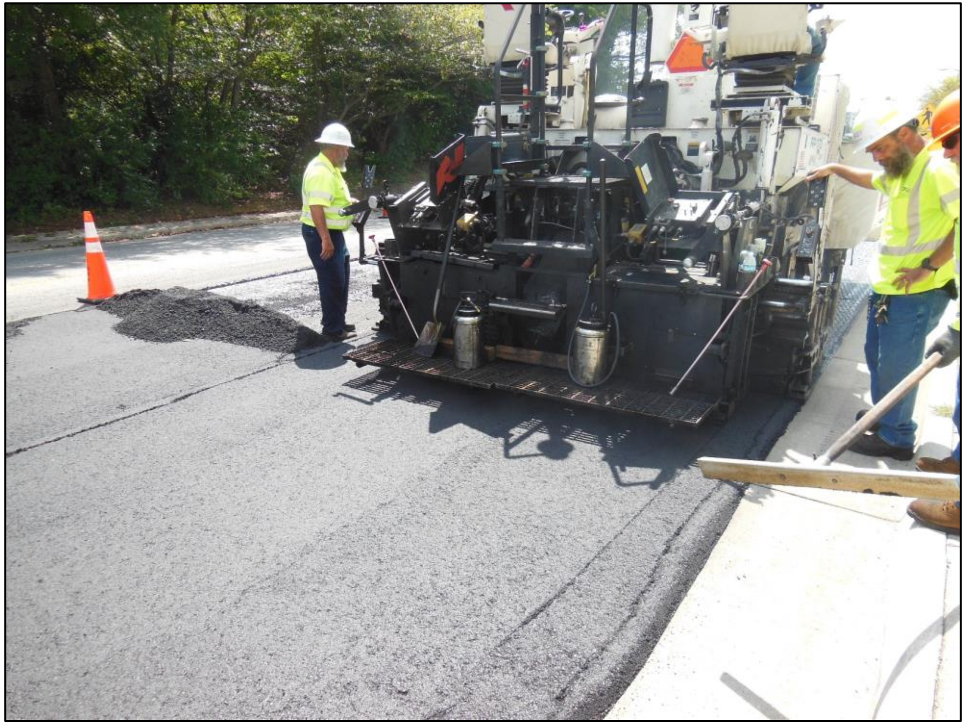
How We Got Here

- Midcentury boom in auto traffic
- Many 2-lane roads were expanded to 4 lanes


Road Diet
Before
After


Road Diet
Before
After

A Golden Opportunity



Related: Lane Diets

VDOT's Experience

- VDOT handles public roads in Virginia except in cities, larger towns, and two counties
  - Fairfax County: Adding dozens of miles of bike lanes every year, many through road diets
  - Some examples of road diets in small towns
- Localities had also conducted road diets
  - Extent was unknown

Study Goals

- Improve understanding of past road diets
  - How are road diets working?
  - How are road diets analyzed and success measured?
- Compile an inventory of Virginia road diets
- Analyze some Fairfax County road diets

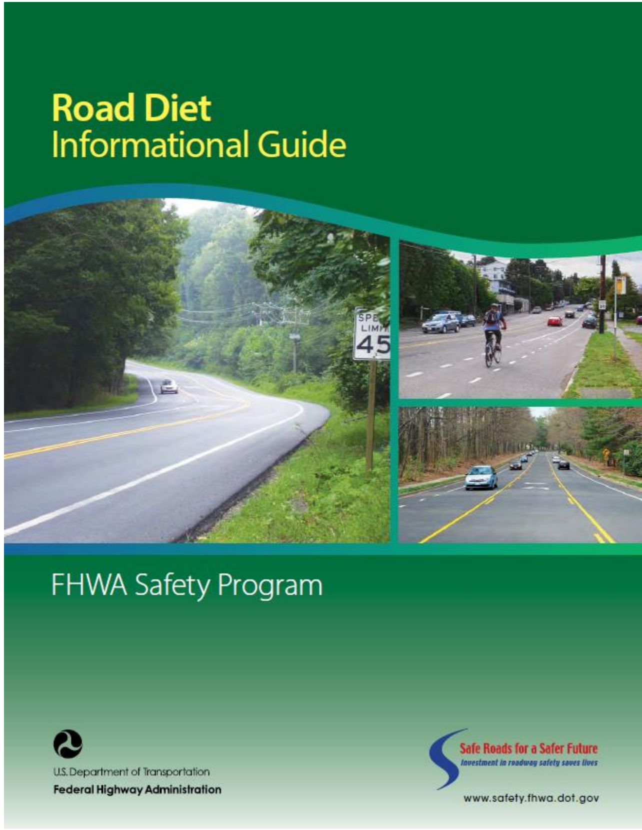
What the Research Says

- Not so safe

- Safer

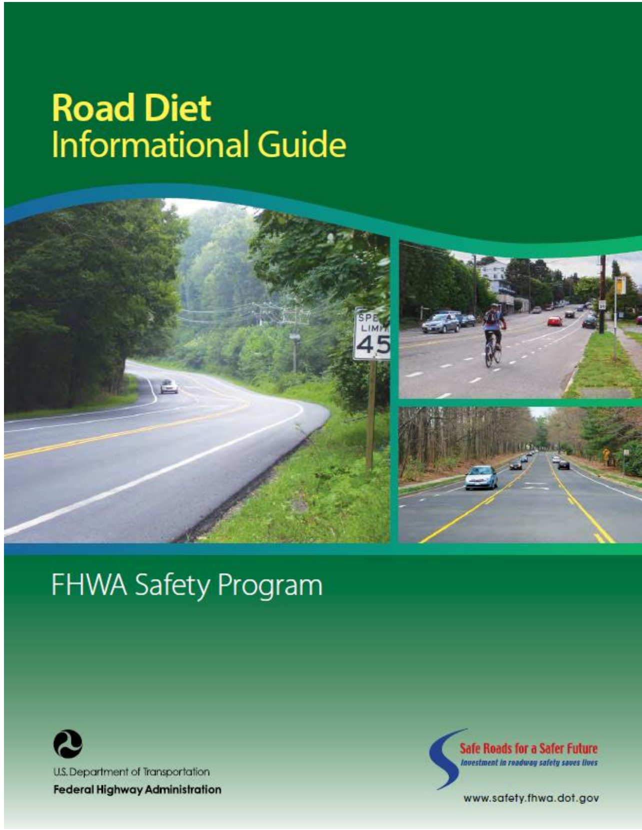
What the Research Says

- FHWA’s 2014 RDIG
  - Sites with average daily traffic from 2,000 to 26,000 veh/day
  - Crash reductions of 19% to 47%
  - Speed reductions: 3 to 5 mph
  - Improved speed harmony



What the Research Says

- FHWA's 2014 RDIG
  - LOS declines at 1,750+ veh/hr
  - Safety benefits may diminish as volumes increase
  - Transit stops may affect operations



What the Research Says: In Brief

- Public opinion affects implementation and whether a project is deemed a success
- Many ways to measure (quantify) success:
  - Volumes, travel times, speeds, crashes, diversions
  - Bicycle and pedestrian volumes, crashes, injuries
  - Retail sales, employment, property values, investment
- Outcomes are generally positive

What the Research Says: In Detail

- Studies before 2014 not included in the *RDIG*
- 2014-2019
  - Before-after road diet studies and other B-A studies
  - Road diet case studies
  - Road diet models and simulations
  - Related guidance and performance measures
  - Studies on related topics, magazine articles, etc.

Road Diet Case Analyses In Larger Studies, 2014-2019

Citation: Title	Focus; Region; Data Year; Methods	Findings	Limitations; Recommendations
FHWA (2015a): Case Studies in Delivering Safe, Comfortable, and Connected Pedestrian and Bicycle Networks	Case studies of various projects including two road diets and Chicago's Complete Streets Arterial Resurfacing Program; New Orleans, Chicago, and Urbana, IL; 2010-2014; bicycle and pedestrian volumes and qualitative descriptions	New Orleans: Estimated 226% increase in bicycling and 132% increase in walking. Chicago chose corridors based on pedestrian crashes and bicycle and pedestrian plans. Bike lanes in Urbana's road diet connected to eight other existing/proposed bike facilities.	Shifting an agency's focus from spot or corridor improvements to a systemwide perspective is challenging, as is measuring and evaluating nonmotorized network connectivity. Road diets are one tool for increasing nonmotorized network connectivity.
Perk et al. (2015): Capturing the Benefits of Complete Streets	Economic activity associated with complete streets projects; one case study is a 2009-2011 road diet in Gainesville, FL; changes in parcel values, property taxes, and jobs	Traffic volumes and speeds decreased somewhat. Bicycle and pedestrian volumes increased, and crashes declined sharply. Economic activity in the immediate area appeared to have increased.	Road diet was part of a major reconstruction project, not a simple resurfacing. An exact causal relationship between the project and economic activity cannot be determined.

Citation: Title	Focus; Region; Data Year; Methods	Findings	Limitations; Recommendations
Dowling et al. (2016): Applying Performance Based Practical Design Methods to Complete Streets - A Primer on Employing Performance-Based Practical Design and Transportation Systems Management and Operations to Enhance the Design of Complete Streets	How the application of performance-based practical design (PBPD) combined with operations strategies can promote the consideration and application of complete streets; Orlando, Pasadena, and Des Moines; years are in source studies; case study summaries	PBPD is one type of analysis that can evaluate the suitability of a road diet. Metrics included traffic volumes on the treatment and parallel streets, on-street parking utilization, pedestrian and bicycle volumes, bicycle and auto level of service, traffic speeds, and crashes.	Success in road diet projects also depends on institutional and policy factors outside the design process.
Moore et al. (2017): Implementing Context Sensitive Design On Multimodal Corridors: A Practitioner's Handbook	Guidance for practitioners developing multimodal thoroughfare designs in suburban areas, urban edges, and small towns; Cincinnati, OH and Dallas, TX; 2006-2010 and 2013-2017; case studies	Removing or narrowing lanes can allow for inclusion of multimodal elements. Case study streets added green space, sidewalk width, and/or parking by removing and/or narrowing lanes while lowering speeds; one had data showing stable traffic volumes and fewer crashes.	Comparing peak hour volumes to capacity per lane can be a quick approach for determining initial viability of a road diet when tube counts are not possible. Travel lanes on walkable streets should be 10 to 11 ft wide and no more than 12 ft.
Schlossberg et al. (2019): Rethinking Streets for Bikes: An Evidence-Based Guide to 25 Bike-Focused Street Transformations	Practitioner-focused guide to seven types of bicycle infrastructure; 25 illustrated examples, mostly in the U.S. and mostly road diets; years vary	Places across the U.S. have reallocated street cross-sections to create two-way cycle tracks, one-way protected bike lanes, raised bike lanes, advisory bike lanes, and off-street paths.	Limited quantitative information. No recommendations, but each case study includes key interventions, evidence of change, and additional context/lessons learned.

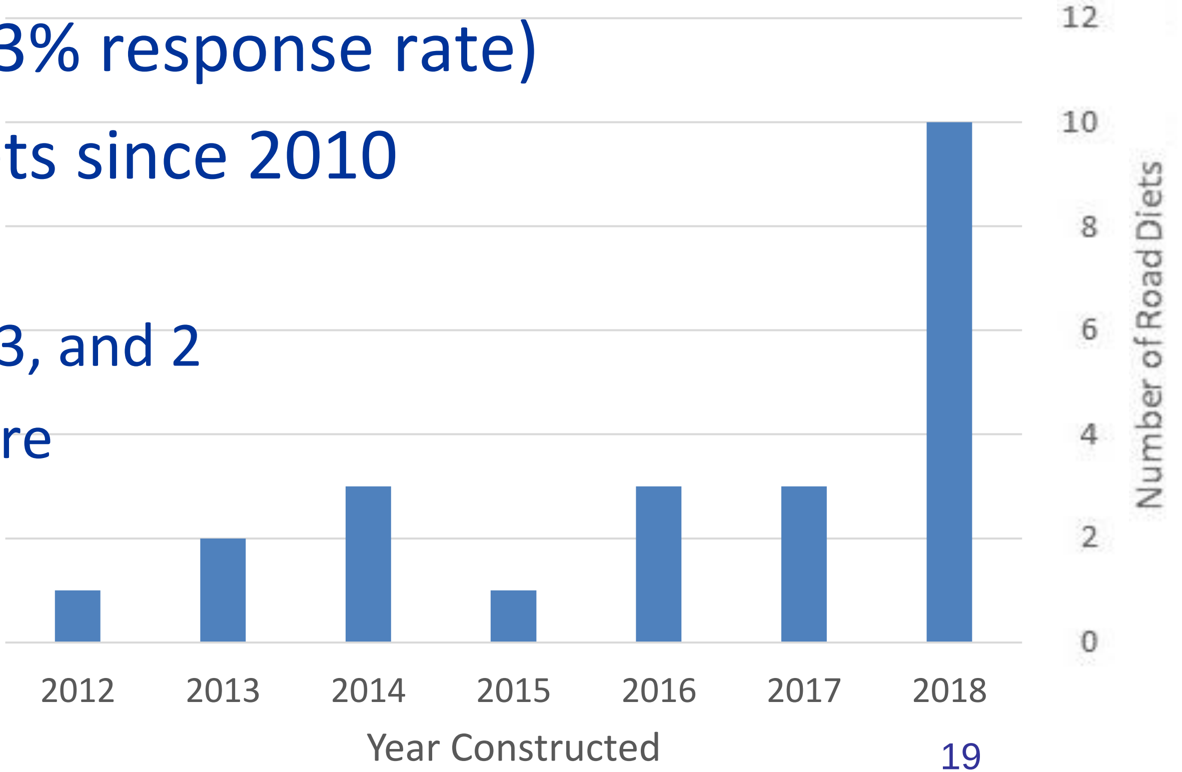
Virginia Road Diets Inventory

- 2018 survey aimed to:
  - Identify locations of and reasons for road diets
  - Document before/after layouts
  - Document study results and professional and public opinions of effectiveness
  - Record lessons learned
- Survey went to cities, counties, towns, Districts

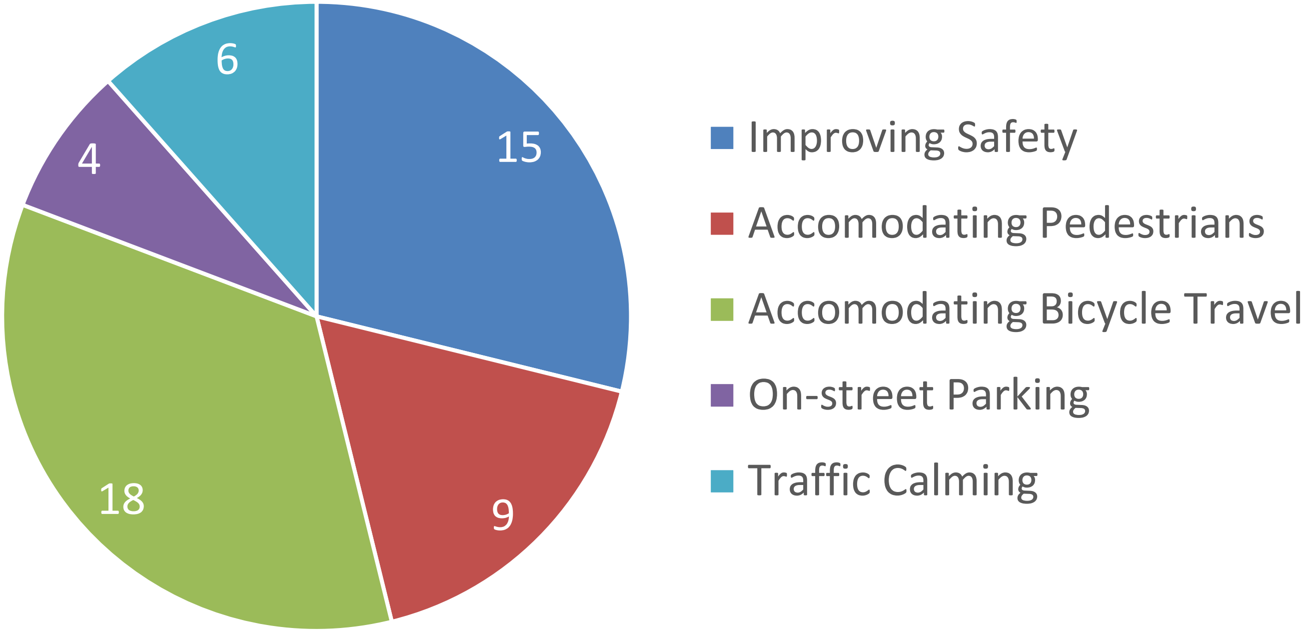
Road Diets Across Virginia

Survey of Localities and Districts

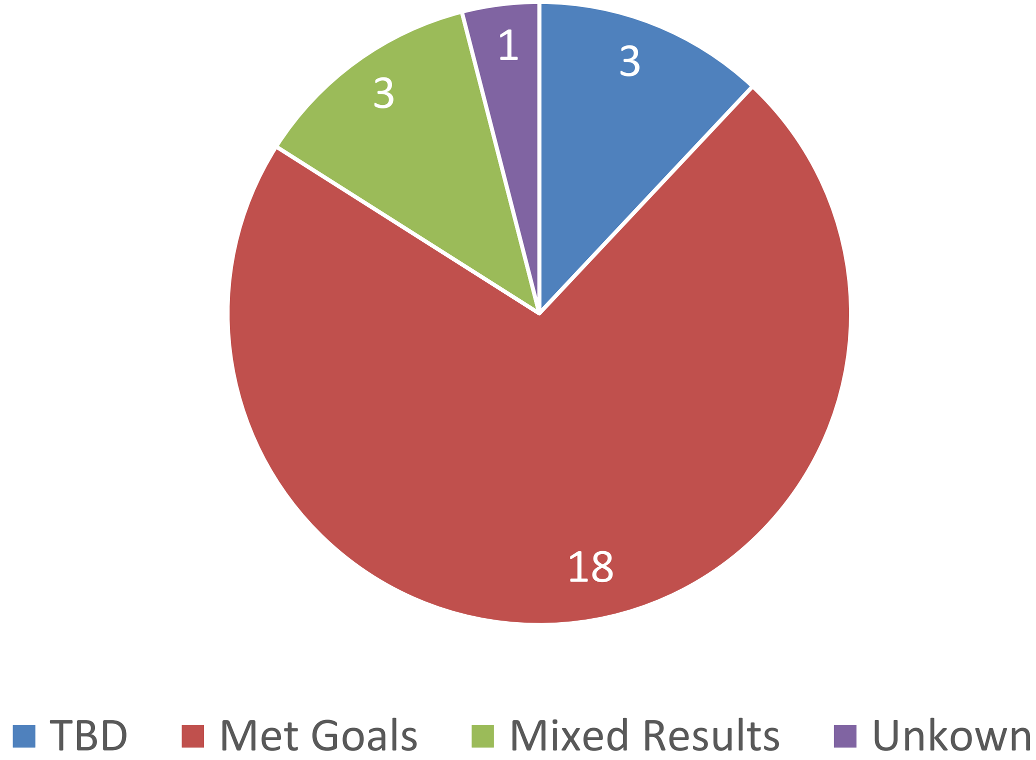
- 105 responses (43% response rate)
- 10% had road diets since 2010
  - Six had one
  - One each had 4, 3, and 2
  - Two had 5 or more



Reasons for Road Diets



Did Road Diets Meet Goals?



How Do We Measure Success?

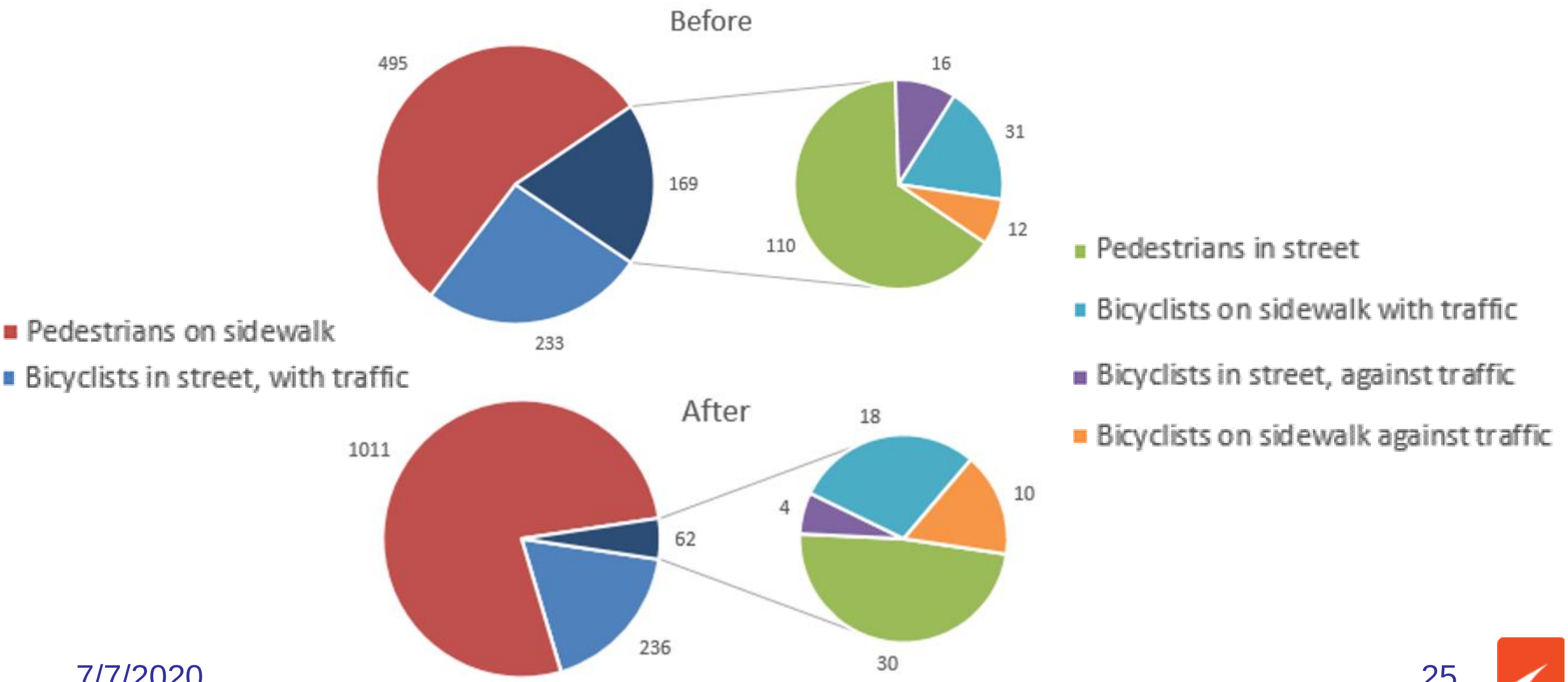
- Depends on the goal(s)
  - Encouraging bicycling: volumes, comfort
  - Neighborhood effects: volumes on parallel streets
  - Safety: crashes, speeders
  - Traffic flow: volumes, speeds

Metrics and Data: Fairfax Co. Diets

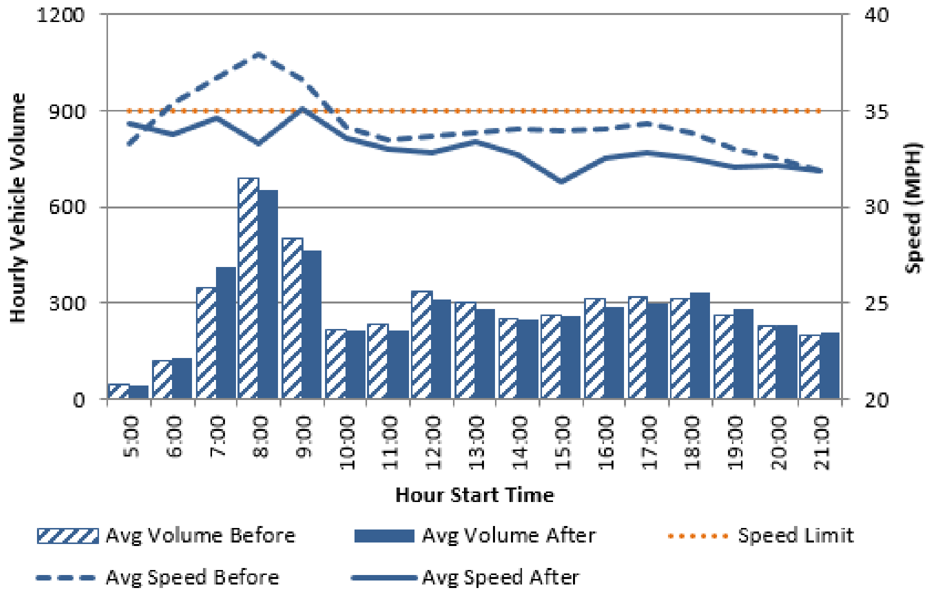
- Auto traffic volumes and speeds before and after road diets
  - Six sites on four roads in Fairfax County
- Bicycle and pedestrian counts and positioning
  - Two sites on one of the same roads

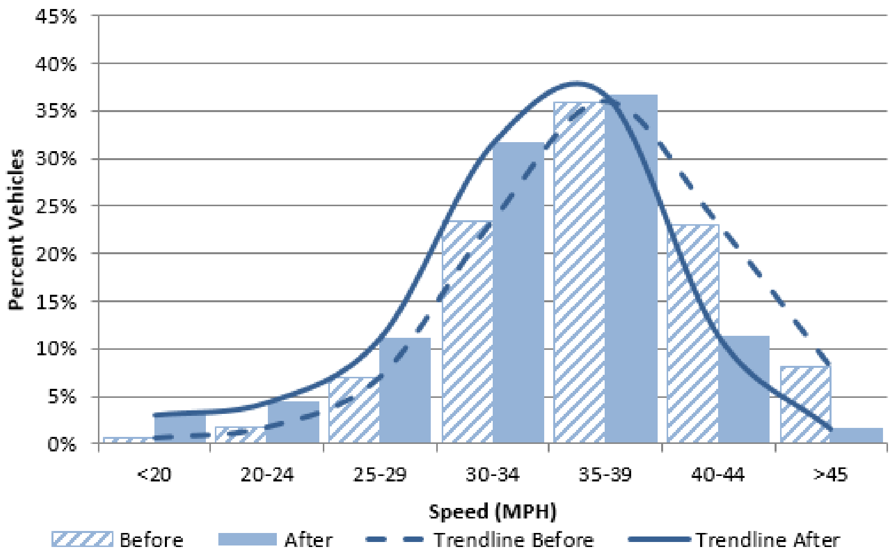
Colts Neck Rd – 2017

Colts Neck Rd: User Positioning



Colts Neck Rd: Volumes and Speeds





2018 Road Diets


Post Forest Drive

Ridge Top Rd


Bluemont Way, Reston (2018)

Conclusions

- Road diets take many different forms
- Many methods and performance measures
- Road diets are part of many other concepts
- Road diets still work
- Virginia survey respondents had generally positive views about their road diet projects

Conclusions

- Fairfax County road diet cases studied
  - No practically significant speed changes
  - May reduce unsafe walking and biking behavior
- Working inventory: approx. 39 miles, 66 projects
- Additional research would be beneficial
- Planning for road diets routinely could improve safety and multimodal connectivity

VTRC
Virginia Transportation Research Council

We Bring Innovation to Transportation

How's That Diet Working?

Performance of Virginia Road Diets

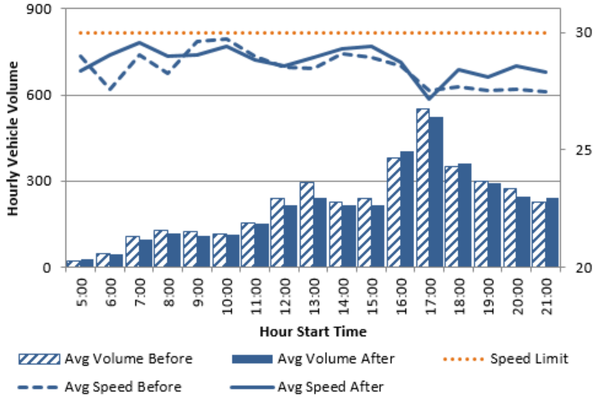
Peter Ohlms, AICP, *Research Scientist*

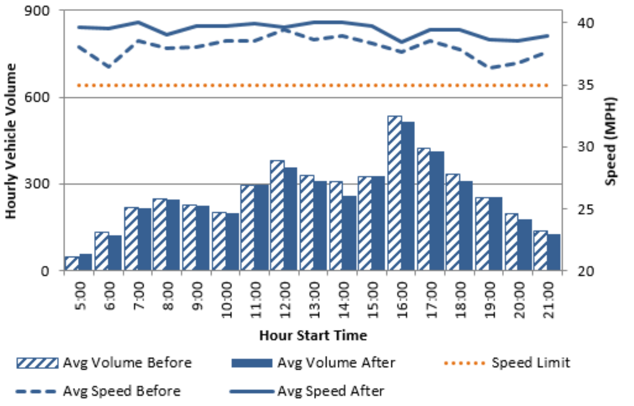
Lance Dougald, *Senior Research Scientist*

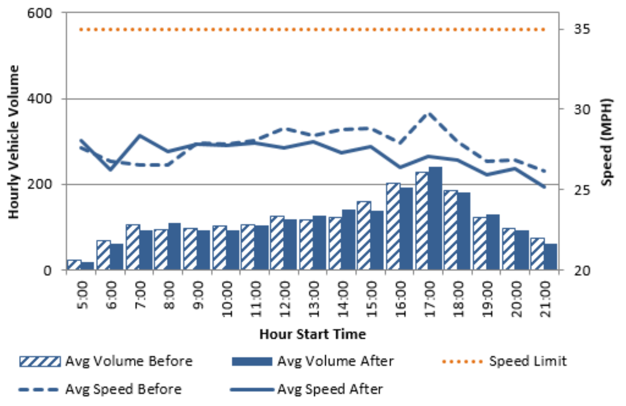
Safe Transportation for Every Pedestrian Webinar, July 7, 2020

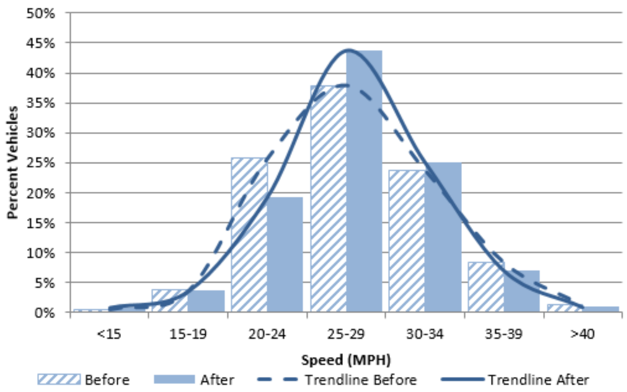
Unused slides

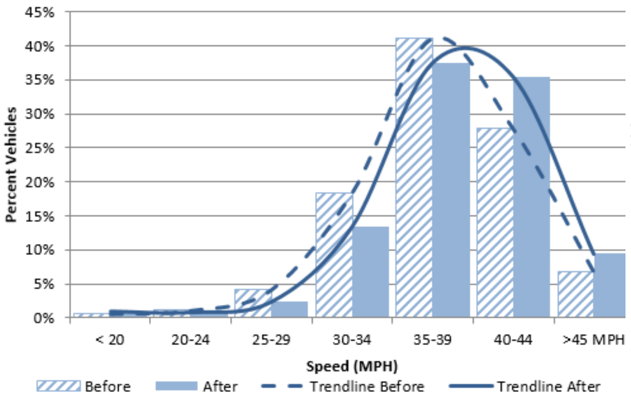
Volumes and Speeds: 2018 Sites

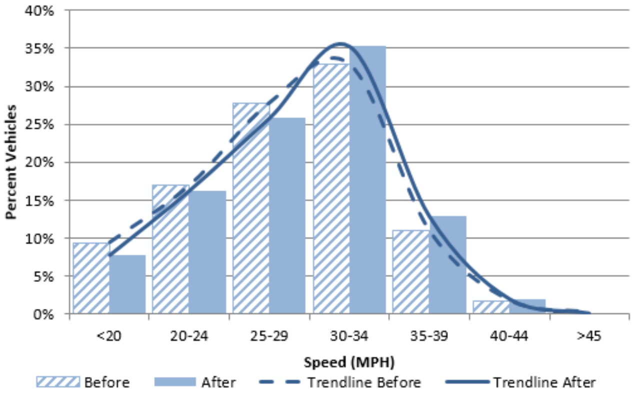












Dieting Can Be Scary

The Virginian-Pilot

Norfolk drops plan to take traffic lanes off Hampton Boulevard after resident outcry

By RYAN MURPHY
STAFF WRITER | FEB 07, 2019 | 3:44 PM

GREATER GREATER WASHINGTON

These "road diets" would make streets safer and barely affect traffic. Why do people oppose them?

ROADS By Canaan Merchant (Elections Committee) June 24, 2019 58

Some local road projects designed to calm traffic and increase safety for all users have been met with a surprising amount of resistence. Worse, regional officials seem to be prioritizing voices of opposition over actual studies, and it's keeping our communities unsafe.

Recently, two traffic calming proposals have came up on roads that are known to be dangerous, one in Alexandria and the other in Montgomery County. Both were nixed after an outcry from drivers who worried the updates would lead to delays, despite evidence to the contrary. What can these incidents tell us?

Alexandria defies the evidence on Seminary Road

Alexandria has plans to update Seminary Road, an important arterial which runs through the central part of the city. The city has passed a Complete Streets ordinance,

Tasks

1. Literature review
   - Performance measure criteria / methods
   - Document quantitative / qualitative results
2. Conduct Virginia inventory
   - Survey of VDOT districts and localities
   - Projects since 2010 / planned projects
   - Document geometrics, costs, study results
   - Compile results: opinions on effectiveness, lessons learned

Tasks

3. Collect before/after data on select road diets in Fairfax
   - Colts Neck Rd (2017): speed, volume, video for bicycle/pedestrian counts
   - Post Forest Dr (2018): speed, volume
   - Ridge Top Rd (2018): speed, volume
   - Bluemont Way (2018): speed, volume
4. Analyze operational impacts
5. Develop conclusions/write report

So Have Virginia's Road Diets Worked?

- It depends how you ask the question.
- Did throughput/speeds drop?
  - No! So yes, the diets worked.
- Did they address speeding? / Did more people walk or bike?
  - Not necessarily

The Future of Dieting in Virginia

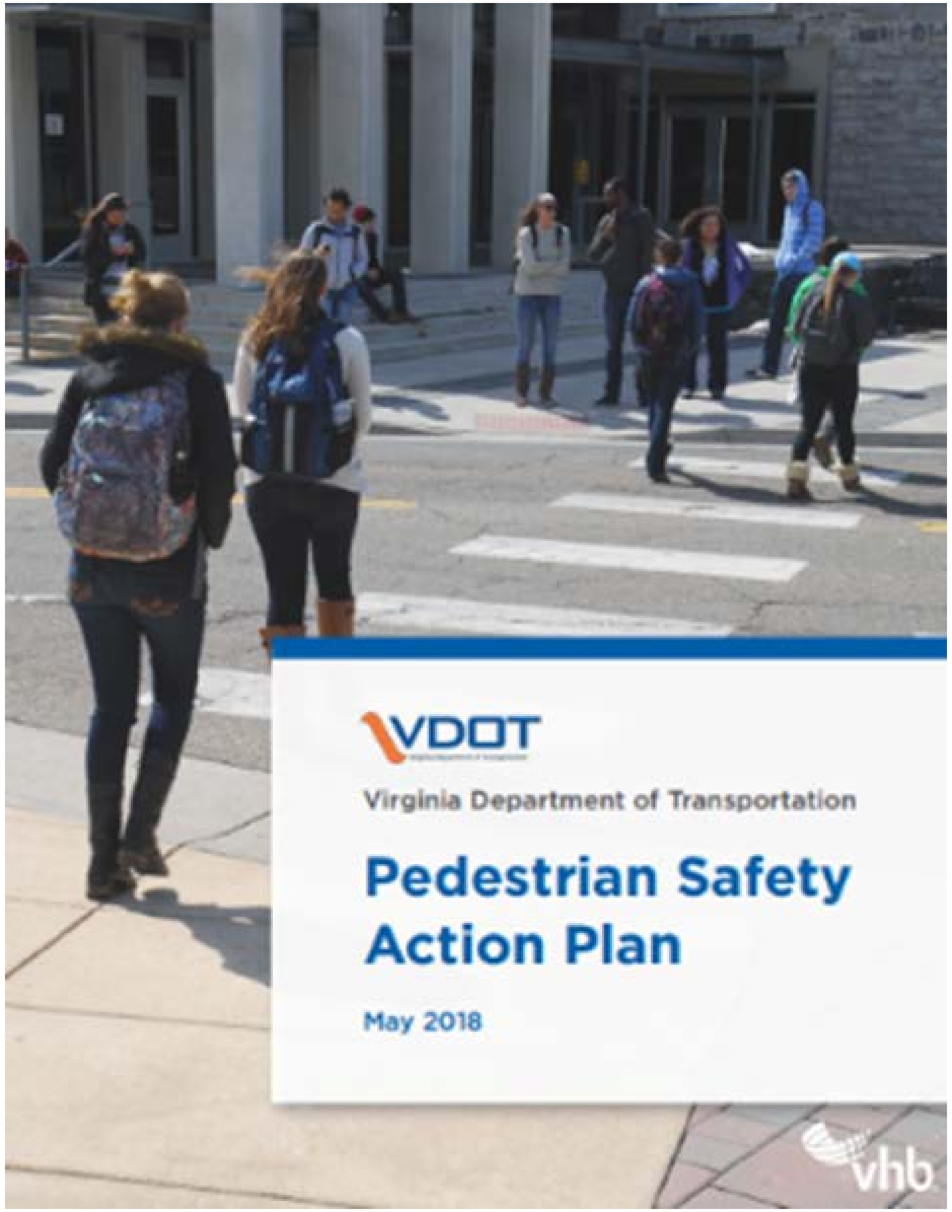
- Development of Crash Modification Factors
- Statewide assessment of candidate streets
- VDOT Road Diet Guidelines

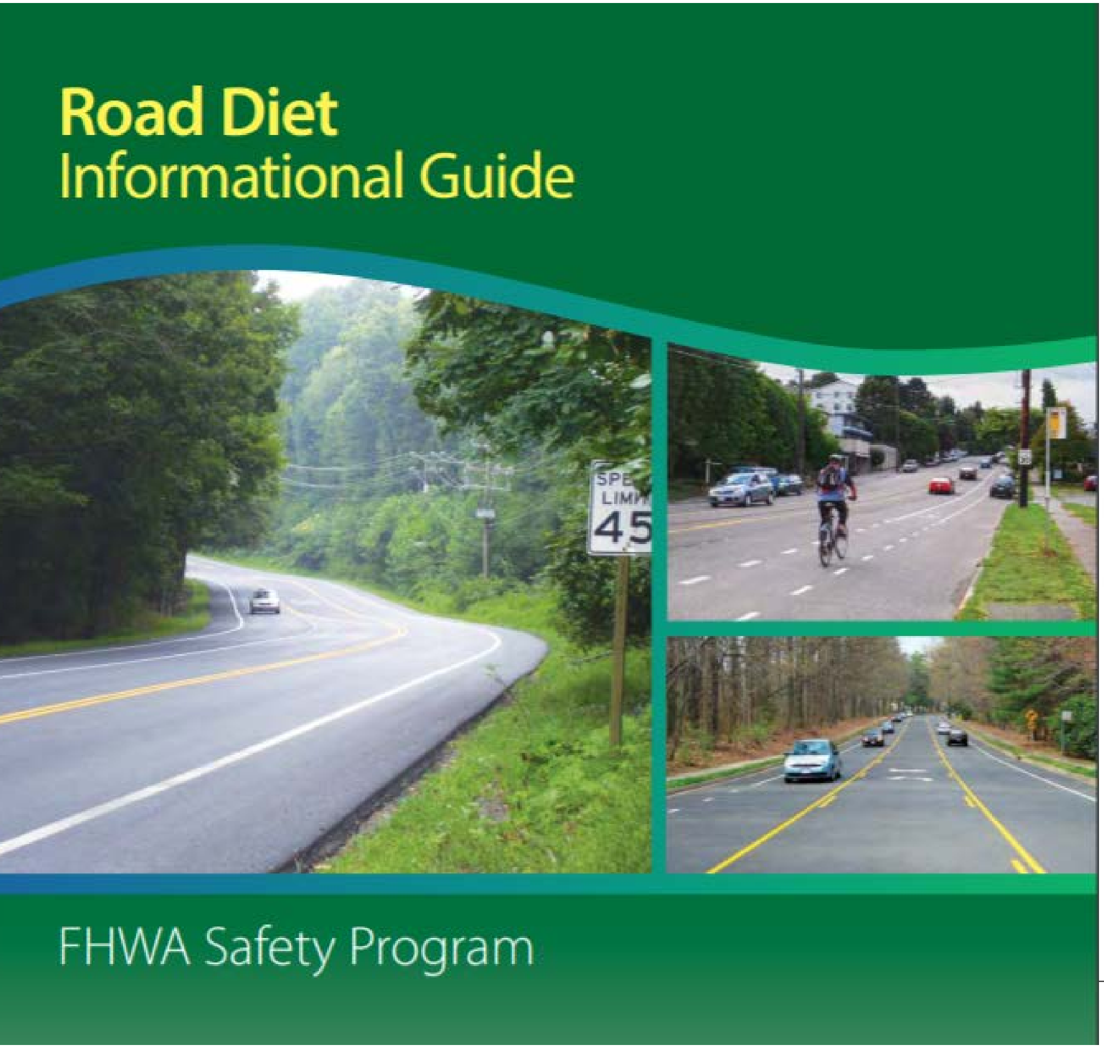
VDOT

Virginia Department of Transportation

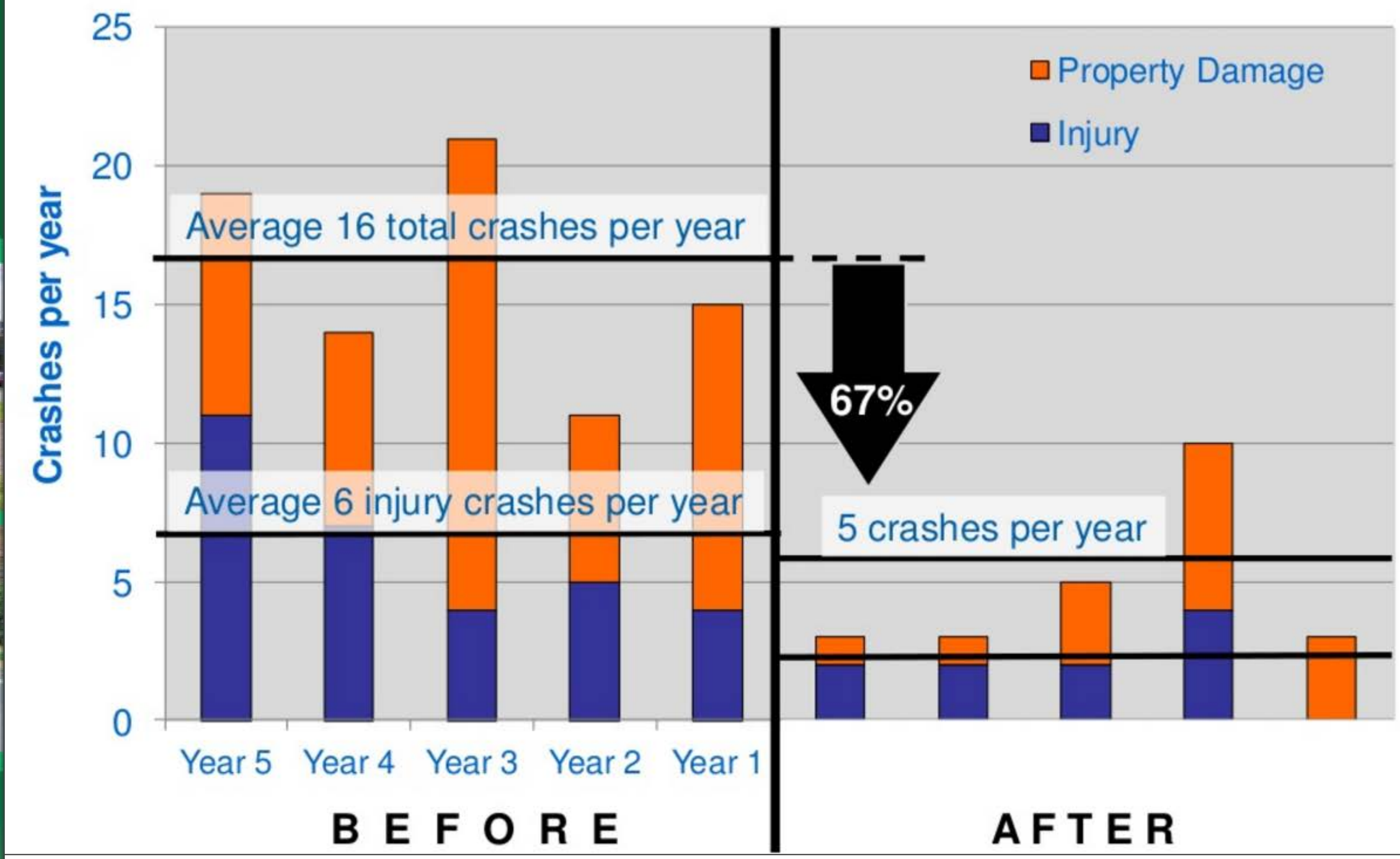
Background

- A recommendation from the Pedestrian Safety Action Plan (page 24) was to: “Develop Road Diet or lane width reduction guidelines”
- Over 66 Road Diets already constructed in Virginia
- Great examples of these happening annually, i.e. Fairfax County
- No place to communicate where, why or how these happened
- No instructions on how localities can request from VDOT





Road Diet
Informational Guide
FHWA Safety Program



Crashes per year
25
20
15
10
5
0
Property Damage
Injury
Average 16 total crashes per year
Average 6 injury crashes per year
67%
5 crashes per year
Year 5
Year 4
Year 3
Year 2
Year 1
B E F O R E
A F T E R

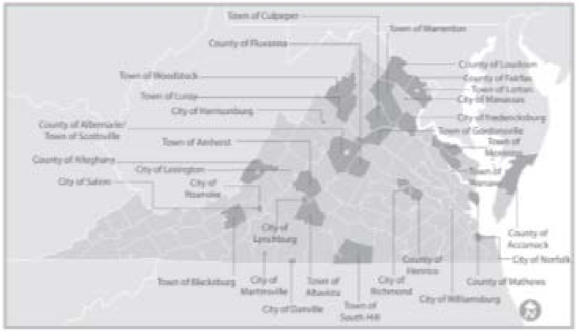
Roadway Reconfiguration Brochure

Roadway Reconfiguration Guidance

Improving safety is a top priority for the Virginia Department of Transportation (VDOT). One of the strategies for achieving this goal is by implementing roadway reconfigurations. This safety strategy can be by implemented by modifying pavement markings during repaving projects or through new construction projects. Implementing striping and marking changes with the repaving program allows improvements in safety by addressing speeding, reducing crossing distances for pedestrians, and adding bike lanes in a very cost-effective manner.

VDOT'S ROADWAY RECONFIGURATIONS ACROSS THE STATE

- REDUCE VEHICULAR SPEEDS
- ENCOURAGE ECONOMIC GROWTH
- IMPROVE ROADWAY SAFETY
- CREATE SPACE FOR BICYCLISTS AND WALKERS



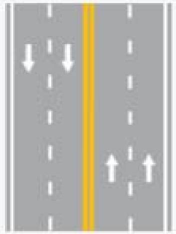
What is a Roadway Reconfiguration?

Roadway reconfigurations change the utilization of the pavement space, typically by restriping, to either remove one or more lanes or narrow them thereby adding bike lanes, turn lanes and/or parking. Roadway Reconfigurations that remove a travel lane are sometimes referred to as Road Diets.

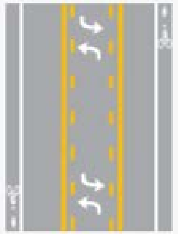
The typical roadway reconfiguration converts a 4-lane, undivided roadway to a 3-lane roadway with a two-way left turn lane and bike lanes. The pavement space on Bluemont Way shown below was reconfigured in this manor.

Bluemont Way (Before)

Bluemont Way (After)



Before



After

Website

Biking and Walking in Virginia

Home | Maps | U.S. Bicycle Routes | Places to Bike | Traveling with your bike | Laws and safety tips | 2004 CTB policy | Projects and Studies | Bicycle and pedestrian advisory committee | Contacts | Resources | Roadway reconfiguration

Roadway Reconfigurations

Improving safety is a top priority for the Virginia Department of Transportation (VDOT).

Roadway reconfigurations are a tool to address safety issues and are designated as a proven safety countermeasure by the Federal Highway Administration (FHWA).

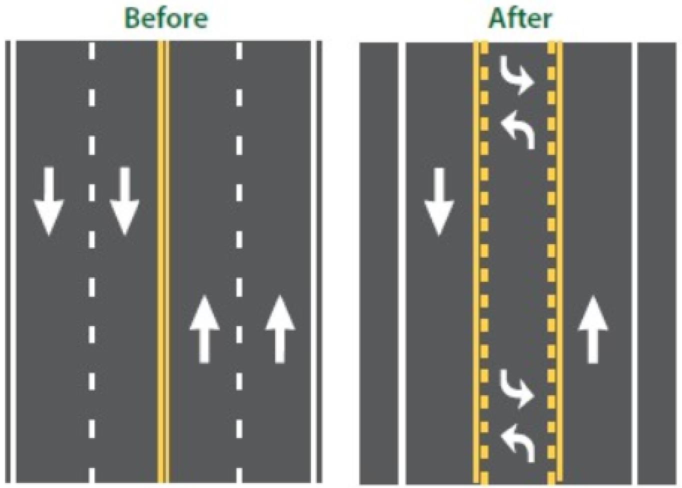
Roadway reconfiguration is a broad term that can be defined as any striping change that alters a roadway's layout.

A Road Diet is a specific type of roadway reconfiguration generally described as removing one or more travel lanes from a roadway and utilizing the space for other uses or travel modes.

VDOT works with localities across the commonwealth interested in implementing roadway reconfigurations either as independent projects or as restriping during repaving projects.

Implementing striping and marking changes with the repaving program is a cost-effective approach for adding bike lanes and improving safety by reducing crashes, speed, and crossing conflicts for pedestrians.

Road Diet Basic Design

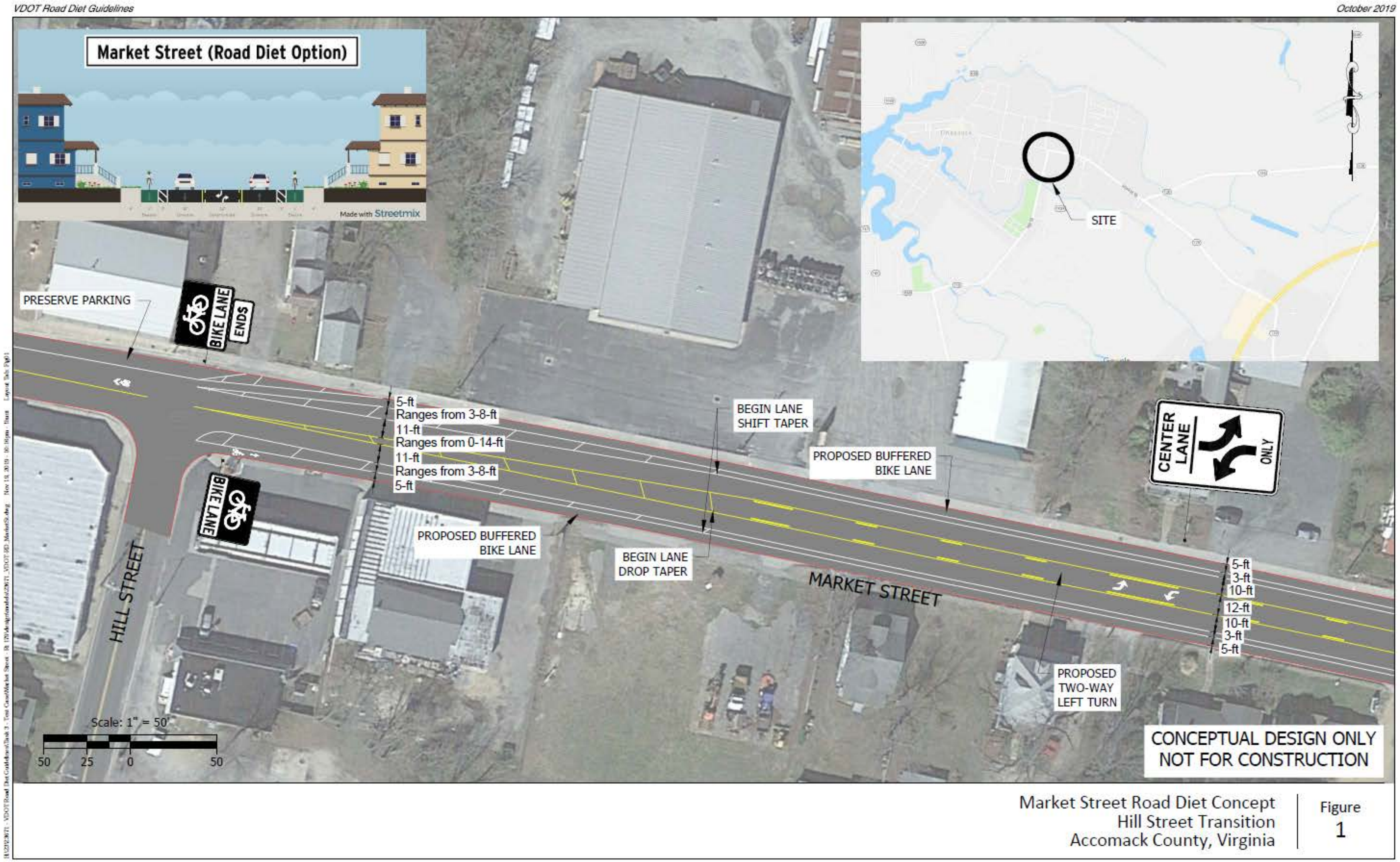


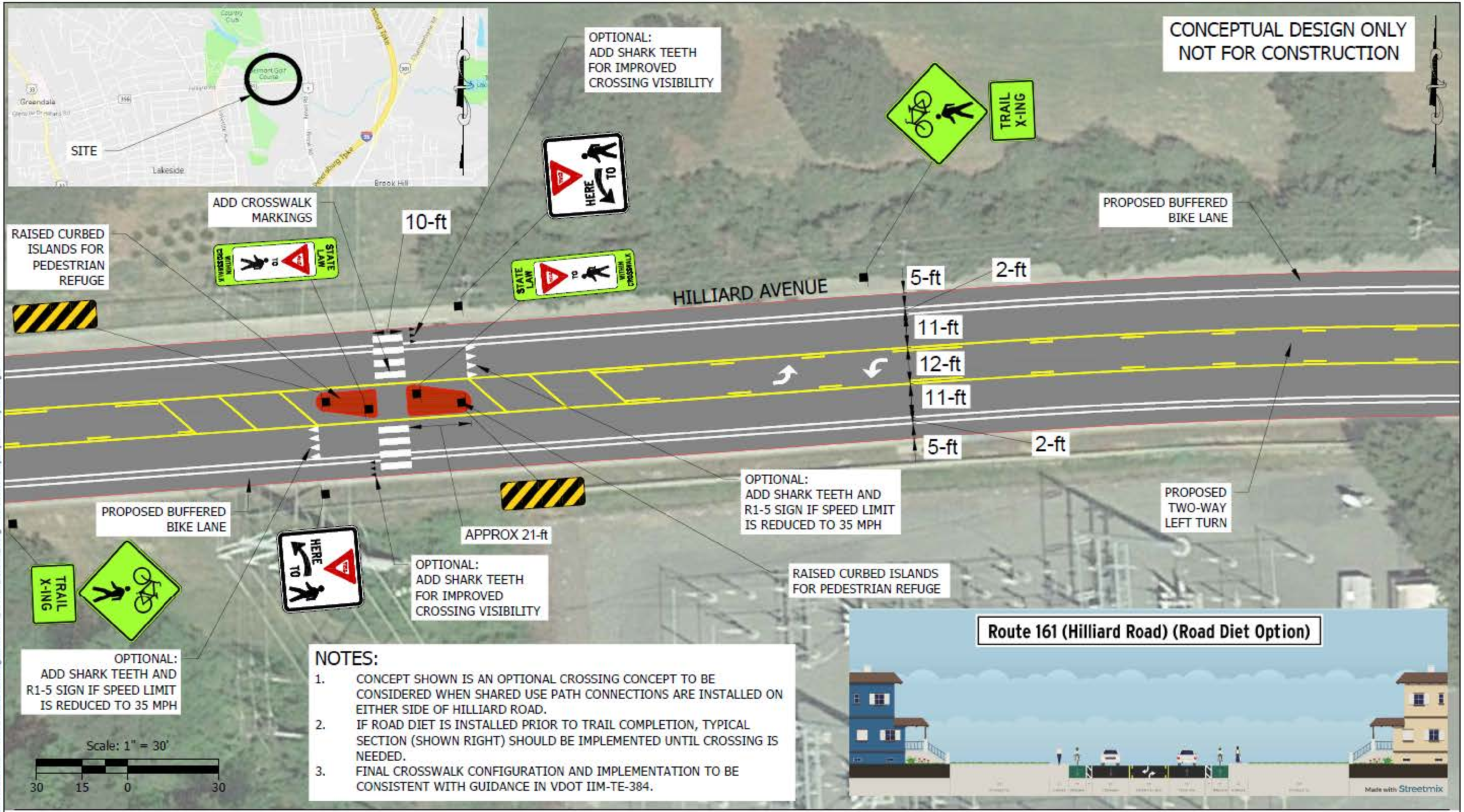
A classic Road Diet typically involves converting an existing four-lane, undivided roadway to a three-lane roadway consisting of two through lanes and a center, two-way left-turn lane and bike lanes or paved shoulders.

At least 27 such "4-3" conversions have been implemented in Virginia.

The resulting benefits of the 4-3 conversion include an average crash reduction of 19 to 47 percent, reduced vehicle speed differential, improved mobility and access by all road users, and integration of the roadway into surrounding land uses that results in an enhanced quality of life.

Concept level striping plan





Hilliard Road Road Diet Concept
Optional Trail Crossing Concept
Henrico County, Virginia

Figure 2

Example of operational analysis

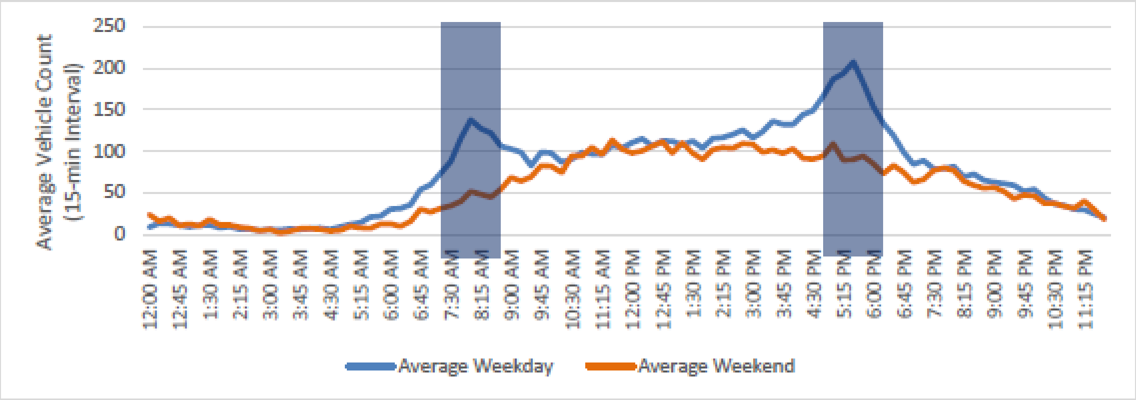


Figure 1 Total Average Weekday/Weekend Traffic Profile

Average Daily Count				ADT[1]	4-lane Existing LOS			2-lane Road Diet LOS		
Direction	Weekday	Weekend	7-Day		C Cap.[3]	D Cap.[3]	LOS[4]	C Cap.[3]	D Cap.[3]	LOS[4]
Eastbound	4,780	3,170	4,320	4,400	25,600	26,900	C or better	15,100	15,900	C or better
Westbound	3,177	2,199	2,898	2,900						
TOTAL	7,958	5,369	7,218	7,300						
Average Peak Hour				Peak[2]	4-lane Existing LOS			2-lane Road Diet LOS		
Direction	Weekday	Weekend	7-Day	Hour	C Cap.[3]	D Cap.[3]	LOS	C Cap.[3]	D Cap.[3]	LOS[4]
Eastbound	627	232	514	520	2,310	2,420	C or better	1,360	1,440	C or better
Westbound	300	151	258	260						
TOTAL	927	383	772	780						

[1]ADT calculated as 7-day average rounded up to nearest 100 vehicles.
[2]Peak hour calculated as 7-day average rounded up to nearest 10 vehicles.
[3]Capacities for LOS C and D calculated using the FDOT Quality Level of Service Tables (Table 1 for daily two-way volumes; Table 4 for peak hour two-way volumes).
[4]LOS compares totals for ADT and peak hour to respective LOS C and D calculated capacities.

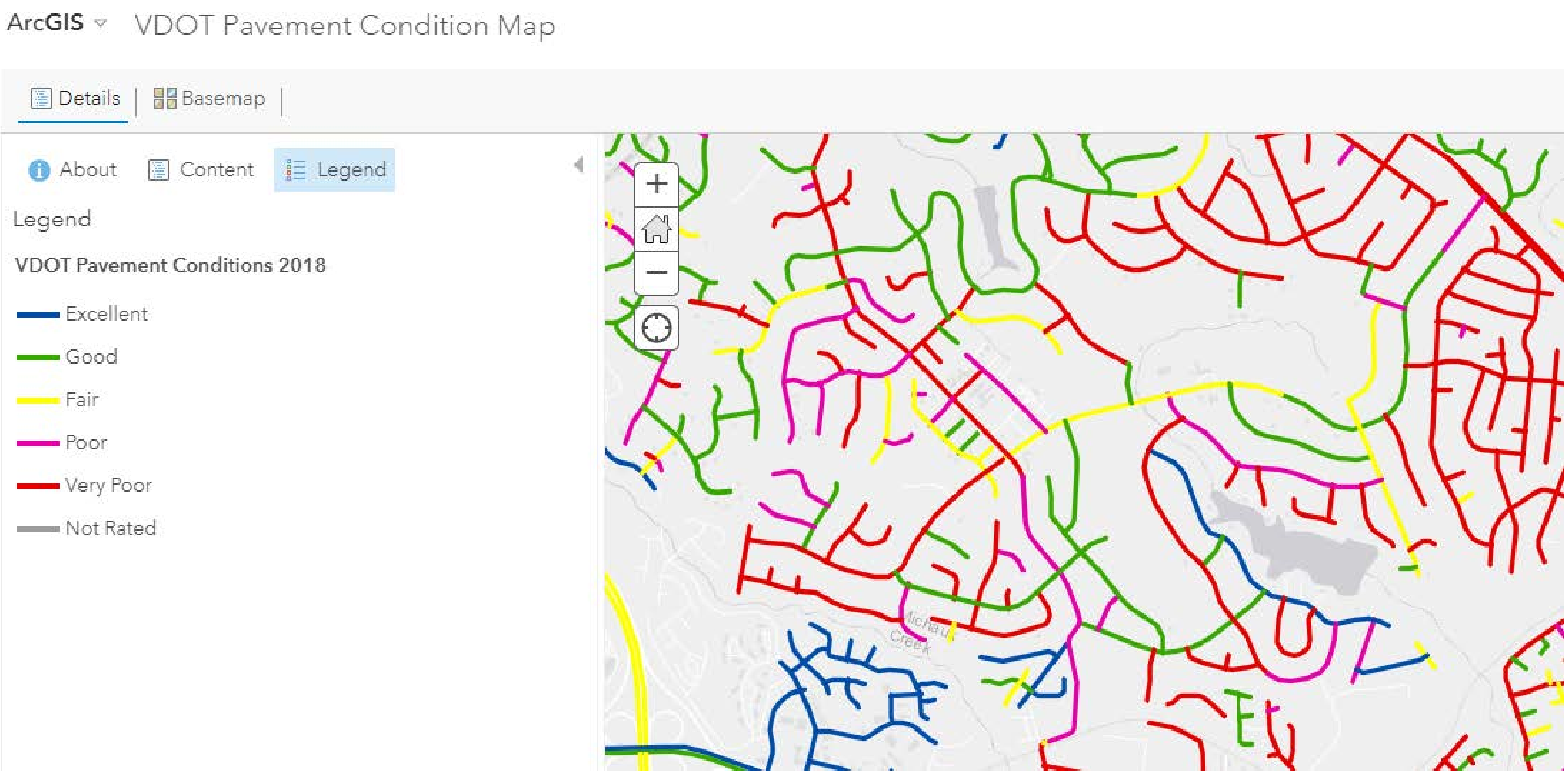
Operations Analysis Results

Table 2 summarizes the intersection operations of the terminal intersections for the Hilliard Road corridor. *Approaches highlighted in orange indicate segments considered for road diet modifications. Synchro analysis worksheets can be found in Attachment B.*

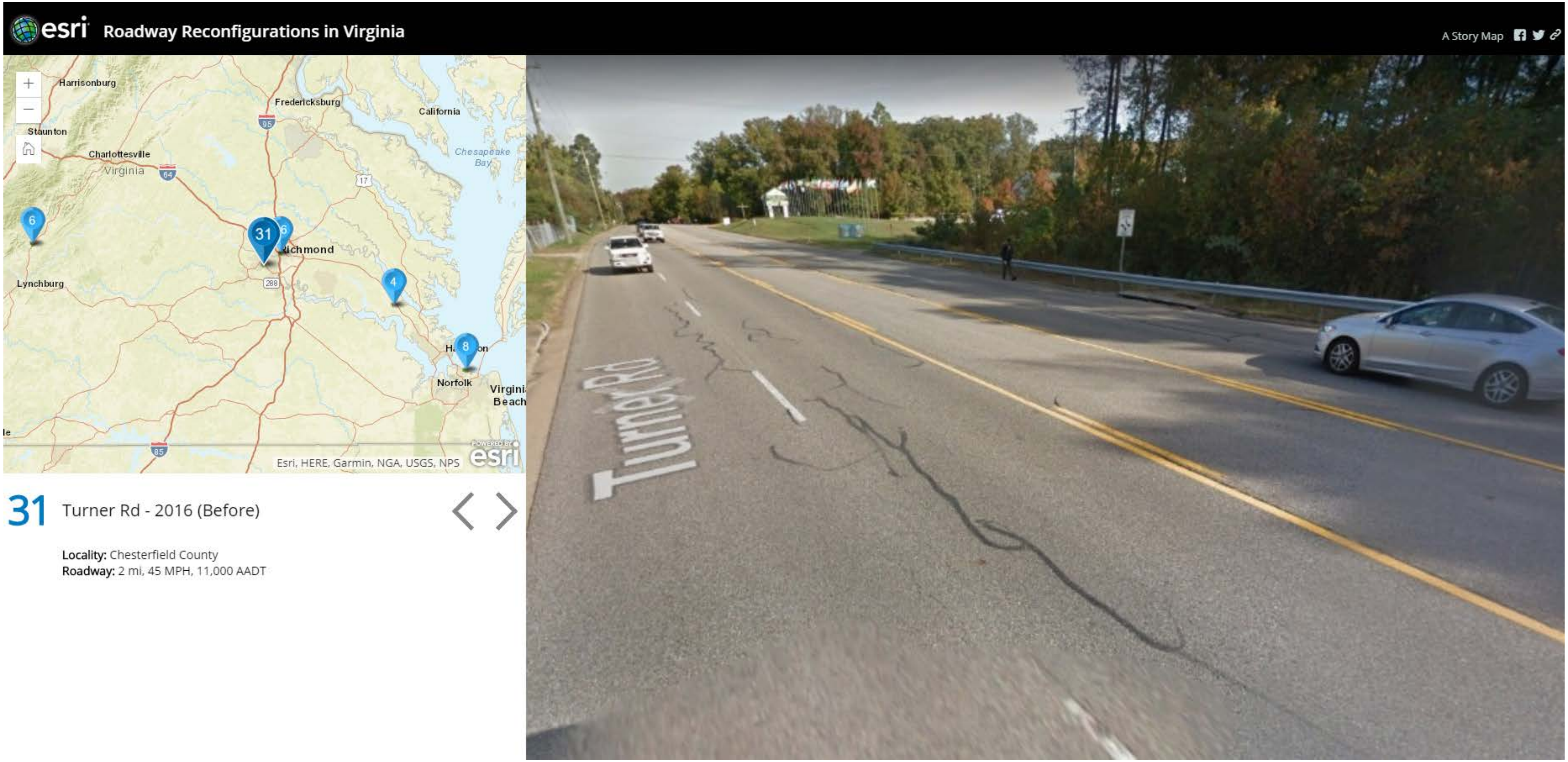
Table 2 - Existing (2019) AM/PM HCM 6th Edition Results

Approach	Movement	Existing Storage (ft)	AM Peak Hour			PM Peak Hour		
			V/C	Delay (s) [LOS]	95 % Queue (ft)[2]	V/C	Delay (s) [LOS]	95 % Queue (ft)[2]
Lakeside Avenue/Hilliard Road[1]								
EB	EBL	165	0.85	68.0 [E]	#250	0.92	70.2 [E]	#500
	EBT	--	0.29	28.7 [C]	150	0.56	34.1 [C]	300
	EBR	220	0.71	28.1 [C]	100	0.43	19.4 [B]	50
	Approach		-	36.2 [D]	-	-	39.7 [D]	-
WB	WBL	215	0.72	61.8 [E]	#75	0.64	63.7 [E]	75
	WBT	--	0.42	35.1 [D]	150	0.52	45.6 [D]	150
	WBR	130	0.00	0.0 [A]	0	0.00	0.0 [A]	0
	Approach		-	38.7 [D]	-	-	48.0 [D]	-
NB	NBL	130	0.72	45.2 [D]	150	0.56	40.1 [D]	200
	NBT	--	0.47	43.0 [D]	125	0.79	46.7 [D]	325
	NBR	130	0.12	36.9 [D]	0	0.26	34.9 [C]	25
	Approach		-	44.1 [D]	-	-	42.0 [D]	-
SB	SBL	235	0.00	27.9 [C]	25	0.03	34.3 [C]	25
	SBT	--	0.47	32.5 [C]	225	0.55	39.7 [D]	250
	SBR	--	0.71	30.5[C]	125	0.55	25.7 [C]	100
	Approach		-	31.1 [C]	-	-	31.1 [C]	-
Overall Intersection			-	36.6 [D]	-	-	39.3 [D]	-

Pros and cons of implementation via resurfacing



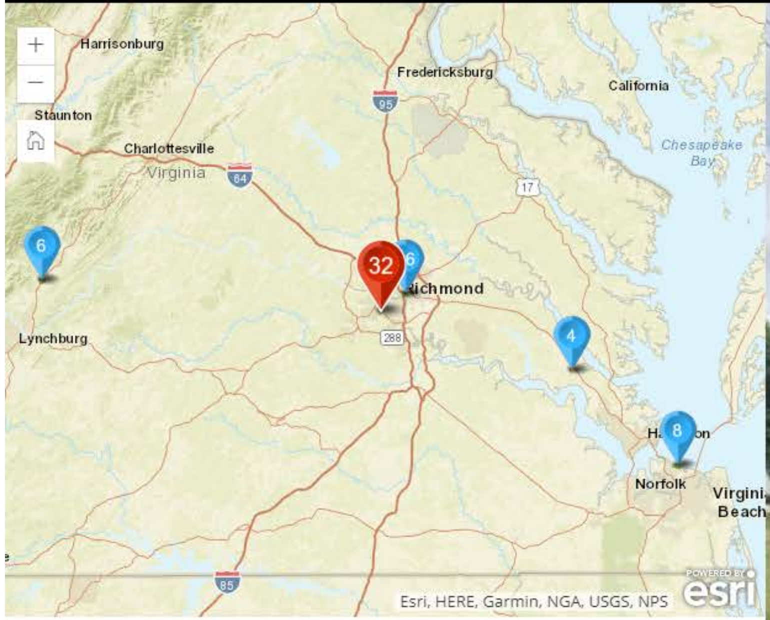
Before / after map with 24 examples



After

esri Roadway Reconfigurations in Virginia

A Story Map



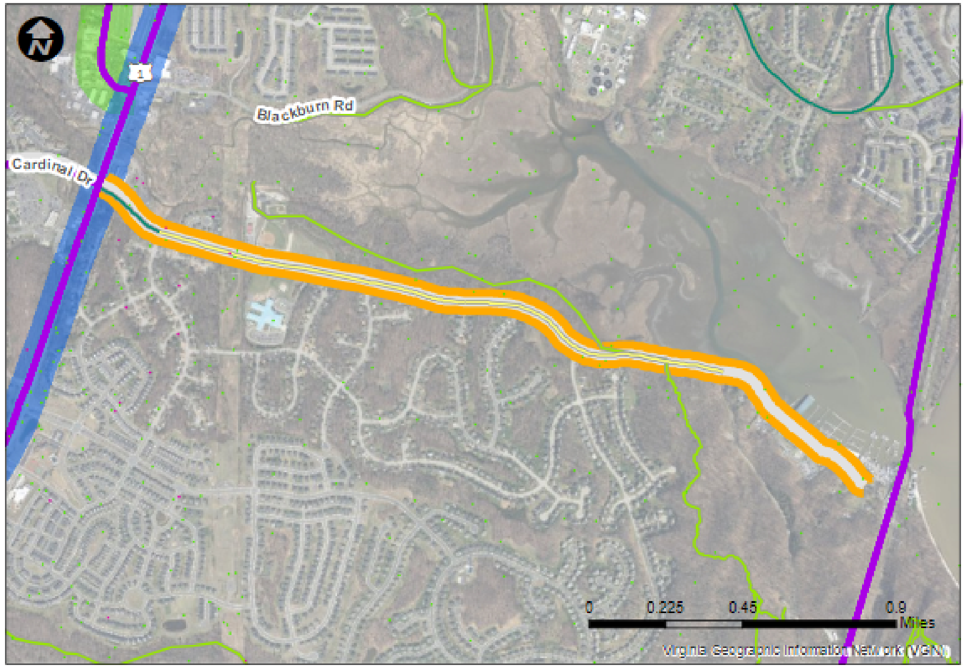
32 Turner Rd - 2020 (After)

Locality: Chesterfield County
Roadway: 2 mi, 45 MPH, 11,000 AADT

GIS tools

These sheets display potential segments with relevant data:

- Existing bike/ped facilities
- Pavement condition
- ACS walk, bike, transit data
- Traffic volume, K-factor
- Crash rate
- V/C Ratio
- Median type



SC-610N (Prince William County), from DEAD END to JEFFERSON DAVIS HWY

- Jurisdiction	Prince William County
- Through Lanes	4
- Functional Classification	Major Collector
- Land Use Description	Outlying Business District
- Median Type	Raised
- Existing AADT	641
- Horizon Year AADT	731
- Percent Grade	
- Right Shoulder Width	0
- Left Shoulder Width	0
- Posted Speed Limit	25
- Bike Route Type	
- Bike Facility Type	
- Sidewalk Side	N
- Percent Heavy Vehicles	2
- Direction Factor	0.61
- K Factor	0.123
- Peak Hour Factor	0.95
- Vehicles per Hour	79
- V/C Ratio	0.03
- Average Speed	24.0338
- Crash Rate	2.176409
- Paving List	No
- Paving List Year	0
- Poor or Very Poor Pavement Condition	No

Legend

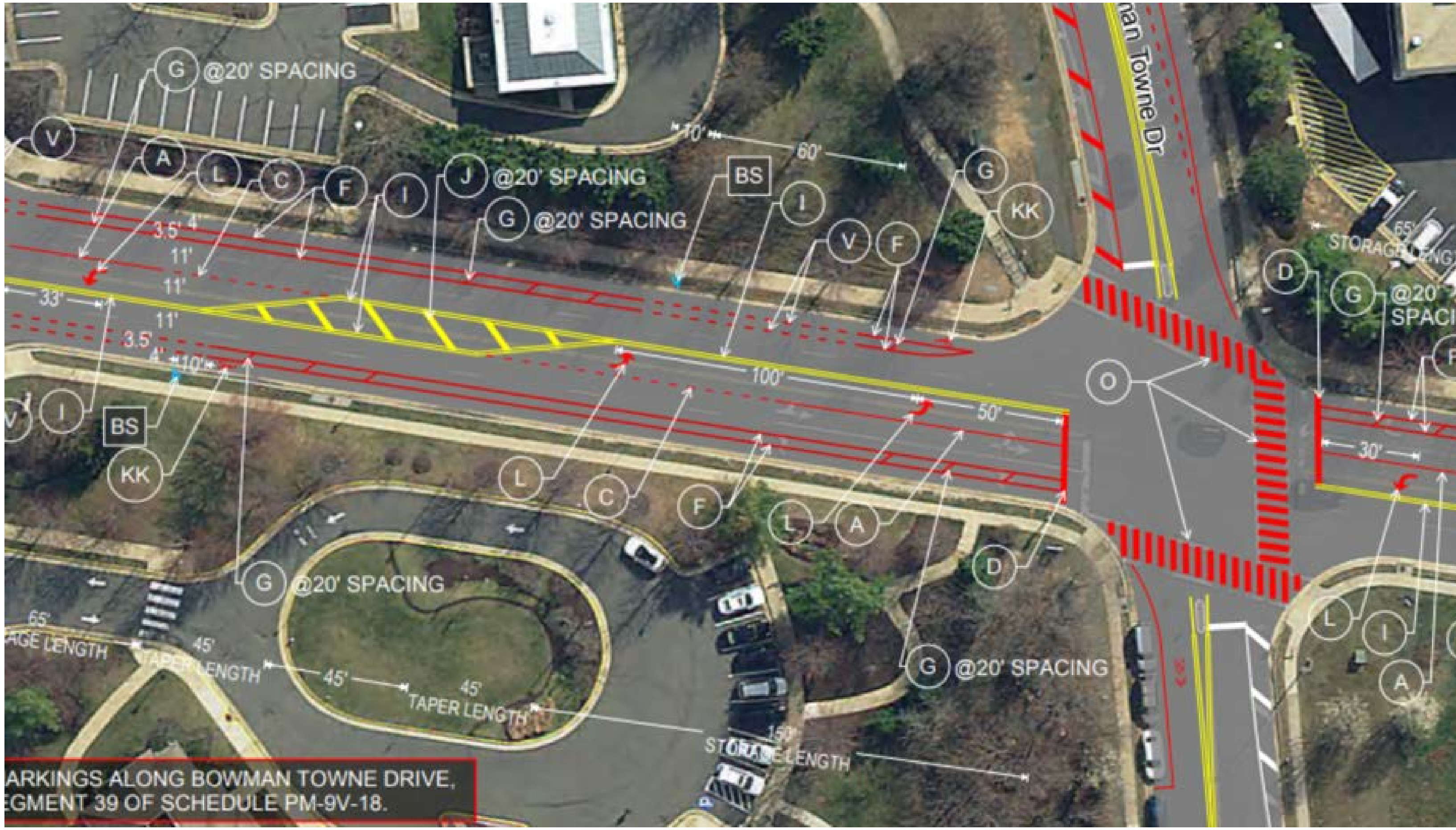
Persons, mode to work, 2012-2016

1 Dot = 1

- Transit
- Bicycle
- Walk
- Other
- Transit Routes
- US Bicycle Routes
- Bike Lane
- Shared Use Path
- 3-Shared Lane
- 4-Paved Shoulder
- 5-Sidewalk
- 6-Natural Surface Trail
- 7-Additional Trails
- 4 Lanes =< 20,000 AADT
- Focus Segment
- Priority Corridors - All
- Future Project
- Design Underway
- Advertised
- Construction Started
- Construction Completed

Next Steps

- Publish more robust guidelines
- Assist with planning
- Continue to assist districts by funding:
  - Requests for striping plans
  - Traffic counts
  - Full studies



FAIRFAX COUNTY
VIRGINIA

Road Diets in Fairfax County: A VDOT & County Collaboration

f

FAIRFAX COUNTY VIRGINIA

Programmatic Implementation

- 20+ road diets since 2009
- Over 100 miles of bike lanes added through VDOT’s repaving program (road diets and lane diets)
- 0 failed or removed road diets (though some are temporary)
- Public support for road diets is growing

Policy Guidance

Evaluate road dieting and/or lane dieting concepts where roadway volume to capacity ratios allow in order to establish on-road bike lanes.

\- Fairfax County Comprehensive Plan

Process Overview & Timeline

1. VDOT: Distribution of Preliminary Paving Plans (August-October Y1)
2. County: Prescoping (October-November Y1)
3. VDOT: Review & Approval (December Y1)
4. County: Political Stakeholder Review & Approval (January Y2)
5. County: Public Outreach (February-April Y2)
6. VDOT: Design & Final Approval (April-May Y2)
7. VDOT: Implementation (May – December Y2)

Lessons Learned

1. Start with low hanging fruit to show positive effects of road diets
2. Be mindful of stadium arrival, including weekends
3. Coordinate with impacted schools
4. Coordinate with transit, move bus stops if needed
5. Don’t forget pedestrians – new crosswalks, ped refuges, signage
6. Communicate new traffic pattern ahead of time (alerts, signage)
7. Drivers need time to adjust (2-3 months)

Thank you!

Contact Information:

Nicole Wynands
Transportation Planner III
Active Transportation Program
Fairfax County Department of Transportation
Nicole.Wynands@fairfaxcounty.gov

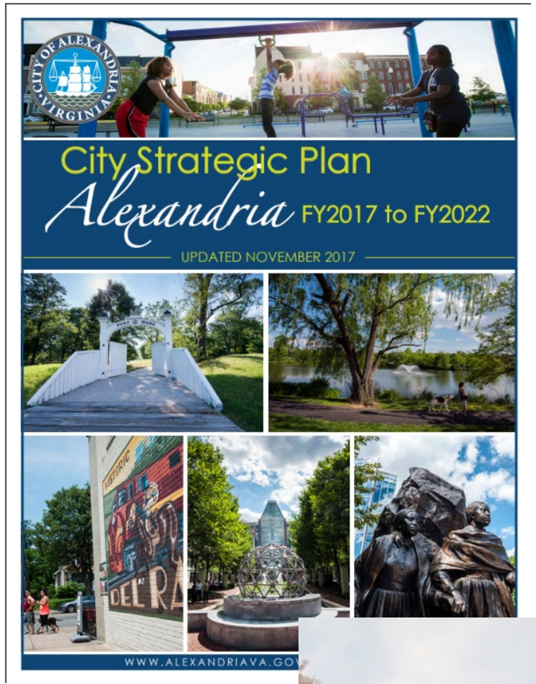
Alexandria, Virginia

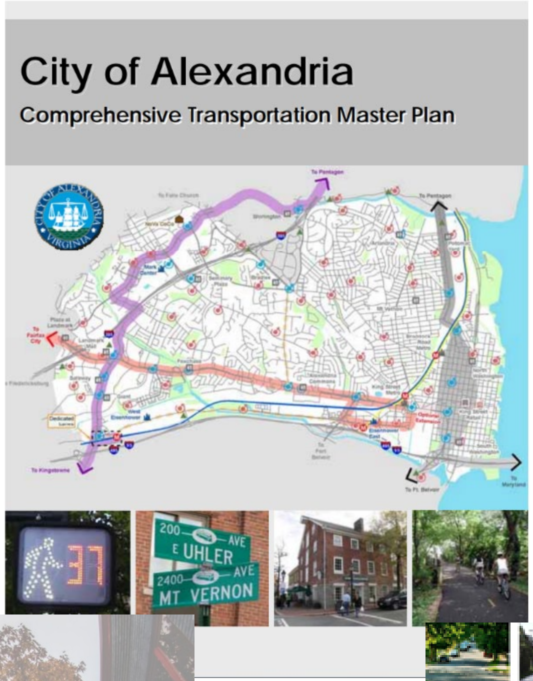
Road Reconfigurations on
Higher Volume Roads

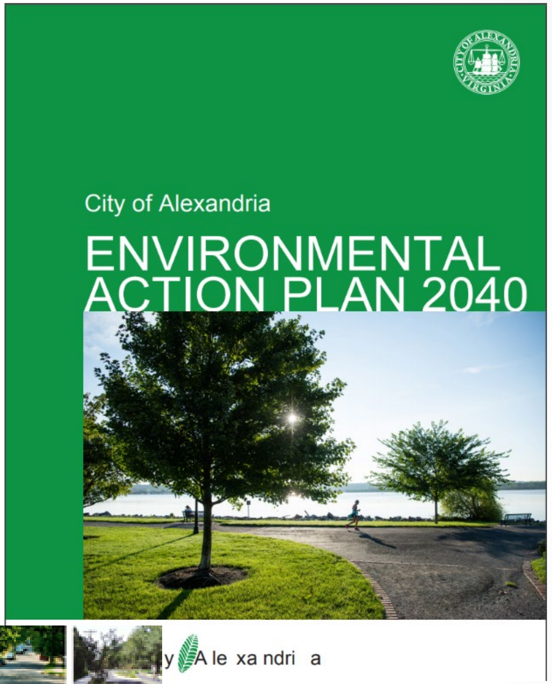
Intro to Alexandria

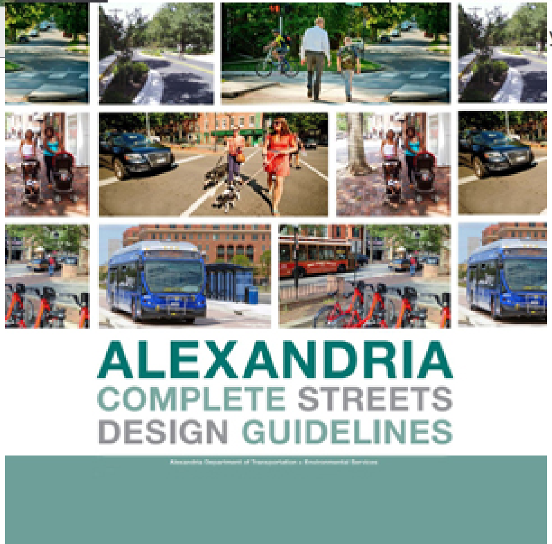
- Street Ownership
- Street Types

Intro to Alexandria



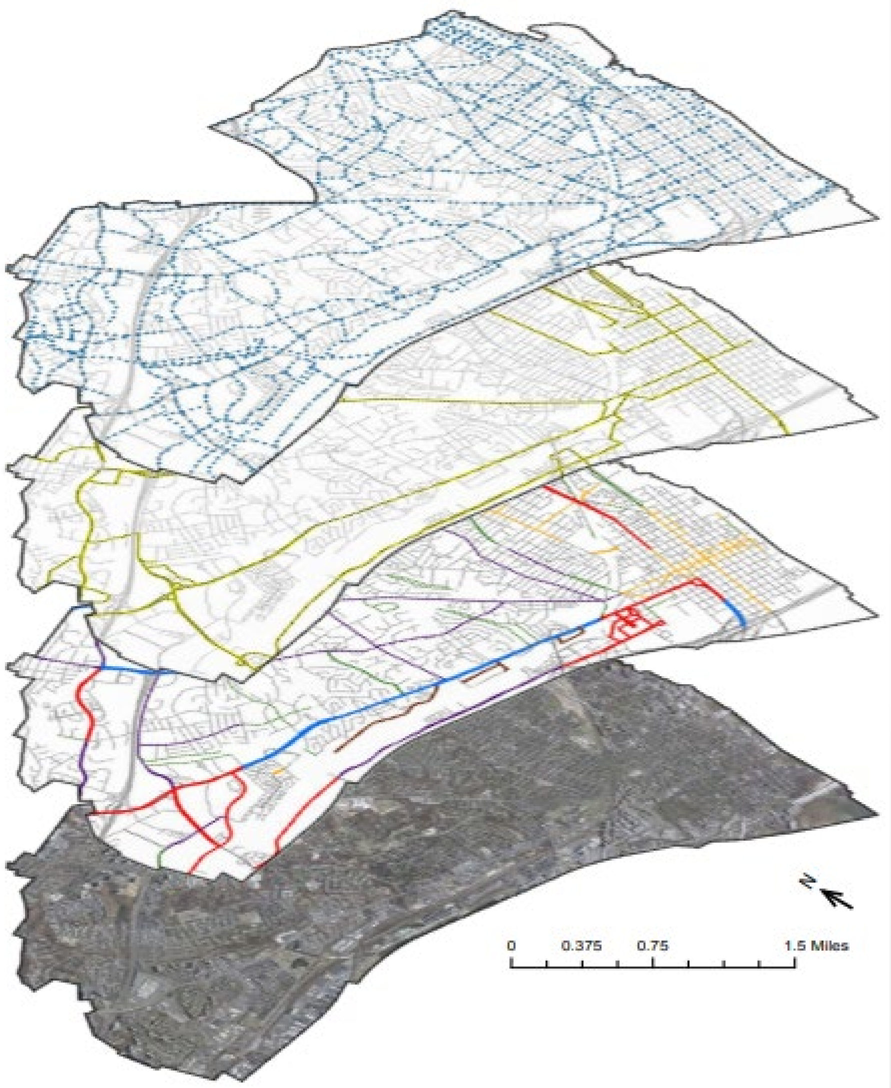






Alexandria Process for Consideration

- Resurfacing schedule
- Planned multimodal facilities
- VDOT or otherwise collected volume data
- FHWA guidance
- Crash Data/ Crash Risk
- Other capital projects in planning



Why consider a Road Diet?

- Federal guidance gives criteria for whether road diets are possible in certain circumstances, recognizing where they are and are not possible:
  - https://safety.fhwa.dot.gov/road_diets/guidance/info_guide/

< 10,000 Average Daily Traffic (ADT)	10,000-15,000 ADT	15,000-20,000 ADT	>20,000 ADT
Great candidate for Road Diets in most instances. Capacity will most likely not be affected.	Good candidate for Road Diets in many instances. Agencies should conduct intersection analysis and consider signal retiming to determine any effect on capacity.	Good candidate for Road Diets in some instances. Agencies should conduct a corridor analysis. Capacity may be affected at this volume depending on the "before" condition.	Agencies should complete a feasibility study to determine whether this is a good location for a Road Diet. There are several examples across the country where Road Diets have been successful with ADTs as high as 26,000. Capacity may be affected at this volume.

Recent Road Reconfiguration Projects

N Van Dorn
(Menokin Drive to West Braddock Road)

2015–2016

King Street
(Janneys Lane to Kenwood Avenue)

2015–2017

Seminary Road
(North Quaker Lane to North Howard Street)

2018–2020

King Street Complete Streets Project

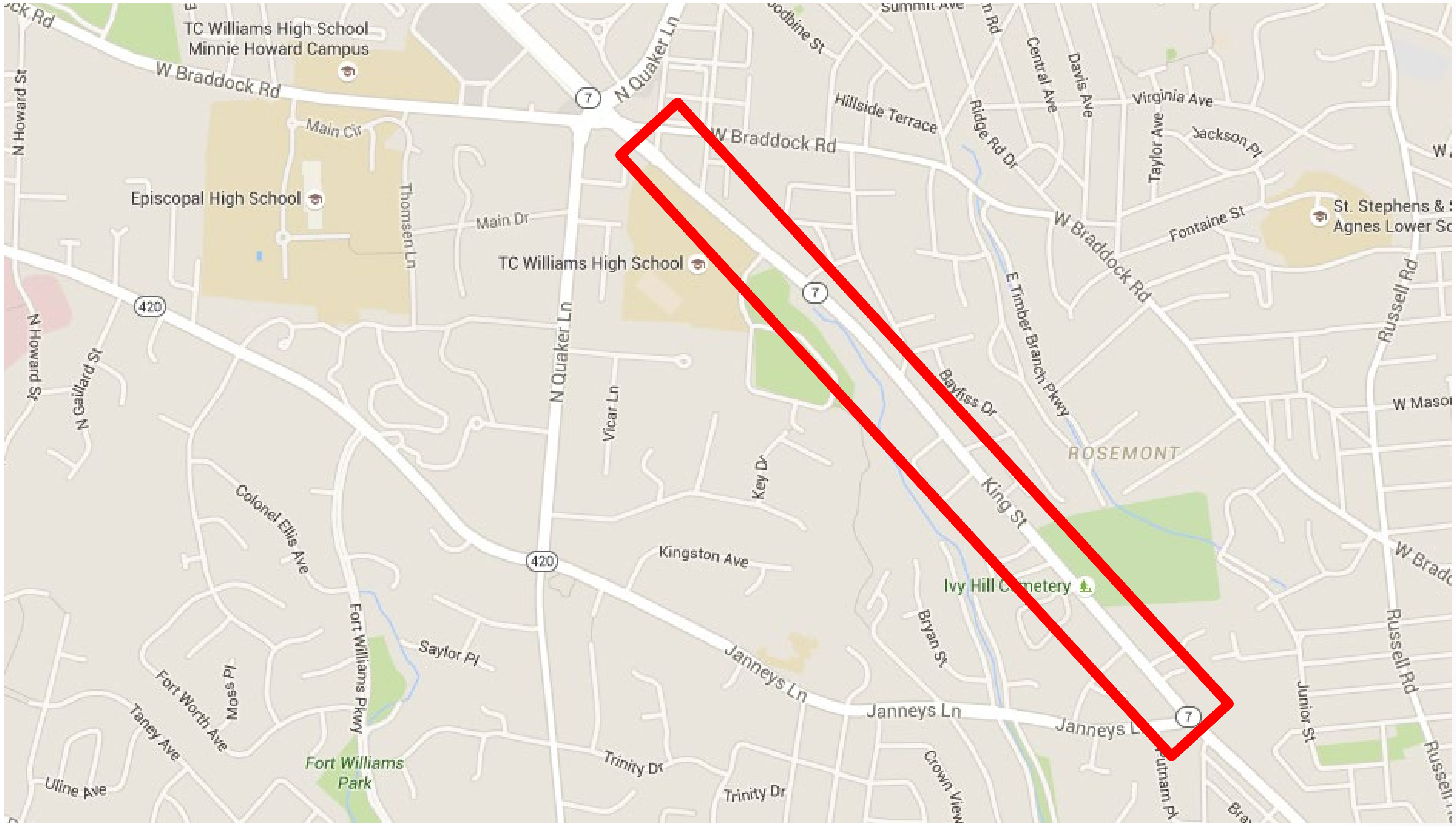
Background

- Board action at TPB Public Hearing in June 2016 recommended:
  - **Removal of EB travel lane** between Chinquapin & Janney's and **WB travel lane** between Kenwood & Janney's
  - Installation of "**No Right Turn on Red**" signs at SB Kenwood at King
  - Reduction in the speed limit from **35mph to 25mph** on King, between Chinquapin & Melrose

- Project implemented between July – October 2016

- Board approved the staff recommendation
  - Requested **staff perform evaluation**
    - If the project failed to meet the staff defined expectations in the project proposal presented to the Board, **take remedial actions** to correct.
  - To comply with the motion:
    - Staff enlisted an **external traffic engineering firm to perform an analysis** along the corridor of
      - Intersection level-of-service
      - Travel time delays

Project Limits: Radford Street to Janney's Lane



Project Goals

- Improve the **safety** and convenience of all street users
- Provide **facilities** for people who walk, bike, ride transit or drive cars
- Implement City Council adopted **plans and policies**

What we heard from the community:

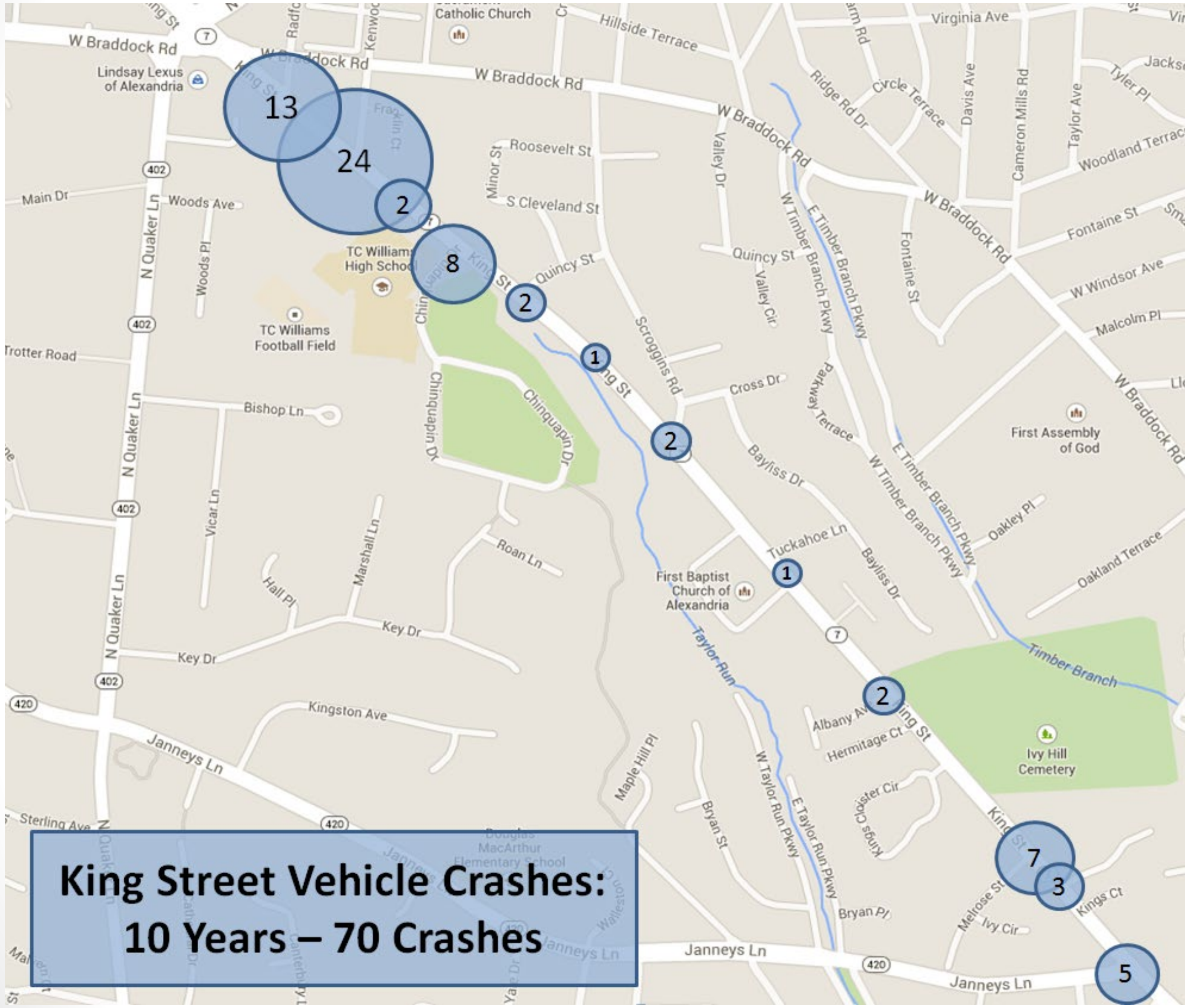
What We Heard – main themes
Difficult to cross King Street
Pedestrian safety concerns near school
Vehicle speeds along King Street are high
Street crossings are long
Not enough time to cross at lights
Maintain travel times
Unsafe for people who bike
Difficult to access bus stops
Improvements needed at intersections
Need to change character of the roadway

King Street Community Comments

Comments	
1	Install protected bike lanes
2	Install green bike lanes at T-intersections
3	Add Bikeshare station between King Street Metro and TC Williams
4	Connect bike network to side streets
5	Lower speed limits to 25mph
6	Maintain speed limit on King (single speed)
7	Redesign the intersection at Scroggins Rd
8	Scroggins a problem for cyclists due to uphill/vehicle blind spot
9	Improve streetscape and provide shade for pedestrian at TC Williams where trees don't grow
10	Provide planting strip at Church and Lexus dealership
11	Add bike lanes
12	Utility poles inhibit pedestrians in front of Ivy Hill Cemetery
13	Need sidewalk buffer/planting strip in front of Ivy Hill Cemetery
14	Overall speed on King is too fast for cycling
15	Provide road diet with two travel lanes, left turn lanes and bike lanes (or buffered bike lanes)
16	Reduce speed to make Scroggins more accessible
17	Aggressive driving in right turn lane of Janney's from King
18	Install more crosswalks
19	Focus less on bikes and more on encouraging public transit
20	Need barriers to prevent cars from going into the bike lanes (turning right from Janneys onto King)
21	Left turn onto King from West View is very hard due to traffic volumes
22	Add bike lanes to narrow King and provide calming/lower speeds
23	Consider pedestrian island at Scroggins and King
24	Traffic and bicycle safety concerns on King from Janneys to TC Williams
25	Add protected bike lanes
26	Lights needed for pedestrian safety at scroggins
27	Consider road diet
28	Extend curbs at Scroggins to reduce vehicle speeds
29	Install pedestrian refuge islands
30	Address general landscape concerns
31	Install speed indicator signs
32	Preserve/expand green space
33	Focus on EB King Street (near TC Williams) where this is poor biking conditions due to low visibility and hills
34	Consider parent drop-off/pick-up access at TC Williams
35	Install all walk phase at Kenwood and King
36	Install curb extensions at Kenwood and King
37	Improve circulation on Chinquapin Dr
38	Install a speed triggered light
39	Provide left only and through & right lanes on Kenwood
40	Consider increase in traffic volume from Woodbine/Memory Care development
41	Install more traffic lights along King
42	Provide "All Walk" phase at Kenwood and King and at Kenwood and Braddock
43	Provide median on King St
44	Add more greenscape and buffer for sidewalks
45	Reduce speed to make it easier to access and exit driveway safely
46	Consider cut-through traffic on Scroggins if speeds are reduced on King
47	Consider impact on driveway access if there are bike lanes on King
48	Evaluate left turn signals near TC Williams
49	Installed Flashing SCHOOL SPEED sign on King Street
50	Control traffic volumes

*Over 250 comments regarding this project submitted

Conditions Before



*No bicycle or pedestrian crashes reported

- Average 85th percentile speeds:
  - 35mph=42   25mph=33
- AM Peak ~750vph
- PM Peak ~650vph
- ADT: 13,000 (VDOT)
- Traffic Study

Data Collection

Location	85th percentile speed (MPH)	AM peak hour volume (VPH)	PM peak hour volume (VPH)	Total vehicles per day (VPD)
King St. eastbound at Quincy St.	40.4	597	574	6,730
King St. westbound at Quincy St.	41.3	663	553	6,931
King St. eastbound at Albany	43.7	657	679	7,457
King St. westbound at Albany	42.9	999	735	8,008
King St. eastbound at Kenwood Ave.*	33.8	768	640	5,924
King St. westbound at Kenwood Ave.*	32.8	832	649	3,367
CORRIDOR AVERAGE 35 MPH	**42.1**			
CORRIDOR AVERAGE 25 MPH	**33.3**			

*25 mph speed limit

Why consider a Road Diet?

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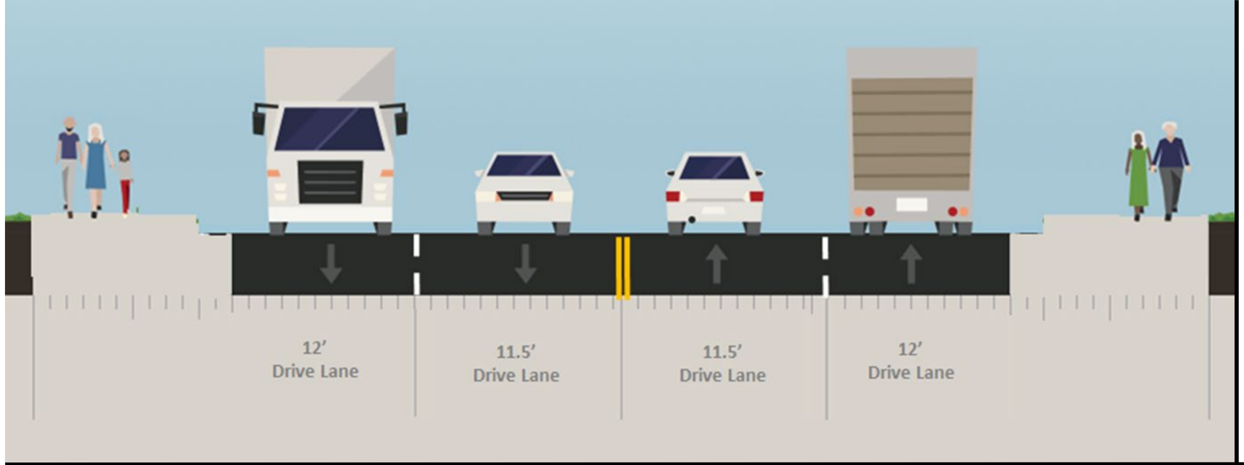
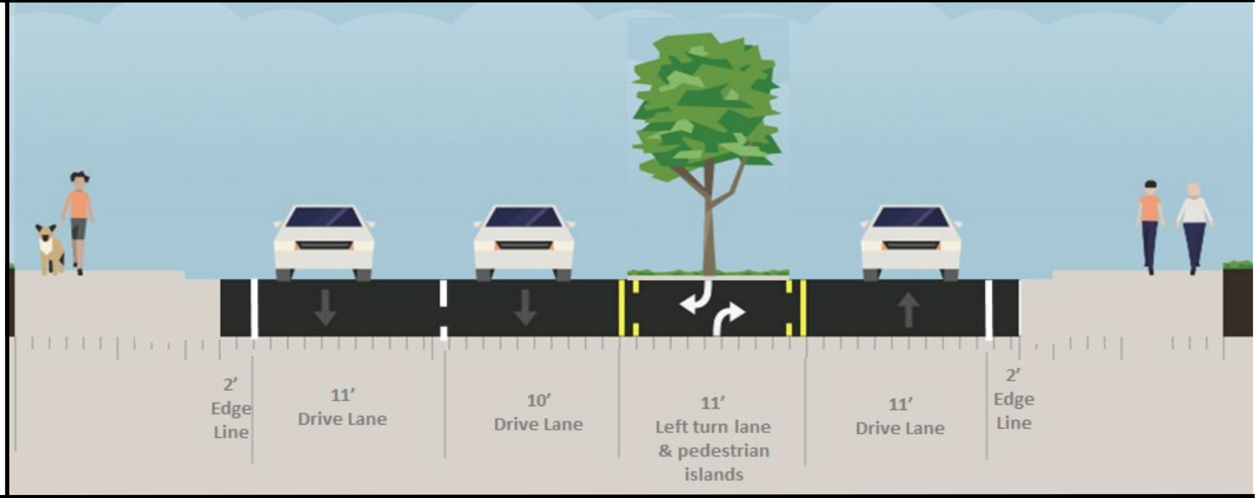


Option 1
Complete Street Maintenance

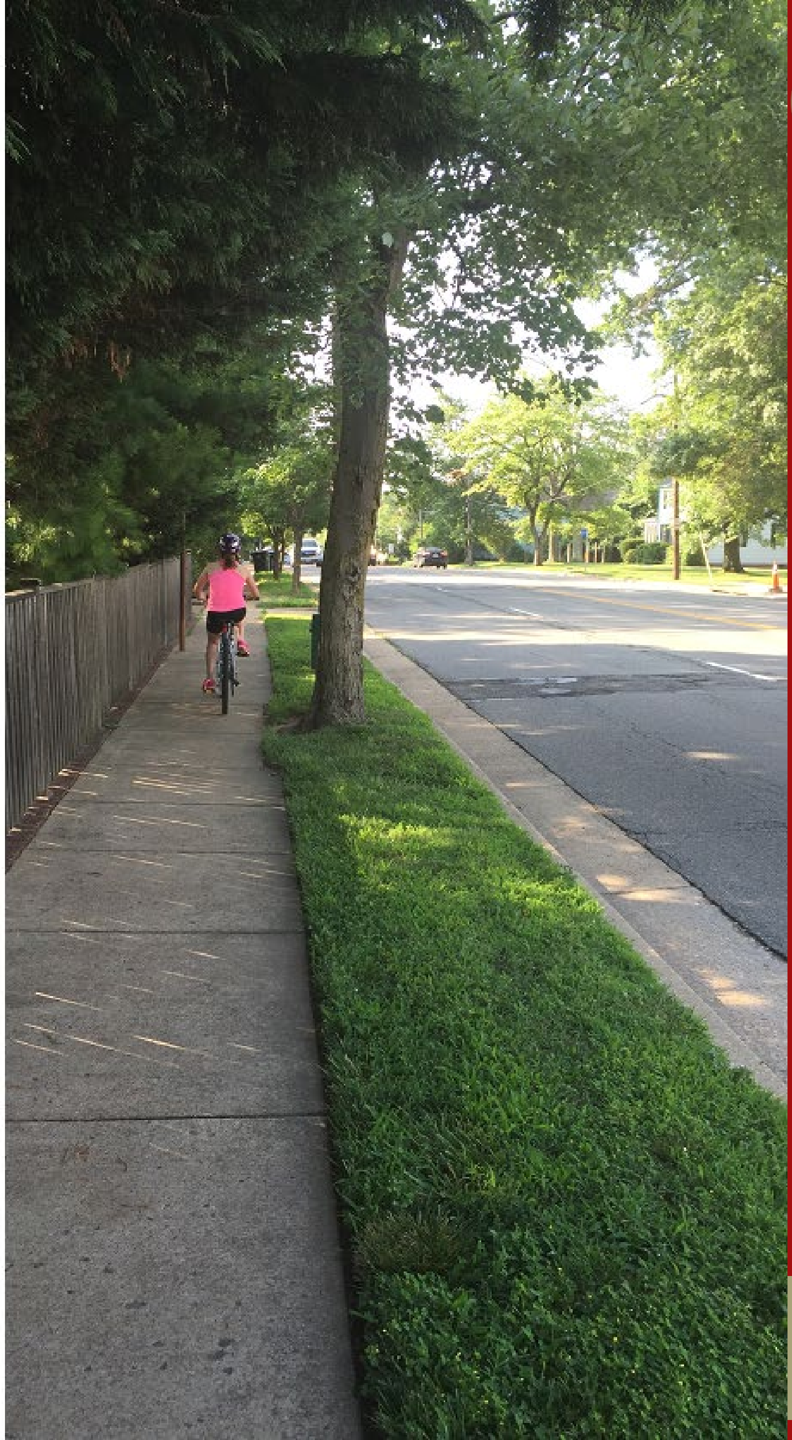
Option 2
Pedestrian & Accessibility Intersection Enhancements



Option 3
Complete Street Corridor Improvements

Complete Street Design Corridor Concept

Before



After

Evaluation – Key Findings

1. **Zero reported traffic crashes in the first year.**
   - Annual average of 7 crashes during the 10 years prior to this project
2. **Average vehicle speeds on the corridor have reduced.**
   - -18% between Albany Ave. and Hermitage Ct.
   - -4% near T.C. Williams High School
3. **Traffic delay at King & Chinquapin has increased slightly more in the AM peak hour than anticipated.**
   - Other intersections along the corridor have seen **minimal or no additional changes** to delay.
4. **Traffic diversion onto Scroggins Road has not appeared to increase due to this project.**
   - Concern from several residents.

Average Vehicle Speeds Have Been Reduced

Segment of King St.	Before		After		Difference	
	Speed Limit (mph)	Avg. 85th % Speed (mph)	Speed Limit (mph)	Avg. 85th % Speed (mph)	Avg. 85th % Speed (mph)	Avg. 85th % Speed (%)
Albany Ave. to Hermitage Ct.	35	43.3	25	35.6	-7.7	-17.8%
Radford St. to Chinquapin Dr.	25	33.8	25	32.4	-1.4	-4.1%

After data collected in May 2017

AM Peak Delays at King & Chinquapin

- **Traffic delay in the AM peak slightly higher** at King & Chinquapin than anticipated
  - **Expected:** 22 seconds of additional delays
  - **Observed:** 32 seconds of additional delays

- Overall intersections operate at a **reasonable level-of-service and delay** after implementation

- Traffic **volumes are up slightly** on King St. during this time.

- **Remedial actions taken** to reduce excessive travel time delays:
  - **Signal timing** modifications at the intersections of Chinquapin & Kenwood (Fall 2016)
  - **Protected left turn** for WB King at Kenwood for vehicles entering TC Williams (Aug. 2017)

Post implementation traffic data collected in May 2017

No Increase in Traffic Diversion on Scroggins

Vehicle Speeds

Segment of Scroggins Rd.	Before	After	Difference	
	Avg. 85th % Speed (mph)	Avg. 85th % Speed (mph)	Avg. 85th % Speed (mph)	Avg. 85th % Speed (%)
Quincy St. to Cleveland St.	30.2	30.6	0.4	1.3%

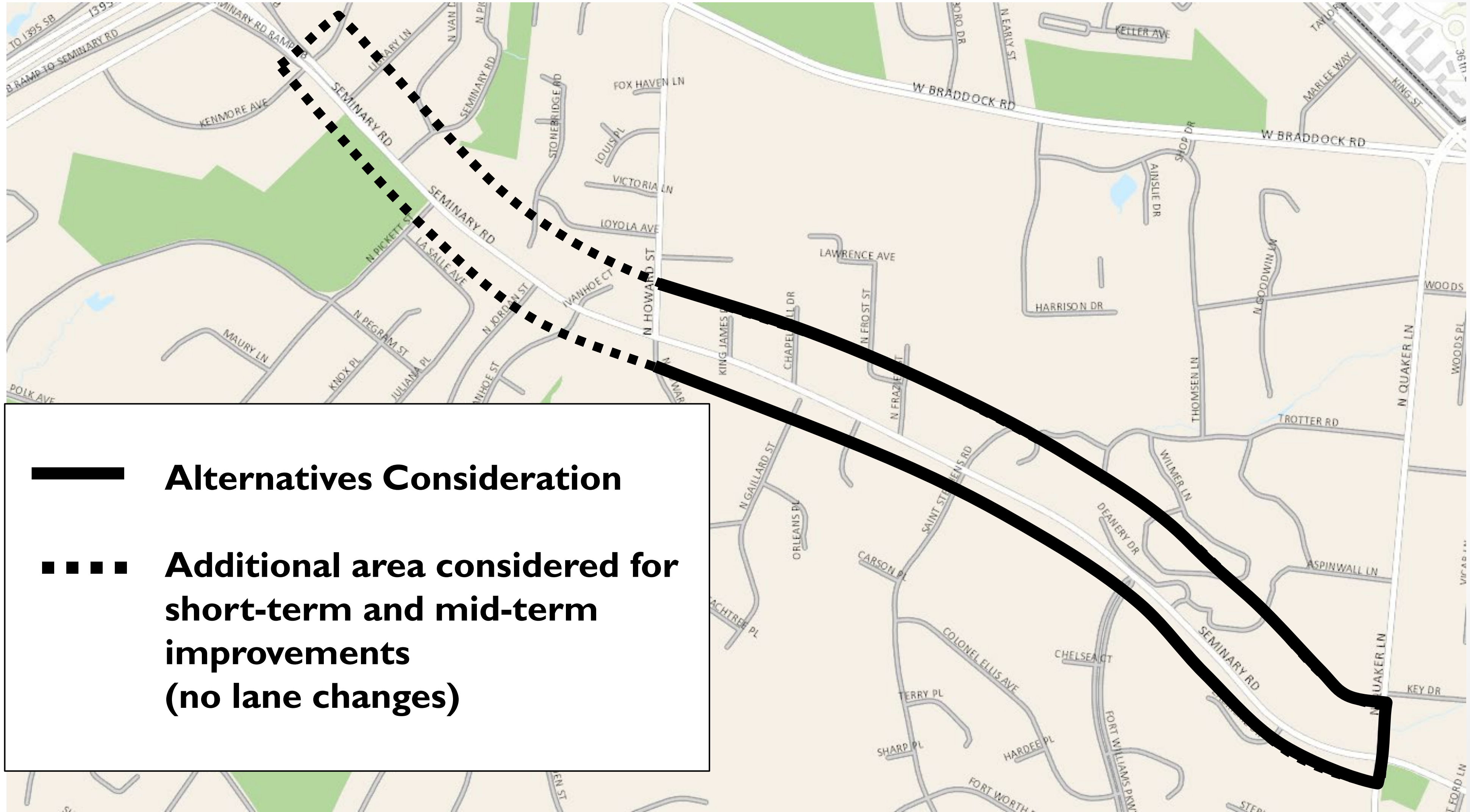
Traffic Volumes

Segment of Scroggins Rd.	Before	After	Difference	
	Vehicles per Day	Vehicles per Day	Vehicles per Day	Vehicles per Day (%)
Quincy St. to Cleveland St.	2,233	2,174	-59	-2.6%

Recent King Street volume counts show steady 13,000 ADT

Seminary Road
Complete Streets Project

Study Area



▬▬ **Alternatives Consideration**

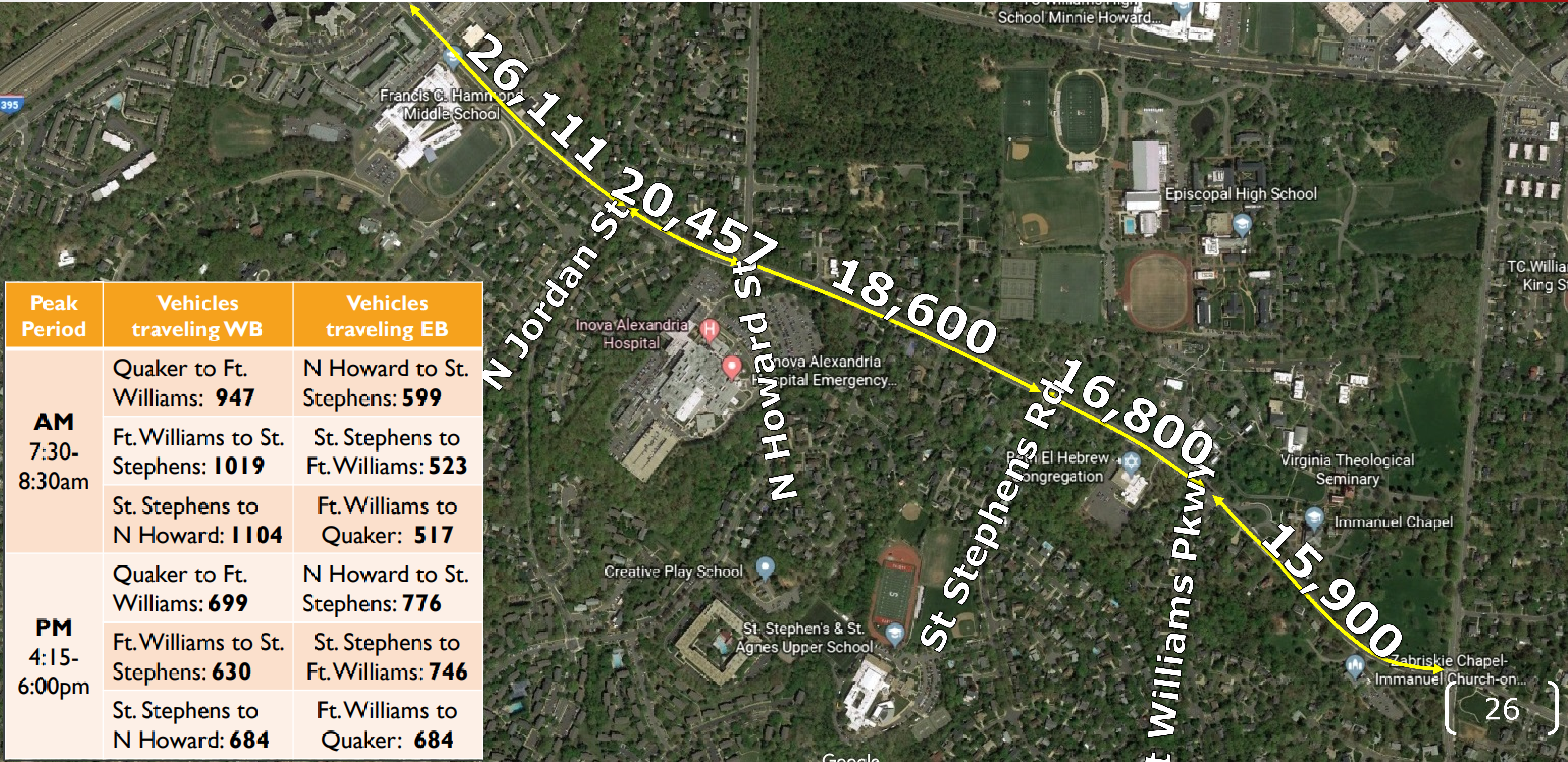
■ ■ ■ ■ **Additional area considered for short-term and mid-term improvements (no lane changes)**

Project Objectives

- Reduce crashes on the corridor
- Improve mobility, safety, and access for all roadway users
- Provide continuous, safe, and comfortable places for people to walk
- Provide more frequent and safer crossing opportunities along the corridor
- Minimize delay at intersections, and encourage speed limit compliance
- Where excess roadway capacity exists, explore opportunities to reconfigure the corridor to better serve all modes

Traffic Volumes Map – 2018 Average Daily Traffic

Typical Maximum Capacity of a Similar Roadway is >30,000 Vehicles per day



Peak Period	Vehicles traveling WB	Vehicles traveling EB
AM 7:30-8:30am	Quaker to Ft. Williams: **947**	N Howard to St. Stephens: **599**
	Ft. Williams to St. Stephens: **1019**	St. Stephens to Ft. Williams: **523**
	St. Stephens to N Howard: **1104**	Ft. Williams to Quaker: **517**
PM 4:15-6:00pm	Quaker to Ft. Williams: **699**	N Howard to St. Stephens: **776**
	Ft. Williams to St. Stephens: **630**	St. Stephens to Ft. Williams: **746**
	St. Stephens to N Howard: **684**	Ft. Williams to Quaker: **684**

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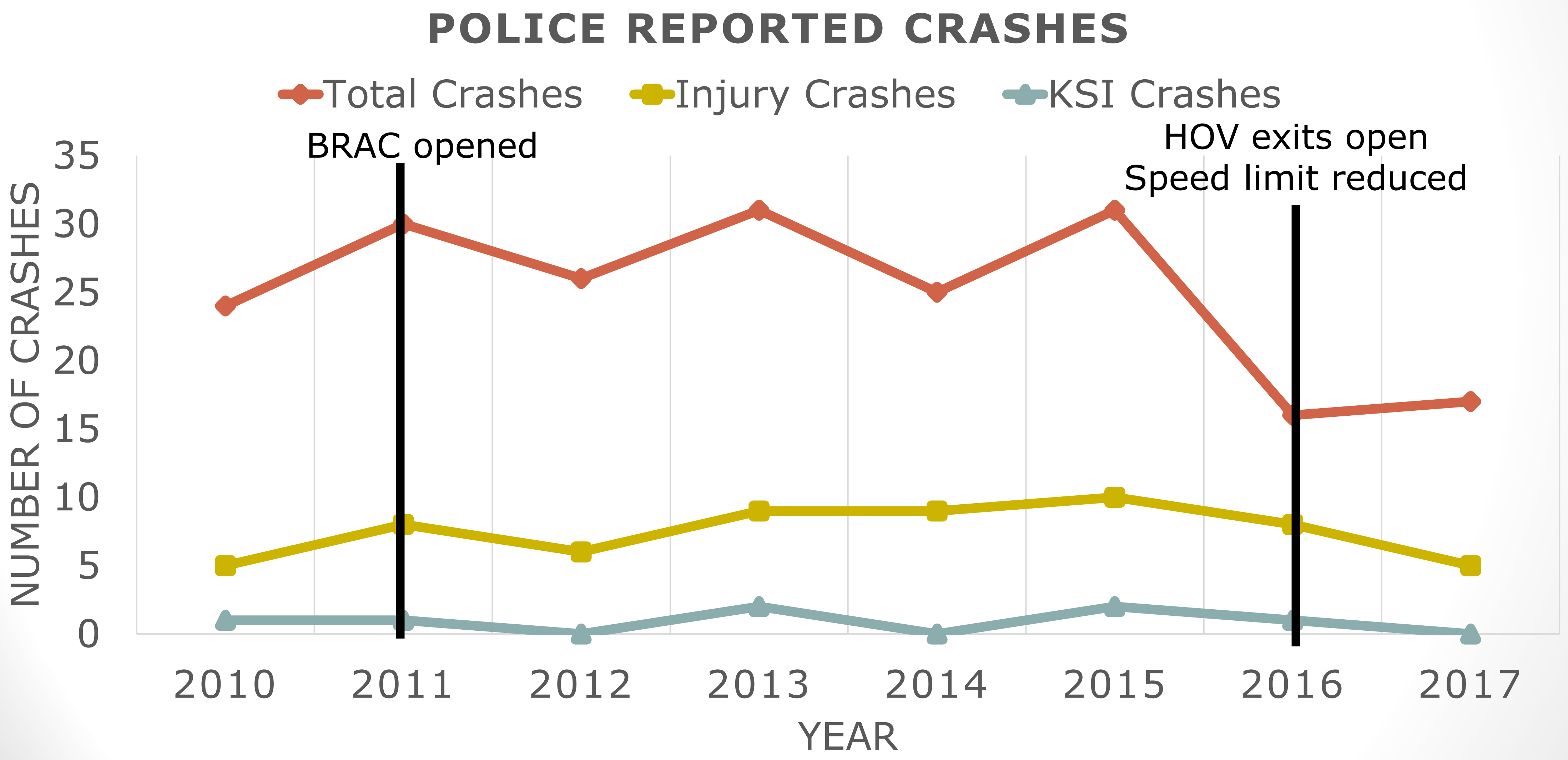
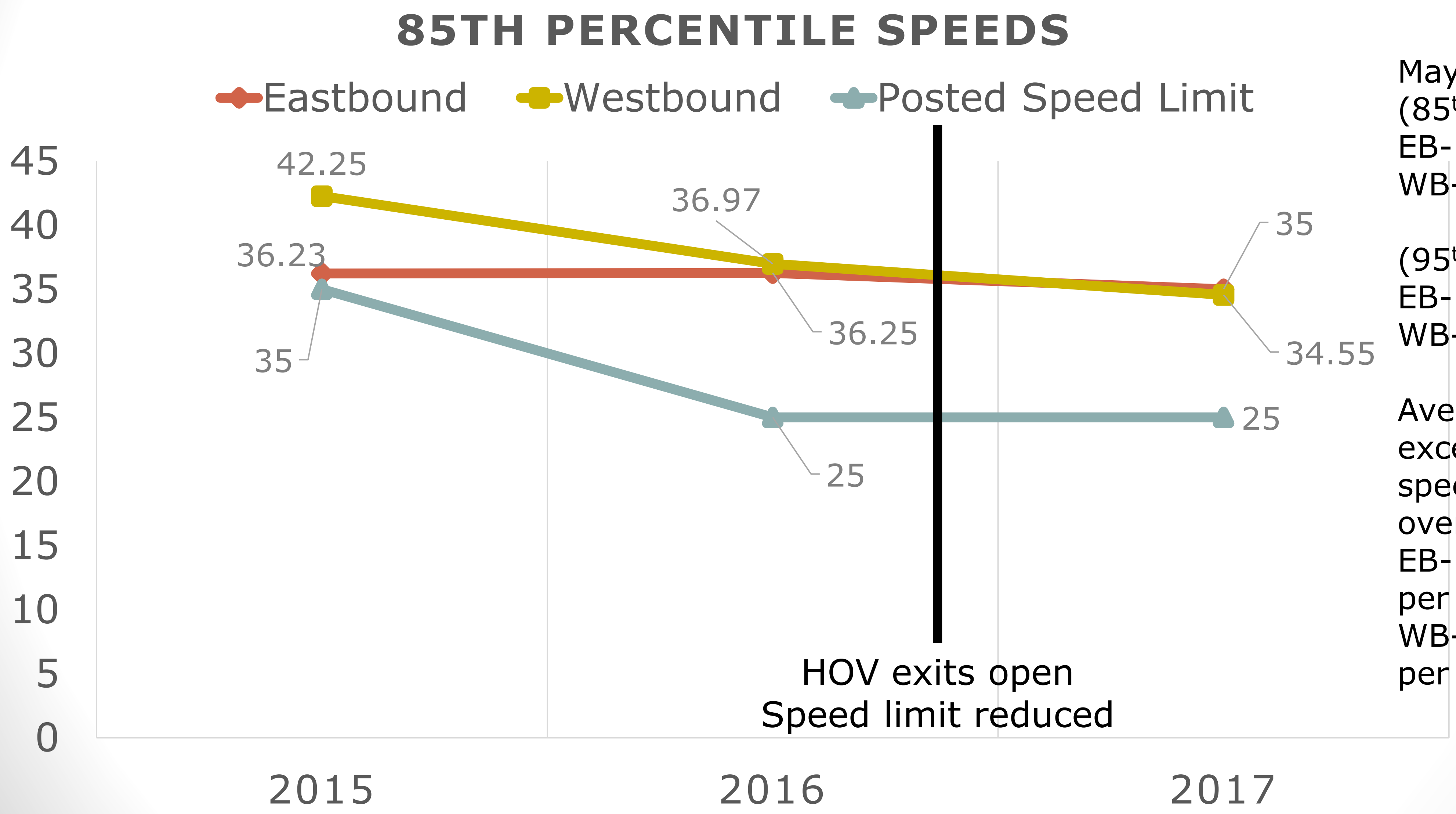
Crash History- Kenmore to Quaker



Speed Data



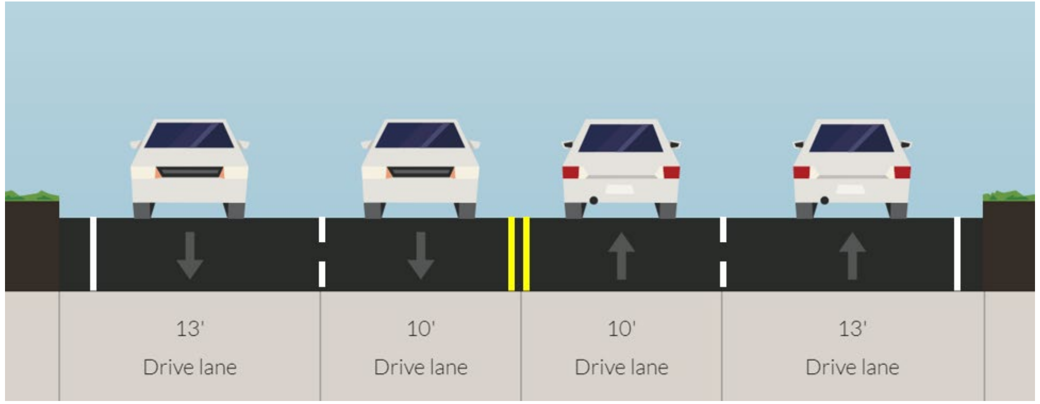
May 2017 count (85th percentile):
EB- 34.9 mph
WB- 34.55 mph

(95th Percentile):
EB- 38.9 mph
WB- 38.3 mph

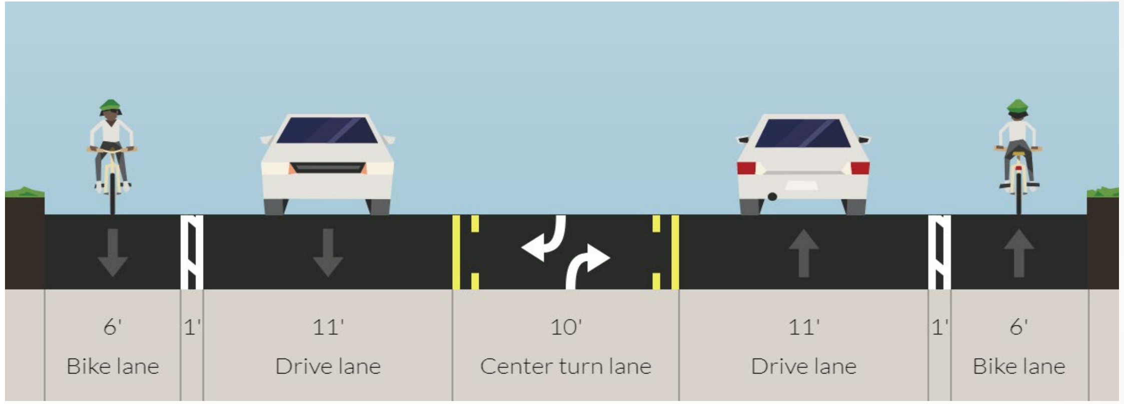
Average excessive speeding (going over 40 mph):
EB-130 drivers per day
WB- 155 drivers per day

Alternatives Studied

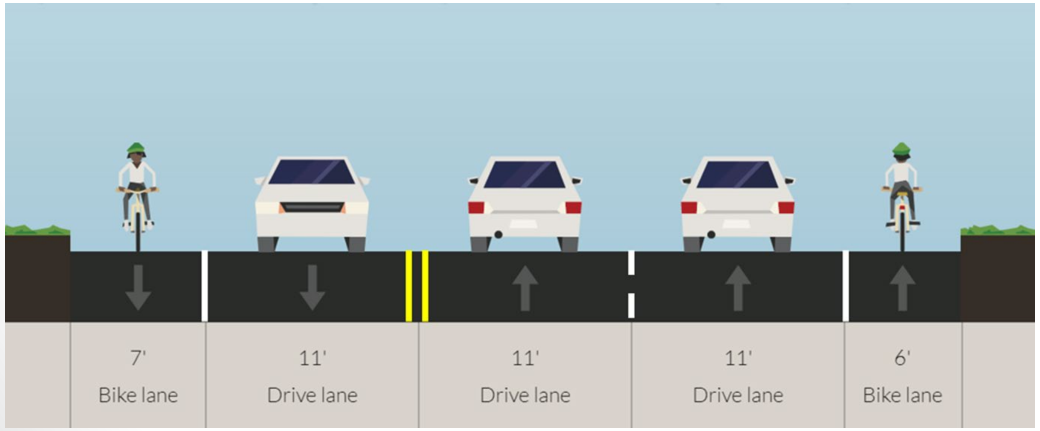
Alternative 1



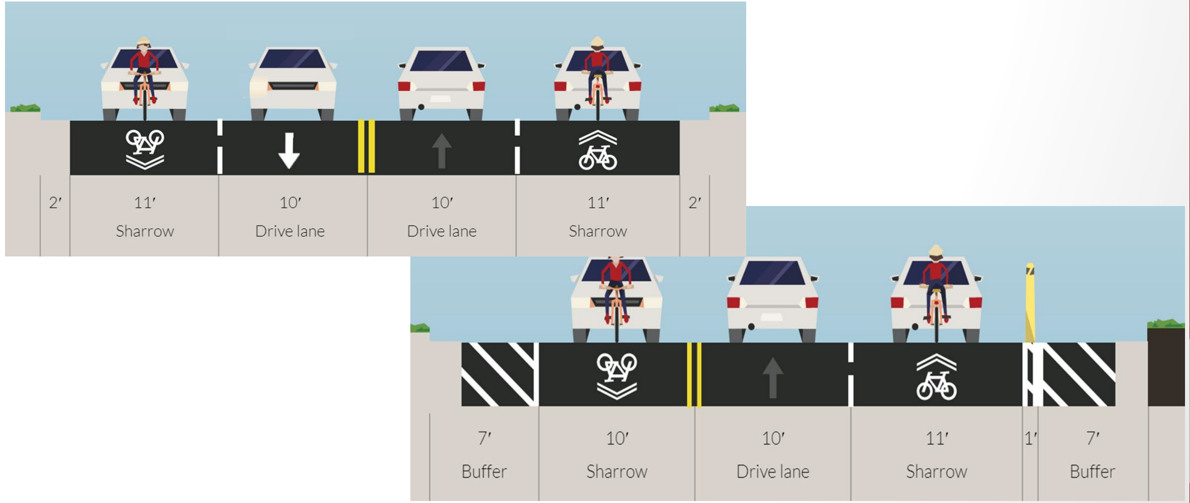
Alternative 3 (Council-adopted)



Alternative 2



Staff Recommendation



Scoring

-2
More Impacts over Existing Conditions

-1
Minor Impacts over Existing Conditions

0
Existing Conditions

+1
Minor Improvement over Existing Conditions

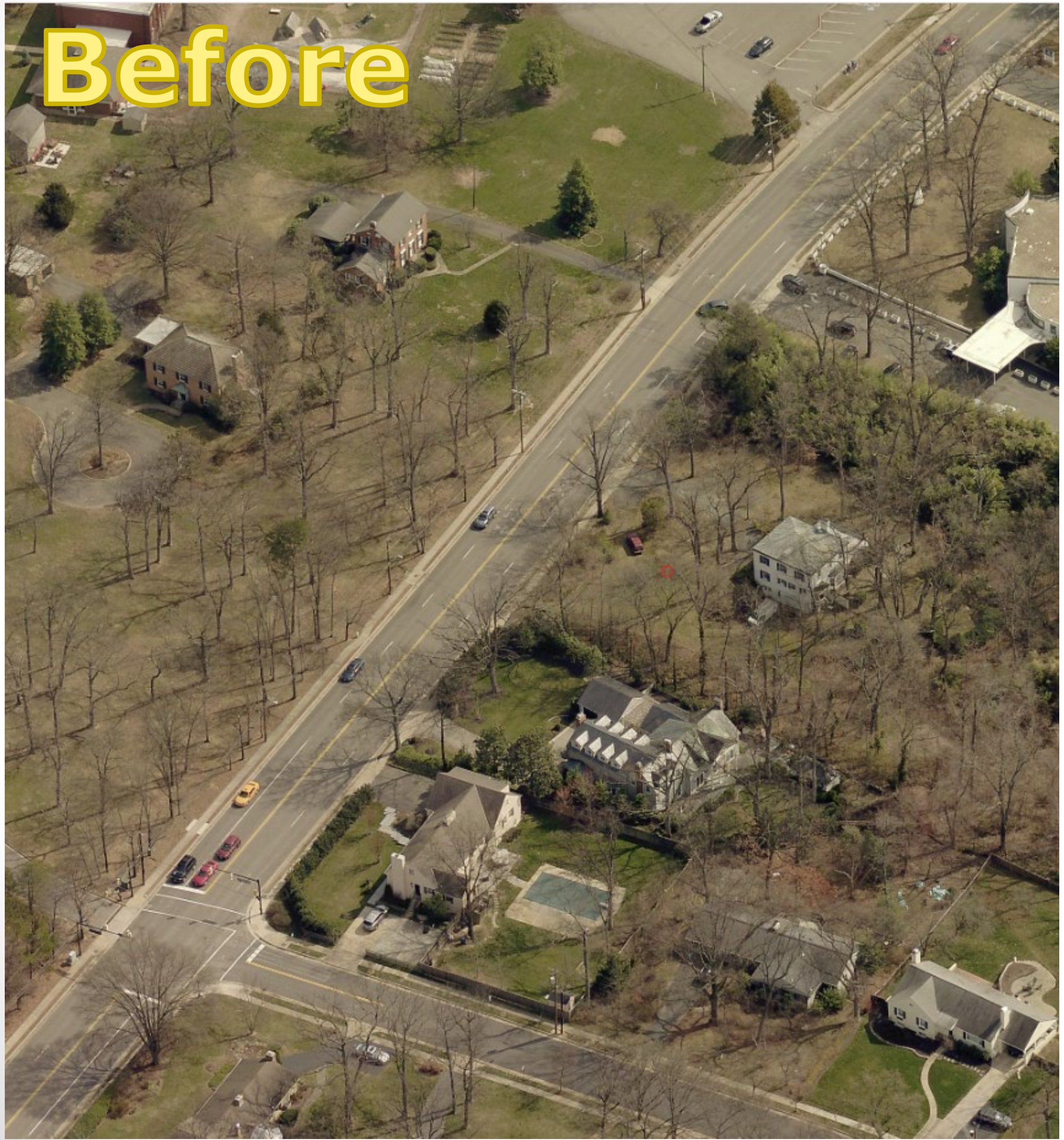
+2
More Improvement over Existing Conditions

DESIGN ALTERNATIVES

PERFORMANCE INDICATORS

	ALTERNATIVE 1 (4 lanes with minor changes)	ALTERNATIVE 2 (1 eastbound, 2 westbound lanes)	ALTERNATIVE 3 (1 eastbound, 1 westbound, 1 turn lane)	STAFF RECOMMENDATION
Pedestrian Safety/Comfort	0	+1	+2	+1
Filling The Sidewalk Gap	0	+1	+1	+2
Controlling Speed	0	+1	+2	0
Preventing Crashes	0	+1	+2	+1
Minimizing Vehicle Delay	+2	+1	+1	+2
Accommodating Vehicle Volumes	+2	0	0	+2
Adjacent Resident Livability	0	+1	+1	+1
Bicyclist Safety/Comfort	0	+1	+2	0
Totals (max score +16, min score -16	+4	+7	+11	+9

Constructed Road Reconfiguration



Constructed Alternative 3

Emergency Access

Mountable Median


Standard Crossing Median

Why were two different medians constructed?

- Mountable medians were installed in conjunction with the temporary side path so vehicles would not have to pull into the sidewalk space to let an emergency vehicle (EV) pass, and the EV could go directly over the median
- Standard crossing medians were installed where vehicles can pull out of the travel lane and into the bike lane to allow EV to pass.
- Medians were designed cooperatively between T&ES and AFD
- **Appropriate measures have been put in place for emergency responders to safely travel before, during and after an emergency call**

Evaluation

- **Volumes**
- **Crashes**
- **Speeds**
- **Travel Times**

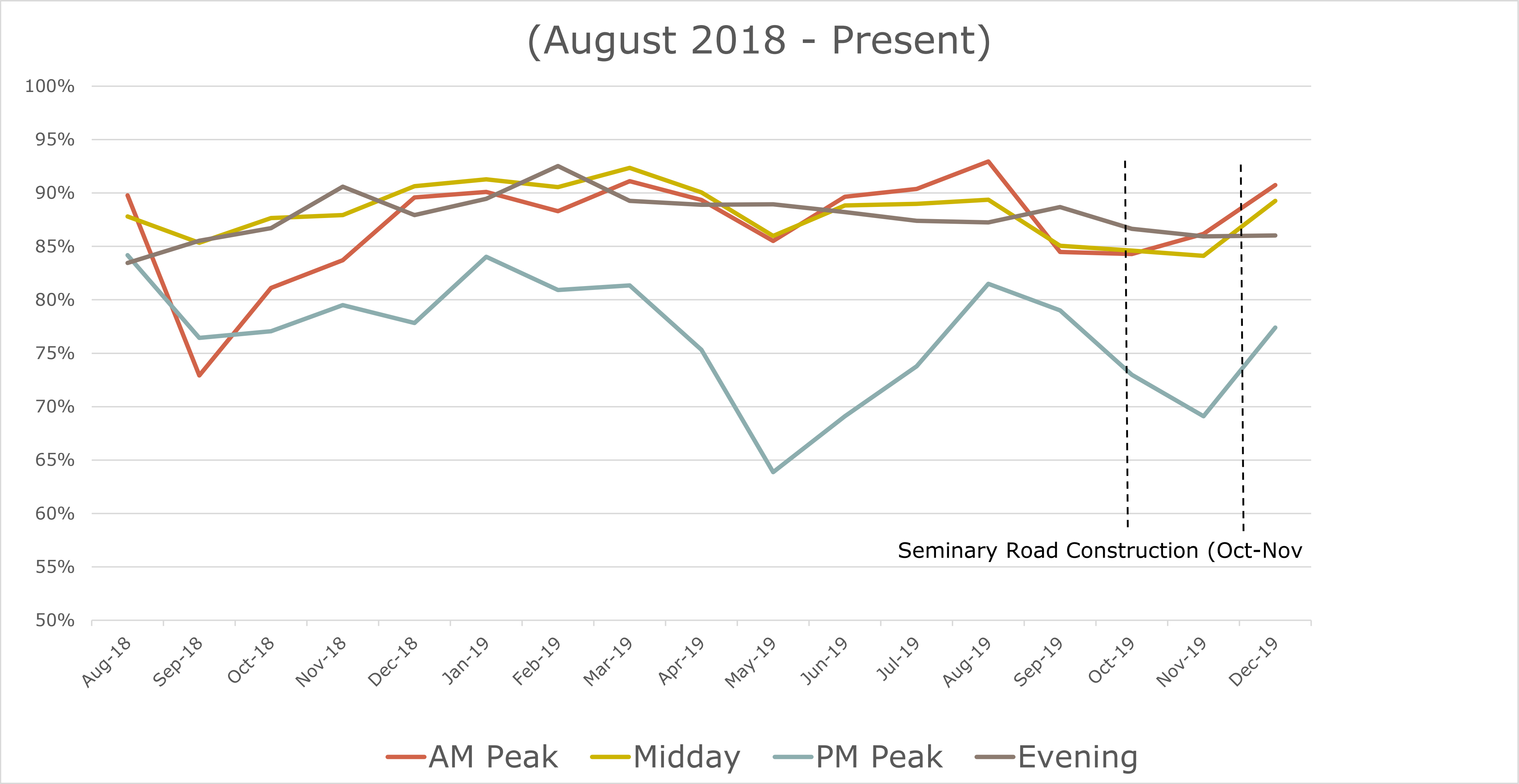
AFTER Data Collection (Spring 2021) → Evaluation Report (June 2021)

Preliminary Travel & Traffic Summary

- **Across the day**, average travel times have generally stayed the same:
  - Increased by an average of 4% (6 seconds) in the westbound direction and have decreased by an average of 6% (about 12 seconds) in the eastbound direction
  - In the eastbound directions, travel times are better or relatively the same as they were during the before period except for the 5pm hour (7% increase or about 6 seconds)
- During the **worst 15-minute period** of the day (in the westbound direction from 8:15am – 8:30am) travel times have increased by 30% (about 1 minute).
  - Across the entire morning peak period (7am-9am), there has been an 8% increase in travel times from 3 minutes to 3.2 minutes (about 12 seconds)
- During the **evening peak**, the greatest increase was between 5:45pm and 6:00pm when there was a 14% increase, from 3.4 minutes to 3.9 minutes (about 30 seconds)

For most of the day, the City's Bluetooth travel time monitoring system shows the road is functioning similarly to before implementation. A tradeoff for the peak half hour increases (30 sec – 1 minute) is a street with safer conditions for people who drive, walk, bike and use transit.

DASH AT2 On-TIME PERFORMANCE



More Information:

www.alexandriava.gov/CompleteStreets

Discussion

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