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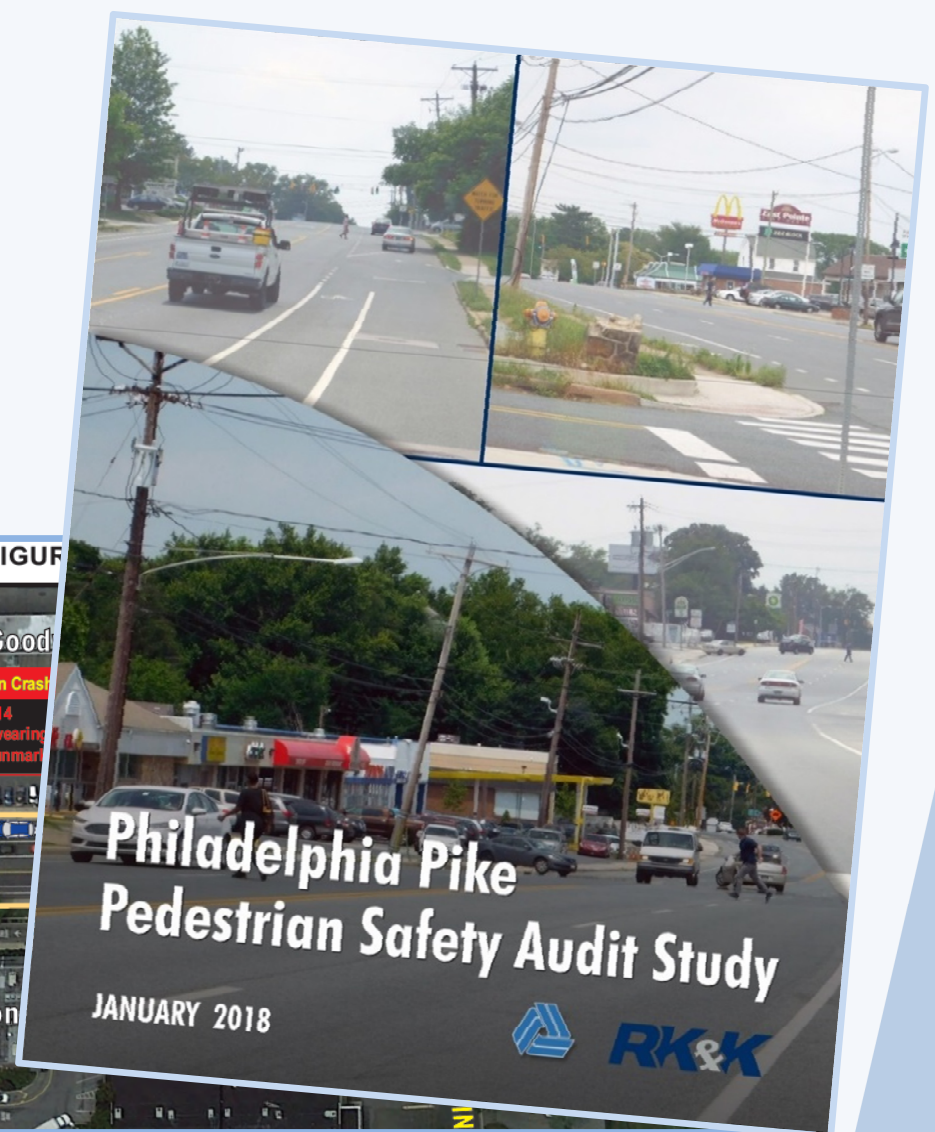
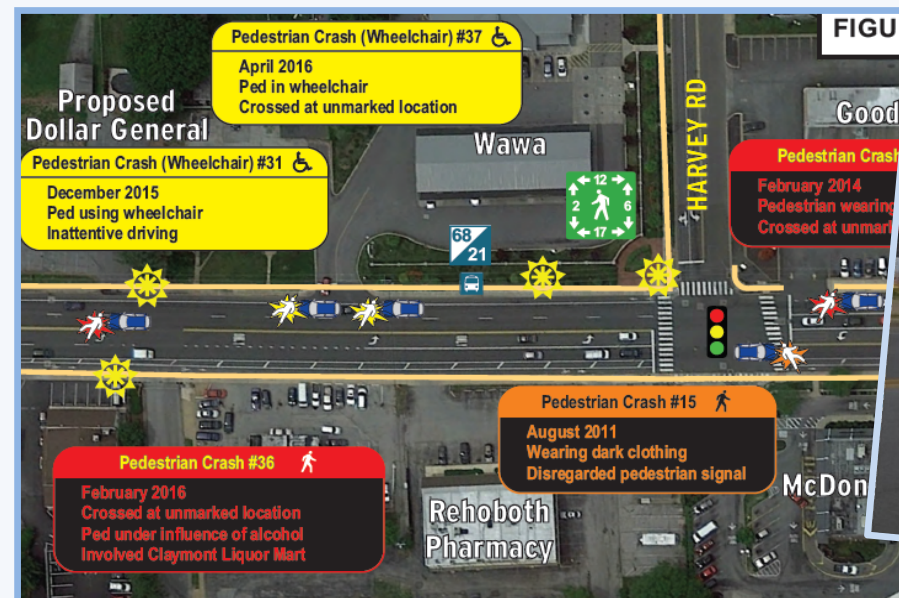
PEDESTRIAN SAFETY AUDIT STUDY

Project Background

- DelDOT completed a Pedestrian Safety Audit Study for the section of Philadelphia Pike between Lea Boulevard and DE/PA State line in 2018, in order to improve pedestrian safety.
- Forty-Six (46) Pedestrian / Bicycle crashes between January 2005 and December 2018:
 - Seven (7) Fatal Crashes
 - Thirty-four (34) Injury Crashes
 - Four (4) Property-Damage-Only Crashes (two crashes involving wheelchairs)
- Based on the results from the study, various short-term, Mid-Term and Long-Term improvement options were recommended, including a Roadway Reconfiguration for the section of Philadelphia Pike between Lea Boulevard and Harvey Road (Approximately 3.6 Miles in Length)

Considerations for Roadway Reconfiguration

- Crash trends
- Traffic Volumes & Operations
- Transit Stop locations
- On-street parking
- Pedestrian Crossing Distances
- Turn Lane Feasibility
- Utility Pole Locations
- Traffic Volumes
- Bike Lanes



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EXISTING CONDITIONS



Existing Conditions

- Many accesses to residential / commercial properties connected to the roadway
- Bike Lanes between Marsh Road and I-495 (Narrows/disappears near Silverside Road)
- Corridor served by DART Bus Route 1
- Forty-Six (46) Pedestrian Crashes from January 2005 to December 2018
 - Seven (7) Fatal Crashes
 - Thirty-Four (34) Injury Crashes
 - Four (4) Property Damage Only Crashes
- Roadway Reconfiguration implemented between Harvey Road and Governor Printz Boulevard in 2012.
- Crosswalks provided at every signalized intersections; however, pedestrians crossing at unmarked locations frequently observed
- AADT ranging from 7,173 vpd to 22,072 vpd.
- Speed limit ranging from 35 MPH to 45 MPH

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PEDESTRIAN SAFETY AUDIT STUDY – RECOMMENDATIONS

Short-Term Improvements

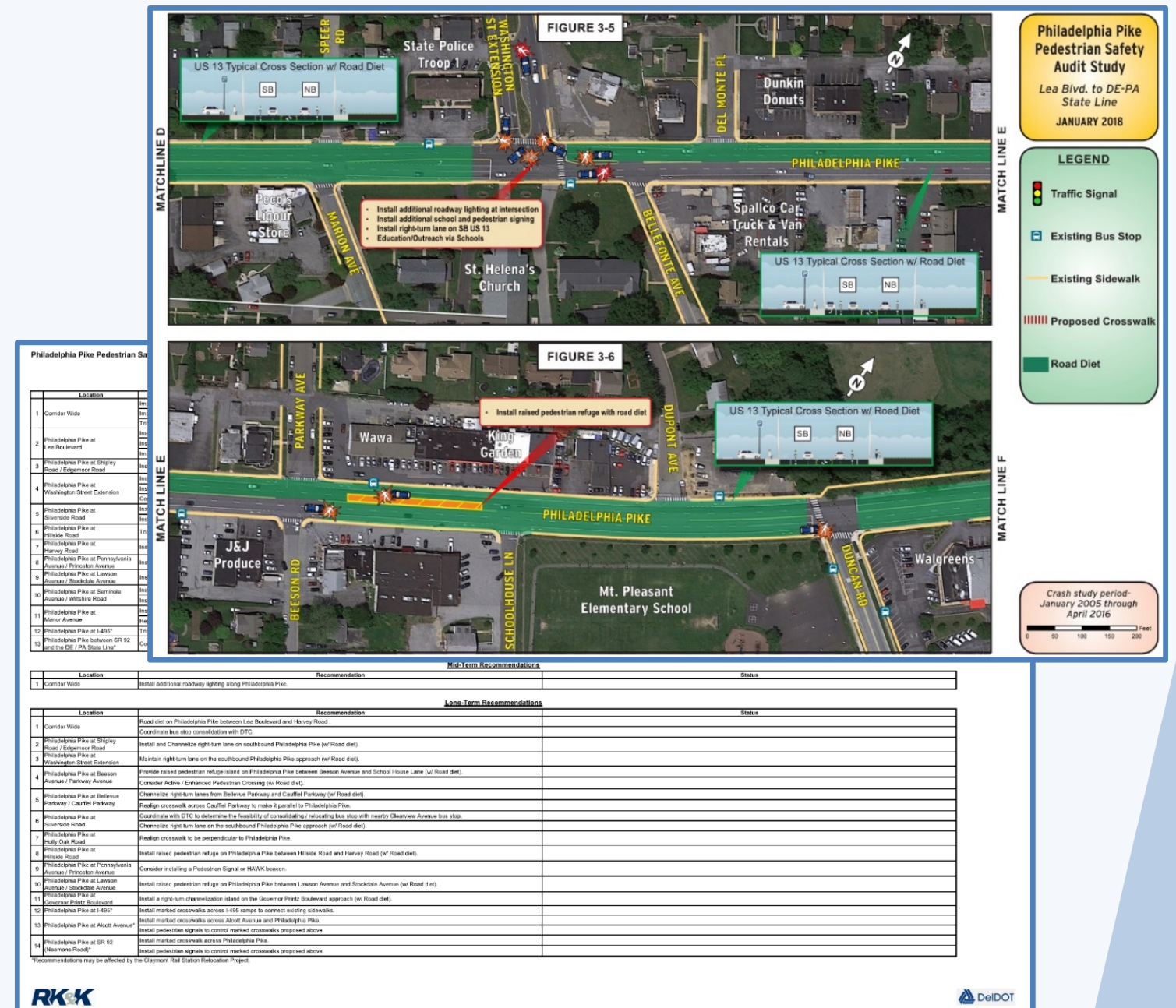
- Corridor-wide Uniform Speed Limit on Philadelphia Pike
- Signing & Pavement Markings Improvements
- Tree / Vegetation Trimming
- Intersection Lighting
- Pedestrian Safety Education / Outreach for Area Schools
- Traffic Signal Back Plates Installations

Mid-Term Improvements

- Corridor-wide Roadway Lighting on Philadelphia Pike between Lea Boulevard and DE / PA State Line

Long-Term Improvements

- Roadway Reconfiguration Consideration for Philadelphia Pike between Lea Boulevard and Harvey Road (Approximately 3.6 Miles in Length)
- With Roadway Reconfiguration:
 - Install Channelization Islands and Pedestrian Refuge Islands
 - Realignment of Existing Crosswalks
 - Active / Enhanced Pedestrian Considerations
- Coordination With Delaware Transit Corporation to Improve DART Bus stop Locations
- Install Pedestrian Signals / Marked Crosswalks Across I-495 Ramps

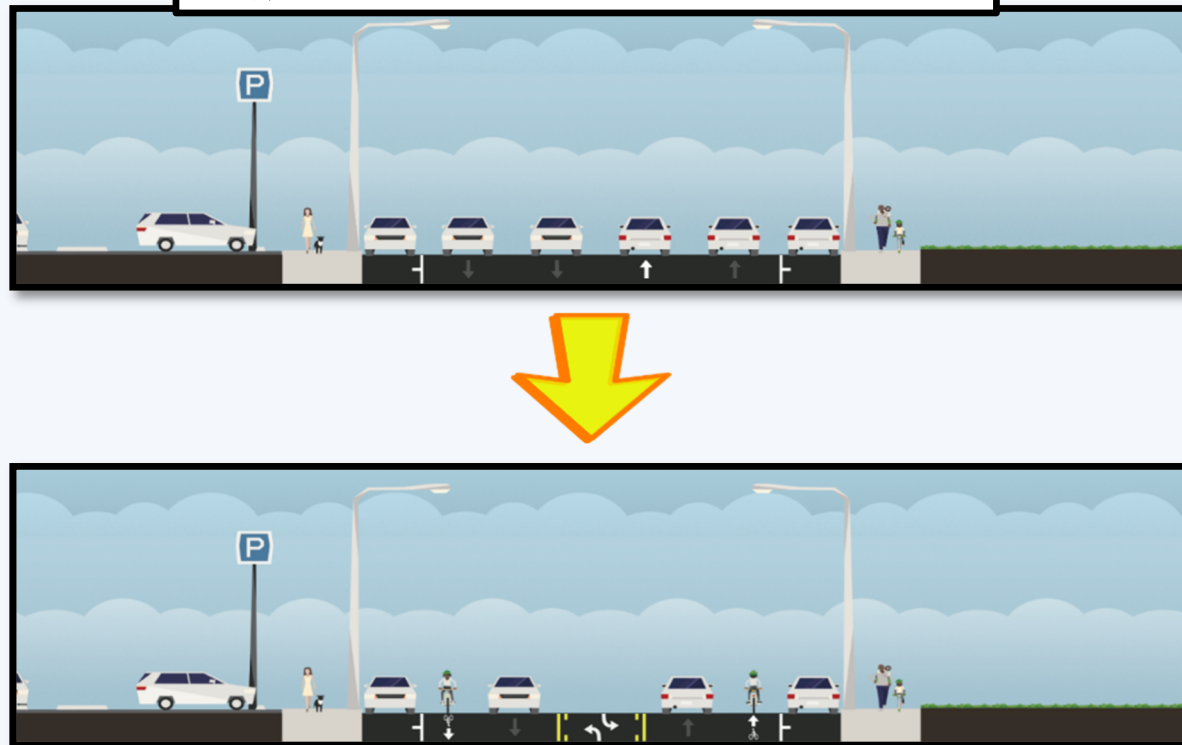


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WHAT IS ROADWAY RECONFIGURATION?

Roadway Reconfiguration is a technique in transportation planning whereby the number of travel lanes and/or effective width of the roadway is reduced in order to achieve systemic improvements.

Typical Four-Lane to Three-Lane Conversion



Four-Lanes to Three-Lanes Roadway Reconfiguration
Maximum Traffic Volume Recommendation by
Federal Highway Administration (FHWA)

LESS THAN 10,000 ADT	10,000 – 15,000 ADT	15,000 – 20,000 ADT	GREATER THAN 20,000 ADT
Great candidate for Road Diet	Very good candidate for Road Diet	Good candidate for Road Diet	Potential candidate for Road Diet

Lea Boulevard ↔ Shipley Road: 2016 AADT = 8,265 vpd	
→ Great Candidate for Roadway Reconfiguration	✓
Shipley Road ↔ Marsh Road: 2016 AADT = 9,870 vpd	
→ Great Candidate for Roadway Reconfiguration	✓
Marsh Road ↔ Washington St. Extension: 2016 AADT = 7,684 vpd	
→ Great Candidate for Roadway Reconfiguration	✓
Washington St. Extension ↔ Silverside Road: 2016 AADT = 10,039 vpd	
→ Very Good Candidate for Roadway Reconfiguration	✓
Silverside Road ↔ Harvey Road: 2016 AADT = 14,354 vpd	
→ Very Good Candidate for Roadway Reconfiguration	✓

Before (October 2005–September 2008) / After (October 2012–September 2015) Study from the Roadway Reconfiguration completed for Philadelphia Pike between Harvey Road and Governor Printz Blvd. Showed:

- The total number of vehicular crashes has decreased by 13% and the crash rate also has decreased by 11% in the three (3) year period after the project was completed (2012-2015).
- Motorists within the Philadelphia Pike segment with roadway reconfiguration showed considerably higher compliance to the posted speed limit than approaching or departing the segment.
- Contrary to expectations, daily traffic volumes have *increased* by approximately 10% on Philadelphia Pike segment with roadway reconfiguration, after the implementation.
- Traffic volumes on Governor Printz Boulevard, a potential diversion route, have *decreased* by approximately 36% since the implementation of the roadway reconfiguration.
- Minor increase in the overall delay at the intersection of Philadelphia Pike and Harvey Road.

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TRAFFIC OPERATIONS: EXISTING vs. ROADWAY RECONFIGURATION (DELAY / LEVEL OF SERVICE)

Philadelphia Pike Signalized Intersection Delay / LOS

Crossing Intersection	AM Peak Hour				PM Peak Hour			
	2017 Existing		2027 Road Diet		2017 Existing		2027 Road Diet	
	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS	Delay ¹	LOS
Lea Boulevard	18	B	19	B	20	C	22	C
Shipley Road	18	B	18	B	17	B	18	B
Marsh Road	14	B	16	B	14	B	17	B
Washington Street Ext.	12	B	17	B	13	B	21	C
Duncan Road	6	A	7	A	6	A	8	A
Bellevue Parkway	12	B	16	B	17	B	22	C
Silverside Road	10	B	13	B	12	B	15	B
Holly Oak Road	4	A	6	A	6	A	8	A
Rolling Road	2	A	3	A	1	A	2	A
Maple Road	7	A	10	A	5	A	7	A
Harvey Road ²	19	B	23	C	20	B	37	D

¹ Seconds per Vehicle

² Road Diet Already Implemented

Results from the Traffic Operational Analyses Showed:

- All signalized intersections operation with minimal / marginal delay (LOS C or better) during both AM (7:00AM – 8:00AM) and PM (5:00PM – 6:00PM) peak hours, under the Existing 2017 Condition
- No significant increase in Delay is expected, if Roadway Reconfiguration is implemented with 2017 volumes as all signalized intersections are expected to operate with minimal/marginal delay (LOS C or better) during both AM and PM peak hours
- Moderate increase in Delay is expected if Roadway Reconfiguration is implemented with 2027 volumes during both AM and PM peak hours, except for the Harvey Road intersection (LOS D during PM peak).

Based on the expected Delay / LOS, Road Diet appear to be feasible for the section of Philadelphia Pike between Lea Boulevard and Harvey Road

Level of Service (LOS) Threshold For Signalized Intersections (Seconds per Vehicle)

A	≤ 10 Seconds / Vehicle
B	> 10 ≤ 20 Seconds / Vehicle
C	> 20 ≤ 35 Seconds / Vehicle
D	> 35 ≤ 55 Seconds / Vehicle
E	> 55 ≤ 80 Seconds / Vehicle
F	> 80 Seconds / Vehicle

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EXPECTED BENEFITS FROM ROADWAY RECONFIGURATION

Roadway Reconfigurations have the potential to improve safety, convenience and quality of life for all road users. Roadway Reconfigurations can be relatively low cost if planned in conjunction with a Pavement & Rehabilitation Projects, since applying Roadway Reconfigurations primarily consists of pavement markings modifications

Improved Safety:

- Roadway Reconfiguration reduce vehicle-to-vehicle conflicts that contribute to rear-end, left-turn and side-swipe crashes by removing the four-lane undivided inside lanes serving both through and turning traffic.
- Studies indicate a 19 – 47% reduction in overall crashes when a Roadway Reconfiguration is implemented on a previously four-lane undivided facility as well as a decrease in crashes involving drivers under 35 years of age and over 65 years of age ^{1, 2}
- Roadway Reconfigurations can reduce the vehicle speed differential and vehicle interactions, which can reduce the number and severity of vehicle-to-vehicle crashes. Reducing operating speed decreases crash severity when crashes do occur

Improved Traffic Operations:

- Separating Left Turns. Separating left-turning traffic has been shown to reduce delays at signalized intersections.
- Side-street traffic can more comfortably enter the mainline roadway because there are fewer lanes to cross - this can reduce side-street delay.
- The reduction of speed differential due to a Roadway Reconfiguration provides more consistent traffic flow and less "accordion-style" slow-and-go operations along the corridor.

Pedestrians and Bicyclists Benefits

- Reallocate space from travel lanes to convert to bike lanes or in some cases sidewalks, where these facilities were lacking previously
- The three-lane cross-section also makes crossing the roadway easier for pedestrians, as they have one fewer travel lanes to cross and are exposed to moving traffic for a shorter time
- With the addition of a pedestrian refuge island, the crossing becomes shorter and less complicated. Pedestrians only have to be concerned with one direction of travel at a time. Refuge islands have been found to provide important safety benefits for pedestrians ³

Livability Benefits

- Added to the direct safety benefits, a Roadway Reconfiguration can improve the quality of life in the corridor through a combination of bicycle lanes, pedestrian improvements, and reduced speed differential, which can improve the comfort level for all users

1. FHWA "Evaluation of Lane Reduction 'Road Diet' Measures on Crashes." FHWA Report No. FHWA-HRT-10-053. (Washington, D.C: 2010)

2. Stout, Thomas B., Before and After Study of Some Impacts of 4-Lane to 3-Lane Roadway Conversions. March 2005.

3. Garder P, "Pedestrian safety at traffic signals: a study carried out with the help of a traffic conflicts technique." Accident Analysis and Prevention 21