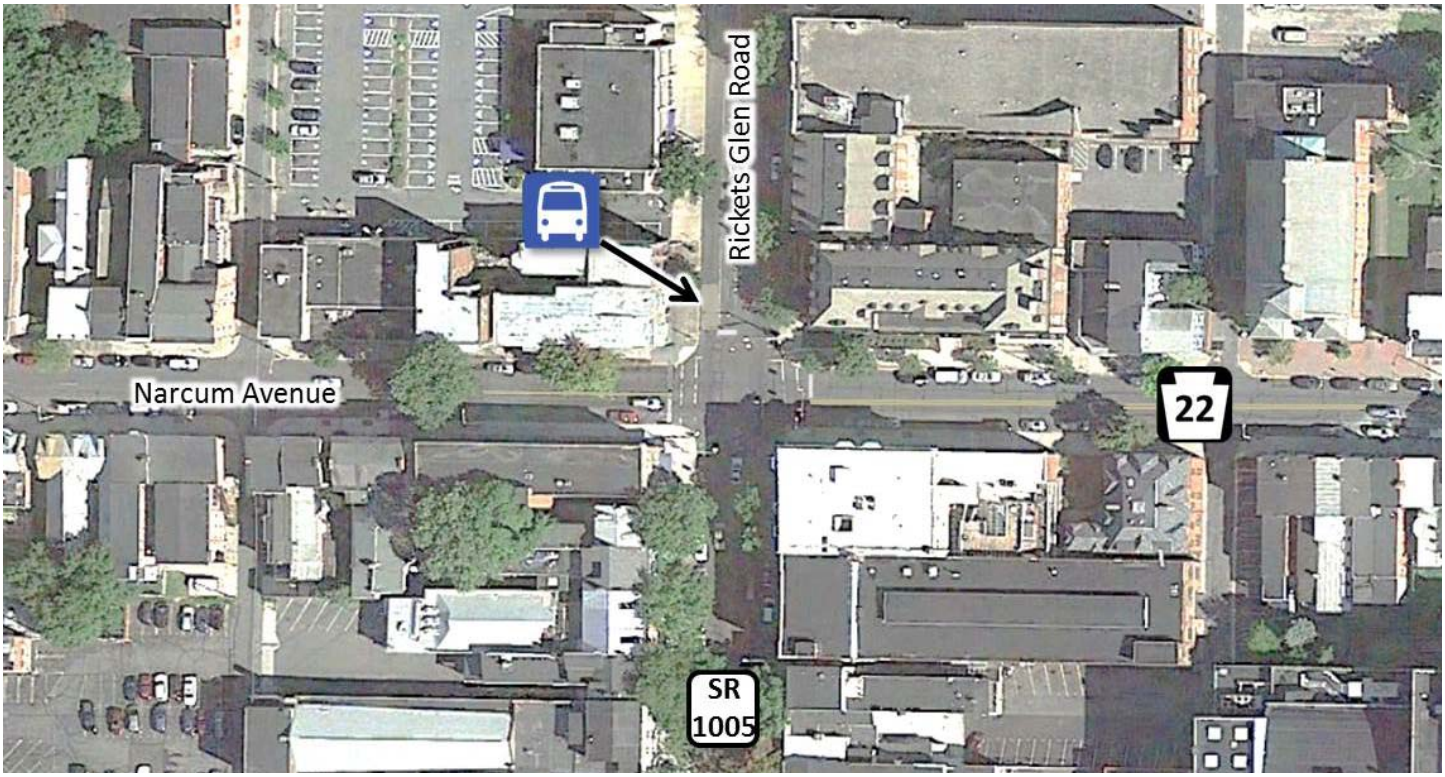
PENNDOT INTERSECTION CONTROL EVALUATION (ICE) POLICY CASE STUDY #3

PROJECT LOCATION



EXECUTIVE SUMMARY

Case Study #3 highlights the evaluation of an existing signalized intersection experiencing operational deficiencies. The purpose of the case study is to illustrate a case where the existing control strategy is maintained with minor improvements.

PROJECT DESCRIPTION

A recent operational analysis conducted on behalf of the City of Wilkes-Barre illustrated the State Route 22 (Narcum Avenue)/State Route 1005 (Ricketts Glen Road) intersection currently operates at level-of-service (LOS) "F" during the weekday p.m. peak period, primarily as a result of the delay incurred on the single-lane, mainline approaches. With no dedicated turn-lanes and only permissive phasing on Narcum Avenue, eastbound and westbound left-turns are forced to yield to opposing traffic. This, in turn, creates substantial delays for vehicles in queue behind left-turning vehicles. The purpose of this project is to analyze potential mitigation factors to help reduce vehicular delays experienced at the intersection, while maintaining access and mobility for pedestrians and bicyclists in the city.

CONDUCTING AN ICE

In an effort to help reduce delays incurred by mainline vehicles, the various control strategies were reviewed for their applicability in stage 1. It was determined the dense urban environment makes many of the control strategies unfeasible, as the footprint required to develop them would substantially impact the surrounding commercial properties and pedestrian infrastructure. A roundabout, for example, would require takes of several buildings located at the corners of the intersection.

The only control strategies that would not have significant impacts include:

- Two-way stop-controlled
- All-way stop-controlled
- Signalized (*existing*)

However, converting the existing signalized intersection to stop-control would not help alleviate the existing operational issues. The most prudent and cost-effective way to improve operations at the intersection was to improve the existing signalized traffic control strategy.

Dedicated left-turn lanes on both mainline (Narcum Avenue) approaches were developed by prohibiting parking for 200 feet upstream of the intersection and shifting through traffic towards the outside of the roadway. Protected-permissive left-turn signal phasing was added as well. The recommendation was approved by the District 4 DTE.

Project Location: Wilkes-Barre
County: Luzerne
PennDOT District: District 4
Project Type: Congestion Mitigation Project
Project Setting: Urban
Existing Intersection Control: Signalized
Outcome: Signalized with added turn lanes
Stages: 1

Pennsylvania Department of Transportation
Intersection Control Evaluation (ICE) Form
Stage I: Screening

To fulfill the requirements of Stage 1 (Screening) of PennDOT's ICE procedures, complete the following form and append all supporting documentation. Completed forms can be submitted to the District Traffic Engineer (DTE) for the project's location.

Project Information

Project Name	Case Study #3	Project Setting	Urban	Project ICE Reference Number	XXXX-XXXX
Submitted By	XXX	Agency/Company	PennDOT	Email	XXXX.XXXX@state.pa.us
Project Purpose and Goals (*What is the catalyst for this project and what are the intended outcomes?*)	A recent operational analysis conducted on behalf of the City of Wilkes-Barre illustrated the State Route 22 (Narcum Avenue)/State Route 1005 (Ricketts Glen Road) currently operates at level-of-service (LOS) "F" during the weekday p.m. peak period, primarily as a result of the delay incurred on the single-lane, mainline approaches. With no dedicated turn-lanes and only permissive phasing on Narcum Avenue, eastbound and westbound left-turns are forced to yield to opposing traffic. This, in turn, creates substantial delays for vehicles upstream of left-turning vehicles. The purpose of this project is to analyze potential mitigation factors to help reduce vehicular delays experienced at the intersection, while maintaining access and mobility for pedestrians and bicyclists in the city.				
Project Setting Description (*Describe the area surrounding the intersection*)	The SR 22 (Narcum Avenue)/SR 1005 (Ricketts Glen Road) intersection is located in downtown Wilkes-Barre. Curb-and-gutter line all four quadrants of the intersection with sidewalks providing access to the mixed-use and retail developments located directly adjacent to the roadway. Similar to many of the parallel routes, street parking is available on both sides of Narcum Avenue and Ricketts Glen Road.				
County	Luzerne	Project Locality (Township/Borough/City)	Wilkes-Barre		
PennDOT District	District 4	Project Type (select most appropriate)	Congestion Mitigation Project		
Multimodal Context (*Describe pedestrian, bicycle, and transit activity in the area and the potential for activity based on surrounding land uses and development pattern*)	The study intersection is located in downtown Wilkes-Barre, which experiences relatively high levels of pedestrian activity due to the adjacent retail land uses. 10-foot sidewalks are present along both sides of Narcum Avenue and Ricketts Glen Road, as well as the adjacent parallel roadways. No on-street bicycle infrastructure is currently present. The Luzerne County Transportation Authority operates a single bus line along Ricketts Glen Road, serving the nearby Plymouth, Kingston, and Wyoming neighborhoods. The bus line operates on one-hour headways between 8 a.m. and 6 p.m. on weekdays and two-hour headways between 10 a.m. and 4 p.m. on weekends. A bus stop is located on the southbound approach of the intersection with a bus pull-out adjacent to the traveled-way (replacing the upstream street parking near the intersection).				

Basic Intersection Information

Major Street

Major Street Route Number(s)	22	Major Street Route Name(s)	Narcum Avenue			SR Segment #	120	SR Offset	0
Primary Functional Classification	Minor Arterial	Secondary Functional Class. (if app.)				Existing AADT	12,000	Existing Control	Signalized
Major Street Ownership		Sidewalks are present along:	Both sides of the roadway						
Crosswalks? ☑	On-Street Bike Facilities? ☐	Multi-Use Path? ☐	Scheduled Bus Service? ☐			Bus stop at intersection? ☐			
Approach #1	Number of Lanes (Count Shared Lanes as Through):		Left-Turn		Through	1	Right-Turn		
	AM Peak Hour Traffic Volumes:		Left-Turn	62	Through	451	Right-Turn	87	
	PM Peak Hour Traffic Volumes:		Left-Turn	55	Through	398	Right-Turn	96	
Approach #2	Number of Lanes (Count Shared Lanes as Through):		Left-Turn		Through	1	Right-Turn		
	AM Peak Hour Traffic Volumes:		Left-Turn	76	Through	536	Right-Turn	124	
	PM Peak Hour Traffic Volumes:		Left-Turn	92	Through	575	Right-Turn	111	

Minor Street — Existing ☑ New ☐

Minor Street Route Number(s)	1005	Minor Street Route Name(s)	Ricketts Glen Road			SR Segment #	40	SR Offset	0
Primary Functional Classification	Urban Collector	Secondary Functional Class. (if app.)	Local Road			Existing AADT (if available)		9,500	
Minor Street Ownership	PennDOT	Sidewalks are present along:	Both sides of the roadway						
Crosswalks? ☑	On-Street Bike Facilities? ☐	Multi-Use Path? ☐	Scheduled Bus Service? ☑			Bus stop at intersection? ☑			
Approach #1	Number of Lanes (Count Shared Lanes as Through):		Left-Turn		Through	1	Right-Turn		
	AM Peak Hour Traffic Volumes:		Left-Turn	36	Through	205	Right-Turn	42	
	PM Peak Hour Traffic Volumes:		Left-Turn	51	Through	229	Right-Turn	24	
Approach #2	Number of Lanes (Count Shared Lanes as Through):		Left-Turn		Through	1	Right-Turn		
	AM Peak Hour Traffic Volumes:		Left-Turn	22	Through	304	Right-Turn	37	
	PM Peak Hour Traffic Volumes:		Left-Turn	25	Through	318	Right-Turn	34	
Approach #3	Number of Lanes (Count Shared Lanes as Through):		Left-Turn		Through		Right-Turn		
	AM Peak Hour Traffic Volumes:		Left-Turn		Through		Right-Turn		
	PM Peak Hour Traffic Volumes:		Left-Turn		Through		Right-Turn		

Crash History (Existing Intersections Only)

Append the most recent five-years of crash data for the intersection from the CDART. If the crash data evidences any issues relating to safety performance, discuss briefly here:

A review of the most recent five years of crash history illustrate there were 11 crashes at the intersection between 2012 and 2016. Seven rear-end crashes occurred between mainline vehicles on SR 22; a majority of these crashes resulted from upstream vehicles striking a vehicle yielding to make a left-turn onto SR 1005.

Screening Evaluation

Provide a brief justification as to why each of the following control strategies should be advanced or not. Justification should consider potential environmental impacts.

Note: FHWA's CAP-X tool is helpful for assessing the viability of alternative intersection forms.

Control Strategy	Strategy Viable?	Justification	Strategy to be Advanced?
Two-way Stop-Controlled	No	The existing intersection is signalized. Converting the minor street approaches to stop-controlled would cause unnecessary increases to delay to northbound and southbound vehicles on Ricketts Glen Road, and queuing would likely spill back to the upstream intersections.	No
All-way Stop-Controlled	No	The existing signalized intersection currently operates at LOS "F". Converting the intersection to all-way stop-controlled would likely increase the delays experienced by all vehicles at the intersection.	No
Signalized Control	Yes	With the addition of left-turn lanes on SR 22 approaches (and the associated protected turn phasing), delays incurred by mainline traffic would be substantially reduced. The addition of left-turn lanes would also help reduce the propensity for rear-end crashes on the mainline, as stopped/yielding left-turning vehicles would be separated from through/right-turning traffic. Overall, this strategy represents a cost-effective way to help improve operations at the intersection with only minor widening required to develop the left-turn lanes.	Yes
Roundabout	No	While a roundabout would potentially help reduce delays incurred on the mainline approaches, the footprint required to accommodate this control strategy would have substantial impacts to the surrounding commercial properties and pedestrian infrastructure.	No
Median U-Turn	No	SR 22 is a two-lane arterial in an urban environment. Developing the median required for a median U-turn would not be realistic given the density of the surrounding land uses, nor would it solve the operational issues present at the existing signalized intersection.	No
Restricted Crossing U-Turn (RCUT) Signalized	No	SR 22 is a two-lane arterial in an urban environment. Developing the median required for a signalized RCUT would not be realistic given the density of the surrounding land uses, nor would it solve the operational issues present at the existing signalized intersection.	No
Restricted Crossing U-Turn (RCUT) Unsignalized	No	SR 22 is a two-lane arterial in an urban environment. Developing the median required for a unsignalized RCUT would not be realistic given the density of the surrounding land uses, nor would it solve the operational issues present at the existing signalized intersection.	No

Jughandle	No	SR 22 is a two-lane arterial in an urban environment. Constructing a jughandle ramp would have substantial impacts to the surrounding commercial properties.	No
Displaced Left-Turn	No	SR 22 is a two-lane arterial in an urban environment. The infrastructure required to develop a displaced left-turn would have substantial impacts to the surrounding commercial properties and would increase the required number of crossings for pedestrians.	No
Continuous Green Tee	No	This control strategy is not applicable given the study intersection has four approach legs.	No
Quadrant Roadway	No	The construction of the quadrant roadway would have substantial impacts to the existing businesses adjacent to the study intersection.	No
Other			

Resolution				
To be filled out by PennDOT District Traffic Engineer or designee only.				
Project Determination	Identified Control Strategy Approved			
Comments				
DTE or Designee Name *(Type)*		Signature		Date