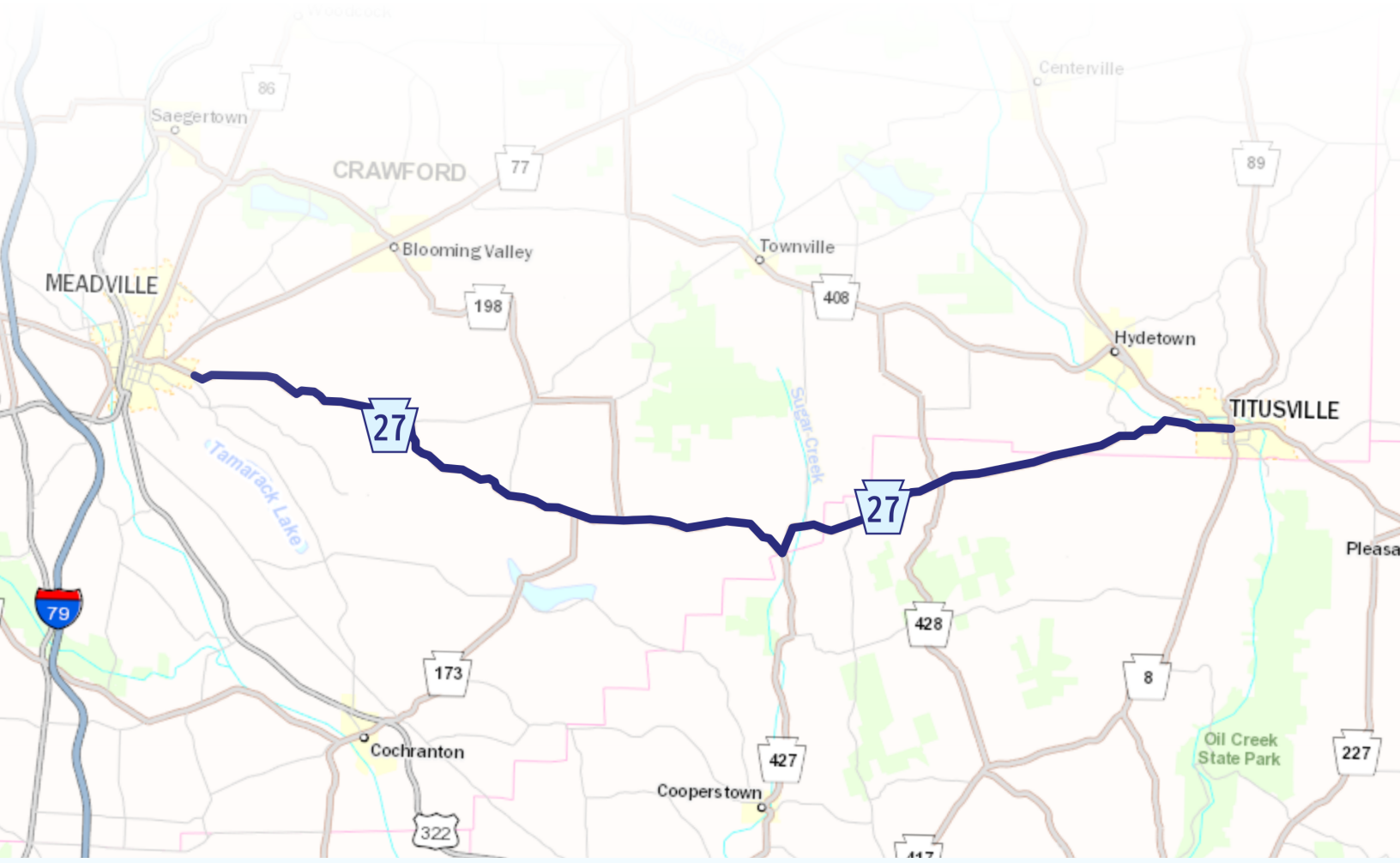
PA Route 27 Corridor Study



Prepared for:

Northwest Commission
395 Seneca Street
Oil City, PA 16301
(814) 677-4800
www.northwestpa.org

Crawford County Planning Office
903 Diamond Park
Meadville, PA 16335
(814) 333-7341
www.crawfordcountypa.net/planning

Prepared by:

Michael Baker International, Inc.
4431 N. Front Street
Harrisburg, PA 17110
(717) 213-2900

Michael Baker
INTERNATIONAL

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Harrisburg, PA 17110
(717) 213-2900

Michael Baker
INTERNATIONAL

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Study Steering Committee

Sue Smith
Northwest Commission

Travis Siegel
Northwest Commission

Zachary Norwood
Crawford County Planning Office

Lyndsie DeVito
PennDOT Engineering District 1-0

Consultant Team – Michael Baker International
Brian Funkhouser, AICP, Project Manager
Todd Trautz, P.E., PTOE
Rebecca Christman, P.E.
Jamie Lemon, AICP
Tracey Vernon, AICP, PP – Vernon Land Use, LLC

CONTENTS

Executive Summary

Who initiated the study?

This study of the PA 27 corridor between the City of Meadville and the City of Titusville was facilitated and funded by the Northwest Commission, with support from the Crawford County Planning Office. The Northwest Commission contracted with Michael Baker International, a planning and engineering firm, to help lead and carry out the study.

Why was this study initiated?

The demand for the study came in response to recent planning initiatives conducted by the Northwest Commission, including a Regional Freight Study and 2040 Long Range Transportation Plan (LRTP) that identified various improvement needs within the study corridor related to safety and mobility. The regional nature of these prior planning efforts is such that they identified general areas of concern: a more detailed level of analysis was required in order to suggest specific projects for the Transportation Improvement Program (TIP) and other funding sources.

This study also builds upon and validates a detailed analysis conducted in 1996 called the Meadville-Titusville East-West Corridor Study Assessment of Need study. The extent of the 1996 study overlaps with the study area presented within this study but it also included a much broader study area to include PA 77, PA 408, along with sections of PA 27 within both Meadville and Titusville. Most of the recommendations presented within the 1996 study have been implemented, with the exception of the PA 27 corridor included as part of this study.

The study is intended to help the Northwest Commission and Crawford County primarily in identifying capital project needs along PA 27 for possible inclusion in the region's forthcoming update to its Long-Range Transportation Plan, and 2021 Transportation Improvement Program (TIP).

Who participated in the study process?

The study report was shaped through the input of a four-member steering committee comprised of the Northwest Commission, Crawford County Planning Office, and the Pennsylvania Department of Transportation (PennDOT) Engineering District 1-0. The steering committee reviewed draft study products and offered local insights and perspectives. The Crawford County Planning Office also held a stakeholders meeting on March 1, 2018 in which representatives from local municipalities, businesses, school districts, and the emergency response community provided study input.

What are the study's major findings?

The planning process identified several major findings, including:

- Collecting data on existing traffic conditions, including turning movement counts, crash data, and traffic operations.
- Identifying existing (2017) and future (horizon year 2027) traffic operation issues to determine transportation improvements regarding capacity, congestion, and safety needs.
- Determining whether there were any future planned developments within or surrounding the study area that would bring additional traffic to the study area in the future.
- The development of twelve recommendations, listed in **Table 1**, for both short-term and long-term implementation improvements on the PA 27 corridor within the study area.
- The development of an implementation complexity matrix as tool for the Crawford County Planning Office to prioritize implementation of the study recommendations.

Table 1: Study Recommendations

#	Recommendation Description
1	Improve the intersection of PA 8 and PA 27
2	Prioritize winter maintenance along the PA 27 corridor
3	Address crash clusters at three curves along PA 27 and identify and remediate other crash clusters (install HFST and upgrade delineation and pavement markings at Wayland Curves, Guys Mills Road Curve and the curve at/near Segment 210)
4	Improve the intersection of PA 173 and PA 27
5	Add climbing lane and other improvements between Pastoris Road and Johnson Road
6	Address Lesh Road intersection with curve straightening and climbing lane
7	Add climbing lane and other improvements between Thurston Road and Leslie Road (Old Ellis Hill Road Intersection)
8	Add climbing lane and other improvements in area west of Wayland Road intersections
9	Add climbing lane and other improvements in area west of and including Beuchat Road intersection
10	Improve sight distance at Moyer Road intersection by cutting back slopes and vegetation, and revising roadway profile (lower crest of hill)
11	Improve sight distance at the Carpenter Road intersection by cutting back slopes and vegetation
12	Improve sight distance at Cherrytree-Plumline Road intersection by revising roadway profile (lower crest of hill)

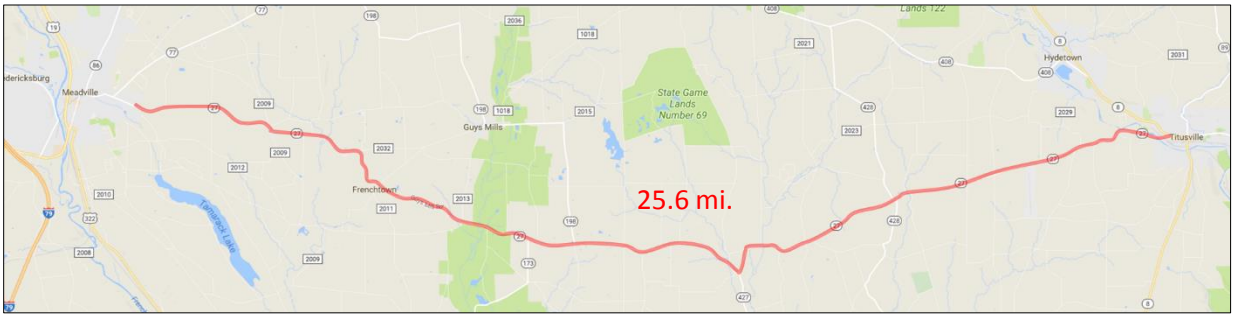
What happens next?

The Northwest Commission will work with the Crawford County Planning Office to review and vet the implementation complexity matrix and then coordinate with PennDOT to program improvements identified to advance.

Introduction

The Crawford County Planning Office initiated this study in October 2017 by petitioning the Northwest Commission for study funding. The study of PA Route 27 Corridor is an update of an earlier study that had been conducted for PennDOT Engineering District 1-0 in 1996 (1996 study). The earlier study in fact focused on the larger area, and developed recommendations for each of the main traveled routes between Interstate 79, adjacent to Meadville, to Titusville. Though a number of the study improvements have been implemented since that time, very few of the PA 27 corridor recommendations from that report have been addressed or implemented specifically along the section of PA 27 between the cities of Meadville and Titusville.

Figure 1: PA 27 Corridor Study Area

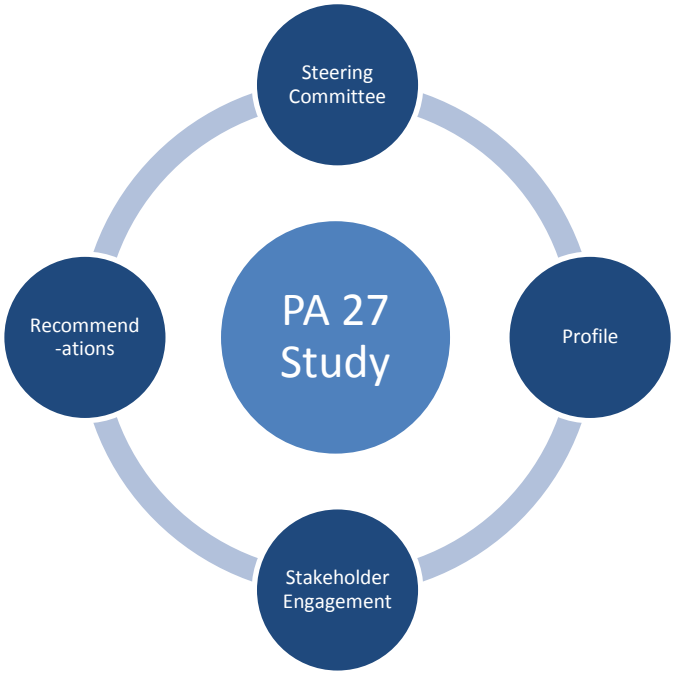


The following study readdresses the traffic and safety needs of PA 27 corridor for the section of the corridor shown above in **Figure 1** understanding that the economy, socio-demographics, and travel patterns likely changed over the past 20 years. This study presents recommendations and an implementation complexity matrix for the Crawford County Planning Office and the Northwest Commission to use to identify specific transportation improvement project for programming.

Methodology/Approach

The study process followed the following primary tasks, as illustrated in **Figure 2**:

Figure 2: Study Methodology



Study Steering Committee – A steering committee to guide the study process was formed at the onset of the study. The committee included representation from PennDOT District 1-0, the Crawford County Planning Office, and the Northwest Commission. A list of the study steering committee members is included in the Acknowledgements section of this report.

Study Area Profile – The study includes a comparison of data and information regarding traffic flows and safety conditions within the study area. Morning and evening traffic counts were conducted at four intersections and traffic volumes, vehicle classification, and vehicle speeds were gathered at four locations throughout the study area to establish a traffic and safety profile. Additionally, five years of historical crash data was collected and analyzed and a field inventory was conducted.

Stakeholder Engagement – In addition to steering committee member involvement, a stakeholder meeting was held to learn more concerning current areas of concern and potential transportation improvements. The event was organized by the Crawford County Planning Office and helped shape the final study report to be reflective of concerns not only from public officials, but the local community.

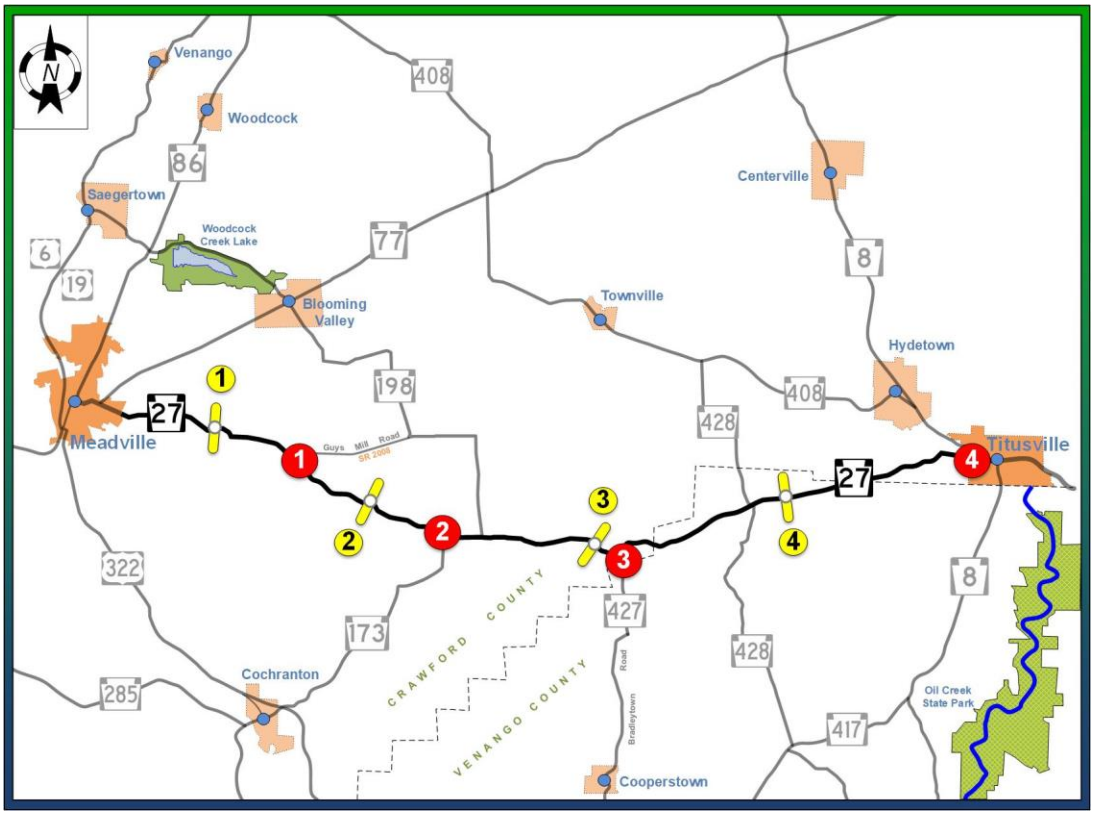
Recommendations – Based on input gathered during stakeholder engagement and from the steering committee together with the findings from the study area profile analyses, recommendations were identified.

Study Area Profile

Study Area Focus

The study area consisted of a 25.6-mile section of the PA 27 corridor between Meadville's eastern city line with West Meade Township and the intersection of PA 8 in the City of Titusville, also shown in **Figure 3**.

Figure 3: Study Area Extents & Traffic Data Collection Locations



Specific study intersection locations, shown in **Figure 3** as red circles and listed below, and study segment locations, shown in **Figure 3** as yellow bars and listed below, comprised macro level focal points for corridor traffic operations:

Study intersection locations:

1. SR 0027 (PA 27) & SR 2032 (Guys Mill Road) – Stop Controlled
2. SR 0027 (PA 27) & SR 0173 (PA 173) – Stop Controlled
3. SR 0027 (PA 27) & SR 0427 (PA 427 – Bradleytown Road) – Stop Controlled
4. SR 0027 (PA 27) & SR 0008 (PA 8 - Spring Street) – Stop Controlled

Study segment locations:

1. PA 27, Segment 110, Offset 760 (between Meadville City border and SR 2032 (Guys Mills Road) intersections)

2. PA 27, Segment 210, Offset 475 (between SR 2032 (Guys Mills Road) and PA 173 intersections)
3. PA 27, Segment 340, Offset 475 (between PA 173 and PA 427 intersections)
4. PA 27, Segment 100, Offset 1650, Venango County (between PA 428 and PA 8 intersections)

PA 27 is a two-lane, two-way, rural minor arterial running east-west from Meadville, PA to Titusville, PA, then northward to PA 69 near Sugar Grove, PA. The study area included only the section of PA 27 between Meadville and Titusville. Within the study area, PA 27 consists of two 10- to 11-foot travel lanes and narrow shoulders that vary from 0 to 5 feet. The speed limit varies from 25 mph to 55 mph, with the predominant speed limit being 55 mph. Advisory reduced speeds relating to steep grades and curves/turns are posted along the corridor. There are a number of steep grades (5% to 9%) both eastbound and westbound and over 80% of the corridor has passing restrictions due to vertical and horizontal curves. **Table 2** provides reportable crash data for a five-year period (2012-2016) within the study area limits.

Table 2: Study Area Reportable Crash Data

Crash Characteristic	Total	% of Total
Collision Type		
Hit Fixed Object	90	57%
Angle	23	15%
Non-Collision (typically roll)	13	8%
Hit Deer (or other wildlife)	11	7%
Rear End	10	6%
Head-on (or Opposite Direction Sideswipe)	8	5%
Same Direction Sideswipe	1	1%
Pedestrian	1	1%
Contributing Driver Action		
Too Fast For Conditions	54	34%
Over/Under Compensate Curve	26	17%
Affected by Physical Condition (Impaired)	27	17%
Other Improper Driving	26	17%
Distracted	12	8%
Proceed Without Clearance	8	5%
Wrong Side of Road	3	2%
Weather Condition		
Dry/Clear	93	59%
Snow/Ice	42	27%
Wet/Rain	20	13%
Fog	3	2%
Time of Day Condition		
Daytime	94	60%
Night/Dark	58	37%
Dusk/Dawn	5	3%

Crash Characteristic	Total	% of Total
Resultant Crash Severity		
Property Damage Only	86	55%
Minor or Possible Injury	46	29%
Unknown Severity	14	9%
Fatal	7	4%
Serious Injury	4	3%

Data Collection

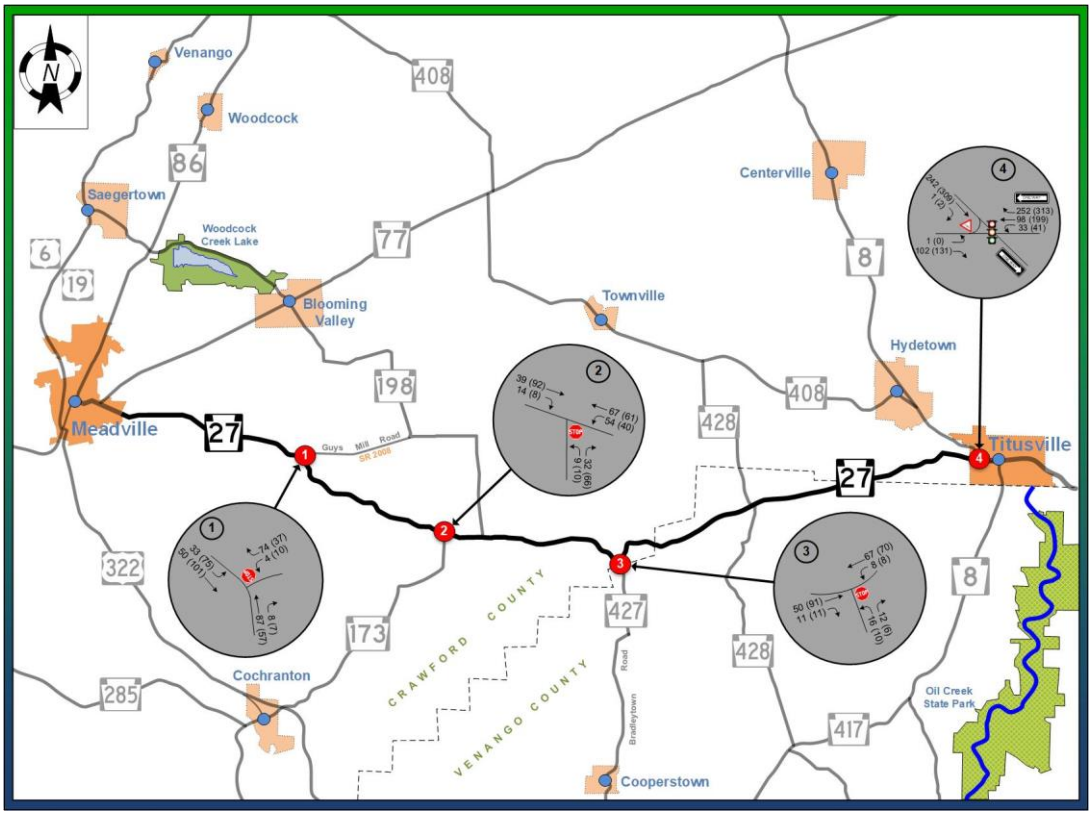
Vehicle Movements

Existing turning movement counts, including pedestrians, bicycles and heavy vehicles were completed on Wednesday, November 8, 2017 from 6:00 A.M to 7:00 P.M. at study area intersections 1-4 identified previously. Peak hours were determined within the following morning and afternoon time periods:

- Weekday A.M. Peak Period (6:00-9:00 A.M.)
- Weekday P.M. Peak Period (3:00-6:00 P.M.)

The A.M. and P.M. peak hour turning movements for each study intersection are shown in **Figure 4**.

Figure 4: Study Intersection Turning Movement Counts



Four Automated Traffic Recorder (ATR) counts were completed at the previously identified study segment locations from November 7 through November 15, 2017. In addition to traffic volume, both vehicle classification and speeds were recorded at each location in each direction. **Figure 5** shows the bi-directional average daily traffic (ADT), heavy vehicle percentage and average travel speed at each of the four study segments.

Figure 5: Study Segment ATR Results

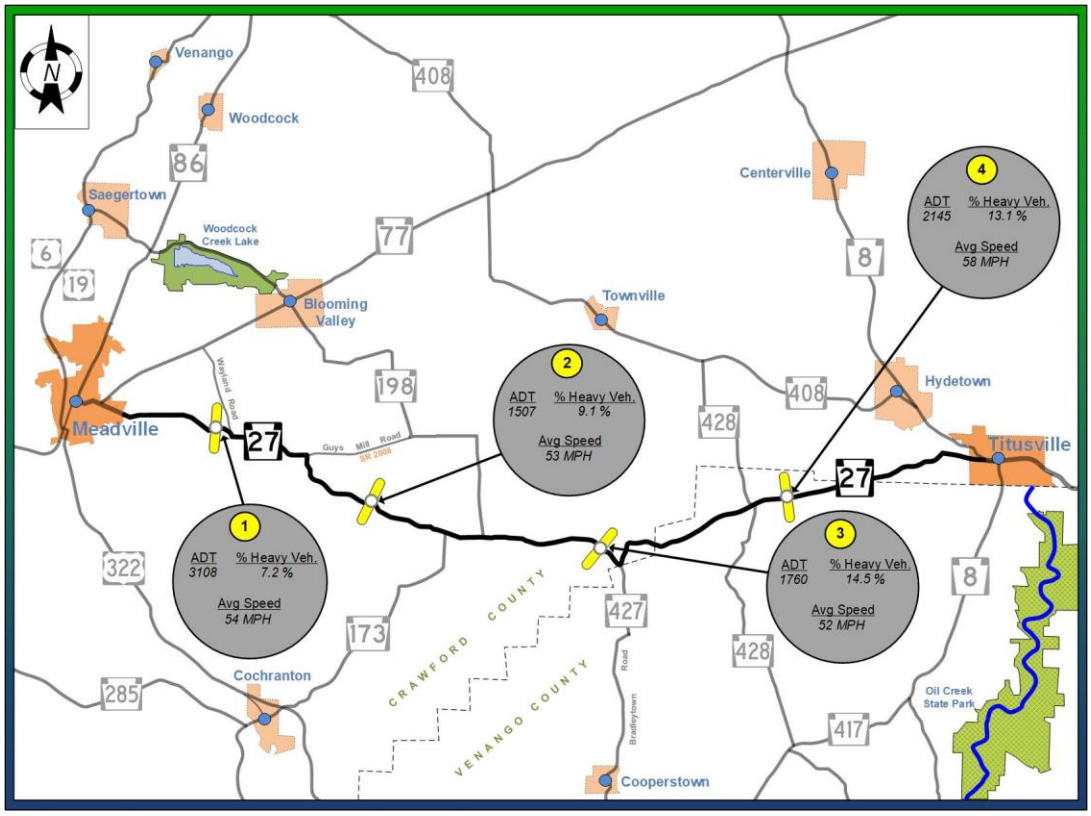


Table 3 provides the directional ADT, heavy vehicle percentage, and 85th percentile speeds at each study segment location.

Table 3: Automated Traffic Recorder Volume, Heavy Vehicle, & Speed

ATR Location		Weekday		Weekend		85th Percentile Speed
		ADT	HV%	ADT	HV%	
Eastbound Direction						
1	Segment 110 Offset 760	1551	8.3%	1147	4.3%	61 MPH
2	Segment 210 Offset 475	758	9.0%	554	3.6%	57 MPH
3	Segment 340 Offset 475	895	14.6%	650	5.1%	59 MPH
4	Segment 100 Offset 1650	1082	13.0%	834	4.9%	63 MPH
Westbound Direction						
1	Segment 110 Offset 760	1557	6.2%	1197	2.1%	57 MPH

ATR Location		Weekday		Weekend		85th Percentile Speed
		ADT	HV%	ADT	HV%	
2	Segment 210 Offset 475	750	9.3%	590	4.0%	59 MPH
3	Segment 340 Offset 475	864	14.4%	679	5.4%	56 MPH
4	Segment 100 Offset 1650	1064	13.2%	857	5.6%	64 MPH

Field Inventory

A field visit and inventory was conducted to more clearly understand the specific issues and physical features within the study area. As part of the field inventory, grades were measures at all climbing lane locations recommended in the 1996 study. **Table 4** shows the climbing lane locations and recorded grades.

Table 4: Roadway Grades Inventory

Location Name	1996 Study Location #	Grade (Field Measured)	Grade on Sign	Climbing Lane Direction
Leslie Rd to East Mead Twp Line	11	8.6%	-	EB
East Mead Twp Line to SR 2009 at Wayland Baptist Church	12	5.8%	-	WB
SR 2009 to SR 2032	15	5.9%	-	WB
Frenchtown (Randolph Twp line) to SR 2013	22	5.0%	-	WB
SR 2013 to PA 173	24	not very long	-	EB
West of Horseshoe Curve	29	7.8%	-	WB
Cooperstown Rd to SR 4009 (east of Fauncetown Road)	33	7.5%	7%	EB
SR 4009 to PA 428 (east of Chapmanville and west of Diamond)	35	no location found	-	WB
PA 428 to east of SR 2029	37	7.4%	-	EB
PA 428 to SR 4011 and east of 2029 (west of Titusville Airport)	38	not very long or steep (≈ 4%)	-	Both
PA 428 to SR 4011 and east of 2029 (west of Gresham)	39	8.1% EB, 6.6% WB	-	Both
PA 428 to SR 4011 and east of 2029 (east of Gresham)	40	5.9%	6%	WB

Sight distance was measured at the four study intersections as well as at intersections that had been identified as problematic during the stakeholder meeting. **Table 5** shows the field measured corner sight distance at the intersections.

Table 5: Corner Sight Distance Measurements

Intersection	Approach	Speed Limit (MPH)	Looking West		Looking East		Side Road Surface
			Grade	Sight Distance (ft.)	Grade	Sight Distance (ft.)	
Wayland Road/ Plank Road	SB	45/35	-	>600	-	>600	paved/gravel
Wayland Road	NB	45	-	>600	-	>600	paved
Moyer Road	NB	55/40	-5.9%	320	5.9%	>600	gravel
Guys Mill Road	SB	45/35	2.9%	>600	-1.9%	450	paved
Beuchat Road/ Oil Creek Road	NB	55/45	-1.5%	360	3.5%	>600	gravel
	SB	55/45		247		>600	paved
New Road	SB	55	-	>600	-	>600	gravel
PA 173	NB	55	-	>600	-	>600	paved
Carpenter Road	NB	45/35	2.5%	260	2.5%	>600	gravel
	SB	45/35		275		200	
PA 427	NB	45/30	-2.0%	415	-2.0%	260	paved
LeBoeuf Trail/ Flat Road	NB	45	-	>600	-	>600	paved
	SB	45		>600		>600	
Troy Center Road (PA 428)	SB	35	-	>600	-	>600	paved
Wallaceville Road (PA 428)	NB	35	-	>600	-	>600	paved
Cherrytree Plum Line Road/ Shriner Rd	NB	55/50	2.6%	>600	-2.3%	480	gravel
	SB	55/50		>600		530	
Troy Road/ Stone Springhouse Road	NB	55/50	-4.5%	590	5.1%	>600	paved
	SB	55/50		552		>600	gravel
Dempseytown Gresham Road	NB	40	-	>600	-2.5%	590	paved
Johnson Road	SB	40/35	-6.0%	300	6.0%	>600	paved

Existing Study Area Conditions

In order to evaluate which of the PA 27 improvements and mitigations recommended in the 1996 study should be prioritized for placement on the TIP, existing traffic volumes (2017) and heavy vehicle percentages were compared to the 1996 study's 20-year projected volumes (also 2017). It was found that

the growth in traffic volumes projected in the 1996 study did not occur as predicted, and in fact, 2017 existing traffic volumes are not much different than the 1996 study's existing volumes. The comparison of these traffic volumes is shown in **Table 6**.

Table 6: Existing Conditions Traffic Volume Comparison

PA 27 Study Segment Extent	1996 Study Traffic Volumes			2017 Existing Traffic Volumes			
	1994	Projected 2017	1994 % Trucks	ATR 2017	TIRE* 2018	ATR % Trucks	TIRE* % Trucks
SR 2007 to SR 2032	3613	6431	4.0%	3108	2762	7.2%	8.0%
SR 2032 to PA 427	1728	2076	7.0%	1760	2048	14.5%	10.0%
PA 427 to PA 428	1680	2990	5.0%	-	1700	-	7.0%
PA 428 to SR 2029	2136	3802	6.0%	2145	1991	13.1%	6.0%
SR 2029 to PA 8	2698	4802	-	-	3806	-	5.0%

* TIRE = PennDOT's Traffic Information Repository (TIRE)

Capacity Analysis

Capacity analyses for signalized and stop-controlled intersections were completed following the 2010 Highway Capacity Manual (HCM) methodologies using Synchro 10 software for the study area intersections. The capacity analyses calculate the control delay for vehicles per lane group at each intersection, which is also aggregated into an average control delay for the overall intersection. Control delay measures the average additional delay incurred by vehicles as a result of the traffic control device (e.g., stop control, signal, roundabout, etc.), and control delay includes stopped time as well as acceleration and deceleration delay. Level of service (LOS) is determined based on the control delay using the following thresholds established in the 2010 HCM as indicated in **Table 7**.

Table 7: 2010 HCM LOS Thresholds

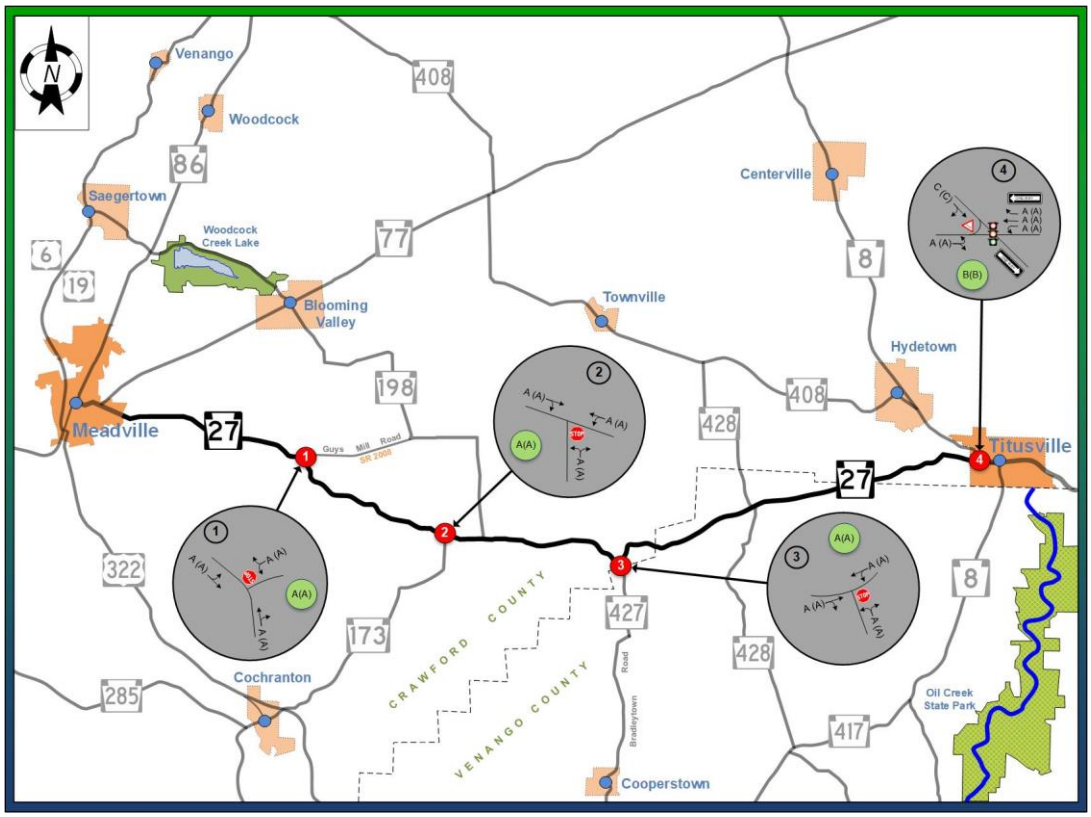
Level of Service	Control Delay (seconds per vehicle)	
	Stop Control	Signal
A	≤ 10	≤ 10
B	> 10 – 15	> 10 – 20
C	> 15 – 25	> 20 – 35
D	> 25 – 35	> 35 – 55
E	> 35 – 50	> 55 – 80
F	> 50 or v/c > 1.0	> 80 or v/c > 1.0

v/c = volume to capacity ratio
Source: *Highway Capacity Manual*, 2010

The existing counts were used to determine the intersection LOS to evaluate whether there were any operational or capacity deficiencies at the study intersections. The results of the existing peak hour LOS

analysis are shown in **Figure 6**. All stop controlled intersections operated at LOS A, and the signalized intersection of PA 27 and PA 8 operates at LOS B during the both the A.M. and P.M. peak hours.

Figure 6: Morning and Afternoon Peak Hour LOS Results



Turn Lane Analysis

Turn-lane analyses for right-turn lanes and left-turn lanes were conducted at each study intersection to evaluate whether there is an existing capacity demand for the addition of a turn lane at any of the study intersections. As a result of the analyses, it was determined that no turn lanes were warranted at any of the study intersections.

Climbing Lane Analysis

Warrants for climbing lanes were analyzed per the criteria set forth in PennDOT Publication 13M and the AASHTO Policy on Geometric Design of Highways and Streets. Though the grades and length of climbing lanes met the warrants in many cases, the traffic volume and truck percentage did not, thus resulting in no climbing lanes being warranted within the study area. However, the AASHTO Policy of Geometric Design of Highways and Streets states that "because of the increasing amount of delay and the number of serious crashes occurring on grades, climbing lanes are now more commonly included in original construction plans, and *climbing lanes on existing highways are being considered as safety improvements*."

Sight Distance Analysis

The measured corner sight distances were analyzed based on sight distance criteria in accordance with PennDOT Publication 212 and Publication 46. Required and available sight distances are shown in **Table 8**. Deficient existing sight distances were observed at the intersections of PA 27 and:

1. Moyer Road
2. Beuchat Road/Oil Creek Road
3. Carpenter Road
4. PA 427 (Horseshoe Curve)
5. Cherrytree-Plumline Road/Shriner Road
6. Troy Road/Stone Springhouse Road
7. Johnson Road

Table 8: Corner Sight Distance Results

Intersection w/ PA 27	Approach	Looking West		Looking East	
		Desirable Sight Distance (ft.)	Measured Sight Distance (ft.)	Desirable Sight Distance (ft.)	Measured Sight Distance (ft.)
Wayland Road/ Plank Road	SB	OK	>600	OK	>600
Wayland Road	NB	OK	>600	OK	>600
Moyer Road	NB	622	320	482	>600
Guys Mill Road	SB	634	>600	398	450
Beuchat Road/ Oil Creek Road	NB	562	360	499	>600
	SB	562	247	499	>600
New Road	SB	OK	>600	OK	>600
PA 173	NB	OK	>600	OK	>600
Carpenter Road	NB	406	260	370	>600
	SB	406	275	370	200
PA 427	NB	398	415	398	260
LeBoeuf Trail/ Flat Road	NB	OK	>600	OK	>600
	SB	OK	>600	OK	>600
Troy Center Road (PA 428)	SB	OK	>600	OK	>600
Wallaceville Road (PA 428)	NB	OK	>600	OK	>600
Cherrytree-Plumline Road/Shriner Road	NB	517	>600	576	480
	SB	517	>600	576	530
Troy Road/ Stone Springhouse Road	NB	606	590	422	>600
	SB	606	552	490	>600
Dempseytown Gresham Rd	NB	OK	>600	331	590
Johnson Road	SB	352	300	287	>600

Crash Analysis

The Highway Safety Manual (HSM) predictive method was used to conduct a network screening level crash analysis of the PA 27 study corridor. In the predictive method, a roadway corridor can be divided into sections based on traffic volume and roadway type/number of lanes and a predicted number of crashes can be determined using statistical equations that predict how many crashes would occur on a roadway of this type with this volume in a typical or average situation. This predicted number of crashes can then be compared to the actual crash history to tell whether the study location has a higher than expected crash history.

For this analysis, the study area of PA 27 was organized into nine sections and each section was evaluated using the predictive method. Additionally, all the intersections along the corridor were analyzed. The results of the analysis indicated that one of the sections (PA 27 between PA 428 and Johnson Road) and four intersections (PA 173 & PA 27, Cherrytree Rd. & PA 27, Lesh Rd. & PA 27, and Old Ellis Rd. & PA 27) had more crashes than were predicted and hence show potential for safety improvements based on crash history.

Crash clusters were also noted at three horizontal curves:

- Wayland
- Guys Mill Rd and
- Curve at Segment 210

Other notable aspects of the crash analysis include:

- 66% of all crashes were Single Vehicle Run Off the Road (SVROR)
- 40% of the crashes occurred in bad weather (27% in snow or ice conditions)
- 37% of the crashes occurred in the dark

Future Conditions

This study uses an analysis period of 10 years when developing future traffic volumes and conditions. Therefore the future year for analysis is the design horizon year of 2027 so as to evaluate the long-term impacts within the study area and identify projects for inclusion on the TIP.

Annual Background Growth

Future base traffic volumes were projected by applying an annual growth rate developed using the PennDOT Growth Factors published for August 2017 to July 2018. The annual compounded growth rate calculated from the PennDOT Growth Factors for Crawford County rural non-interstate roads is 0.45%. For the proposed design horizon year of 2027, the annual growth rate of 0.45% is compounded over 10 years to yield a growth factor of 4.6%.

Nearby Proposed Developments

Growth in the area surrounding the PA 27 study corridor is minimal. Communication with the steering committee revealed there are no known proposed developments which would have significant traffic generation.

Design Year Traffic Volumes

Design year projected traffic volumes were determined using the growth factor of 4.6% with no additional trips added for 'known' developments since none were identified. Design year LOS analysis for the four study intersections indicated that all intersections are projected to continue to operate at or better than LOS B. Projected design year traffic volumes for the sections along PA 27 are shown in **Table 9**. Design year analysis for the projected AADTs indicated no capacity or traffic volume operational constraints.

Table 9: Design Year Conditions Traffic Volume Comparison

PA 27 Study Segment Extent	1996 Study Traffic Volumes		2017 Existing Traffic Volumes		2027 Design Year Traffic Volumes	
	1994	Projected 2017	ATR 2017	TIRE 2018	ATR Projected	TIRE Projected
SR 2007 to SR 2032	3613	6431	3108	2762	3251	2889
SR 2032 to PA 427	1728	2076	1760	2048	1841	2142
PA 427 to PA 428	1680	2990	-	1700	-	1778
PA 428 to SR 2029	2136	3802	2145	1991	2244	2082
SR 2029 to PA 8	2698	4802	-	3806	-	3981

Stakeholder Engagement

The study included community outreach that directly engaged invited members of the community to gather meaningful input on current issues relative to travel on the PA 27 corridor. In addition to providing background on the purpose of the study and the approach for developing recommendations, the stakeholder focus meeting offered an opportunity to engage breakout groups in developing an understanding of issues and gather additional ideas on potential transportation improvement recommendations. The results of the stakeholder engagement activities are summarized on the following pages.

Stakeholder Meeting

On March 1, 2018, the Crawford County Planning Commission hosted a stakeholder meeting at the East Mead Volunteer Fire Department to provide an update on the study. The stakeholder meeting included a review of the study purpose, an overview of existing transportation trends, and an introduction to the 1996 study. A facilitated discussion occurred after the study overview presentation and the 26 attendees were assigned to one of three breakout groups. Each breakout group focused on one of three segments of PA 27 in detail with an emphasis on safety and mobility themes. The outcomes of the breakout group discussions are summarized as follows:

Table #1 – Meadville City Limit to Boland Road

Traffic Movement

- Backups in both directions during the AM and PM peak commute occur at Guys Mills Road at Hunter's Inn.
- Motorists speed along the corridor between Leslie Road and Towline Road and making it difficult to turn off Towline Road and onto PA 27 safely.
- Towline Road is being used more heavily by both cars and heavy trucks.
- There is significant congestion at Thurston Road in Meadville because of bus traffic around the Crawford County Career and Technical Center, next to the high school.
- There is no place to safely pass slow moving vehicles on PA 27.
- There are speeding issues around the Guys Mills/KOA area and motorists drive off the road because they don't understand the roadway curves.
- Leslie Road is being used by buses and there is congestion at its intersection with PA 27. It was suggested that a blinking light be installed at this intersection to control traffic.
- It was suggested that a hill climbing lane be added by expanding the southern side of the road between N. Wayland Road and the hill crest, towards Millers Furniture.
- Drivers coming from Meadville begin to speed as soon as they cross Leslie Road, as it is a straighter section of the corridor. It was mentioned that drivers appear to hit the guiderails on the section of the road between Leslie Road and the hill crest.

- Blinking lights on either side of the East Mead Fire Department Building warn traffic of a maneuvering fire truck, but they only blink for 30 seconds. This is not enough time for motorists to slow down.

Sight Distance

- The line of sight turning left onto PA 27 from Beuchat Road is terrible. It was noted that some drivers avoid turning left at this intersection due to sight distance issues. It was suggested that addressing the hill crest would provide better sight distance.
- The line of sight is challenging at the Moyer Road intersection, both turning onto the road from PA 27 and turning onto PA 27 from Moyer Road. The ditching at this intersection is very deep.
- It was suggested that if the roadway could not be widened or straightened, then vegetation clearing may be another solution to help with sight distance. Some intersections and sections of PA 27 have significant tree canopy which obscures light.
- There are visibility issues at Wayland Corners, where PA 27 intersects N. and S. Wayland Road. There are speeding issues at those curves, especially after driving downhill.
- It was stated that the "smoothing out" of the Guys Mills Road curve at Hunter's Inn has worsened sight distance issues. The smoother curve allows motorists to drive faster and the line of sight for turning traffic hasn't been improved.

Drainage

- Drainage is an issue on several parts of the road, especially by the Erie Wildlife Refuge and other wetland areas. Water will occasionally pool on the road and drivers will swerve to avoid it.
- Drainage issues were identified:
    - near the Leslie Road and PA 27 intersection,
    - near the Townline Road and PA 27 intersection,
    - near the intersection of S. Wayland Road where water freezes on the road, and
    - around the East Mead Fire Department.
- There is often standing water on both sides of the road just east of Boland Road (there are equalizer cross pipes at this location) and the potential for flooding.

Truck Impacts

- It was mentioned that trucks occasionally avoid PA 77 and PA 408 because there are too many light bridges, which forces them to detour on PA 27.
- If PA 8 is narrowed from 4 lanes to 2, then more truck traffic will be directed onto PA 27.
- One attendee noted that PA 27 should not allow trucks and be used only as a local residential road.
- It was noted that a local business routes their truck up I-79 through Meadville to PA 27 rather than trying to go through Franklin on PA 322 to PA 173.
- Multiple comments were made concerning trucks moving slowly with no safe place to pass.

Roadway Alignment

- The corridor is dangerous during the winter months.

- There is an issue with trucks spinning out at the top of the hill (starting at Wayland Rd. and Plank Rd.).
- Drivers go too fast for the road curves, especially eastbound going down the hill (starting at Wayland Rd. and Plank Rd.).
- It was suggested that the Hunter's Inn corner may need to be realigned or reconstructed. Drivers can't see down the road past the curve for oncoming cars when turning left off PA 27 at Hunter's Inn going east. This is the same problem for residents and businesses with driveways connecting to PA 27.
- Many drivers misjudge the curve at Hunter's Inn and occasionally drive off the road.
- The banking and bending of the road at the first two curves going down the hill is unsafe.
- It was suggested that the road be smoothed where an S-curve exists near the intersection of PA 27 and Wayland Road.
- Truckers occasionally turn too wide at the curve at Hunter's Inn and cross the centerline, especially if they are not expecting the turn to be so sharp.

General/Other

- One attendee noted the biggest issue on PA 27 is winter maintenance.
- There was not consensus on the level of commercial development along PA 27. It was noted that Titusville is not growing and not well connected to nearby destinations. However, it was also mentioned the pallet shop and other small businesses are popping up and there is an impression that there is an uptick in activity along the road.
- Wider shoulders would be beneficial along the corridor for slow-moving vehicles to pull over and for car breakdowns.

Table #2 –Boland Road to Snyder Road

Traffic Movement

- Both approaches to the Horseshoe Curve are dangerous.
- Speed limits are not enforced, possibly because the Corry and Seneca State Police are headquartered quite a distance away. Perhaps the Sheriff's deputies could enforce the speed limit.
- Armstrong Hill is steep and curvy.
- Hipple Hill has had some work completed and it needs additional improvements.
- Weekday mornings and afternoons are the worst times for traffic congestion due to trucks and school buses.
- Wider berms are needed everywhere. Many passing lanes are needed.

Sight Distance

- The sight distance is bad at Carpenter Road and PA 27; there is a bank and a house in the way.
- Dingman Road approaching PA 27 has a blind spot.
- PA 173 and PA 27 (Wentworth Ford) has poor sight distance. It was noted by a PennDOT representative that it is hard to properly place a stop sign at this intersection.
- Sight distance is poor at the following locations:

  - Bradleytown Road and PA 27,
  - LeBeouf Trail Road and PA 27 where a house blocks the line of sight,
  - the Village of Diamond,
  - at Black Ash (as driveways come up fast), and
  - Mt. Hope Golf Course.
- Trees should be cut near the New Road and PA 27 intersection (near Wentworth Ford).

Truck Impacts

- Lumber trucks are dominant. United Refining trucks from Warren County deliver all gasoline to Meadville by way of PA 27. Many milk trucks also travel the route.
- Most truck drivers are local and understand the road. Glen Peterson store has had no complaints from their drivers.
- Trucks cause grooves in the pavement requiring additional maintenance.
- Big trucks have stalled out in the snow between Fauncetown to Chapmanville. The stalling always happens on the curves.
- Armstrong and Mavis Hills are challenging for freight trucks.
- Gravel trucks struggle with the overall roadway design. Two local gravel companies use PA 27 extensively.
- Gravel trucks heading north on Bradleytown Road make turns onto PA 27 at low speeds.
- Large trucks are not allowed on PA 77 (State Road Hill) heading into Meadville. There has been a large decrease in accidents since large trucks were taken off this hill.

Roadway Alignment

- Both approaches to the Horseshoe Curve are dangerous. Hipple Hill Road used to connect PA 27. Passing lanes are needed if the Hipple connection comes back. Speed limits need to be studied and adjusted in the Horseshoe Curve area.
- The PA 198 and PA 27 intersection has a tight turning radius.
- Horseshoe Curve was created in the 1940s and needs to be removed and returned to the former roadbed.
- The curve east of Horseshoe curve is bad.
- A PennDOT representative said there is a tradeoff to eliminating the Horseshoe Curve. The tradeoff would be the steepness of Hipple Hill Road. A suggestion was made to soften the curve by realigning it to the north.

General/Other

- PA 27 is a great motorcycle route.
- Bicycle/pedestrian activities would not work on PA 27.
- Local municipal comprehensive plans should be looked at; they are excellent sources of information.
- The entire route and especially the Carpenter Road/PA 27 intersection should be studied more extensively for safety improvements.

Table #3 –Snyder Road to Titusville

Traffic Movement

- There was recently an accident west of Kightlinger Road; the speed limit drops from 45 mph to 35 mph.
- It was suggested that a passing lane should be added along the hill going into Titusville to help with truck-related traffic congestion.
- The entire corridor could benefit from wider shoulders.
- Traffic flow is pretty consistent throughout the day, with increases in volume during the AM and PM peak periods.
- The Sheetz intersection at PA 27 in Titusville is a safety concern. Trucks will deliver goods downtown and have to make a U-turn to navigate that area.

Sight Distance

- Sight distance is poor at the Dempsytown-Gresham Road and PA 27 intersection.
- Sight distance is poor at the Cherry Hill Road and PA 27 intersection.
- Brush trimming could be completed along the entire corridor for improved visibility.
- There are hidden driveways and vertical alignment issues due to elevation change.
- The intersection of E. Troy Road and PA 27 is unsafe; there have been many near misses at this location.

Truck Impacts

- Hasbrook hauls material along PA 27.
- Johnson Road at PA 27 experiences a lot of heavy trucks routing from Hydetown.
- Petroleum trucks use PA 27 for hauling.
- There are many logging and gravel trucks that haul along this section of the study area.

General/Other

- Road wear is noticeable along the entire corridor due to heavy trucks.
- The rail crossing into Titusville could benefit from minor improvements (e.g., signage).
- Development opportunities and activity at the Titusville Airport could have impacts on PA 27.

Review of Recommendations

Overview/Intro

The 1996 study recommendations for PA 27 were used as a baseline for this study. The general findings from the 1996 study identified corridor deficiencies in six general categories:

1. Narrow shoulders
2. Substandard lane widths
3. Steep grades
4. Tight curves
5. Passing restrictions on over 80% of the length of the corridor
6. Crash rate below state average for similar roads

The recommendations from the 1996 study fell into seven generalized categories:

1. Upgrade entire corridor to lane width and should standards (12' lanes and 8' shoulders)
2. Add left turn lanes at five (5) intersections
3. Lower crest of hill at four (4) locations
4. Add climbing lanes at fourteen (14) locations
5. Straighten horizontal curves at twelve (12) locations
6. Smooth bridge approaches at one (1) location
7. Improve signalized intersection of PA 8 and PA 27 by widening, adding turn 'ramps', and replacing signal

These recommendations were reviewed accounting for changes in the economy, socio-demographics and travel patterns that have developed in the ensuing 20 years. Based on the analysis of the current traffic data, the following general trends were noted:

- Growth in the area did not occur as projected in the 1996 study. Traffic volumes were expected to increase by 78% by 2017. The 2017 traffic counts indicate volumes are very similar to traffic volumes recorded in 1994.
- Due to generally low traffic volumes, truck climbing lanes do not meet warrants.
- Due to generally low traffic volumes, left turn lanes at intersections do not meet warrants.
- Without more traffic volume or a more serious crash history, widening lanes and shoulders along the entire corridor is difficult to justify from a Benefit/Cost standpoint.
- Crash rates remain below state predicted levels from a network screening perspective except in the following locations:
    - Along a 4.29-mile section of PA 27 between PA 428 and SR 2009
    - At the Intersections of:
        - PA 27 and PA 173
        - PA 27 and Cherrytree Road
        - PA 27 and Old Ellis Hill Road
        - PA 27 and Lesh Road

As noted, growth did not occur as predicted in the 1996 study, and the 2017 traffic volumes remain very similar to those recorded in 1994. Since traffic volume did not increase and there are no capacity concerns for the design year 2027, recommended improvements from the 1996 study were identified and prioritized to address safety issues first. Recommended improvements concurrently address improved mobility, although incrementally. Analysis of the recommendations was focused on meeting the following needs driving the project:

1. Assist the Northwest Commission and Crawford County in identifying capital project needs
2. Suggest specific projects from the 1996 study for the TIP and funding sources
3. Identify infrastructure, safety and operational improvements, and consider other opportunities for corridor improvements through recommended changes in public policy
4. Identify timeline and planning cost estimates for recommendations within the study area. Identify short and long-term improvement projects.

To fulfill these needs, a total of 12 recommendations were identified and presented to the steering committee for consideration. The 12 recommendations are summarized below in **Table 10** and more detailed descriptions of each are provided thereafter.

Table 10: Study Recommendations

#	Recommendation Description
1	Improvements to the intersection of PA 8 and PA 27
2	Prioritize winter maintenance along the PA 27 corridor
3	Address crash clusters at three curves along PA 27 and identify and remediate other crash clusters (install HFST and upgrade delineation and pavement markings) (at Wayland Curves, Guys Mills Road Curve and the curve at/near Segment 210)
4	Improvements at the intersection of PA 173 and PA 27
5	Add climbing lane and other improvements between Pastoris Road and Johnson Road
6	Lesh Road intersection curve straightening and climbing lane
7	Add climbing lane and other improvements between Thurston Road and Leslie Road (Ellis Road Intersection)
8	Add climbing lane and other improvements in area west of Wayland Road intersections
9	Add climbing lane and other improvements in area west of and including Beuchat Road intersection
10	Improve sight distance at Moyer Road intersection by cutting back slopes and vegetation, and revising roadway profile (lower crest of hill)
11	Improve sight distance at the Carpenter Road intersection by cutting back slopes and vegetation
12	Improve sight distance at Cherrytree-Plumline Road intersection by revising roadway profile (lower crest of hill)

Recommendation 1 – Improvements to the intersection of PA 8 and PA 27

Improvements to the intersection of PA 8 and PA 27 were originally identified as a recommendation in the 1996 study. The recommended improvements in the current study are the result of observations of motorist confusion regarding the two-way to opposing one-way approaches and alignment. There is also history of a fatal crash with a driver continuing in the wrong direction in an opposing lane. The specific recommended improvements are conceptually depicted in **Figure 7** and include the following:

- Widen PA 27 eastbound approach southward to thereby improve the alignment of the WB receiving lane by shifting it southward.
- Construct a channelizing island for the westbound left-turn lane, thereby creating a physical barrier to prohibit eastbound PA 27 traffic from entering the one-way westbound approach.
- Increase the turning radius for the westbound left turn movement from PA 27 westbound to PA 8 EB/SB to accommodate truck turning for this movement. (Truck accessibility in this area has been affected, since the 1996 study, with the construction of the Sheetz in the SE quadrant of the intersection.)
- Improve the signing to inform motorists on all approaches of the one-way conditions on the east and south legs of the intersection.

Figure 7: Recommendation 1 Concept Sketch

Recommendation 2 – Prioritize winter maintenance along the PA 27 corridor

Prioritization of winter maintenance is recommended to address the relatively high (27%) proportion of crashes that occurred along the corridor during winter weather conditions.

- Pursue agility agreements between local townships and PennDOT to facilitate more responsive winter maintenance on PA 27.

Recommendation 3 – Address crash clusters at three curves along PA 27

The current five-year crash analysis of the PA 27 corridor revealed that 60% of the crashes were SVROR, and of those 43% occurred in bad weather and 43% occurred at night. Crash clusters were noted at three curves along PA 27. The curves identified include curves in the vicinity of Wayland, curves west of Guys Mill Road intersection, and curves near segment 260. It is recommended that the following low-cost safety improvements be pursued at these locations:

- High Friction Surface Treatment (HFST)
- Delineation
- Raised snow-plowable pavement markings
- Review of optimizing chevron signing placement relative to any roadways or driveways within the curve alignments

Because the overall crash analysis/safety analysis for this study was from a network screening perspective, it is also recommended that a more detailed HSM predictive method analysis be conducted that focuses on smaller segments of the corridor to determine whether there are other areas that are experiencing more crashes than predicted. It is recommended that mitigations can then be implemented that target specific problem areas based on that more detailed analysis.

Recommendation 4 – Improvements at the intersection of PA 173 and PA 27

The addition of an eastbound left turn lane at the intersection of PA 173 and PA 27 was originally recommended in the 1996 study. Additionally, sight distance constraints at this intersection were identified during the stakeholder meeting. The current five-year crash data analysis identified this intersection as experiencing more crashes than would be predicted and hence having a potential for safety improvement. The specific recommended improvements are conceptually depicted in **Figure 8** Figure 7and include the following:

- Acquire the adjacent property to realign the intersection to 90 degrees.
- Reduce the radii at the newly aligned intersection to place the stop sign in a more conspicuous location.
- Channelize the driveway access to the adjacent commercial property in the SW corner of the intersection.
- Widen PA 27 sufficiently to add a left turn lane for westbound PA 27 to southbound PA 173 turns.

Figure 8: Recommendation 4 Concept Sketch

Recommendation 5 – Add climbing lane and other improvements between Pastoris Road and Johnson Road

Construction of a climbing lane between Pastoris Road and Johnson Road was originally identified as a recommendation in the 1996 study. The recommended improvements in the current study are the result of crash analysis indicating a potential for safety improvement in the vicinity of the Cherrytree Road intersection (within the climbing lane limits). Sight distance constraints exist at the PA 27 and Johnson Road intersection. Additionally, drainage ditches are close to the roadside through this area and several the crash reports indicate cars end up in the ditches. The specific recommended improvements include:

- Construct a one mile long climbing lane from east of Pastoris Road to west of Johnson Road
- Provide shoulders and relocate drainage ditches (swales) farther from roadway edge
- Improve signing for curves east and west of Cherrytree Road intersection.

Recommendation 6 – Lesh Road Curve Straightening and Climbing Lane

Construction of a climbing lane west of Lesh Road was originally identified as a recommendation in the 1996 study. The recommended improvements in the current study are the result of crash analysis indicating a potential for safety improvement in the vicinity of the Lesh Road intersection (within the climbing lane limits). Additionally, the intersection of PA 27 and Lesh Road is in the middle of a sharp curve and at a significant skew angle, contributing to safety hazards at this intersection. Construction of a climbing lane will affect the curve at the Lesh Road intersection. The specific recommended improvements include:

- Straighten curve and tie Lesh Road in at less skew
- Improve signing at curve
- Construct a climbing lane on the steep grades west of the Lesh Road intersection

Recommendation 7 – Add climbing lane and other improvements between Thurston Road and Leslie Road (Old Ellis Hill Road)

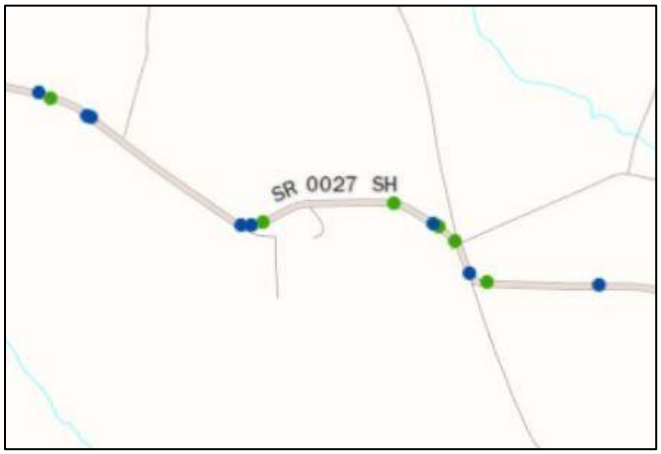
Construction of a climbing lane between Thurston Road and Leslie Road was originally identified as a recommendation in the 1996 study. The recommended improvements in the current study are the result of crash analysis indicating a potential for safety improvement in the vicinity of the Old Ellis Hill Road eastern intersection (within the climbing lane limits) as well as a fatal crash at this intersection. Additionally, the intersection of PA 27 and Old Ellis Road is in the at a significant skew angle, contributing to safety hazards at this intersection. Construction of a climbing lane will provide vehicles exiting and entering Old Ellis Road to/from the west more maneuvering room to make the sharp skewed turn angle. The crash history has indicated this may be contributing to safety issues at this intersection. The specific recommended improvements include:

- Construct a climbing lane on the steep grades between Thurston Road and Leslie Road.

Recommendation 8 – Add climbing lane and other improvements in area west of Wayland Road intersection

Construction of a climbing lane in the vicinity of the Wayland Road intersections was originally identified as a recommendation in the 1996 study. The recommended improvements in the current study are the result of crash analysis indicating crash clusters along the climbing lane area and curves (**Figure 9**). The PA 27 intersections with Wayland Road were also identified as being perceived as having a sight distance problem during the stakeholder meetings. Though the field investigation did not confirm a sight distance constraint, both Wayland Road intersections are at skewed angels and this may make sight distance from some vehicle types more constrained. The addition of a climbing lane could address some of the perceived sight distance issues as well.

Figure 9: Reportable Crashes Near Wayland Road



The specific recommended improvements include:

- Adding climbing lane and shoulders on steep grades west of and including the Wayland Road intersections.
- Providing delineation and/or snow-plowable raised pavement markers on the curves within the climbing lane section.

Recommendation 9 – Add climbing lane and other Improvements in area west of and including Beuchat Road Intersection

Construction of a climbing lane in the area west of and including Beuchat Road was originally identified as a recommendation in the 1996 study. The recommended improvements in the current study are the result of crash analysis indicating crash clusters along the curves in climbing lane area. (**Figure 10**) The PA 27 intersection with Beuchat Road was also identified as being perceived as having a sight distance problem during the stakeholder meetings. The field investigation confirmed a sight distance constraint to the west, and the addition of a climbing lane to the west can address the sight distance constraint at the same time.

Figure 10: Reportable Crashes in Area of Beuchat Road

The specific recommended improvements include:

- Adding a climbing lane and shoulders on steep grades west of and including the Beuchat Road intersection.
- Providing delineation and/or snow-plowable raised pavement markers on the curves within the climbing lane section.

Recommendation 10 – Improve Moyer Road intersection

Sight distance problems at the PA 27 and Moyer Road intersection were identified during the stakeholder meeting and confirmed by field measurements. This recommendation, as proposed, would address the sight distance constraint. The specific recommended improvements include:

- Cutting back slopes
- Cutting back vegetation
- Revising roadway profile (lower crest of hill)

Recommendation 11 – Improve Carpenter Road intersection

Sight distance problems at the PA 27 and Carpenter Road intersection were identified during the stakeholder meeting and confirmed by field measurements. This recommendation, as proposed, would address the sight distance constraint. The specific recommended improvements include:

- Cutting back slopes
- Cutting back vegetation

Recommendation 12 – Improve Cherrytree-Plumline Road intersection

Sight distance problems at the PA 27 and Cherrytree-Plumline Road intersection were identified during the stakeholder meeting and confirmed by field measurements. This recommendation, as proposed, would address the sight distance constraint. The specific recommended improvements include:

- Revising roadway profile (lower crest of hill)

Implementation Complexity Matrix

After meeting with the steering committee, an implementation complexity matrix was developed to provide weighting information for each recommendation. In this way, the recommendations can be compared against one another to summarize the relative complexity of each to help determine and prioritize which improvements should be pursued, and determine which can be considered short- or long-term projects. The resultant implementation complexity matrix can be viewed in **Table 11**.

Table 11: Implementation Complexity Matrix

Recommendation # - Name	Recommendation Description	What Issues are Addressed?					How Complex is Design and Construction? (Rated 0 - 5: 0 = not complex, 5 = very complex)					How Much Money to Construct?
		5-Year Crash History			Sight Distance	Slow Vehicle Delay, Mobility, Freight	ROW Impacts	Utility Impacts	Roadway Construction Impacts	Structure Impacts	Traffic Control Devices	
		Fatal	Injury	PDO								
1 - PA 8 & PA 27 Intersection Improvements	Widen PA 27 west of PA 8 to better align WB one-way traffic from Titusville	1	2	0	-	-	2	2	2	0	3	$$
	Install raised channelizing island for WB PA 27 left turns to SB/EB PA 8 to provide a physical obstruction to ensure no wrong-way (EB) entries onto WB one-way PA27. (Ensure sufficient ROW is acquired and geometric improvements are made to permit truck turns)				-	X	2	2	2	0	2	$$
	Improve/revise signing and pavement markings on all approaches to intersection to be clearer about one-way approach				-	-	0	1	1	0	2	$
2 - Prioritize Winter Maintenance	Pursue and utilize agility agreements to enable PA 27 to receive winter maintenance closer to inclement weather events	1	11	30	-	-	0	0	0	0	0	$
3 - Address Crash Clusters at Three Curves Along PA 27 and Identify and Remediate Other Crash Clusters	Install HFST at 3 curves with high SVROR crash history (at Segment 110, Wayland Curves, Segment 160, Guys Mill Curve and Segment 210)	0	7	14	-	-	0	0	1	0	0	$
	Install delineators and/or plowable raised pavement markers at 3 curves with high SVROR crash history (at Segment 110, Wayland Curves, Segment 160, Guys Mill Curve and Segment 210)				-	-	0	0	0	0	1	$
	Identify higher crash density locations and design and install low cost signing, pavement marking, delineator and lighting improvements (for high proportion of nighttime crashes and other identified crash trends)	2	22	23	-	-	0	1	0	0	3	$
4 - Intersection of PA 173 & PA 27	Realign PA 173 to eliminate skew and improve sight distance as vehicle approach the intersection	0	2	3	X	-	3	0	3	0	2	$$$
	Reduce radii to improve stop sign placement, improve and increase visibility of signing				-	-	0	0	2	0	1	$
	Construct left-turn lane on PA 27 at intersection				X	-	2	1	2	0	1	$$
	Channelize driveway access to adjacent businesses				-	-	2	0	1	0	1	$
5 - Climbing Lane Between Pastoris Road and Johnson Road	Construct 1 mile climbing lane from east of T960 (Pastoris Road) to west of Johnson Road	0	7	2	X	X	4	3	4	0	1	$$$$
	Provide shoulders along the 1-mile section and relocate drainage ditches farther from roadway edge				X	-	4	3	4	0	1	$$$$
	Improve signing for curves east and west of Cherrytree Road intersection				-	-	0	0	0	0	2	$
	Adjust vertical curve west of Johnson Road to improve sight distance				X	-	0	0	2	0	1	$$
6 - Lesh Road Curve Straightening and Climbing Lane	Straighten curve and tie Lesh Road in at less skew	1	3	2	X	-	2	0	3	0	1	$$$
	Improve signing at curve				-	-	0	0	0	0	2	$
	Construct appx. 0.6 mile climbing lane from east of Sugar Creek bridge (near Fauncetown Road) to east of Lesh Road				-	X	3	3	3	0	1	$$$$
7 - Climbing Lane Between Thurston Road and Leslie Road	Add 0.7 mile climbing lane from bridge over Ellis Run (east of Thurston Road) to Leslie Road	1	2	3	-	X	4	4	4	0	2	$$$$
8 - Climbing Lane West of Wayland Road	Add 1.1 mile climbing lane from Piped creek east of S. Wayland Road to vicinity of Millers Furniture	0	5	5	-	X	3	2	4	0	1	$$$$
	Provide delineation and/or raised pavement markings				-		0	0	0	0	2	$
9 - Beuchat Road Area Climbing Lane and Improvements	Add 1.25 mile climbing lane and shoulders from west of bridge over Lake Creek Tributary to residential driveways appx. 1.25 miles westward.	0	3	9	-	X	4	2	3	5	1	$$$$
	Provide delineation and/or raised pavement markings				-	-	0	0	0	0	2	$
10 - Moyer Road Intersection Improvements	Cut back embankment slopes and vegetation	0	0	1	X	-	1	1	1	0	0	$
	Adjust vertical curve to improve sight distance					-	1	0	2	0	1	$$
11 - Carpenter Road Intersection Improvements	Cut back embankment slopes and vegetation	0	0	1	X	-	1	0	1	0	1	$
12 - Cherrytree-Plumline Road Intersection Improvements	Adjust vertical curve to improve sight distance	0	0	1	X	-	1	1	2	0	1	$$

Design and Construction Complexity Factors:

***ROW Impacts**: ROW research, acquisition, and construction easements*
***Utility Impacts**: Utility conflict identification, coordination, and relocation*
***Roadway Construction Impacts include**: Grading, cut, fill, drainage, swales, pipes, inlets, curb, subbase, pavement, high friction surface treatment, shoulder construction, guiderail, retaining walls*
***Structure Impacts**: Bridge construction or widening, culvert construction or widening*
***Traffic Control Devices**: Signing, pavement marking, delineators, raised pavement markers, traffic signals*

Legend for Construction Costs

$: Estimated construction cost < $250K
$$: Estimated construction cost between $250K and $500K
$$$: Estimated construction cost between $500K and $1M
***$$$$**:* Estimated construction cost greater than $1M

Next Steps

As the planning process segues from planning to implementation, there will be an important transition. Crawford County Planning Commission will continue to work with the Northwest Commission to ensure that the projects and alternatives being recommended by this study report are considered along with other transportation infrastructure priorities being contemplated within the county and region.

The region's 25-year long range transportation plan – the Regional Long-Range Transportation Plan (LRTP) – serves as the "gatekeeper" for projects being considered for programming. As such, it is the primary vehicle for advancing proposed projects from a conceptual status to preliminary engineering and construction. The update of the plan is slated to begin in July 2018. Projects identified as a result of the PA 27 Corridor Study will be considered and prioritized against other candidate projects throughout the region as part of the larger LRTP update.

The end of the PA 27 Corridor study process comes at a time when the Northwest RPO is preparing to adopt the 2019 Transportation Improvement Program (TIP). Crawford County Planning Commission will work with the Northwest Commission and other partners in advocating for study area improvements through the regional planning process described above. For the more complex recommendations being proposed, this could come in the form of a line item within the LRTP's investment plan, or portfolio of proposed projects. The lower-cost safety and traffic operations projects recommended in the study report could be listed as individual candidates to be funded through the region's Highway Safety Improvement Program (HSIP) funding allocation.

From there, the study projects could be considered for placement on the 2021 Twelve Year Program, the development of which will begin in Spring 2019.

Michael Baker
INTERNATIONAL

Contact Information:

Brian Funkhouser, AICP, Project Manager
4431 North Front Street, 2nd Floor
Harrisburg, PA 17110
(717) 213-6236
Brian.funkhouser@mbakerintl.com