

State Route 18 Corridor Operations Planning Study From State Route 551 to State Route 351

Beaver Falls, Koppel, and Big Beaver Boroughs Beaver County, Pennsylvania December 2022

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State Route 18 Project Description and Study Team

Objective:

Analyze the State Route 18 corridor from State Route 551 to State Route 351 to identify potential transportation operational and safety improvements.





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1. Introduction

As demonstrated through research, previous corridor studies, and past experience in the Regional Road Safety Audit (RSA) program, transportation operations and safety have a direct relationship with one another. Typically, when congestion is present and corridor operations begin to break down, safety is also impacted. Similarly, crashes and incidents along a corridor can result in increased delay and reduced travel time reliability for motorists, transit operators and freight carriers, impacting operations. Therefore, it is important that operations and safety be evaluated together, particularly on major regional corridors.

1.1 What is a Corridor Planning Study?

In order to improve mobility, accessibility and safety in a comprehensive manner, SPC has developed a corridor study approach which focuses on both operations and safety. Corridor Operations Planning Studies are a hybrid between traditional traffic studies and the charrette-style RSA process, resulting in a more holistic look at both operations and safety and how they impact one another along a corridor. The improvements identified in these studies will be geared toward short-term (1-5 years) and long-term (5+ years) alternatives that can be incorporated into the Long-Range Transportation Plan (LRTP), Transportation Improvement Program (TIP), and partner maintenance and development activities.

1.2 Project Selection

Candidates for Planning Studies are derived from SPC's regional planning tools including the LRTP, the Regional Operations Plan (ROP), and the Congestion Management Process (CMP). As part of implementing the region's long-range plan, SPC staff reviews study candidates and works with regional planning partners along with PennDOT to set up corridor studies as resources allow.

1.3 Corridor Planning Study Process

The study process consists of three (3) major phases: preassessment, field assessment, and post-assessment. The preassessment phase consists of gathering preliminary data for the study team to review at least 1 week before the field assessment. The preliminary data report should include:

LRTP Level 1
 Candidate Forms
 Review (identifies
 potential projects
 that have already
 been suggested
 through public



outreach and other planning efforts in the area)

Maps of:



- Aerial imagery of study corridor
- Intelligent Transportation System (ITS) elements
- Traffic signals
- Rail crossings
- o Transit routes
- \circ Bike routes
- Land uses (commercial, industrial, schools, hospitals, parks, etc.)
- Proposed projects
- Straight line diagrams
- Applicable traffic data
- Transportation/planning studies (traffic impact studies, comprehensive plans, etc.)
- Crash analysis/diagrams

After the pre-assessment is completed, the field assessment is conducted over approximately a 1-week period. The assessment includes a start-up meeting, key stakeholder interviews, operations and safety field review, operations and safety planning charrettes, and a preliminary presentation of the team's findings that documents key accessibility and mobility concerns with a list of potential solutions.

The study team focuses on the following areas when conducting the field review:

Mobility Goal	Objective Areas
	Bottlenecks
	Traffic Signals
Mitigate Recurring Congestion	Travel Demand Management
	Access Management
	Parking Management
Maintain Mahility During	Work Zones
Planned Events	Special Events
Plainied Events	Traveler Information
	Traffic Detection and Surveillance
Minimize the Impact of	Incident Management
Unplanned Events	Road Weather Management
	Detour Routes
	Freight
Provide an Efficient Multimodal	Transit
Transportation System	Pedestrian and Bicycle
	Ridesharing/Carpools & Vanpools

Table 1: Field Review Areas of Focus

The study team also focuses on safety measures that can improve regional safety performance metrics such as:

- Reducing the number and rate of traffic crashes
- Reducing the number and rate of transportation-related fatalities
- Reducing the number and rate of transportation-related serious injuries
- Reducing the number of non-motorized fatalities and non-motorized serious injuries

Lastly, during the post-assessment phase, a draft and final report are generated that include an implementation plan identifying a menu of potential projects, programs and initiatives, funding resources,



and the lead agency that would be responsible for each potential strategy or improvement. Upon receipt of the final report, roadway owners, at their discretion, can prepare a response documenting plans to address identified concerns and reasons for deferring other issues.

In addition to the elements noted above, traffic counts were conducted, and preliminary traffic analysis was completed at the request of the roadway owners to refine suggested improvements.

2. Study Area Overview

The study area for this project consists of State Route 18 from State Route 551 to State Route 351 in Beaver Falls, Koppel, and Big Beaver Boroughs, Beaver County, Pennsylvania (Figure 1).



State Route 18 is a critical arterial that serves primarily truck and automobile traffic. It links Koppel Borough and a significant steel distributor to the PA Turnpike (I-76) and I-376. It also may serve as a route for through traffic avoiding I-376, a toll road running generally north-south in this area. The cross section



is two through lanes per direction in the study corridor, and one lane per direction in the sections immediately north and south of the corridor.

The study area is moderately developed. Smaller businesses are located along the corridor mixed with open land, some of which offers the opportunity for additional development, and some of which is likely not feasible for development due to terrain.

2.1 Mode Types

A variety of modes utilize the transportation network within the study area. The primary modes of transportation along the corridor include passenger and commercial vehicles; however, other modes such as transit, trains and pedestrians use the study area as well.

Traffic Volumes

Historical traffic volumes were obtained through PennDOT's Traffic Information repository. Average Daily Traffic (ADT) volumes along State Route 18 range from 12,000 vehicles per day within the corridor to just under 5000 vehicles per day with trucks accounting for about 10 percent of the overall traffic volume. The table below provides a summary of ADT and truck volumes for both directions along the study corridor.

Location	ADT	Truck ADT			
State Route 18, South of State Route 551	9387	911			
State Route 18, North of State Route 551	12014	995			
State Route 18, North of Turnpike	12591	1247			
State Route 18, at Beaver/Lawrence Co					
Line	4951	747			

Table 2: State Route 18 Corridor Traffic Volumes

Source: PennDOT Traffic Information Repository https://www.dot7.state.pa.us/tire

The portion of the corridor under study has higher volumes than the sections to the north and south. State Route 18 has a notable increase in traffic volumes at the intersection with State Route 551. Traffic volumes south of the corridor are 78 percent of the volumes within the corridor, with the dividing line being the intersection with State Route 551. Similarly, the traffic volumes change significantly north of the intersection with State Route 351, where the ADT is only 39 percent that within the section between the PA Turnpike and State Route 351.

Truck traffic similarly varies along State Route 18. The volumes are similar south of the corridor as within the southern section of the corridor. There is a significant difference in the section north of the PA Turnpike. Truck volumes within the section north of the intersection with State Route 351 are 59 percent of the volumes within the section between the PA Turnpike and Koppel Borough.

Turning movement counts were conducted at the three signalized intersections (SR 18 at SR 351, SR 18 at Eastwood Dr, and SR 18 at SR 551) along the corridor. Data was collected on Wednesday 11/30/22 (PM Peak) and Thursday 12/1/22 (AM Peak). The summaries appear below.



Mount St ISR 18 airlane Rive 233 Fairlane Blvd (SR 351 Arthur St Arthur St (SR 351)



Figure 2: Morning Peak Volumes





Figure 3: Evening Peak Volumes









Travel time was measured for the corridor. As shown below, average speeds for the corridor were measured to be near 45 miles per hour. Delay was measured at the Eastwood and State Route 551 intersections, which appear below.

	Average Speeds (MPH)		
Peak	NB	SB	
AM	45.0	48.1	
PM	42.8	45.2	

Table 3: State Route 18 Travel Time and Delay Summary

	Average Delay (seconds)				
	NB at SB at NB at S				
Peak Eastwood Eastwood		351	551		
AM	9.1	8.8	20.4	7.3	
PM	7.8	11.2	24.7	11.3	

Transit

Transit is present on the southern end of the corridor. Beaver County Transit Authority (BCTA) offers fixed route service along the State Route 18 intersections and then turns onto State Route 551. This route originates in Pittsburgh and travels northward through the intersection with State Route 551, then ends at the Wal Mart plaza in Beaver Falls. The opposite route is also offered. There is no fixed route transit along the rest of the corridor.

Bicycle & Pedestrian Infrastructure

No dedicated bicycle infrastructure (bike lanes, trails, etc.) is present within the study area. There are no PennDOT bike route designations within the study area.

Pedestrian infrastructure is very limited within the study area. There are no sidewalks except a very short section in front of the Dollar General in Beaver Falls, and within the State Route 551 intersection. There are sidewalks with signs of pedestrian activity on the bridge just north of State Route 551. North of here, shoulders are available for use by pedestrians. The two signalized intersections within the corridor, Westgate/Eastwood and State Route 351, both have pedestrian accommodations at the signal.

Rail

Railroad tracks are present adjacent to the corridor, running roughly parallel to the Beaver River. There are no crossings within the corridor, however a grade crossing is located on Westgate Drive near its intersection with SR 18. Another rail line is present on the west side of State Route 18, running parallel along the south end of the corridor then veering westward and running parallel to the PA Turnpike.

Freight

There is freight movement within the corridor. With the proximity of the PA Turnpike nearby and Interstate 376 running approximately parallel to the corridor, there is reduced need for this corridor to serve through truck traffic. Trucks with local origins and destinations were observed; most went to the steel plant in Koppel. This is located on State Route 351 east of its intersection with State Route 18. The



route taken uses State Route 18 south to the intersection with State Route 551, then westward to access Interstate 376.

2.2 Current Land Use & Potential Development

Land use is primarily light commercial comprised of smaller traffic generators, with a couple exceptions. There are some residential properties abutting the corridor, however residential area is more common on intersecting streets versus along State Route 18. A more detailed look at land use and potential developments by study corridor segments is provided in subsequent sections; the segments were defined based on roadway and land use characteristics.

State Route 18 from State Route 551 to PA Turnpike

Land use within this section is primarily light commercial mixed with open land. There are some residential units within Beaver Falls. A Dollar General is present at the intersection with State Route 551. To the north is a plaza with a couple of retail facilities generating lower traffic volumes. An insurance office and podiatry office are also present and accessible from the plaza parking lot. North of these facilities, there is open land. It is most likely not developable, limited by the railroad to the west and grade to the east. The northern part of this section has smaller businesses such as a landscaping supply, auctioneer, motel, and a restaurant.

State Route 18 from PA Turnpike to State Route 351

Similar to the southern section, this section is comprised of light business land use. These include both brand name and private motels, and bowling lanes. Northward, entering Koppel Borough, the corridor is the boundary between the Borough's residential area to the east and wooded land to the west.

2.3 Roadway Characteristics

State Route 18 is a principal arterial that serves primarily truck and automobile traffic. It links the PA Turnpike to Koppel Borough, a location of a steel distributor, to I-376. It also may serve as a route for through traffic avoiding I-376, a toll road in this area. The cross section is two through lanes per direction in the study corridor, and one lane per direction in the sections immediately north and south of the corridor. The speed limit is posted at 50 mph. Pedestrian access and connections are limited due to the absence of sidewalks. Roadway lighting is scarce and is only provided sporadically at major intersections. The cross section is comprised of one through lane northbound at the intersection of State Route 551, opening to two through lanes just north of the intersection. Southbound, the second through lane is dropped as a turn lane at the intersection with State Route 551. Similarly, at the intersection at the north end of the intersection. The northbound direction drops the second through lane as a turn lane at the intersection direction drops the second through lane as a turn lane at the intersection with State Route 551. Some locations have left-turn lanes present, but not necessarily at higher traffic generators. The corridor has three signals: at the intersection with State Route 551, at Eastwood/Westgate Drive, and at State Route 351.

The right of way for the corridor exceeds the pavement width, which offers room for expansion and flexibility with adding or removing roadside objects and hardware. See the traffic signal permit drawings in the appendix for available right of way information.



2.4 Safety History

PennDOT crash data were reviewed for State Route 18 along the length of the corridor. The last five years of available data, calendar years 2017 through 2021, were reviewed. For the corridor, 85 crashes occurred within this timeframe. Only reportable crashes were included in the data. Reportable crashes are those that result in an injury or fatality; or where a vehicle is required to be towed from the scene.

One fatal crash occurred within the corridor. There were three suspected serious injury, and 15 suspected minor injury. 47 resulted in property damage only. The chart below shows crash severity.



The fatality occurred at the intersection with State Route 551. A vehicle reportedly was traveling too fast, and ran the red light, striking another vehicle.

Of the crashes occurring within the corridor, 20 were rear-end, 30 were angle, 20 were hit fixed object, and three were head-on. The chart below shows the percentages of crash type.





The weather varied for each crash. The weather was reported as clear for 67 of the crashes, the majority. Rain was reported for 9 crashes, and snow was reported for 4 crashes. The chart below summarizes proportions for weather conditions for each crash.





2.5 Corridor Long-term Vision

The North Central Beaver County Comprehensive Plan was reviewed to help establish a long-term vision of the corridor. The following themes emerged as the long-term vision for the study area:

- Establish design guidelines for development along Route 18
- Market Interchange for Development
- Improve signing and lighting at Interchange
- Encourage new development on Route 18 to use shared driveways
- Develop a Park and Ride near Interchange
- Require new developments are linked to community amenities
- Improve the awareness of, and access to, historic and/or cultural resources
- Westgate Business Park
- PA Route 18:
 - Concrete median limiting left turns
 - Poor overhead lighting
 - Need for increased/improved signage
 - Poor turning radii for trucks

3. Study Findings

A summary of the operations and safety field assessment, areas of concern and suggested improvements are documented in subsequent sections.

3.1 Stakeholder Interviews

To better assess the study corridor, key person interviews were conducted to provide the study team access to local knowledge of the corridor. Information from these interviews was utilized to assist team members in determining focus areas for the field assessment, shaping a vision of the corridor, and identifying potential projects and improvements to improve safety and operations.

The following individuals were interviewed to better assess the study corridor:

- Todd Kravits PennDOT District 11-0
- Katherine Fink PennDOT District 11-0
- Representative Jim Marshall State Representative
- Chad Crawford Big Beaver Borough
- Charles "Mick" Jones Beaver Falls
- Dan Collville Beaver County
- Chris Posset Big Beaver Falls School District
- Dave Lancaster PennDOT Maintenance Manager Beaver County



North Central Beaver County Multi-Municipal Comprehensive Plan





- Dean Poleti PennDOT District 11-0
- Jennifer Gasser Big Beaver Borough
- John Quatman PennDOT District 11-0
- Michele Yeager PennDOT District 11-0
- John Fisher BCTA
- Joyce Depenhart Big Beaver Falls School District

A summary of major themes emerging from the key person interviews is provided below. More detailed information from these interviews can be found in Appendix B.

- Representative Marshall: important project for residents and businesses along State Route 18 Corridor.
- The Mayor of Koppel Borough asked for the study.
- The group identified several items to study:
 - Turning lanes in key locations.
 - Locations may include: two lanes with center turn lane. Many areas where businesses use, balance with insufficient room.
 - o If traffic was slowed and a center turning lane it may be better for businesses.
 - Several businesses have crossings but not turn lanes.
 - Crash history, people wait in left lane for gaps which can be crash prone.
 - Full U-turns occur which can also cause crashes.
 - o Jersey barriers restrict turn opportunities and increase need for U turns.
 - Some locations have turn lane but no crossing.
 - Traffic volumes have been studied.
 - Four lanes may not be warranted in this corridor. Consider reducing to a 3-lane cross section. This could be a viable solution to this road. Heavy truck traffic would be a consideration to evaluate. Steel trucks and garbage trucks are common. This is the only section that is four lanes; north and south of here is two lanes.
 - A considerable amount of truck traffic is going to the scrapyard nearby; or into Koppel. Its more local versus through.
- More property is available nearby, so there could be growth along the corridor.
- Pedestrians: Sidewalks probably not needed. Some ped traffic to Dollar General. Occasionally peds walk along State Route 18, but very rare. Theoretically would be a good road for bikes since grades are low, but they are not frequent.
- Turnpike future plans: the bridge over the railroad is planned to be replaced: slated for 2028. Interchange may be redone from cloverleaf style to traffic signal. Beaver River bridge will be replaced to the north of existing.

https://www.paturnpike.com/traveling/construction/site/mileposts-12-14-total-reconstruction

- School buses: not too many issues. They cross State Route 18, but no stops along the corridor. No issues with signals. No issues with drivers failing to stop for buses.
- Other developments: possible housing plan behind golf course. Possibly small business park as well. Golf course has been sold, so it may be proceeding. Sheetz may be looking at a parcel across State Route 18 from Super 8 motel to see if it's a viable site. Gas station may be going in.
- Transit: There is no fixed route system in this area. Room for expansion. They are having a consultant study the possibility to expand to here. Dart system (demand and response system)



uses this area frequently. Many trips are for appointments, not as much shopping. A 3-lane road would be very beneficial since U-turns are required currently. Would help with scheduling.

- Issues at the three signals: Intersection with State Route 351: Kopell reports queuing here. Truck traffic impacts the operations here. When they repaved in Koppel, they changed it from a through/right and left to a right and a through/left. The traffic signal at Koppel is co-owned by Big Beaver and Koppel. Intersection with Westgate: coming down from Norwood down to 18: fire trucks have a problem here. It is hard to come down ats make a right onto State Route 18. Loops in this area were damaged by a project and never repaired. The signal at Eastwood drive is due to be replaced. No funding currently available.
- Drainage issues: At end of Norwood Drive it ponds. There is a pipe plugged. They cannot find the other end of the pipe. Spring water in this area. Houses have been built in the last several years; it could be that the houses poured fill over the pipe outlet or it goes under a house.
- Railroad is rarely used. They have someone walking with train if it is used. Never created an issue or backup.
- Enforcement: Police do enforce speeds: Koppel is contracted with Big Beaver police. Prior to that, it was state police. Big Beaver police have several spots where they enforce along the corridor. They sit in the median in a few spots.
- Area from Big Beaver plaza to turnpike is dark.
- Sight distance: Eastwood drive is only concern. Hillside nearby. Bend in road and hillside limits sight distance.

A meeting was conducted exclusively with PennDOT personnel, the roadway owner. The following was discussed in this meeting:

- Turns occur now through small gaps in the median. Would be good for this to be studied. Road could be reconfigured to allow for turn lanes and still maintain two lanes per direction.
- Businesses desire to make lefts possible.
- Consider converting excess R/W and turn it into parking. A left-turn lane should be able to be accommodated. PennDOT's preference is to keep two through lanes per direction.
- No HOPs in progress for this area.
- Previous SPC study was done for this area.
- No needs for bike/peds infrastructure.
- New Turnpike interchange: don't know at this point if there are new signals.
- Speeding: speeds can be a concern in this area. PennDOT hasn't heard any recent concerns about speeding. Speeds are an enforcement issue, PennDOT is revising traffic calming strategies. Treatments may not be practical for the corridor.
- Future projects: None planned.
- Access control. Issues in the area.
- Signals may need upgrades. Signal funding may be premature since recommendations from this study can impact the corridor.
- 10 percent truck traffic is typical within the corridor.

3.2 Site Visit

The Corridor Planning Study was conducted the week of November 28, 2022. The study team examined corridor operations during the AM, MID, and PM peaks to observe traffic at its highest volumes. A



nighttime examination was also conducted to observe operations and visibility during dark conditions. Specifically, the study team observed operations on Wednesday, November 30 from 7:00 AM to 5:00 PM; and Thursday, December 1 from 5:00 to 6:00 AM and from 8:00 AM to 1:00 PM. The remainder of the week was utilized to complete field work, review planning documents for local jurisdictions, conduct stakeholder interviews, and develop suggestions for roadway owners to consider.

3.3 Proposed Improvements

In order for the long-term vision to be successful, roadway owners must begin to conceptualize the future roadway layout and strategically plan development around what the corridor will be in the future. This step is essential for implementing smart transportation concepts and achieving the long-term vision in the corridor, allowing the communities to grow without overburdening the transportation network.

Analysis

For the purpose of this study, three scenarios were studied for the three signalized intersections along the corridor. The intersections under study are:

- State Route 18 and State Route 551
- State Route 18 and Eastwood/Westgate Drive
- State Route 18 and State Route 351

The following scenarios were studied for the 2022 year volumes:

- Existing/Base conditions
- Road Diet, assuming one through lane per direction
- State Route 351 Westbound reconfiguration from the current shared left/through lane and right lane to a left and shared through/right lane.

Level of Service at the intersections was evaluated using the Highway Capacity Manual (HCM) 6th Edition methodologies within Synchro 11 analysis modeling. Results are shown in Tables 4 and 5.

Overall, the corridor operates at a high LOS. The only intersection that is operating at a LOS below B in the 2022 base model is the State Route 351 at State Route 18 intersection. Since the LOS on the westbound approach is low, operating at a LOS F in the AM peak and a LOS E in the PM peak, this results in an overall intersection LOS of LOS E in the AM peak and a LOS D in the PM peak. It should be noted that the Synchro "Lanes, Volumes, and Timings" analysis shows this approach as a LOS C with a total delay of 28.6 seconds in the base 2022 analysis. Comparing the values from HCM and Synchro to the observed queue values, engineering judgment indicates that the actual LOS lies somewhere in between.

Two alternatives were evaluated, a corridor-wide road diet and a lane reconfiguration of the WB approach of State Route 351. As can be seen, the road diet has little impact on the LOS for intersections within the corridor. This is due to the two signals at the termini of the corridor operating with one through lane in the current condition. LOS does drop slightly at the Eastwood Dr/Westgate Dr at State Route 18 intersection due to eliminating a through lane. However, since the intersection is underutilized, this is not a significant impact. Note however, that the corridor LOS would degrade to E with a one-lane cross section versus LOS B for the two-lane corridor. The corridor LOS is a two-lane highway analysis and a multilane highway analysis which represents traffic flow through the entire corridor considering travel speeds and ease of travel. The intersection LOS represents delay through only each intersection.



The reconfiguration of the westbound State Route 351 approach from a shared left/through and right lane configuration to left and through/right lane configuration does have a significant impact on the LOS, improving the overall intersection from LOS E (AM) and LOS D (PM) to LOS B in the AM and PM peaks.

Approach	Base	Road Diet	State Route 351 WB Reconfiguration		
State Route 551 at State R	State Route 551 at State Route 18				
EB State Route 551	C (20.2)	C (20.2)			
NB State Route 18	B (17.0)	B (17.0)			
SB State Route 18	B (19.0)	B (19.0)			
Overall	B (18.8)	B (18.8)			
Eastwood Dr/Westgate Dr	at State Route 18				
EB Eastwood Dr	B (15.0)	B (18.8)			
WB Westgate Dr	B (15.0)	B (18.9)			
NB State Route 18	B (10.8)	B (10.7)			
SB State Route 18	B (12.4)	B (14.8)			
Overall	B (12.1)	B (13.8)			
State Route 351 at State Route 18					
EB State Route 351	B (17.0)	B (17.0)	B (14.0)		
WB State Route 351	F (147.5)	F (147.5)	B (16.8)		
NB State Route 18	D (36.7)	D (36.7)	B (16.2)		
SB State Route 18	D (35.4)	D (35.4)	B (14.8)		
Overall	E (69.8)	E (69.8)	B (15.8)		

Table 4: AM Peak Level of Service Summary (2022) (sec/veh)



		, (00	-, · •,		
Approach	Base	Road Diet	State Route 351 WB		
			Reconfiguration		
State Route 551 at State Ro	oute 18				
EB State Route 551	C (24.6)	C (24.6)			
NB State Route 18	B (15.3)	B (15.3)			
SB State Route 18	B (17.3)	B (17.3)			
Overall	B (18.4)	B (18.4)			
Eastwood Dr/Westgate Dr at State Route 18					
EB Eastwood Dr	B (16.1)	B (19.1)			
WB Westgate Dr	B (15.8)	B (18.8)			
NB State Route 18	B (10.8)	B (13.7)			
SB State Route 18	B (11.8)	B (12.5)			
Overall	B (11.3)	B (13.5)			
State Route 351 at State Route 18					
EB State Route 351	B (21.3)	B (21.3)	B (17.0)		
WB State Route 351	E (68.0)	E (68.0)	B (18.5)		
NB State Route 18	D (35.6)	D (35.6)	B (15.8)		
SB State Route 18	C (26.6)	C (26.6)	B (11.1)		
Overall	D (39.6)	D (39.6)	B (15.5)		

Table 5:	PM Peak Le	vel of Service	e Summary	(2022)	(sec/veh)
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Clearance Interval Pedestrian Time Verification

Clearance interval calculations were conducted for the three signalized intersections on the corridor. The Yellow and All-Red times on the permit were verified with the existing field timings. Only the State Route 551 pedestrian timings could be obtained in the field. As can been seen in Tables 6,8, and 10, the majority of existing All-Red times are short of the calculated values. Furthermore, most of the existing pedestrian Walk and Flashing Don't Walk times are short of the calculated values (Tables 7, 9, and 11). Entries in **bold face** in the tables below exceed the times on the existing permit.

Table 6: Comparison of	⁻ Vehicular Clearance	Intervals of State Rou	te 551 at State Route 18
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Vehicular Phase	Yellow Clearance Interval (seconds)		All-Red Clearance Interval (seconds)	
	Permit	Calculated	Permit	Calculated
1+6, NBL/NBT	3.5	3.5	2.0	3.5
2+6, SBT/NBT	3.7	4.8	2.2	3.1
3, EBL	4.2	2.8	2.0	3.5

Table 7: Comparison of Pedestrian Clearance Intervals of State Route 551 at State Route 18

PED Phase	Walk Clearance Interval		Flashing Don't Walk Clearance Interval	
	(seconds)		(seconds)	
	Field Observed Calculated		Field Observed	Calculated
4, WBT	7.0	21.6	30.0	37.2



Vehicular Phase	Yellow Clearance Interval (seconds)		All-Red Clearance	Interval (seconds)
	Permit	Calculated	Permit	Calculated
1+5, NBL/SBL	4.5	3	2.5	3.5
1+6, NBL/NBT	4.5	4.5	2.0	2.9
2+5, SBL/SBT	5.0	5.0	2.5	3.5
2+6, NBT/SBT	5.0	5.0	2.0	2.2
4+8, EBT/WBT	3.5	4.5	3.5	3.7

Table 8: Comparison of Vehicular Clearance Intervals of Eastwood Dr/Westgate Dr at State Route 18

Table 9: Comparison of Pedestrian Clearance Intervals of Eastwood Dr/Westgate Dr at State Route 18

PED Phase	Walk Clearance Interval (seconds)		Flashing Don't Walk Clearance Interval (seconds)	
	Permit	Calculated	Permit	Calculated
2+6, SBT/NBT	14.0	17.3	22.0	28.6
4+8, EBT/WBT	13.0	16.3	22.0	26.6

Table 10: Comparison of Vehicular Clearance Intervals of State Route 351 at State Route 18

Vehicular Phase	Yellow Clearance Interval (seconds)		All-Red Clearance Interval (seconds)	
	Permit	Calculated	Permit	Permit
1+5, NBL/SBL		2.9		3.7
2+6, NBT/SBT	5.0	4.8	2.0	1.8
4, WBT	4.5	5.6	2.0	3.3

Table 11: Comparison of Pedestrian Clearance Intervals of State Route 351 at State Route 18

PED Phase	Walk Clearance Interval		Flashing Don't	Walk Clearance
	(seconds)		Interval (seconds)	
	Permit	Calculated	Permit	Calculated
2+6,	14.0	13.8	19.0	21.5
NBT/SBT				
4, WBT	10.0	13.2	12.0	20.3

Detailed analysis for each of these locations can be found in Appendices C-F.



Access Management:

seeks to limit and

Access Management

It is critical for S.R 18 to operate at an acceptable level of service in order to maintain mobility within the region. It is recommended that Koppel and Big Beaver Boroughs consider and adopt specific access management ordinances to manage existing and future State Route 18 traffic.

As mentioned previously, the majority of the development along the corridor has occurred in a piece-meal fashion where each business is provided direct access to State Route 18 instead of shared-driveways or cross-access through adjacent parcels. When business driveways are not consolidated and local road access is not provided between adjacent parcels, all local business traffic must then utilize individual driveways from

State Route 18, creating additional vehicle trips and degrading the roadway level of service and safety. To improve mobility and safety while discouraging this type of development, access management principles should be applied along the corridor.

Typical access management approaches include:

- Limiting access
- Corner clearance
- Driveway channelization
- Outparcel access
- Driveway throat length
- Joint access Auxiliary lanes

• Driveway spacing

• Frontage/Service roads

Signalized intersection spacing

Transportation Demand Management refers to the process of formulating strategies to inform and encourage travelers to, or from, a particular area to maximize the efficiency of a transportation system, leading to improved mobility, reduced congestion, and lower vehicle emissions. This includes strategies that use planning, programs, policies, marketing, communications, incentives, pricing, data, and

Tenaris-Koppel:

communications.

- Large scale employer
- Appears to have ample parking
- However, the plant entrance is located near the Intersection of State Route 18 and State Route 351
- Could be opportunities to promote carpooling and/or vanpooling to help reduce vehicular traffic along the corridor.



Figure 4 on the next page provides both examples of undesirable and desirable access management conditions along the corridor.

consolidate access points along major roadways while supporting street systems, unified access, and circulation for current and future development.



- Overlay districts
- Official Map
- Bonuses / incentives







Figure 4: Undesirable and Desirable Access Management Conditions



In addition to the typical access management principles mentioned previously, the following specific suggestions and considerations should be examined for study area.

Suggestions:	Considerations:
Ensure comprehensive plan fully supports access	Access management overlay district
management.	with special access management
Create an access management ordinance limiting	ordinances.
driveways and encouraging parcel interconnections.	
Combine driveways and interconnect existing parcels.	PennDOT Model Access Management
Require Traffic Impact Studies (TIS) as part of any	Ordinances for Municipalities.
future development/ redevelopment for projects	
accessing local roads TIS should evaluate roadway	
capacity and signal interconnection. The industry	
suggested baseline for requiring a TIS is when a new	Create inter-parcel connections and
development generates 100 new trips to the adjacent	connections to local street network.
street network during the peak hour of the adjacent	
street traffic.	

Table 12: Access Management Suggestions and Considerations

Recent Developments

The Shell ethane cracker plant development is open and operational in Potter Township, Beaver County. The plant is being used to convert natural gas products into ethane and then into plastics. Downstream businesses, such as Polyethylene Plastics Processors, could develop and economically benefit from this site.





Figure 5: Shell Ethane Cracker Plant Location and Site Plan

Potential economic impacts for the plant and support industry include increased workforce and increased traffic to local businesses.



Additional potential industrial sites along the State Route 18 corridor include:

- Koppel Borough
- Truck traffic could also increase along the corridor and in areas where there is good access to I-376 and I-76.
- Expansion opportunities and desired sites along the corridor
 - Koppel Borough (Rail sites)
 - Westgate Business Park
- Access and utilities are issues that may need to be addressed for specific sites.



In addition to the Cracker plant, other development potential exists in the area.

- Stonecrest Golf Course
- Several vacant parcels to the east of Route 18 between Huffman Lane and Koppel Borough.
- There is significant potential for an estimated 68 acres of land to be developed at the Westgate Business Park.







- South of the PA Turnpike Interchange (Convenience Store) (A)
- Several vacant parcels to the east of Route 18 between Giuseppe's Grill and Vance's Landscaping. (B)
- There is potential for redevelopment south of Big Beaver Kennels. (C)

It is important to mmaximize joint access with existing driveways when a new parcel is developed. Maximize parcel interconnections when new parcels are developed. Implement new access and TIS requirements via overlay district, which could also include setback increases, landscaping, sidewalk, signage, and lighting requirements.





Safety Successes

Several previously implemented improvements were noted that the study team considers to be safety successes. These include:

- Exclusive pedestrian phase at State Route 551 intersection.
- Sidewalks present along southern portion of corridor.
- Transit service in south end of corridor.
- Some bicycle safe storm grates in corridor.
- Variable message signs for PA Turnpike.
- Edge line rumble strips.
- Enforcement present within corridor.
- Train pre-emption at Westgate Industrial Park entrance.







Improvement Suggestions

The observations for the corridor are geared toward safety and operational issues that can be mitigated by suggestions presented within. **Figures 6** through **40** show the observations and suggestions for the corridor.









OBSERVATION: There are 9 median openings along the corridor that do not have the proper signage (Wrong Way, Do Not Enter, Around Median): Near the Dollar General, South and North Entrance to Big Beaver Plaza, at Giuseppes, Self Storage/Adult Store, Buttermilk Falls Natural Area, Bowling Alley/ Bills Valhalla, Norwood Drive, and Ida Street.





SUGGESTIONS:

- Add DO NOT ENTER signs to all locations listed above and should be placed directly in view of a roadway user.
- Add supplemental WRONG WAY signs to helps emphasize the DO NOT ENTER.
- Add Keep Right signs at the median to alert drivers on where to go.

Figure 10: Corridorwide: Median Openings

OBSERVATION:Edge line rumble strips are in place through part of the corridor. Their usage is not complete. Pavement rutting and washboarding was noted in locations within the corridor.



SUGGESTION:

- Provide edge line rumble strips continuously through the corridor to help drivers who drift out of
- the travel lane. Business accesses should be excepted. Upgrade shoulders where needed.
- Repave the corridor to ensure a smooth riding surface when required.

Figure 11: Corridorwide: Edge Line Rumble Strips



OBSERVATION: Delineators are in place within the corridor, but most are in poor shape and lack the actual delineation. They are especially ineffective at night.





SUGGESTIONS:

- Upgrade delineation where needed to maximize the visibility of shoulders and medians.
- Median delineators should be retroreflective on both sides.
- Ensure that raised pavement markers are visible.

Figure 12: Corridorwide: Delineation

OBSERVATION: The pedestrian crossing on the west leg appears to use pedestrian timings too short for the crossing. A flashing DON'T WALK time of 30 seconds was timed. Also, the crossing is not shown on the signal permit for this intersection. Stop bars and crosswalk markings aren't visible.



SUGGESTIONS:

- Provide proper pedestrian timings for this intersection. Ensure that the signal permit is updated for the current operation with proper reviews.
- The crosswalk as shown requires 37 seconds of flashing DON'T WALK timing.
- Upgrade to countdown signal heads due to the length of the crossing.
- Upgrade to provide properly visible stop bars and crosswalk markings.
- Consider adding an all-pedestrian phase for crossings due to the length of crossing.

Figure 13: State Route 18 and State Route 551 - Signal

33



OBSERVATION: The southbound right-turn movement is wide for trucks, resulting in relatively high turning speeds. Pavement is rutted through the intersection. The southbound right-turn lane lacks pavement marking arrows.





SUGGESTIONS:

- Investigate tightening the corner radius for the northwest quadrant to slow turning vehicles, and reduce pedestrian crossing distances.
- · Upgrade the pavement through the intersection to eliminate ruts
- Add pavement marking arrows through the intersection.

Figure 14: State Route 18 and State Route 551 - Pavement and Turning Radii

OBSERVATION: The sidewalk in the southwest quadrant transitions to shoulder within the walking paths through the intersection. The bridge to the north has a narrow sidewalk, narrower than the minimum for ADA. There are paths suggesting that pedestrians walk beneath the bridge.



SUGGESTIONS:

- Extend the sidewalk farther west past the intersection
- Add a fence to discourage pedestrians from walking beneath the bridge
- When the bridge is rehabilitated or replaced, provide proper width for ADA, at least 5 feet.

Figure 15: State Route 18 and State Route 551 - Sidewalks



OBSERVATION: There is a clogged inlet in the southeast quadrant; ponding was observed in the through lane. Utility poles are very close to the through lane.



SUGGESTIONS:

- Clean inlets regularly to ensure that they drain water properly.
- Repave and eliminate low spots that do not drain properly.
- Add utility pole collars to poles to maximize retroreflectivity.

Figure 16: State Route 18 and State Route 551 - Drainage

OBSERVATION:Northbound trucks were passed through the intersection before the second through lane opened; northbound traffic turning left into the Dollar General waits in the through lane; and the alley east of the intersection is located within the intersection. The All-Red time for State Route 18 is low.





SUGGESTIONS:

- Fit a northbound left-turn lane for the Dollar General. This would also discourage traffic to pass before the second through lane starts.
- Ideally, the alley should have a signalized phase. Absent of that, reconfigure it to be right in-right out.
- Utilize the calculated 3.0 seconds of All-Red time versus the 2.2 seconds currently in use.

Figure 17: State Route 18 and State Route 551 – Turn Lanes and Side Street Access



OBSERVATION: The southern entrance to the plaza has a pocket left turn lane but none at the northern entrance. The median between the northern entrance and southern entrance is showing signs of severe deterioration and the delineation no longer is effective. There are several drainage inlets between the southern entrance and the bridge that are clogged.



SUGGESTIONS:

- Add left turn lane pavement markings to pocket left turn lane.
- Remove debris, weeds, and loose concrete from median. Long-term: replace mountable median with median barrier.
- Replace broken or worn out delineation.
- Remove debris from inlets.

Figure 18: Big Beaver Plaza - Delineation and Inlets

OBSERVATION: The southern entrance to the plaza lacks proper signage and has a solid white line across the entrance. There is a lack of sidewalk connectivity from the bridge to the Big Beaver Plaza. There is the potential to encounter slowing traffic with trailer for the ATV business as well as the commercial driving school.



SUGGESTIONS:

- Add two "KEEP RIGHT" signs to intersection.
- Replace solid white line with dotted line, indicating the entrance and exit to the plaza.
- Add a sidewalk connection from the bridge to the Big Beaver Plaza.
- Add "WATCH FOR SLOW MOVING VEHICLES" signs near the plaza.







OBSERVATION: The cross section of the corridor is comprised of four through lanes with turn lane use inconsistent. Median openings are present at certain locations. Mid to major driveways often lack turn lanes, resulting in traffic waiting to turn left from the left lane, mixing stopped vehicles with high speed vehicles passing. The median openings add to this conflict by encouraging traffic to turn at these locations.



SUGGESTIONS:

- Consider one of three options:
- Option 1: Reduce to one-lane per direction and add two-way left-turn lane
- Option 2: Keep 2 lanes per direction and add two-way left-turn lane
- Option 3: Add barrier to prohibit left-turns, and establish jughandles at certain frequencies

Figure 22: State Route 18 between Hostetter Auctioneers and Turnpike Interchange – Cross Section

SUGGESTION: Option 1: Reduce to one-lane per direction and add two-way left-turn lane.



Figure 23: State Route 18 between Hostetter Auctioneers and Turnpike Interchange – Cross Section









Figure 27: State Route 18 and Buttermilk Falls Access - Signing

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OBSERVATION: None of the pedestrian push buttons work. Pedestrian signal heads are outdated and do not have the countdown display. Crosswalk pavement markings are faded across State Route 18 and missing across Eastwood Drive and Westgate Drive. ADA Ramps are covered with asphalt and debris.





PED Phase /Movement	Walk Clearance Interval (seconds)		Flashing Don't Walk Clearance Interval (seconds)	
	Permit	Calculated	Permit	Calculated
2+6 SBT/NBT	14.0	17.3	22.0	28.6
4+8 EBT/WBT	13.0	16.3	22.0	26.6

SUGGESTIONS:

- · Install new pedestrian push buttons.
- · Install new countdown pedestrian signal heads.
- Install new high visibility crosswalks on all approaches.
- Clear, repair, or replace ADA ramps.

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Figure 30: Eastwood Drive/Westgate Drive at State Route 18 - Pedestrian Accommodations

OBSERVATION: The slope and skew of the EB Eastwood Drive approach causes difficult turning movements for vehicles turning onto State Route 18. There are scrapes in the pavement from vehicles bottoming-out making the EB right turn.



NB State Route 18



OPTION 1:

OPTION 2:

• Consider realigning and regrading Eastwood Drive from Norwood Drive to State Route 18 to improve turning movements from this approach.

CONSIDERATION: • Adjacent bridge clearance.

Raise the profile of State Route 18 to improve the vertical grade through this intersection.









Figure 35: North of Westgate Drive – Cross Section



OBSERVATION: There are drainage issues near Norwood Drive that result in ponding near State Route 18. The drainage inlet in this area may be missing or plugged. Norwood Drive SUGGESTION: · Install or clean inlet to improve drainage in the area. 56 Figure 36: Norwood Drive at State Route 18 - Drainage OBSERVATIONS: Skew of intersection makes it difficult for vehicles turning in/out. Pothole on SB side has been an issue, according to residents. Ponding water and flow observed on roadway/debris on shoulder during field visit. Close or reduce median opening to force more straight approach. . SUGGESTIONS: Investigate cause of pothole and fix/resurface roadway. Clean debris off of shoulder. Add side road warning sign with advance street name in both directions. . 57

Figure 37: State Route 18 and Norwood – Access and Pavement Condition





- Replace the traffic signal: back plates with retroreflective tape, radar detection, ADA pedestrian accommodations.
- Replace faded stops bars and crosswalks and add a Lead Pedestrian Interval phase to the signal.
- Short Term: replace broken push buttons and reset pedestrian stub poles.

Figure 39: State Route 351 and State Route 18 - Signal Condition



OBSERVATIONS: The current lane configuration for westbound traffic is causing excessive delays and aggressive driving. There are missing supplemental STOP HERE ON RED signs which is important due to the amount of large truck that traverse the intersection. Due to the geometry, vegetation, and lack of set backs, right turning vehicles have limited sight. The I-376 sign is posted right behind a utility pole.



SUGGESTIONS:

- Switch the current lane configuration for WB traffic to a dedicated Left and Through/Right.
- · Add supplemental STOP HERE ON RED signs to all four approaches.
- Add NO RIGHT TURN ON RED signs to all approaches due to poor sight distances.
- Relocate/reposition Interstate sign so that it visible, seek permission from utility company to mount on pole.

Figure 40: State Route 351 and State Route 18 - Signing

OBSERVATIONS: There is evidence of rutting in the middle of the intersection causing motorists to take a non-conventional travel through the intersection. Several pedestrians were observed at the intersection, however there are missing gaps in the sidewalk connections. The northbound median on Route 18 lacks delineations and proper signage.



- Repave the intersection.
- Add delineators and KEEP RIGHT sign to the median.
- Add missing sidewalk connections (see next slide).

Figure 41: State Route 351 and State Route 18 - Pavement and Pedestrian Network

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Figure 42: State Route 351 and State Route 18 - Pedestrian Upgrades

OBSERVATIONS: First Avenue is showing signs of major pavement deterioration. The road is used as an over flow parking lot for AL's Corner Café. Trucks and other motorists were observed parking along the shoulders. There is a missing crosswalk at the intersection. WB motorists block the intersection for left tuning vehicles causing excess delays and aggressive driving.



SUGGESTIONS:

- Repave First Avenue.
- Restrict parking to one-side of first Avenue to cut down on confusion.
- Add missing crosswalk.
- Add DO NOT BLOCK INTERSECTION sign for WB traffic before the First Avenue intersections.



4. Potential Funding Sources

In order to move forward with the suggested improvements in this document, funding needs to be secured by roadway owners. A number of funding mechanisms are available for roadway owners ranging from federal and state funds to private dollars. Below is a list of some potential funding mechanisms.

- State and federal transportation funds through the Southwestern Pennsylvania Commission Transportation Improvement Program (TIP).
- State discretionary funding programs:
 - o DCED Multi-Modal Fund
 - o DCNR Greenways, Trails, and Recreational Program
 - DCED Municipal Assistance Program
 - DCNR Growing Greener
 - PennDOT Rail Freight Assistance Program
 - DCED Keystone Communities Program
- SPC Transportation Alternatives Program, Livability through Smart Transportation Program, and the Congestion Mitigation and Air Quality Program.
- Green Light Go, ARLE, SPC signal program for signal improvements.
- Liquid fuels and Act 13 for local roadway improvements.
- PA Infrastructure Bank.
- Partnering with private industry and developers.

5. Next Steps for Roadway Owners

Upon receipt and review of the final report, the roadway owner(s) have the option to prepare a formal response. A formal response could document plans to address identified issues and reasons to defer other issues. Roadway owners should work together to incorporate the suggestions in this document into future projects and planning documents at the Municipal, County and Regional levels. Roadway owners are encouraged to collaborate with one another to develop coordinated, comprehensive projects and plans to improve the operations and safety along the corridor.

Roadway owners should collaborate to create larger, comprehensive projects instead of several smaller, individual ones. A corridor committee could be created with all roadway owners as participants to identify comprehensive projects to move forward with programming, design and funding. It is recommended that the corridor wide short-term improvements identified in the study be evaluated by the roadway owners to determine which improvements can be addressed through local municipality maintenance and operation funds. More involved, long-term improvements should be pursued through SPC's project development process in which local funds can be leveraged with additional state and federal funds to address the improvement requirements.

With the current financial climate, competition for available transportation funding is ever increasing along with the scrutiny of each proposed project. Decision-makers are more likely to select a collaborative, comprehensive project that's going to improve mobility and safety within a region instead of an isolated community.

Tables 13-14 provide a list of proposed improvements and the respective roadway owners responsible for each improvement.



	years		
Improvement	Responsible Party		
Clear all trees and shrubs from power lines and right of way			
throughout the corridor	ALL		
Clean all sewer inlets of debris throughout the corridor	ALL		
Restripe centerlines throughout the corridor	DOT		
Clear debris from center lanes throughout the corridor	ALL		
Upgrade guiderail along corridor where needed and bring outdated			
posts and non-preferred end treatment up to current standards	DOT		
Add Do Not Enter, Wrong Way, and Keep Right signs at the following median openings along the corridor: Near the Dollar General, South and North Entrance to Big Beaver Plaza, at Giuseppe's, Self- Storage/Adult Store, Buttermilk Falls Natural Area, Bowling Alley/ Bills Valhalla, Norwood Drive, and Ida Street.	DOT		
Provide edge line rumble strips continuously through the corridor. Upgrade shoulders where necessary.	DOT		
Upgrade delineation to maximize the visibility of shoulders and medians throughout the corridor. Ensure delineators are retroreflective on both sides and that raised pavement markers are visible.	DOT		
Provide proper pedestrian timings for the intersection of State Route 18 and State Route 551. Ensure that the signal permit is updated for the current operation with proper reviews. Upgrade the countdown signal heads. Install properly visible stop bars and crosswalk markings. Consider adding an all-pedestrian phase at the intersection.	BB, BF, DOT		
Clean inlets regularly and repave and eliminate the low spots that do			
not drain properly at the intersection of State Route 18 and State			
Route 551.	BB, BF, DOT		
Add utility pole collars to poles at the intersection of State Route 18 and State Route 551	BB		
Fit a northbound left turn lane for the Dollar General at the intersection of State Route 18 and State Route 551	DOT		
Ideally, a signalized phase should be installed for the alley within the intersection of State Route 18 and State Route 551. Absent of that, reconfigure the alley to be right in-right out.	BB, DOT		
Utilize the calculated 3.0 seconds of All-Red time versus the 2.2			
State Route 551	BB DOT		
Add left turn lane pavement markings for the pocket left turn lane at Big Beaver Plaza	DOT		
Remove debris, weeds, and loose concrete from the median			
between the northern entrance and southern entrance at Big Beaver Plaza.	DOT		
Replace broken or worn out delineation at Big Beaver Plaza	DOT		
Remove debris from inlets at Big Beaver Plaza	DOT		
ey: (DOT)-PennDOT; (BB)-Big Beaver Borough; (BF) – Beaver Falls Borough; (K)-Koppel Borough			

Table 13: Short- and Mid-term Improvements (1-5 years)



Improvement	Responsible Party		
Add Keep Right sign to the intersection at Big Beaver Plaza	DOT		
Replace the solid white line with a dotted white line at the			
entrance/exit to Big Beaver Plaza	DOT		
Add Watch For Slow Moving Vehicles signs near Big Beaver Plaza	DOT		
Add a destination sign for both directions in advance of the State			
Route 18 and Buttermilk Falls Access intersection	BB		
Add a No Outlet sign at the entrance to the Buttermilk Falss access	BB		
Verify existing clearance heights of bridges on State Route 18 and			
than 14' 6" install W12-2 and W12-2a low clearance signs on			
southbound State Route 18 for the PA Turnpike and railroad bridges.	DOT		
Install now backplates for the traffic signals at the intersection of			
Fastwood Drive/Westgate Drive and State Route 18	BB		
	00		
Check signal height clearance on Eastwood Drive	BB		
Install retroreflective tape on all vehicular signal heads at the			
intersection of Eastwood Drive/Westgate Drive and State Route 18	BB		
Reattach near side EB signal head to the bottom of the span wire at			
the intersection of Eastwood Drive/Westgate Drive and State Route			
18	BB		
Replace the No Turn On Red sign for the eastbound approach at the			
intersection of Eastwood Drive/Westgate Drive and State Route 18	BB		
Fix the broken detection or install radar or video detection at the			
intersection of Eastwood Drive/Westgate Drive and State Route 18	BB		
Install emergency vehicle preemption at the intersection of	DD		
Eastwood Drive/ Westgate Drive and State Route 18	DD		
Install new pedestrian push buttons at the intersection of Eastwood			
Drive/Westgate Drive and State Route 18	BB		
Install new countdown pedestrian signal heads at the intersection of			
Eastwood Drive/Westgate Drive and State Route 18	BB		
Install new high visibility crosswalks on all approaches at the	D D		
Intersection of Eastwood Drive/ westgate Drive and State Route 18	ВВ		
Clear, repair, or replace ADA ramps at the intersection of Eastwood	RD		
Install lane configuration and stop has pavement markings on both	DD		
side road approaches at the intersection of Eastwood			
Drive/Westgate Drive and State Route 18	BB		
Restripe the hatching at the southwest corner or replace the			
hatching with a curb bulb-out at the intersection of Eastwood			
Drive/Westgate Drive and State Route 18	BB		
Install gates at the railroad crossing to enhance safety and allow for			
more frequent use of the crossing with future development	BB		
Install or clean the inlet to improve drainage in the area of Norwood			
DKeye (@od)State Bory tel Bage Beaver Borough; (BF) – Beaver Falls Borough; (K)-kBB PB Fough			



Improvement	Responsible Party
Close or reduce the median opening to force straighter approach at the Norwood Intersection	BB, DOT
Investigate the cause of the pothole and fix/resurface the roadway at the Norwood intersection	DOT
Clean debris off of the shoulder at the Norwood intersection	BB, DOT
directions at the Norwood intersection	К
Re-designate the southbound through lane to a left turn lane into Ida Street from State Route 351. Continue the through movement south of the intersection	DOT
Add a side road warning sign with advance street name at the	
intersection of Ida Street and State Route 351	К
Add supplemental lane designation markings to the pavement at the State Route 351 intersection	К
Replace the faded stop bars and crosswalks and add a Lead Pedestrian Interval phase to the signal at the State Route 351 intersection	к
Replace the broken push buttons and reset the pedestrian stub noles at the State Boute 351 intersection	к
Add a supplemental Stop Here On Red sign for all four approaches at the State Route 351 intersection	K
Add No Right Turn On Red signs to all approaches at the State Route 351 intersection	К
Relocate/reposition the I-376 sign at the State Route 351 intersection so that it is visible. Seek permission from utility company to mount on pole.	DOT
Add delineators and a Keep Right sign to the median at the State Route 351 intersection	DOT
Add missing sidewalk connections at the State Route 351 intersection	к
Restrict parking to one-side of First Avenue	К
Add missing sidewalk at First Avenue in Koppel	к
Add a Do Not Block Intersection sign for westbound traffic before the First Avenue intersection	к



Table 14: Long-term Improvements (5+ years	5)
Improvement	Responsible Party
Investigate tightening the corner radius for the northwest quadrant at the intersection of State Route 18 and State Route 551. Upgrade the pavement through the intersection to eliminate ruts. Add	
pavement marking arrows for the southbound right-turn lane.	BB, DOT
Extend the sidewalk farther west at the intersection of State Route 18 and State Route 551. Add a fence to discourage pedestrians from walking beneath the bridge to the north. Upgrade the sidewalk along the bride to provide proper width for ADA when the bridge is rehabilitated or replaced.	BB
Add a sidewalk connection from the bridge to Big Beaver Plaza	DOT. BB
Option 1: Close the median at the northern entrance of Big Beaver Plaza and make it a right in-right out and add signage for "Plaza Access Next Left" which would utilize the existing left turn lane at the southern entrance. Create a jug handle north of the northern entrance for vehicle wanting to make a U-Turn.	рот
Ontion 2: Widon for a left turn lane at Rig Reaver Plaza	DOT
Option 1: Reduce to one-lane per direction and add a two-way left- turn lane on State Route 18 between Hostetter Auctioneers and	
Turnpike interchange.	DOT
Option 2: Maintain 2 lanes per direction and add a two-way left-turn lane on State Route 18 between Hostetter Auctioneers and Turnpike interchange.	DOT
Option 3: Add barrier to prohibit left-turns, and establish jughandles	
at certain frequencies along State Route 18	DOT
Option 1: Consider realigning and regrading Eastwood Drive from Norwood Drive to State Route 18 to improve turning movements from this approach	BB, DOT
Option 2: Raise the profile of State Route 18 to improve the vertical grade through the intersection of Eastwood Drive/Westgate Drive and State Route 18	BB, DOT
Redesign certain mid-block Route 18 sections north of Westgate Drive to a five-lane configuration with a Two Way Left Turn Lane	ALL
Consider reducing current lane width (12' to 11') to minimize widening and additional right-of-way required while encouraging traffic calming to lower speeds in sections north of Westgate Drive	DOT
Replace the following at the State Route 351 intersection: traffic signal back plates with retroreflective tape, radar detection, and ADA pedestrian accommodations	к
Reconfigure State Route 351 westbound approach lane configuration to Left and Through/Right to increase LOS	K, DOT
Repave the State Route 351 intersection	K, DOT
Repave First Avenue	К
Adjust clearance intervals at the three signalized intersections on the corridor to meet those observed in the field	К

(5+ years) hla

Key: (DOT)-PennDOT; (BB)-Big Beaver Borough; (BF) – Beaver Falls Borough; (K)-Koppel Borough

