

ROUTE 8 LAND USE & TRANSPORTATION STUDY FINAL REPORT



EXECUTIVE SUMMARY

The Route 8 Land Use and Transportation Study was undertaken by the Northwestern Pennsylvania Regional Planning Commission in cooperation with the Borough of Barkeyville, Venango County, and The Pennsylvania Department of Transportation. Recent development in the Barkeyville Industrial Park has resulted in increased traffic congestion at the intersection of Route 8 with Stevenson Road, and additional proposed developments have increased concerns over traffic management. The scope of the project was broadened to be a smart transportation study of the entire Route 8 corridor in the Borough of Barkeyville, and to address land use issues as well as transportation management.

An extensive program of public engagement was conducted, including two public meetings and three newsletters sent to the entire Barkeyville community. Based upon input from the public, the goals and objectives of the study were defined and the limits of the study area were established.

Analysis was conducted of existing traffic conditions in the study area, based upon data collection conducted in March, 2010. Adjustment was made to the traffic analysis to reflect peak summer traffic volumes as well as site-specific conditions. This analysis indicated that unacceptable levels of service exist during peak periods at the intersections of Route 8 with Stevenson Road and at the I-80 westbound off-ramps.

The study then evaluated the potential traffic impacts of two future scenarios:

- The 2020 Medium-Term Land Use Scenario including full development of the Barkeyville Industrial Park and the proposed East Gate commercial development, and
- The 2030 Long-Term Land Use Scenario was based upon full build-out of all commercially- and industrially-zoned land within the Borough of Barkeyville.

Under both scenarios, traffic analyses projected a significant increase in traffic congestion at intersections and driveways throughout the Route 8 Corridor.

The projections indicate that with anticipated development by the year 2020, unacceptable traffic congestion would occur at the intersections of Route 8 with Stevenson Road and with the I-80

off-ramps. Signalization of these intersections could improve traffic conditions to acceptable levels.

These projections further indicate that with full buildout of developable industrial and commercial areas of the Borough by 2030, unacceptable traffic conditions would occur at the intersections of Gibb Road, Route 208, and at most driveways in the corridor. To improve traffic conditions to acceptable levels, significant widening of Route 8 would be required, along with signalization of these additional intersections and driveways.

Based upon the comments received from the public, the following alternatives were identified as preferable to other options considered:

- Relocation of the exit from the TravelCenters of America service plaza, initially away from Stevenson Road, and in the longer term to a signalized configuration with Stevenson Road,
- Signalization of the Stevenson Road / Route 8 intersection with geometric improvements,
- Signalization of the I-80 Eastbound Off-Ramp,
- Signalization of the I-80 Westbound Off-Ramp,
- Construction of gateway improvements between Willow Street and Dholu Road, including sidewalks, street trees, and a landscaped buffer, and
- Access management controls related to future driveway locations and transferring the cost of mitigating traffic-related impacts to site developers on a project-by-project basis.

A number of other options were considered, but do not appear to be needed at this time. These measures include: land use controls to limit the amount of future development within the Borough, widening of Route 8, signalization of additional intersections or driveways, construction of sidewalks along both sides of Route 8 within Barkeyville, and construction of a roundabout at the intersection of Route 208 and Route 8.

The Borough of Barkeyville has given approval to seek funding for the signalization of the Stevenson Road / Route 8 intersection. PennDOT has reviewed the project and determined that this intersection does not warrant signalization at this time, but may in the future. It will not be possible to fund this project until traffic increases to the point where signalization is warranted.

The Borough of Barkeyville and Venango County may consider implementing new access management control ordinances.

INTRODUCTION

Request for Proposal

Venango County, in cooperation with the Borough of Barkeyville and business interests located in the community, realized the need to examine the land use and transportation needs impacting the safety of accessing Route 8. Responding to this need, the Northwestern Pennsylvania Regional Planning and Development Commission (NWPRPDC) initiated the Route 8 Land Use & Transportation Study, documented in this report.

Need for Study

The Borough of Barkeyville, located at the interchange of Interstate 80 (I-80) and Pennsylvania Route 8 (Route 8), provides the gateway to Venango County and the Oil Region. It is strategically located to serve trucking and passenger traffic on I-80. This traffic supports a small but vibrant commercial district, which includes service plazas, restaurants and hotels.

In the 1990s, the Oil Region Alliance developed the Barkeyville Industrial Park (BIP) to leverage this strategic location to generate new economic development. The location of industrial tenants in this park led to a significant increase in truck traffic on Stevenson Road, a local roadway, and a corresponding increase in congestion and perceived safety problems at the intersection of Stevenson Road and Route 8.



Figure 1: Stevenson Road at Route 8 showing TA service plaza exit driveway.

Purpose

Prior to initiating this study, the Borough of Barkeyville met with local government officials and the Pennsylvania Department of Transportation (PennDOT) District 1-0 representatives to discuss ways in which a highway access plan could assist in managing safely the throughput of vehicles along this important corridor in Venango County.

As defined by these sponsoring agencies, this project was to accomplish two critical tasks:

1. Develop and complete a Highway Access Management Plan for this section of Route 8 at least one mile in either direction from the I-80 exit, and
2. Advance a design solution to the Stevenson Road / Route 8 intersection.

In order to continue to provide appropriate levels of service and to assure that future developments of regional significance are compatible with the Highway Access Management Plan recommendations, the project sponsors realized the recommendations must be tied to future land use decisions along the Route 8 corridor and that these decisions are important to the overall transportation network.

The Borough agreed to implement the necessary land use controls to ensure the results of the Highway Access Management Plan can restore safe access and greater efficiency along this corridor.

Funding

Funding for this study was provided by PennDOT's Supplemental Planning Program funds through the NWPRPDC's 2009-2010 Unified Planning Work Program (UPWP).

The UPWP establishes an outline of work tasks to be undertaken by the NWPRPDC during the 2009-2010 Fiscal Year. The Northwest Pennsylvania Regional Planning and Development Commission has the responsibility to plan and program transportation projects receiving federal funds for all of Clarion, Crawford, Forest, Venango and Warren Counties.

Smart Transportation

The Commonwealth of Pennsylvania has recognized that the historical pattern of land development and transportation investments is no longer sustainable for a variety of financial, environmental, and social reasons. In Pennsylvania, as in other states, public funding is very limited for all transportation improvements. Costs are soaring, as global demand for raw materials has made new infrastructure exorbitantly expensive. Gas prices are higher than ever before, and concerns about global warming are at the forefront of the political agenda. The Commonwealth recognizes that we must use our limited resources more efficiently than before.

The ultimate goal of Smart Transportation is to create transportation facilities that are safe and affordable, responsive to the needs of all users, and support community planning goals.

To advance this goal, PennDOT has identified 10 principles to guide Smart Transportation as our communities plan for the future:

1. **Money Counts:** Gas tax revenues are falling, while cost inflation has been raising the cost of transportation improvements, making it harder and harder for Pennsylvania and other states to fund required transportation improvements and maintenance. Smart Transportation encourages innovative solutions that can provide improved transportation at lower costs.
2. **Leverage and preserve existing investments:** Pennsylvania's existing transportation infrastructure represents an investment of billions of dollars. Limited funding means we need to preserve and leverage this investment to support our future transportation needs.
3. **Choose projects with high value/price ratio:** Sometimes, smaller, lower cost solutions can provide nearly as much benefit as much larger, more costly solutions.
4. **Safety always and maybe safety only:** Safety for all users is and always will be the most important consideration while designing and building transportation infrastructure. Smart transportation looks for innovative ways to continue improving the safety of our roadways.

5. **Look beyond level-of-service:** Performance measures used to evaluate transportation projects must consider more than simply adding capacity. Factors such as multimodal accessibility and economic development should also be considered.
6. **Accommodate all modes of travel:** An efficient transportation system should include the infrastructure to accommodate all modes of travel, including walking, bicycling, transit, private automobiles, and freight.
7. **Enhance local network:** A disconnected network of local roads can lead to an increased impact on arterial roadways. Increased connections between local roadways can provide a variety of route options and less congestion.
8. **Build towns not sprawl:** Transportation planning and design should take into account the impact on economic development and on the character of our communities. Land use and transportation are closely intertwined.
9. **Understand the context; plan and design within the context:** Transportation projects should be planned and designed with careful consideration of the local land use, economic, environmental, and social contexts. A solution that is ideal in one community or context may not be appropriate in another.
10. **Develop local governments as strong land use partners:** In Pennsylvania, land use decisions are made by local governments, but these decisions can have major impacts on the statewide transportation network. In Smart Transportation, PennDOT and local governments will work together to ensure that transportation solutions are consistent with a community's land use goals, and that land use decisions take into account transportation needs and realities.

These principles are not new. They recognize an interrelationship between transportation and land use that has always existed, and they take into account limited financial resources. Decisions that the Borough of Barkeyville makes today will influence the character of the community for decades to come. Careful application of these principles can help the Borough make cost-effective decisions.

History

1700s

Since the earliest days, the project area has been dominated by transportation. The Venango Trail was used by the Delaware and Seneca nations as a connection between the Ohio River and Lake Erie. During the French and Indian war, it was used by European armies travelling between forts on the frontier. In 1796, the Franklin Road was constructed along this route, providing the first wagon route north from Pittsburgh. The community of Wesley in the northern part of Irwin Township was a significant stop for stagecoaches along the route.

1800s

Barkeyville was founded by Henry Barkey in 1850, and quickly became a small village thriving along the road. The historic architecture is clearly visible in many of the homes and buildings in the village.

1900s

The construction of US 19 in the 1920s provided an alternate north-south route, diverting much traffic from the modern Route 8 corridor. Combined with the construction of Interstate 79 in the 1960s and 1970s, this diversion undoubtedly helped to maintain the current rural character of the study area. During the 1970s, I-80 was constructed through the study area. This roadway restored Barkeyville to a position astride key national transportation routes.

2000s

Today, Barkeyville benefits significantly from its location midway between Chicago and New York City. Its commercial core consists primarily of a range of businesses that serve truckers and travelers passing through the area.

In the early 2000s, the Barkeyville Industrial Park (BIP) was developed by the Oil Region Alliance to leverage this strategic location for economic development. The park was designated a Keystone Opportunity Zone, providing 10 years of tax abatements to qualified tenants. Several businesses have located in the park.

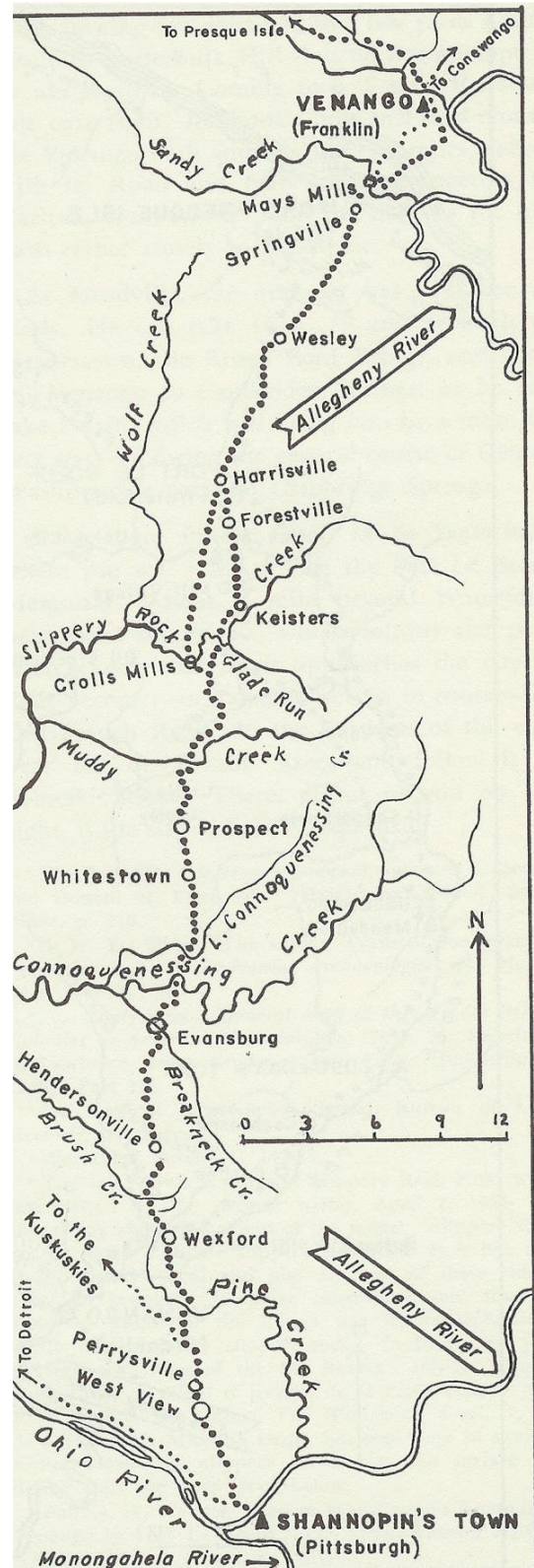


Figure 2: Historic Venango Trail. Source: Pennsylvania History and Museum Commission.

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Recent Land Use Development

The location of tenants within the Barkeyville Industrial Park led to an increase in traffic along Stevenson Road, and to an increased perception of traffic congestion and safety problems at the Stevenson Road / Route 8 intersection. In response to these perceptions, the Borough of Barkeyville directed the TravelCenters of America (TA) service plaza to close a portion of their driveway adjacent to the intersection.



Figure 3: Traffic to Barkeyville Industrial Park on Stevenson Road.

More recently, landowners and developers identified the potential for a new commercial retail center on the east side of Route 8 near Willow Street. In the absence of a formal traffic study, a number of concerns were raised by the community about the potential impact of this development.

With a growing recognition of potential traffic problems developing in the Route 8 corridor, the Borough of Barkeyville convened a meeting of agencies to identify potential solutions. While signalization and geometric improvements at the Stevenson Road / Route 8 intersection were identified as obvious solutions, the participating agencies recognized the need to be proactive, and to identify and address other traffic problems that might develop in the area.

Study Area

Limits

Based upon concerns raised at the first Public Meeting for this study, the study area limits were defined to be the Route 8 corridor within the Borough of Barkeyville, from the Route 208 intersection north to the Irwin Township line, a total distance of approximately 1.6 miles.

This includes the intersections of Route 8 with Gibb Road, I-80 westbound ramps, I-80 eastbound ramps, Stevenson Road, and Route 208. Other intersections and driveways within the study area were also analyzed as appropriate.

Key Roadways and land uses within the study area are described in the existing conditions section of this report.

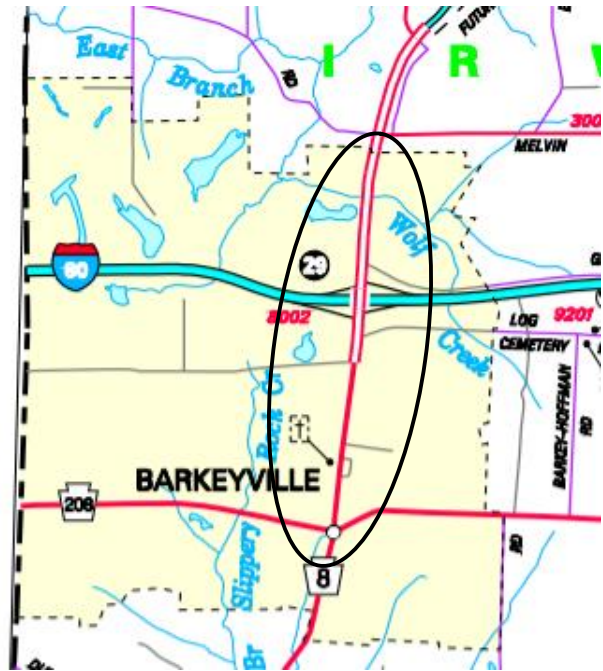


Figure 4: Study Area Limits.

Previous Plans

Southern Venango County Regional Comprehensive Plan

In 2007, the Southern Venango County Regional Comprehensive Plan was conducted by the Venango County Regional Planning Commission, as a cooperative venture including Barkeyville Borough and six other rural municipalities.

This plan defined portions of the Borough as designated growth areas, particularly the areas along Route 8 and Route 208 that are served by municipal water and sewer systems. It anticipated commercial growth along Route 8, and industrial development in the Barkeyville Industrial Park.

In the plan, the I-80 interchange area is designated as a model site, to demonstrate economic development. The overall vision for the interchange is to provide a gateway context that

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welcomes travelers into the region, capitalizes on the economic opportunities presented by the interchange, and protects the safety and welfare of borough residents. This vision may be achieved through a combination of access management, traffic improvements, screening and buffering, new development, business recruitment, and signage improvements.

This would serve as a model for development at other interchanges along I-80, given its prominent location and available infrastructure.

The plan also includes a Barkeyville Concept Plan, as shown below in Figure 5. Of relevance to this study is the extensive level of development planned for the "Interchange Development Corridor" along Route 8, and the highway streetscape improvement area which includes a number of streetscape enhancements and improved pedestrian accommodations. The plan also includes a number of municipal targets. Those for the Borough of Barkeyville were:

- Focus new highway commercial development within the growth area along Route 8.

- Provide for flex space and light industrial development within the growth area along Route 208 West.
- Preserve the rural character of the residential areas of the borough.
- Create a gateway/entrance into the region at the Barkeyville interchange along I-80.
- Update the borough's zoning ordinance to address the Pennsylvania Municipal Code (MPC) mandates.
- Update the borough's zoning ordinance to address the borough's changing needs.
- Explore the implementation of the comprehensive plan through the borough's zoning ordinance.

BIP Traffic Impact Study

A traffic impact study for the Barkeyville Industrial Park was performed for the Oil Region Alliance in September 2007 (Lichty Engineers, 2007). This study evaluated the projected traffic impacts of development within the industrial park, but did not appear to consider the impact of any additional development along the Route 8 corridor.

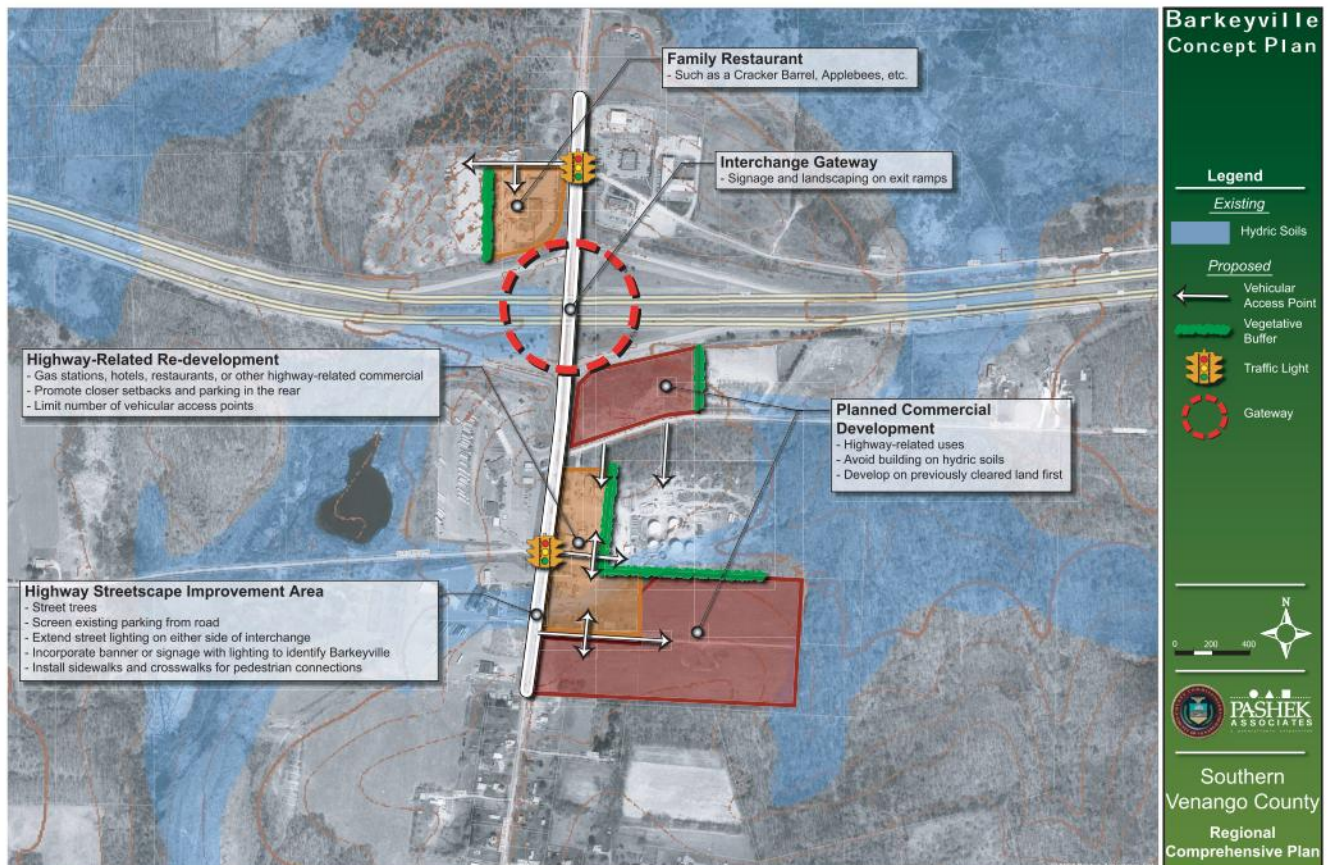


Figure 5: Barkeyville Concept Plan.

The study evaluated the intersections of Route 8 with the I-80 ramps and with Stevenson Road. The study projected acceptable levels of service at all intersections except Stevenson Road, but recommended that widening of Stevenson Road by one lane would mitigate this impact. This study appeared to find signalization of Stevenson Road to be warranted, but that with the recommended widening of Stevenson Road, the signal would no longer be warranted. The study also recommended moving the TA truck stop driveway on Stevenson Road approximately 250 feet to the west to improve operations.

Organization of Report

The remainder of this report documents the methodology and findings of this study, the public engagement process, existing and potential land uses, existing and projected traffic conditions, potential land use and transportation improvements, and a proposed implementation plan.

PUBLIC ENGAGEMENT

Process

Continuous Engagement

A primary goal of this study is successful Public Engagement and collaboration with the community of Barkeyville to identify the transportation and land use problems, develop the study goals and objectives, and guide the project team in identifying solutions that would best meet the community's needs. Only with effective concurrence building can the community take ownership of the study, and support the commitments needed to move forward with implementing the selected alternatives.

To this end, an ongoing process of interactive communication was established between the study team and the community, centered upon two public meetings providing the project team with the opportunity to both present information and to listen to the community. Three project newsletters provided the opportunity to present information to the community in advance of the public meetings.

The project team made a concerted effort to reach out to residents, developers, land owners, and businesses who expressed questions and concerns during the study.

A Study Committee was established to provide further involvement of the community in the study. This committee included a broad range of interests and viewpoints within the community, and met approximately monthly throughout the study.

Study Committee

The committee was established at the beginning of the project in order to guide the study. The committee met six times during the course of the study, and provided key input in defining the study area, establishing goals and objectives, and developing the range of alternatives evaluated in the study. The formal makeup of the committee was:

Susan Smith, Northwestern Pennsylvania Regional Planning and Development Commission;

Judith Downs, Venango County Regional Planning Commission;

Erin Wiley Moyers, Pennsylvania Department of Transportation;

William Coursen, Borough of Barkeyville;

Jim Molloy, Glen O. Hawbaker, Inc.;

Harry Fairlamb, Travel Centers of America;

John Phillips, Oil Region Alliance; and

Darryl Phillips, PB Americas.

Study committee meetings were hosted by the Glen O. Hawbaker, Inc., at their Barkeyville facility.

Table 1: Study Committee Meetings.

Study Committee Meetings	
Date	Topics Discussed
12/14/2009	Project Kickoff Review of Newsletter #1 Draft Preparation for Public Meeting #1 Required Information
1/29/2010	Review of Public Meeting #1 Draft Objectives Draft Goals Definition of study area
3/26/2010	Existing Conditions Analysis Basis of land use forecasts
4/30/2010	Land use projections Traffic projections and analysis
6/1/2010	Preparation for Public Meeting #2
6/26/2010	Review of Public Meeting #2 Preferred Alternatives

Newsletter #1

The first project newsletter was intended to introduce the community to the project, with the particular goal of encouraging participation in the first public meeting. The newsletter outlined the study goals, delineated the proposed study area, and summarized the proposed project schedule. The newsletter also included an announcement of the first public meeting, which was scheduled for January 19, 2010.

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The newsletter was drafted by PB, and following review by the Study Committee, was mailed on January 11, 2010.

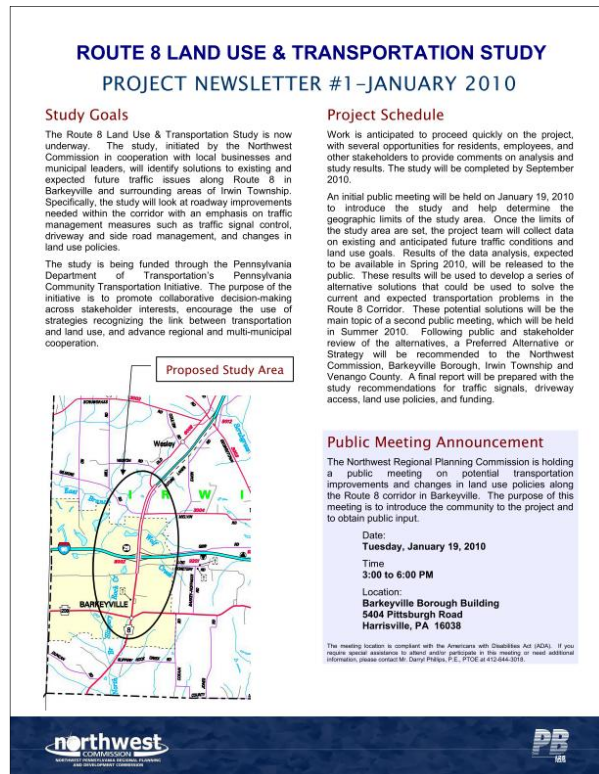


Figure 6: Newsletter #1.

A full-size copy of the newsletter is included in Appendix A.

The mailing list for the newsletter was developed using tax records and 911 data provided by Venango County. The initial list included the owners of all land parcels within the Borough. Parcels with ownership outside the borough were evaluated based upon 911 data, and if a structure was located on that parcel, the local address was included on the mailing list. The mailing list also included all public officials from Barkeyville Borough, Irwin Township, key officials from Venango County, and the state legislators representing the study area. The final mailing list included 169 stakeholders.

Public Meeting #1

The first public meeting was held on January 19, 2010, from 3:00 to 6:00 PM at the Barkeyville Borough Building. Public notice of the meeting was provided by an advertisement in the Franklin

News Herald and the *Oil City Derrick* on Tuesday, January 5, 2010.

The meeting was conducted in an open house format. The project team was available to discuss the project and the transportation and land use needs of the community. Over 30 people attended the meeting.

PB presented the background and purpose of the study, and solicited comments from the participants on the proposed scope of the project and on the existing and perceived transportation and land use issues in the community. Key issues received at the meeting included:

- Pedestrians walking along the road,
- Access to the industrial park,
- Need for traffic signals at I-80 ramps and at Stevenson Road,
- Roadway maintenance issues,
- East Gate Plaza impacts,
- Sight distance problems at Route 208,
- Traffic congestion on ramps and Stevenson Road,
- Need for more development in Borough
- Need for developers to pay for needed improvements, and
- Speeding traffic on Route 208.

A summary of the comments received is provided in Appendix A.

Newsletter #2

The second project newsletter was distributed to the community midway through the study to maintain an ongoing awareness and involvement. The newsletter summarized the key issues identified at the first public meeting, and presented the goals, objectives, and study area defined based upon the public input. The newsletter included the results of data collection and the level of service analysis of the key study area intersections. The newsletter concluded with an announcement of the time and location scheduled for the second public meeting.

The mailing list for the second newsletter was based upon that used for the first newsletter, with updates for incorrect and invalid addresses, and the addition of several stakeholders who requested to be added to the mailing list.

A full-size copy of the second newsletter is included in Appendix A.

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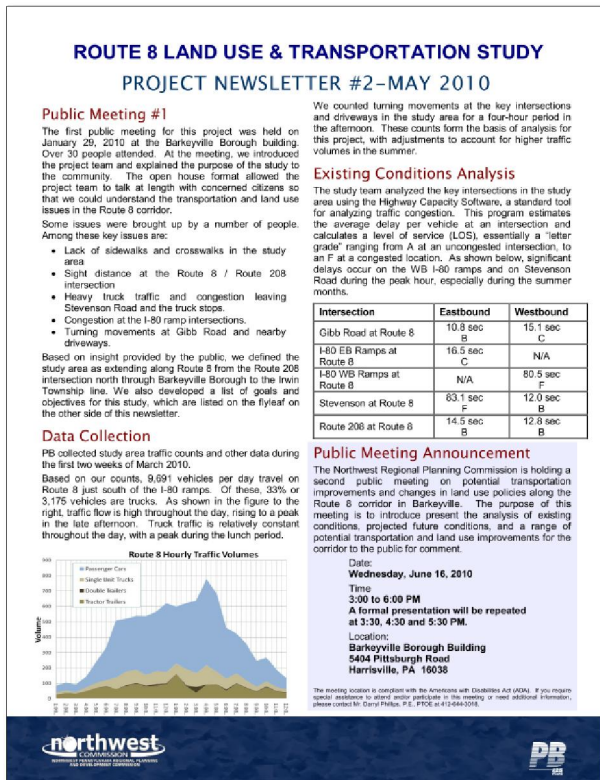


Figure 7: Newsletter #2.

Public Meeting #2

The second public meeting was held on June 16, 2010 at the Barkeyville Borough Building. This meeting consisted of a formal presentation, which was repeated at 4:30 and 5:30 PM. Approximately 21 people attended the presentations at the public meeting.

Public notice of the meeting was provided by an advertisement in the *Franklin News Herald* and the *Oil City Derrick* on Tuesday, June 1, 2010. Additionally, posters were placed at locations throughout the community, including the Barkeyville Borough Building, the TA and Kwik Fill service plazas, Burger King and King's restaurants announcing the public meeting.

The formal presentation included a detailed history of the project to this point, including the public engagement process, the key issues identified at the first public meeting, and the study area and the goals and objectives established for the study. Data collection efforts and the results of the existing conditions were summarized. Also, the traffic analyses for two future land use scenarios, as described later in this report, were presented. The final part of the presentation focused on

several potential traffic and land use scenarios designed to mitigate the levels of projected future traffic. The formal presentation was closed with a question and answer session. Comment forms were provided for participants to submit comments.

A PowerPoint presentation was used for the presentation which was posted on the NWPRPDC website on June 18, 2010, and electronically submitted to stakeholders upon request.

Following the meeting, the study team received one completed comment form and one letter expressing concerns over the study's recommendations. Commenters were concerned about the magnitude of the traffic impacts forecasted in future years, and about the negative impacts of land use controls on land owners and developers. These comments are included in Appendix A.

Barkeyville Borough Council

Following the second public meeting, a formal briefing to the Barkeyville Borough Council on the findings and recommendations of the study was made at the regularly scheduled council meeting held at 7:00 PM on July 6, 2010.

The briefing included presentation of the PowerPoint slideshow used for the second public meetings and information on the projected construction and maintenance costs of the alternatives considered.

Judith Downs (VCRPC) informed the council about the potential to partially fund the selected improvements with a grant from the Appalachian Regional Commission (ARC), but that the deadline for a funding application required immediate action.

Following an extensive period of debate, the council approved a concept with signalization and geometric improvements at the Stevenson Route / Route 8 intersection, and authorized VCRPC to pursue the ARC grants.

A copy of the official minutes of the July 6, 2010 Barkeyville Borough Council meeting are presented in Appendix A.

Newsletter #3

At the conclusion of the study, a third newsletter was distributed to the community to inform them of the final study findings, the preferred alternatives

identified, and the proposed next steps for implementation.

This newsletter was mailed to the same list as the second newsletter, and additional copies were made available for distribution within the community.

A full size copy of the newsletter is attached in Appendix A.

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Public Meeting #2

The second public meeting for this project was held on June 16, 2010 at the Barkeyville Borough building, and was attended by more than 20 people. The focus of the meeting was the history of the project, the methodology used for analysis, and the range of reasonable potential alternatives that could resolve current and future transportation problems in the Route 8 Corridor. Comments were received from residents and landowners regarding these alternatives during and after the meeting.

Study Findings

In this study, the potential future traffic impacts of two scenarios were evaluated:

- 2020 Medium-Term Land Use Scenario
- 2030 Long-Term Land Use Scenario.

The 2020 Medium-Term Land Use Scenario included full development of the Barkeyville Industrial Park and the proposed East Gate commercial development.

The 2020 Long-Term Land Use Scenario was based upon full build-out of all commercially- and industrially-zoned land within the Borough of Barkeyville.

Under both scenarios, traffic analyses projected a significant increase in traffic congestion at intersections and driveways throughout the Route 8 Corridor.

These projections indicate that with anticipated development by the year 2020, unacceptable traffic congestion would occur at the intersections of Route 8 with Stevenson Road and with the I-80 off-ramps. Signalization of these intersections could improve traffic conditions to acceptable levels.

These projections further indicate that with full buildout of developable industrial and commercial areas of the Borough by 2030, unacceptable traffic conditions would occur at the intersections of Gibb Road, Route 208, and at most driveways in the corridor. To improve traffic conditions to acceptable levels, significant widening of Route 8 would be required, along with signalization of these additional intersections and driveways.

Barkeyville Council Meeting

The findings of the study were officially presented to the Barkeyville Borough Council at a monthly council meeting on July 5, 2010. This meeting provided residents and land owners a second opportunity to comment on the range of potential land use and traffic scenarios.

Following an extensive period of debate, the council approved an improvement concept with signalization and geometric improvements at the Stevenson Road - Route 8

intersection, and authorized the Venango County Regional Planning Commission to pursue potential funding for this project.

Preferred Alternative

Based upon the comments received from the public, the following alternatives were identified as preferable to other options considered:

- Relocation of the exit from the TravelCenters of America service plaza, initially away from Stevenson Road, and in the longer term to a signalized configuration with Stevenson Road
- Signalization of the Stevenson Road / Route 8 intersection with geometric improvements
- Signalization of the I-80 Eastbound Off-Ramp
- Signalization of the I-80 Westbound Off-Ramp
- Construction of gateway improvements between Willow Street and Dholu Road, including sidewalks, street trees, and a landscaped buffer.
- Access management controls related to future driveway locations and transferring the cost of mitigating traffic-related impacts to site developers on a project-by-project basis.

A number of other options were considered, but do not appear to be needed at this time. These measures include: land use controls to limit the amount of future development within the Borough, widening of Route 8, signalization of additional intersections or driveways, construction of sidewalks along both sides of Route 8 within Barkeyville, and construction of a roundabout at the intersection of Route 208 and Route 8.

Next Steps

The Borough of Barkeyville has given approval to seek funding for the signalization of the Stevenson Road / Route 8 intersection. PennDOT has reviewed the project and determined that this intersection does not warrant signalization at this time, but may in the future. It will not be possible to fund this project until traffic increases to the point where signalization is warranted.

The Borough of Barkeyville and Venango County may consider implementing new ordinances to implement access management controls.

Final Report

The final report for the Route 8 Land Use & Transportation Study will be available at the Barkeyville Borough Building and on the Northwest Pennsylvania Regional Planning and Development Commission's website:

www.nwcommission.org



Figure 8: Newsletter #3.

GOALS AND OBJECTIVES

Introduction

As initially scoped by the NWPRPDC, this study was to accomplish two critical tasks: develop a highway access plan for the Route 8 corridor, and advance a design solution to the Stevenson Road access point.

From this initial point, the initial task of the project team was to work with the Barkeyville community to define the goals and objectives for the study. The first public meeting provided the community with the opportunity to discuss their transportation and land use needs and visions with the Study Committee. Based upon this dialogue, the Goals and Objectives were defined by the Study Committee over several meetings, and were presented to the community in the second newsletter and at the second public meeting.

These Goals and Objectives were used to guide the study, and to provide a framework for evaluating a range of alternatives, identifying the community's preferred alternatives, and in developing a plan to move forward with implementation.

The Goals and Objectives defined for this study are presented below.

Goals

1. Improve traffic operation in the study corridor.
2. Provide a sustainable transportation system, accommodating pedestrians and bicycles as well as motorized traffic.
3. Improve safety for vehicular and non-vehicular traffic throughout the study area.
4. Limit or control driveway access throughout the corridor.
5. Ensure that the costs of future transportation improvements are assessed fairly.
6. Encourage land use policies that support a sustainable and efficient transportation system.

Objectives

1. Improve operations at Stevenson Road. (Goals 1, 2, 3, 4).
2. Address causes of identified safety issues at Stevenson Road and elsewhere in the corridor. (Goals 2, 3).
3. Maintain acceptable levels-of-service at study intersections and key driveways under projected future traffic conditions. (Goal 1).
4. Adopt appropriate land use controls (Goal 4 and 6).
5. Developing a mechanism for identifying transportation impacts of developments and for capturing the cost of implementing the improvements. (Goal 5).
6. Identify changes to zoning and other ordinances to allow the Borough of Barkeyville to manage land uses and direct future development. (Goal 6).

EXISTING CONDITIONS

Transportation Network

The study area roadway network is shown in Figure 9 below, and described on the following pages.

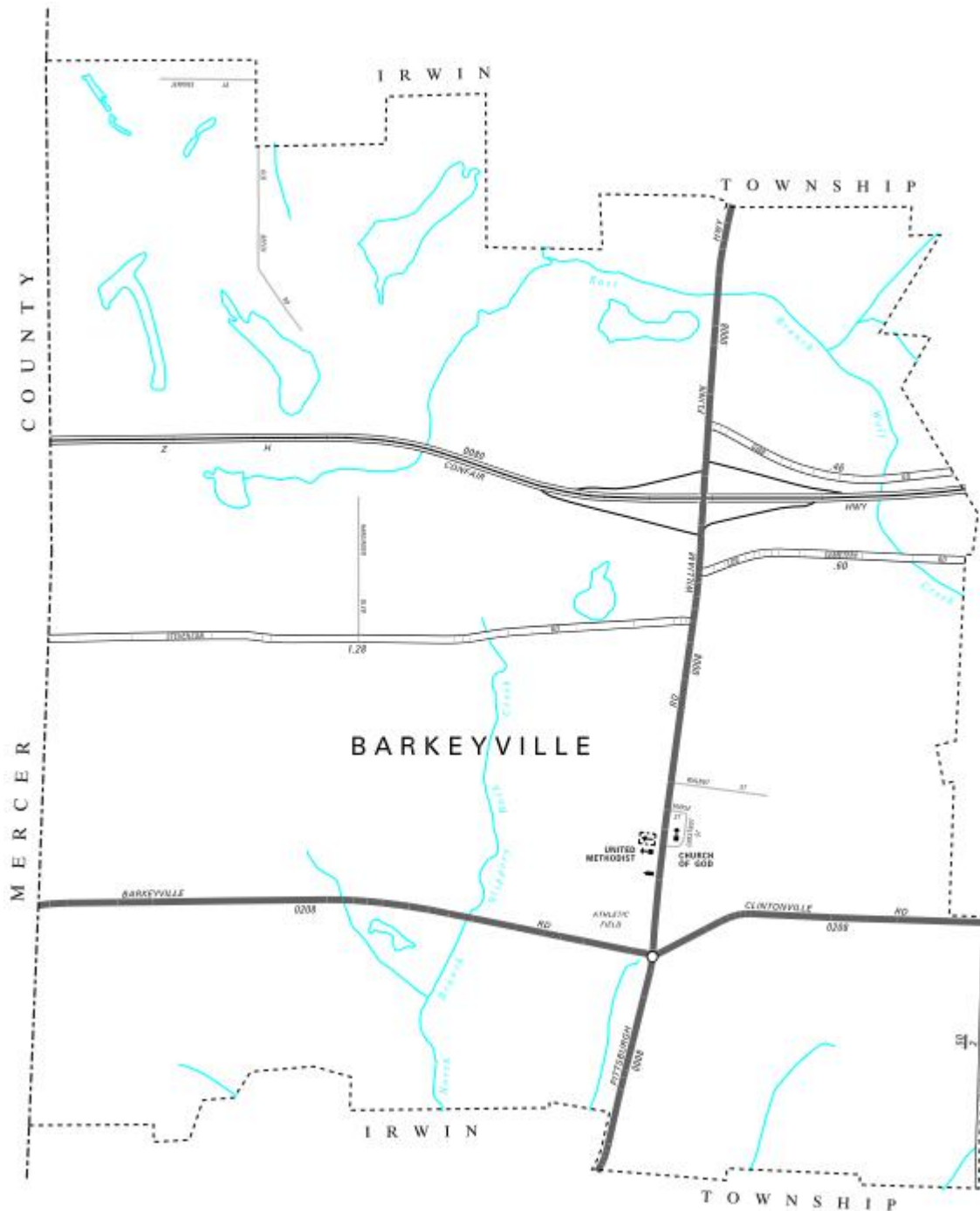


Figure 9: Study area roadway network. Source: PennDOT Type 2 Map of Barkeyville Borough. June 2008.

Interstate 80

Interstate 80 (I-80) dominates the local transportation network. This freeway extends from San Francisco, California to I-95 in New Jersey. It provides a direct connection between the Northeast, the Industrial Midwest, and the West Coast. Barkeyville is located near the midpoint between New York and Chicago, making it a convenient point for fuel and rest stops. Total average daily traffic (ADT) near Route 8 is approximately 30,000 vehicles. Trucks account for approximately 15% of the total traffic volume.

I-80 intersects Route 8 at a diamond interchange, with both ramps controlled by stop signs. Although the I-80 mainline was not directly analyzed in this study, these two intersections connecting Route 8 with the interchange are congested during peak periods and are key elements of this study.

Route 8

The primary focus of the study area is Pennsylvania Route 8 (Route 8). This highway extends from Wilkesburg, on the east edge of the City of Pittsburgh, to downtown Erie, passing through the cities of Butler, Franklin, and Oil City as well as many smaller communities. Paralleled by I-79 roughly five to 10 miles to the west, Route 8 primarily serves local traffic, connecting Butler, Venango, and Crawford counties to the Interstate System. For most of its length, Route 8 is a two-lane, undivided highway passing through rolling terrain, bordered by a significant amount of low-density residential and agricultural uses. Within the study area, Route 8 can be divided into three separate segments, each with a distinct character and traffic pattern.

North of Gibb Road, Route 8 is a single lane in each direction, with a posted speed limit of 45 mph. The cartway consists of two 11-foot lanes within a 60-foot right of way. Adjacent land uses are low-density, and consist of a mix of rural, light industrial, and commercial. Traffic flow in this area is primarily traffic between I-80 and the Oil Region cities to the north.

Between Willow Street and Gilmore Road, Route 8 widens to a four-lane cross section, with two 2-foot lanes in each direction separated by a 4-foot painted median. Speed limit in this section is 45 mph. The right of way varies in width from 160 feet to the south of I-80 to 200 feet north of I-80. The land uses in this section are primarily commercial, including a mix of hotels, restaurants,

gas stations, and service plazas. Traffic in this segment is dominated by traffic between these businesses and the I-80 interchange.

South of Willow Street, Route 8 consists of a single lane in each direction, with a posted speed limit of 35 mph. The cartway consists of two 11-foot lanes within a 60-foot right of way. Adjacent land uses are primarily low density residential on narrow lots.

Gibb Road

Gibb Road is a borough road extending along the north side of I-80 from Route 8 to Georgetown Road (SR 3003). The cartway is 22 feet wide. Gibb Road provides local access to several restaurants and hotels located adjacent to Route 8, and is otherwise rural in character. Gibb Road intersects Route 8 at an unsignalized intersection aligned with a commercial driveway approximately 375 feet north of the I-80 eastbound off-ramp. The close spacing of these intersections appears to cause some operational problems.

Log Cemetery Road

Log Cemetery Road is a borough street extending east from Route 8. It provides access to a truck wash/painting facility and a primarily rural area of Irwin Township. Log Cemetery Road intersects Route 8 at an unsignalized intersection aligned with the entrance and auto exit for the TA Service Plaza.

Stevenson Road

Stevenson Road is a borough street extending west from Route 8 into Mercer County. Within the Borough, the cartway is 20 feet wide, and is posted with a 20-mph speed limit. Stevenson Road serves as the primary access to the Barkeyville Industrial Park as well as to a number of residences. Stevenson Road intersects Route 8 at an unsignalized intersection aligned with the CITGO service station driveway.

This intersection provided the impetus for this study, and is one of the primary focus points. The intersection operation is complicated by a number of factors, as shown in the aerial photograph in Figure 10: Stevenson Road / Route 8 Intersection. While Stevenson Road volumes are light, they include a significant number of trucks destined to the Barkeyville Industrial Park. The truck exit from the TA Service Plaza enters Stevenson Road approximately 80 feet from the Route 8 intersection. This short distance does not allow

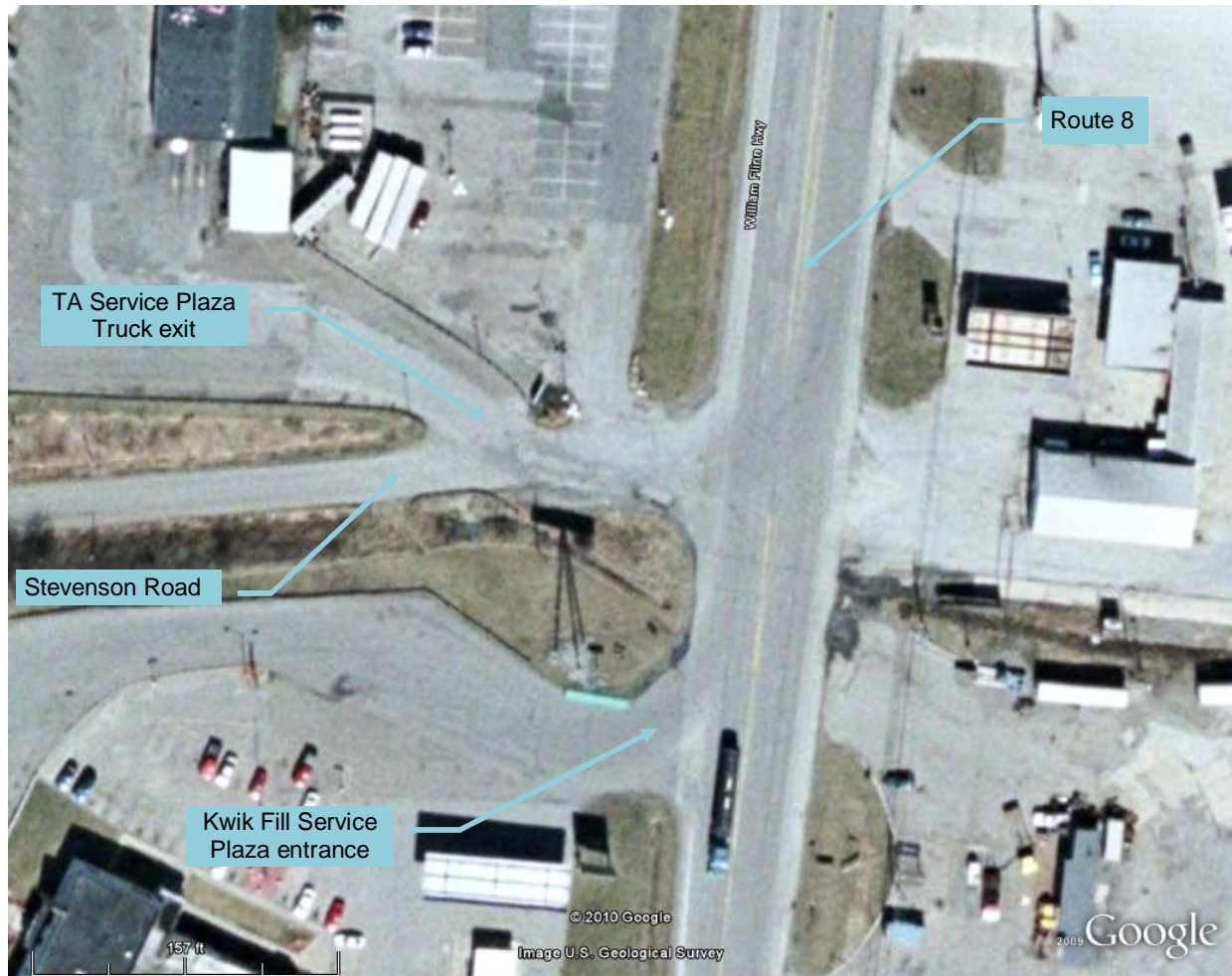


Figure 10: Stevenson Road / Route 8 Intersection.

trucks to properly align within the eastbound lane on Stevenson Road, often blocking the westbound lane. Delays are sometimes significant, due to the large gap required for trucks to exit from the stop control onto Route 8. A further complication is added by the presence of the Kwik Fill Service Plaza entrance approximately 50 feet south of the intersection. Trucks entering the service plaza decelerate in advance of the intersection, with this slower movement of cross traffic resulting in reduced gaps for Stevenson Road traffic.

A final complication is a significant grade on Stevenson Road sloping downward away from the Route 8 intersection. While this does not appear to affect corner sight distance significantly, Stevenson Road drops away and is hard to visually identify between the wider, more prominent driveways of the service plazas.

Willow Street

Willow Street is a borough street extending east of Route 8 approximately 400 feet south of Stevenson Road. It is an unimproved dirt road, and is insignificant except as potential access to the proposed East Gate commercial development.

Route 208

Route 208 provides an east-west connection through the study area approximately one mile south of I-80. While it extends from the Ohio state line to Clarion County, in the Barkeyville area it primarily provides a more direct access to the Grove City area. Route 208 has a 22-foot cartway, with a single lane in each direction. The speed limit is unposted. Route 208 intersects Route 8 at a two-way-stop.

Traffic Data Collection

ATR

Automatic traffic recorder (ATR) counts were taken on Route 8 between the I-80 eastbound ramps and the TA service plaza entrance/Log Cemetery Road. Data collection was originally scheduled for February 2010, but was postponed due to heavy snow accumulation, and was later conducted from March 4 through March 11, 2010. Counter equipment was vandalized at approximately 4 PM on March 6, 2010, but the count was sufficient to determine typical weekday volumes, directional distribution, classification, and peaking behavior.

Total ADT was approximately 4,693 vehicles northbound and 4,998 southbound. Truck traffic accounted for 33% of total daily traffic, and 28% of peak hour traffic. Figure 11 shows the variation of traffic throughout the day.

The ATR data is provided in Appendix B.

Turning Movement Counts

Manual turning movement counts were taken at the intersections of Route 8 with Gibb Road, I-80 eastbound ramps, I-80 westbound ramps, Stevenson Road, and Route 208. Gibb Road and the driveways between I-80 and Stevenson Road were videotaped to allow for spot traffic counts and other data collection.

Manual turning movement counts were conducted between 2:00 PM and 4:00 PM on March 4 and March 11, 2010. The counts were only conducted in the PM period because ATR data indicated that the AM peak period is significantly lower than the PM peak period.

The peak hour was determined to occur between 4:15 and 5:15 PM. Manual turning movement data is provided in Appendix B.

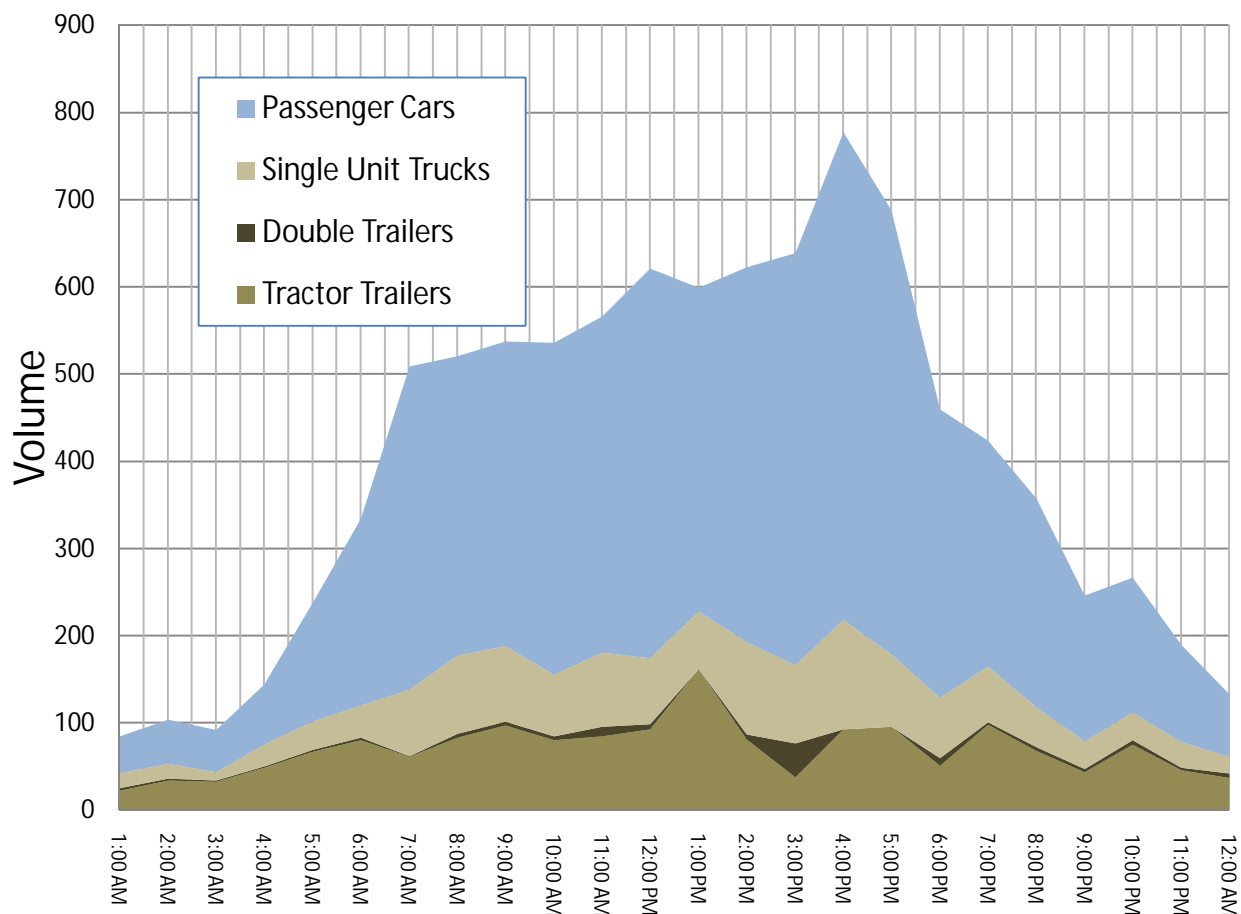


Figure 11: Daily traffic patterns.

Travel Time Runs

Travel time runs were conducted through the study area on March 4, 2010. The test vehicle was driven through the study area at the prevailing traffic flow speeds, and the time at each intervening intersection was manually recorded. As shown in Figure 12 traffic flow is relatively uncongested on Route 8 through the corridor.

Travel time data is included in Appendix B.

Sight Distance

Sight distance is generally excellent throughout the corridor, by observation exceeding 500 feet. Public comments indicated a potential sight distance problem at the Route 208 intersection, particularly the view of northbound traffic from vehicles stopped on eastbound Route 208. PB conducted field measurements on March 11, 2010. Measured sight distance was 714 feet, which exceeded the 360 feet required for safe stopping sight distance at 45 mph.

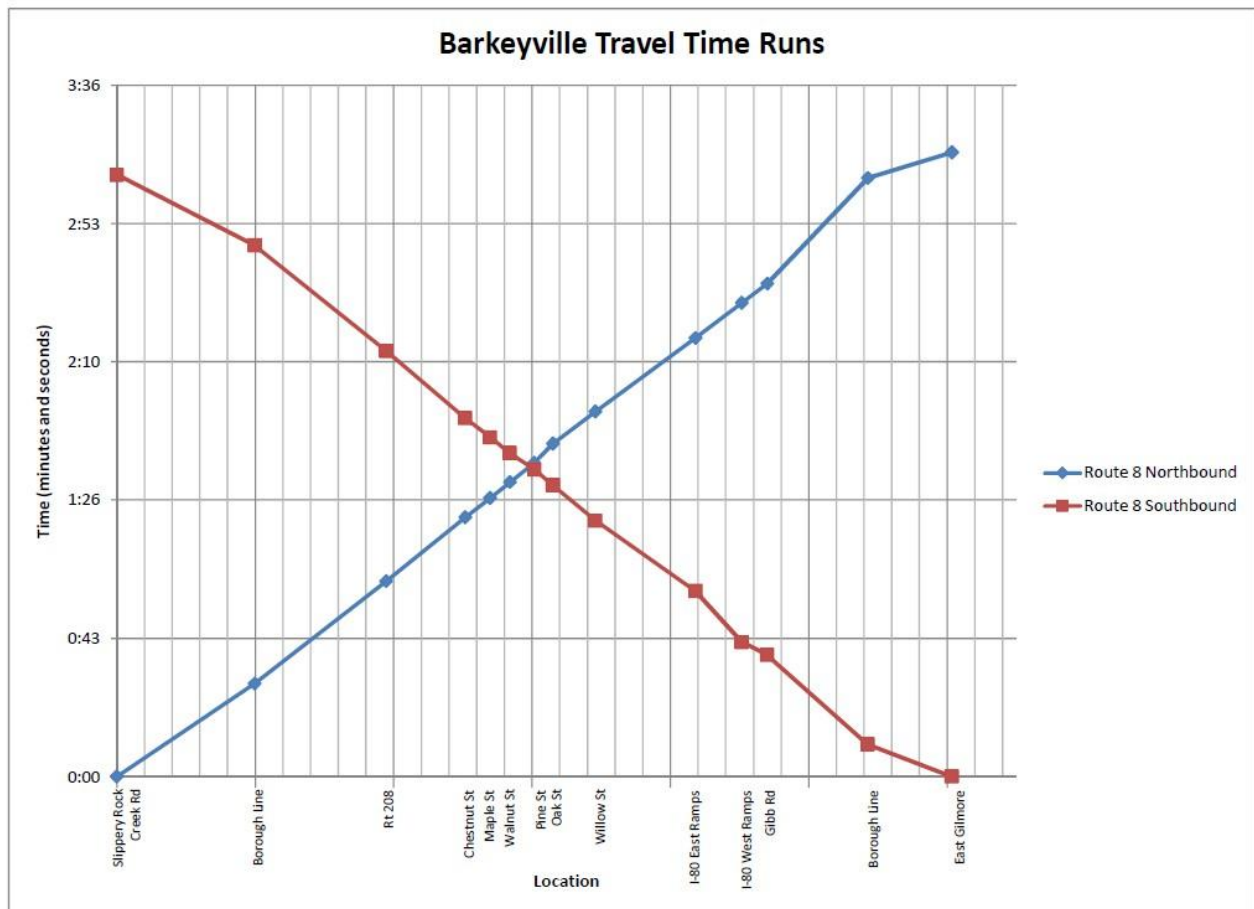


Figure 12: Route 8 Travel Times.

Crash History

An evaluation of the crash history in the study area was conducted based upon data provided by PennDOT for the period of January 2004 to December 2008.

Thirty-six (36) crashes were reported on Route 8 during this time period, with one fatality reported. Crashes were spread uniformly throughout the year and throughout the week. Approximately 39% of crashes occurred during the afternoon period from 1:00 to 6:00 PM.

Angle collisions accounted for 36% of crashes, hitting fixed objects accounted for 33% and rear-end collisions accounted for 16% of the accidents.

Over 55% of crashes occurred in clement conditions, such as dry pavement, daylight, clear weather, and no adverse environmental factors.

Approximately 41% of crashes had no contributing actions identified, while 15% were associated with driving too fast for conditions, 10% for proceeding without clearance, 7% from improper or careless turning, and 5% from other improper driving. Only 5% of the crashes involved large trucks, while 27% of crashes involved small trucks.

Crash data was geographically analyzed as shown in Figure 13. Slightly higher concentrations of crashes were clustered around the Gibb Road and Route 208 intersections.

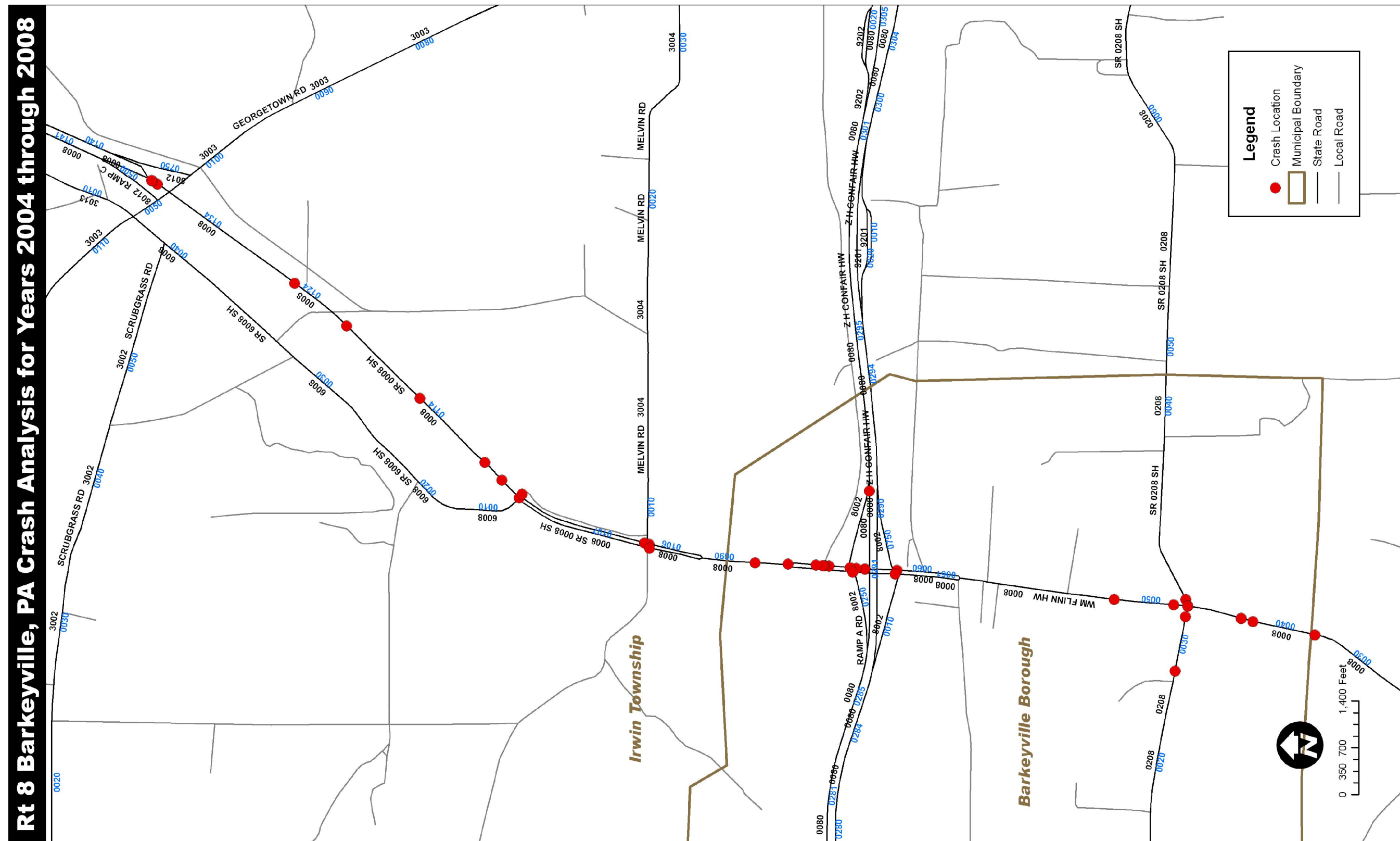


Figure 13: Crash analysis.

Level-of-Service Analysis

Methodology

Traffic conditions in the study area were evaluated using the methodology established by the Highway Capacity Manual (HCM) 2000, published by the Transportation Research Board. The HCM establishes procedures for evaluating the operation of roadways and intersections under varying traffic conditions.

Key to the HCM methodology is the establishment of Level of Service (LOS). A LOS analysis summarizes the calculated or observed operation of a roadway into a single parameter representing the traffic flow conditions. The LOS rating system defines a letter grade, ranging from LOS A representing free-flowing traffic, to LOS F, representing jammed or congested conditions.

The HCM 2000 establishes the following thresholds for each LOS, based upon the average delay per vehicle measured or calculated at an intersection:

Table 2: Level of Service Delay Thresholds.

LOS	Delay Thresholds	
	Signalized Intersection	Unsignalized Intersection
A	≤10 sec	≤10 sec
B	10-20 sec	10-15 sec
C	20-35 sec	15-25 sec
D	35-55 sec	25-35 sec
E	55-80 sec	35-50 sec
F	≥80 sec	≥50 sec

The HCM 2000 establishes methods for calculating traffic delay used to determine the LOS. These methods are based upon calculating the traffic capacity of an intersection or roadway, and evaluating the operation of the intersection under the projected traffic volumes. Analysis takes into account factors such as traffic signal timings, roadway lane width, roadway grade, conflicting pedestrian volumes, and the operation of buses and trucks in the traffic stream. This methodology is carefully calibrated based upon

national standards, but includes great flexibility to calibrate the analysis to local conditions.

A VISSIM simulation model was developed of the study corridor and used for visualization of transportation alternatives, including the Stevenson Road and Route 208 intersection. This model was not used for LOS calculations.

Calibration

PB initially performed the HCS evaluation using the default parameters incorporated into the HCS+ software package. This analysis provided levels of service significantly better than observed in the field. In particular, the analysis indicated only minor delays at the stop signs on the I-80 ramps and on Stevenson Road. Field observations indicated that delays could be significant, although highly variable. Upon observation, the cause of the variability appeared to relate to the operation of tractor-trailer combinations.

Field observations also showed that automobiles generally incurred only minor delays at the stop signs, consistent with the level of service calculated using the default parameters. However, tractor-trailer combinations generally incurred significant delays. Queues of two to three vehicles frequently occurred at these ramps. While relatively short in length, these queues often caused significant delay for vehicles.

This observed behavior results directly from the operational of a one- or two-way stop, and the different performance characteristics of trucks and automobiles. At a one-way stop such as those at the Route 8 intersections evaluated in this study, an approaching vehicle stops at the stop sign and waits for an appropriate gap in traffic and then enters the intersection. Gaps in traffic vary in size, and some are not long enough to permit a vehicle to enter safely. Left turning vehicles require longer gaps in both directions of traffic, while right turning vehicles only require a gap in traffic approaching from the right.

Video observations of these intersections confirmed that trucks required significantly larger gaps than the default parameters used in HCS analysis. As there are fewer large gaps available, trucks will generally wait longer than cars at these locations.

The site-specific gap acceptance parameters were used for the HCS analysis of unsignalized intersections in this study. As noted, heavy vehicles account for 28 to 33% of traffic flow in the

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study area, and an even higher percentage at locations such as the TA service plaza exit/Stevenson Road intersection. Using these parameters results in a significantly higher level of delay and worse LOS than projected in previous studies, but more realistically reflects actual intersection operations.

No similar calibration was required for the analysis of signalized intersections, as gap acceptance is not a key element in operation at such locations.

Table 3: 2010 HCS gap acceptance calibration.

Turning Movement	Required Gap	
	HCS default ¹	Site-calibrated ²
Left turn	7.1 sec	15.0 sec
¹ Calculated using HCS+ for site-specific conditions.		
² Measured from video observations of truck traffic at Route 8 intersections.		

Volume Adjustment

The project schedule required that traffic counts be conducted in March 2010. However, traffic volumes in the study area are seasonal, with volumes significantly higher in the summer months than in the winter. Therefore, the volumes used for analysis in this study were adjusted to reflect this seasonal peak.

Based upon PennDOT's Pub 601 (6-09) for a roadway classified as TPG-4 (Rural – Other Principal Arterials), a factor of 1.13 is appropriate to adjust March counts to reflect the seasonal peak in July.

The Glen O. Hawbaker Inc. plant on Stevenson Road only operates seasonally. During March, when counts were conducted, the plant was not in operation, with only a limited number of administrative employees on site. During the summer months, the plant operates to provide asphalt to a broad range of construction sites, resulting in an increase in employee trips and to a

significant number of trucks hauling asphalt and raw materials. Based upon historical data provided by Hawbaker, an estimate of typical peak daily traffic to and from the plant via Stevenson Road was developed. Actual daily and hourly volumes are subject to great variation depending on the location of the constantly-changing mix of construction sites being supplied. The estimate also accounts for the direct access constructed from the Hawbaker plant to Route 208.

2010 Existing Levels of Service

Using the adjusted 2010 traffic volumes and the calibrated HCS analysis methodology, the peak-hour LOS values shown in Table 4 were calculated.

The intersections generally operate at acceptable levels of service, with the exception of the I-80 westbound off-ramp and Stevenson Road, where high volumes of turning trucks impede traffic flow.

Table 4: Peak hour LOS.

2010 Peak Hour LOS			
Intersection	Type	Delay	LOS
Gibb Road	Unsig	14.0 sec	B
I-80 WB Off-ramp	Unsig	81.2 sec	F
I-80 EB Off-ramp	Unsig	18.1 sec	C
Stevenson Road	Unsig	101.0 sec	F
Route 208	Unsig	14.5 sec	B
Note: Values reported for unsignalized intersections represent minor street approach.			

Land Use

Development Patterns

The Borough of Barkeyville is a rural community. Based upon 2000 Census data, the population of 237 people live in 91 households spread over 3.5 square miles.

Barkeyville is perhaps best known for its commercial core. This area, located on both sides of Route 8 within about ¼ mile of the I-80 interchange, primarily serves motorists and truckers traveling I-80. As noted, businesses in this area include two service plazas, fast food restaurants, hotels, and several other businesses servicing highway and truck traffic.

The Barkeyville Industrial Park is adjacent to the commercial district, and includes an asphalt plant, a warehouse, and a propane tank distribution facility.

South of the commercial district is the village area of Barkeyville. For about one-half mile, Route 8 is lined with closely-spaced small homes on both sides, interspersed with churches and some small retail establishments. This community dates back to the 1850s and many of the structures appear to date from that time period as well.

Outside of these more-densely developed areas, the Borough is rural in character, with a mix of farms, low density residential, and light industrial uses.

Zoning

The Borough of Barkeyville adopted a zoning code in May 1999. The code establishes six zoning districts which reflect the existing character of the Borough: These are shown on the Zoning Map in Figure 14 and described below.

IDC – Interchange Development Corridor. This district was established to meet the objectives of capturing the economic development potential of I-80, to maintain and project existing commercial uses, and to encourage new commercial facilities to locate in functionally designed centers with safe and adequate roadway access. The IDC is

primarily located on both sides of Route 8 for approximately ½ mile on either side of I-80.

IP – Industrial Park. This district is established to meet the objective of preserving strategic properties suitable for industrial development for the establishment of diversified industry in the Borough. This zoning is primarily located in the Barkeyville Industrial Park along Stevenson Road west of the IDC.

I-2 – Industrial. This district is established to meet the objective of protecting property values to ensure a suitable, attractive, and efficient community environment by providing a regulated environment for uses which could be innately threatening to the health, safety, morals and general welfare of the community. This zoning is primarily in the north east quadrant of the Borough, relatively isolated from incompatible land uses.

R – Residential. This district is established to encourage future residential use in compact neighborhood units, and to limit uses to those compatible with the relatively high density and quality of life. This zoning primarily encompasses the village area of the Borough along Route 8.

CB – Community Business. This district is established to provide a traditional mixed-use setting for a variety of commercial and residential uses. This zoning primarily encompasses the area adjacent to the intersection of Route 8 and Route 208.

C – Conservation. This district was established to meet the community goals of preserving wetlands, aquifers, forests, floodplains and farmland, while accommodating a variety of uses appropriate to the district's rural, low-density setting. This zoning covers the outlying areas of the Borough.

Some revisions to the zoning code and map have been made in subsequent years to facilitate proposed development projects.

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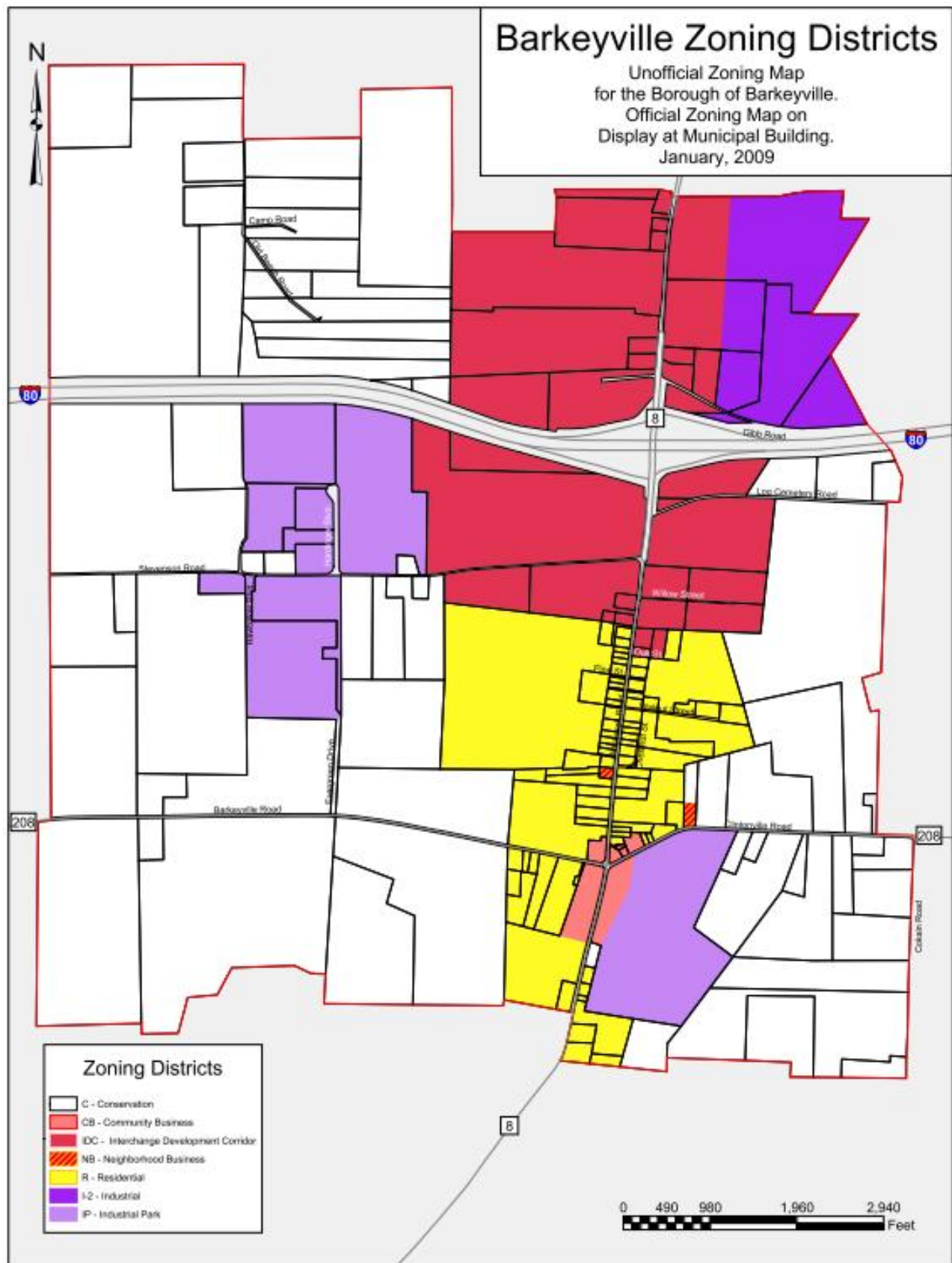


Figure 14: Barkeyville Zoning Map.

Barkeyville Industrial Park

The Barkeyville Industrial Park represents the most significant economic development in the Borough over the past decade. With tenants including the Glenn O. Hawbaker, Inc. plant, the Team Hardinger warehouse, and the Renovex facility, the industrial park has led to a significant increase in traffic volumes on Stevenson Road. The industrial park is designated as a Keystone Opportunity Zone, which provides significant abatements of state and local taxes to selected tenants. As a result of this abatement, the Park has not led to any increase in Borough tax revenues to this point, although abatements for the initial tenants will be expiring at the end of 2010.

East Gate Property

The East Gate property is a commercial development that has been proposed for the southern end of the Interstate Development Corridor along Willow Street. The exact tenant

mix is unknown at this time, although a preliminary subdivision plan has been submitted to Venango County for approval. The potential traffic impacts of this property have been the subject of concern in the community.

Utility Infrastructure

Water

The Barkeyville Municipal Authority provides water service throughout the Route 8 corridor, as well as to the Barkeyville Industrial Park and to limited areas along Route 208.

Sewer

Barkeyville is served by a small private sewage treatment facility, serving businesses along Route 8 immediately adjacent to I-80, as well as the Barkeyville Industrial Park. The sewage treatment facility is reported to have available capacity.

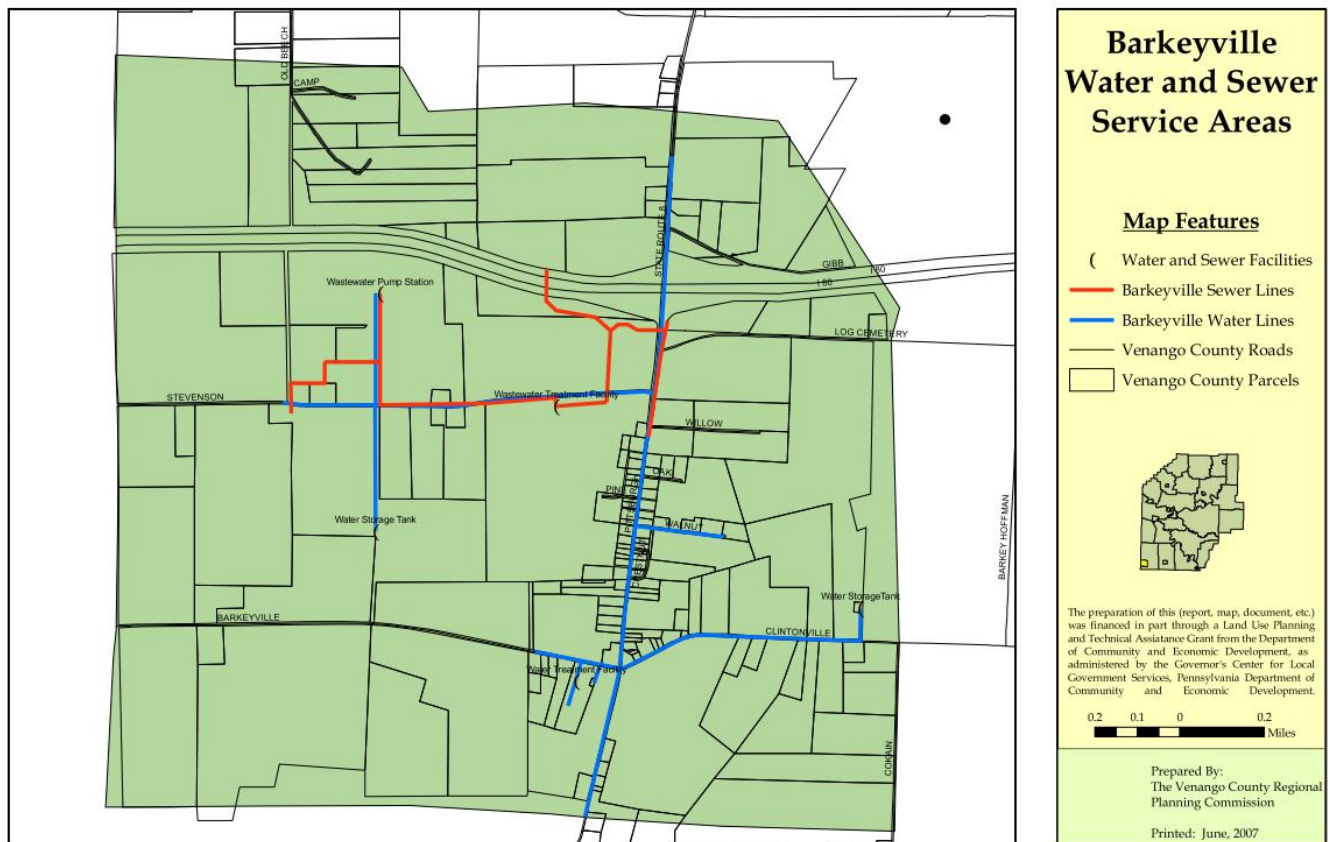


Figure 15: Water and Sewer Facilities.

LAND USE PROJECTIONS

Introduction

An analysis of existing and anticipated future land use conditions for the Borough of Barkeyville was conducted as part of this study to identify likely future land use scenarios in support of the traffic modeling and development of recommended transportation improvements for the Route 8 corridor. Future land use scenarios were developed for the medium-term (2020) and long-term (2030) full build-out analysis using current zoning regulations, as well as a potential 2030 build out with land use controls.

Future Land Use Projections

Methodology

A full-build capacity analysis of Barkeyville's zoning ordinance was conducted to determine the potential future land use scenario that could be accommodated under the Borough's current zoning ordinance. The initial developable area was determined by subtracting out setbacks and restrictions as specified in the Borough of Barkeyville Zoning Code.

The need to protect sensitive environmental conditions was also considered in defining developable area. Hydric soils provide a significant restriction of the ability to fully develop many properties in Barkeyville. Hydric soils are one of the three characteristics that define wetlands, and thus provide a realistic approximation of areas where development would either be prohibited or highly restricted. A more detailed delineation of wetlands could be prepared as was done for the Barkeyville Industrial Park, but such delineation was beyond the scope of this study. Figure 16 shows the hydric soils in the borough based upon Venango County GIS mapping. The developable area of each available parcel was further adjusted by subtracting out the areas where hydric soils are present.

The full-build capacity analysis of the borough's existing zoning code identified the potential for up to 443 residential lots, 2.1 million square feet retail use, 722 acres gas/oil drilling or mineral extraction related use, 6.6 million square feet warehousing, and 2.8 million square feet of manufacturing/industrial uses. Figure 17 shows the developable parcels overlaid on the Borough zoning map.

The amount of growth realistically anticipated to occur in Barkeyville was determined through a review of historic building permit data and through the identification of anticipated commercial and industrial development projects within the Borough. Future residential growth was determined based on historic population growth trends provided in the Southern Venango County Regional Comprehensive Plan. It is anticipated that new residential development over the next 10 to 20 years will be limited to approximately 5 to 10% of the total residential development capacity allowable under the current Barkeyville Zoning Ordinance.

The development potential shown in Figure 17 is divided into fifteen zones, numbered 1 through 15. These zones represent areas with common zoning and transportation access. The traffic projections discussed later in the report are based on these zones.

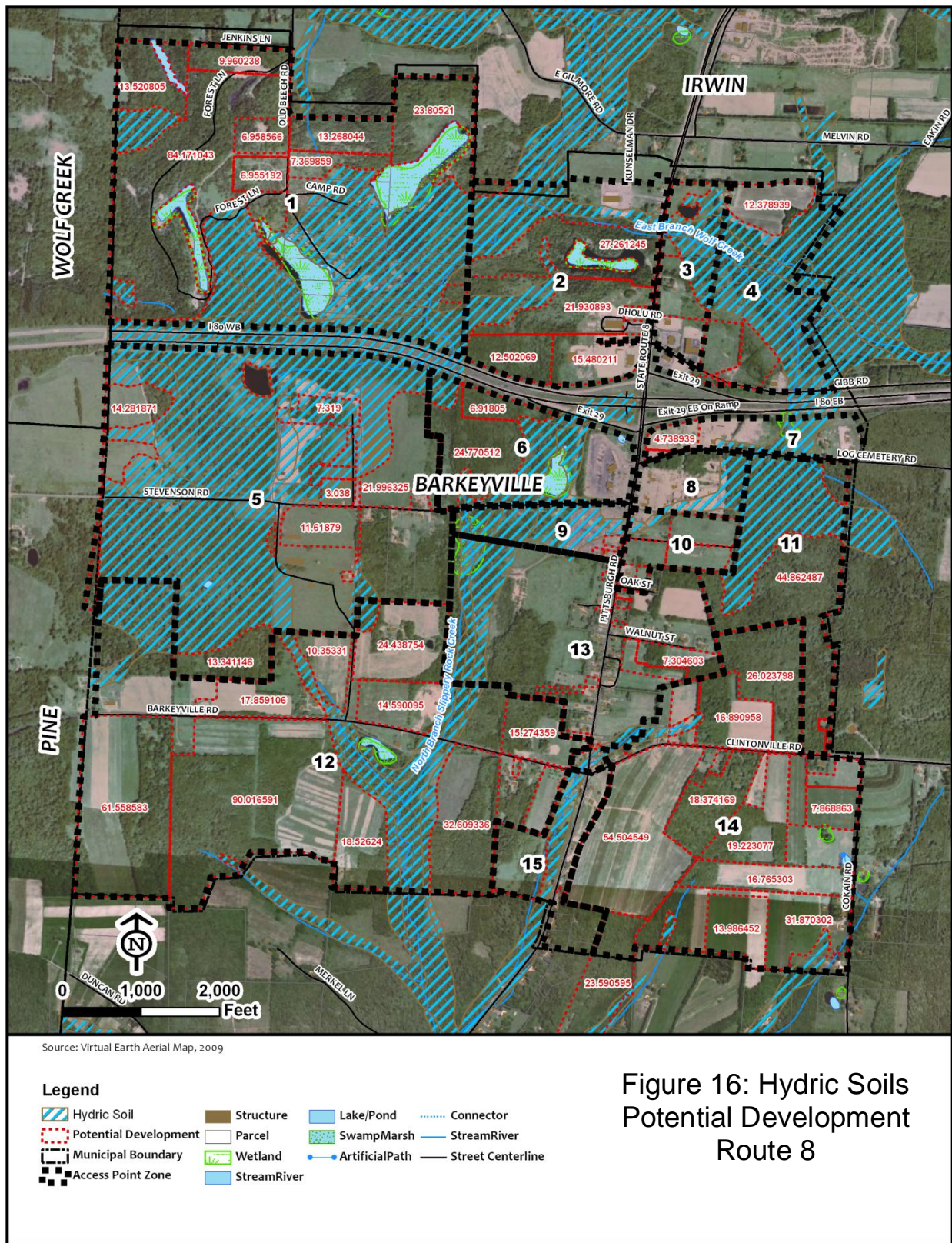


Figure 16: Hydric soils.

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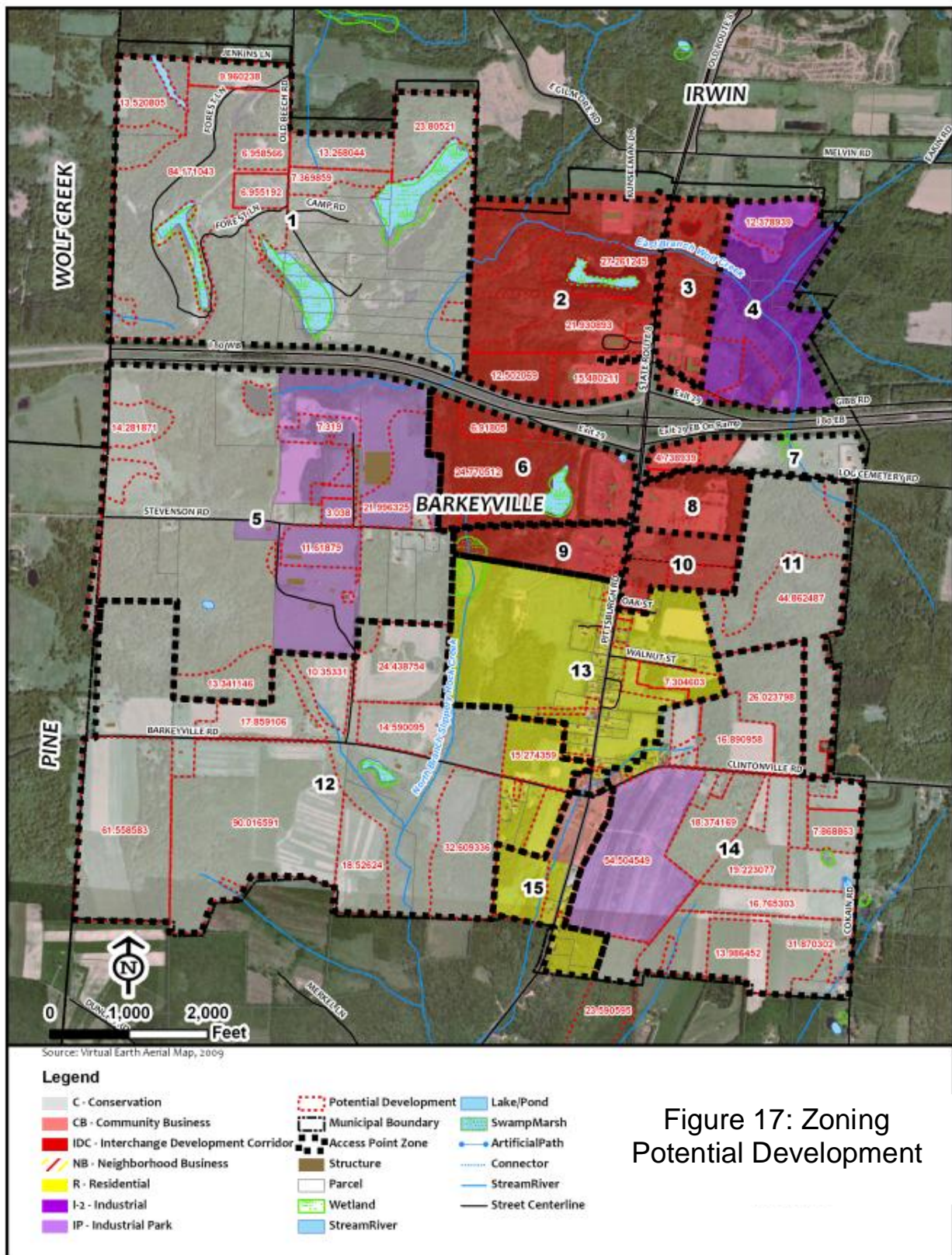


Figure 17: Zoning Potential Development

Figure 17: Zoning Potential Development.

2020 Medium-Term Scenario

The 2020 Medium-Term land use scenario is based on development that is currently planned or proposed, and is likely to occur in the next few years. This includes full build-out of the Barkeyville Industrial Park, and development of the East Gate commercial property site.

The medium term scenario also includes modest residential growth of approximately 20 units, consistent with recent historical patterns in the Borough.

For analysis purposes, the potential development in this scenario is assumed to be similar to the existing patterns, with additional warehousing being developed in the Barkeyville Industrial Park, and a gas station/convenience market and small retail uses at the East Gate development site. The land use assumed for this scenario is shown in Table 5.

Table 5: 2020 Medium-Term Land Use Assumptions.

2020 Medium-Term Land Use Scenario	
ZONE #	Assumed Land Uses
1	4 Single-Family Residential Lots
5	1.3 Million SF Warehousing 1 Single-Family Residential Lot
8	N/A
10	16,000 SF Retail 4000 SF Convenience Market With Gas Pumps
11	1 Single-Family Residential Lot
12	5 Acres Mining (Sand/Gravel Quarry Mine) 8 Single-Family Residential Lots
13	1 Single-Family Residential Lot
14	5 Acres Mining (Sand/Gravel Quarry Mine) 4 Single-Family Residential Lots
15	1 Single-Family Residential Lot

2030 Long-Term Scenario

The 2030 Long-Term scenario is based upon full buildout of the commercial and industrial areas of the Borough in accordance with the zoning code. Residential development is anticipated to occur at a rate consistent with past trends, with 20 to 40 units to be constructed over the next 20 years.

Although this full build-out scenario for Barkeyville Borough is very optimistic, it provides the worst-case scenario and reflects development that would be permitted by right under today's zoning code. At this time, economic conditions do not appear to support such an intensive level of development. However, economic trends are likely to reverse, and with suitable zoned land and available infrastructure, Barkeyville could be well-positioned for future growth.

Land uses for the 2030 Long-Term scenario are anticipated to be relatively similar to today's land uses, with warehousing in the industrial zones and a mix of restaurants, hotels, and gas stations in the commercial zones. This also included several commercial retail centers of 50,000 square feet, the maximum size permitted by right under the zoning code. This study does not evaluate the potential impact of much larger retail centers that could be permitted as conditional uses under the zoning code.

The land use assumptions for the 2030 Long-Term scenario are shown in Table 6 on the following page.

Table 6: 2030 Long-Term Land Use Scenario.

2030 Long-Term Land Use Scenario	
ZONE #	Assumed Land Uses
1	8 Single-Family Residential Lots
2	Two parcels 50,000 SF Retail 4,000 SF Fast-Food Restaurant with Drive-Through Window Two Motels 70 Rooms Each 7000 SF High-Turnover (Sit-Down) Restaurant 4000 SF Convenience Market With Gas Pumps
3	4,000 SF Fast-Food Restaurant with Drive-Through Window 50,000 SF Retail 4000 SF Convenience Market With Gas Pumps
4	765,000 SF Warehousing
5	1.3 Million SF Warehousing 2 Single-Family Residential Lots
6	880,000 SF Warehousing
7	7000 SF High-Turnover (Sit-Down) Restaurant
8	N/A
9	31,500 SF Retail
10	Two parcels at 50,000 SF Retail 16,000 SF Retail Two Motels 70 Rooms Each 4000 SF Convenience Market With Gas Pumps
11	2 Single-Family Residential Lots
12	5 Acres Mining (Sand/Gravel Quarry Mine) 16 Single-Family Residential Lots
13	2 Single-Family Residential Lots
14	5 Acres Mining (Sand/Gravel Quarry Mine) 1.5 Million SF Warehousing 8 Single-Family Residential Lots
15	2 Single-Family Residential Lots

2030 Land Use Control Scenario

As noted, the full build-out of the Borough in Borough is somewhat unrealistic. As will be discussed in the next section, the projected traffic impacts of this scenario would be significant. An alternative scenario, which has been developed, reflecting modest changes in zoning would have a less significant impact on traffic.

Of the anticipated future land uses, two in particular contribute to a disproportionate amount of the future projected traffic: warehousing and large commercial retail centers. By changing zoning to restrict these uses somewhat, the future traffic projections could be reduced by nearly one-third. The proposed changes include rezoning industrial areas in the northeastern and

northwestern segments of the Borough as conservation zones, and reducing the maximum “by-right” size of a commercial retail center to 16,000 square feet from 50,000 square feet. Both changes would be consistent with current land uses and scale of development in the Borough.

This scenario is hypothetical. Many alternate land use control scenarios could be developed, some of which could reduce future traffic impacts further, but could have a greater adverse impact on property owners and future economic development.

The land use assumptions for the 2030 Land Use Control Scenario are shown in Table 7 on the following page.

Table 7: 2030 Land Use Control Scenario.

2030 Land Use Control Scenario	
ZONE #	Assumed Land Uses
1	8 Single-Family Residential Lots
2	Two parcels 15,000 SF Retail
	4,000 SF Fast-Food Restaurant with Drive-Through Window
	Two Motels 70 Rooms Each
	7000 SF High-Turnover (Sit-Down) Restaurant
	4000 SF Convenience Market With Gas Pumps
3	4,000 SF Fast-Food Restaurant with Drive-Through Window
	15,000 SF Retail
	4000 SF Convenience Market With Gas Pumps
4	2 Single Family Residential Lots
5	1.3 Million SF Warehousing
	2 Single-Family Residential Lots
6	Conservation
7	7000 SF High-Turnover (Sit-Down) Restaurant
8	N/A
9	31,500 SF Retail
10	(2) 15,000 SF Retail
	16,000 SF Retail
	Two Motels 70 Rooms Each
	4000 SF Convenience Market With Gas Pumps
11	2 Single-Family Residential Lots
12	5 Acres Mining (Sand/Gravel Quarry Mine)
	16 Single-Family Residential Lots
13	2 Single-Family Residential Lots
14	5 Acres Mining (Sand/Gravel Quarry Mine)
	Conservation
	8 Single-Family Residential Lots
15	2 Single-Family Residential Lots

TRAFFIC PROJECTIONS

Methodology

Future traffic volume estimates are based on 2010 turning movement volumes, with adjustment to reflect growth in background traffic and growth due to projected development in the study area.

Background growth reflects an increase in traffic passing through the study area, due to development elsewhere. Based upon the PennDOT Statewide Traffic Trends Table for 2007-2008, traffic on I-80 is anticipated to grow at 2.4% per year, while traffic on Route 8 and Route 208 is anticipated to grow by approximately 1% per year.

Estimates for traffic due to development in the study area are based upon the land use scenarios outlined in the previous section. Trip generation is based upon based rates and procedures contained in the *Trip Generation Manual* (Institute of Transportation Engineers, 8th edition, 2008).

Because of the unique development patterns in the study area, all-site generated trips are assumed to be primary trips, with the majority arriving and departing via I-80. Because of the low existing traffic volumes on Route 8, and the lack of significant residential development, very few trips would be pass-by trips on Route 8 or originate and terminate within the study area.

With a significant amount of industrial/ warehouse development, truck volumes in the study area are projected to remain high.

2020 Medium-Term Scenario

Results of the HCS analysis performed using projected 2020 traffic volumes on the existing roadway network are summarized in Table 8.

As shown in the table, intersection operation is projected to degrade significantly at the I-80 ramps and at Stevenson Road. The projected levels of service are to some extent unrealistic.

These high levels of projected congested delay can be traced to the operation of these intersections under one- or two-way stop control. As discussed previously, vehicular operation at such intersections requires vehicles to wait and select a gap in cross traffic large enough to permit entering the intersection safely. Two of these intersections are already at capacity. Increases in cross traffic on Route 8 will reduce the number and size of available gaps, while an increase in traffic on Stevenson Road and the I-80 ramps will create an increased demand for those gaps.

The projected levels of congestion would be to some extent self-limiting. The level of delay would encourage travelers to select alternate routes, or could discourage anticipated development from occurring. This could have a significant adverse economic impact on existing and potential businesses. In either case, traffic congestion would reach a point significantly higher than at present.

Table 8: Existing and Projected Levels of Service.

Existing and Projected Levels-of-Service							
Intersection	Type	2010 Existing		2020 Medium-Term		2030 Long-Term	
		Delay	LOS	Delay	LOS	Delay	LOS
Gibb Road	Unsig	14.0 sec	B	17.1 sec	C	14.2 hr	F
I-80 WB Off-ramp	Unsig	81.2 sec	F	1.4 hr	F	*	F
I-80 EB Off- ramp	Unsig	18.1 sec	C	6.8 min	F	*	F
Stevenson Road	Unsig	101.1 sec	F	27.8 min	F	15.3 hr	F
Route 208	Unsig	14.5 sec	B	27.5 sec	D	1.8 hr	F
Note: Values reported for unsignalized intersections represent minor street approach. *Value exceeds threshold of analysis methodology.							

2030 Long-Term Scenario

Results of the HCS analysis performed using projected 2030 traffic volumes on the existing roadway network are also summarized in Table 8.

As shown in the table, intersection operation is projected to degrade significantly at the I-80 ramps and at Stevenson Road. The projected levels of service are essentially off the charts, and are unlikely to occur in reality.

These high levels of projected congested delay can be traced to the operation of these intersections under one- or two-way stop control. As discussed previously, vehicular operation at such intersections requires vehicles to wait and select a gap in cross traffic large enough to permit entering the intersection safely. Two of these intersections are already at capacity. Increases in cross traffic on Route 8 will reduce the number and size of available gaps, while an increase in

traffic on the minor streets ramps will create an increased demand for those gaps.

The projected level of development could not occur without adding significant new roadway capacity to the study area, as outlined in the following section. Without such additional capacity, the projected levels of congestion would be self-limiting. The level of delay would encourage travelers to select alternate routes, or could discourage anticipated development from occurring. This could have a significant adverse economic impact on existing and potential businesses. In either case, traffic congestion would reach a point significantly higher than at present.

POTENTIAL ALTERNATIVES

A range of alternatives were evaluated to determine their ability to meet the objectives of this study. Among these measures were all-way stop control at key intersections, signalization, roadway and roundabouts. Some widening and geometric improvements were evaluated in conjunction with these measures. Land use controls were evaluated as an alternative to capacity improvements. A range of pedestrian improvements were also considered.

All-Way Stop Control

The lowest-cost method to improve level-of-service at two-way stop controlled intersections is conversion to all-way stop control (AWSC). By alternating the right-of-way between vehicles on major- and minor-street approaches, an all-way stop can provide significantly more opportunity for traffic on the minor street to enter the intersection. This can substantially reduce the delay on the minor street, although at the cost of introducing delay on the formerly free-flowing major street.

All-way stop control is somewhat unconventional on arterial highways, but can work well if traffic volumes are moderate and evenly balanced. HCS

analysis indicates that all-way stop control would provide some mitigation of traffic congestion at key intersections, but would not provide acceptable levels of under projected 2020 conditions. Projected LOS is summarized in Table 9.

Site-specific conditions would make all-way stop control less than ideal. Stop signs on a major arterial are often unexpected, and shoulder-mounted signs may not be visible from all lanes. Additional measures, such as flashing beacons, might be required to assure safety. Tractor-trailer combinations have poor acceleration and deceleration, and requiring each vehicle to stop at a succession of stop signs would be inefficient and could lead to adverse air quality and noise impacts.

Given these limitations, all-way stop control does not appear to provide an acceptable mitigation of the projected traffic conditions in the Route 8 corridor. All-way stop control could be an acceptable interim measure during the design and installation of long-term improvements at these intersections, should traffic congestion or safety issues require more immediate resolution.

Table 9: LOS with All-Way Stop Control.

LOS with All-Way Stop Control										
Intersection	2010 Existing		2020 Medium-Term				2030 Long-Term			
	TWSC		TWSC		AWSC		TWSC		AWSC	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Gibb Road	14.0 sec	B	17.1 sec	C	N/A	-	14.2 hr	F	22.4 min	F
I-80 WB Off-ramp	81.2 sec	F	1.4 hr	F	80.9 sec	F	*	F	41.6 min	F
I-80 EB Off-ramp	18.1 sec	C	6.8 min	F	138.0 sec	F	*	F	40.4 min	F
Stevenson Road	101.1 sec	F	27.8 min	F	24.2 sec	C	15.3 hr	F	18.5 min	F
Route 208	14.5 sec	B	27.5 sec	D	12.7 sec	B	1.8 hr	F	10.6 min	F
TWSC – Two-way stop control AWSC – All-way stop control WB – Westbound; EB - Eastbound N/A – Not analyzed * Value exceeds threshold of analysis methodology.										

Signalization

Signalization of key intersections could also provide some improvements at a reasonable cost, as shown in Table 10.

2020 Projected Conditions

Under projected 2020 conditions, the intersections of Route 8 with Stevenson Road and the I-80 off-ramps would operate at acceptable levels of service. This analysis indicates that no additional widening or turn lanes would be required on Route 8 or the I-80 off-ramps to support signalization. The I-80 off-ramp intersections would operate acceptably with two-phase signal operation and permissive left turn control.

Some geometric improvements would be required at the Stevenson Road intersection to support signalization. These are shown graphically in Figure 18. Primarily, this would consist of relocating the TA service plaza exit closer to Route 8, allowing it to operate as a fifth leg of the intersection. This approach would be controlled by a separate, exclusive signal phase. The geometric improvements would also include widening the Stevenson Road approach to provide a full 12-foot lane in each direction, installation of crosswalks on all approaches, and defining the curb returns and pavement edge lines to better delineate the intersection.



Figure 18: Stevenson Road Geometric Improvements.

Table 10: LOS with Signal Control.

LOS with Signal Control										
Intersection	2010 Existing		2020 Medium-Term		2030 Long-Term					
	TWSC		TWSC		Signal		TWSC		Signal	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Gibb Road	14.0 sec	B	17.1 sec	C	N/A	-	14.2 hr	F	32.7 sec	C
I-80 WB Off-ramp	81.2 sec	F	1.4 hr	F	18.2 sec	B	*	F	57.1 sec	E
I-80 EB Off-ramp	18.1 sec	C	6.8 min	F	19.1 sec	B	*	F	46.0 sec	D
Stevenson Road	101.1 sec	F	27.8 min	F	22.4 sec	C	15.3 hr	F	35.1 sec	D
Route 208	14.5 sec	B	27.5 sec	D	N/A	-	1.8 hr	F	36.2 sec	D
N/A – Not analyzed TWSC – Two-way stop control * Value exceeds threshold of analysis methodology.										

2030 Projected Conditions

Under projected 2030 conditions, the intersections of Route 8 with Stevenson Road, the I-80 off-ramps and Route 208 would operate at a poor level of service, even with significant widening of Route 8 and the intersecting ramps and streets.

As shown in Figure 19, the projected improvements would include widening the I-80 overpass to 7 lanes, to permit dual left turn lanes onto and off of each ramp. Widening would extend from Gibb Road to Willow Street, in order to provide additional turning lanes at Stevenson Road and Gibb Road. Additional widening may be required further north and south to accommodate adjacent driveways as well.

Even with this extensive widening, the HCS analysis indicates that the I-80 westbound off-ramp intersection would operate at LOS E. The I-80 eastbound off-ramp and Stevenson Road intersections would operate at LOS D.

Traffic Signal Warrants

The results of a traffic signal warrants analysis at the key study area intersections are summarized in Table 11: Warrant Analysis Summary. The Manual on Uniform Traffic Control Devices (MUTCD) mandates an engineering study to determine whether installation of a traffic signal is justified at a particular intersection. The MUTCD then establishes eight warrants which, if met, can justify the installation of a traffic signal. These warrants are based upon the evaluation of a range of traffic conditions, pedestrian characteristics, and physical conditions of the intersection.

Under 2010 existing traffic conditions, the intersection of Route 8 with the I-80 eastbound off-ramp meets the volume criteria of Warrant 3: Peak Hour. Two additional intersections, Stevenson Road and I-80 Westbound Off-ramp, meet the volume conditions of Warrant 2: Four Hour Vehicular Volume, if adjusted to reflect the high proportion of large trucks in the traffic stream. Such an adjustment is not typically made, but field observations and actual traffic counts indicate that the truck percentages observed are significantly outside the standard range, and that this adjustment follows from the guidance provided in the MUTCD.

Under 2020 projected conditions, the intersections of Route 8 with both I-80 off-ramps, Stevenson Road and Route 208 all meet the volume conditions of Warrant 3: Peak Hour. These are



Figure 19: Route 8 Widening.

conditions that would be met with full build-out of the Barkeyville Industrial Park and the East Gate development, and would require future reevaluation following actual development of these sites.

Under projected 2030 traffic conditions, the intersection of Gibb Road also meets the volume conditions of Warrant 3. It can be anticipated that under the traffic conditions of this full build-out of developable land within the borough, a number of other driveways would also warrant signalization.

Discussion with the Traffic Engineering Unit of PennDOT District 1-0 indicated that they will not

accept the adjusted warrant analysis to justify traffic signal installation under existing conditions, but they concur that signalization is likely to be warranted in the future with increasing development and growth in traffic..

Table 11: Warrant Analysis Summary.

Warrant Analysis Summary			
Intersection	2010 Existing Conditions	Warrant Met	
		2020 Projected Conditions	2030 Projected Conditions
Gibb Road	Not met	Not Met	Peak Hour
I-80 WB Off-Ramps	Not met*	Peak Hour	Peak Hour
I-80 EB Off-Ramp	Peak hour	Peak Hour	Peak Hour
Stevenson Road	Not met*	Peak Hour	Peak Hour
Route 208	Not met.	Peak Hour	Peak Hour
* Intersections at I-80 WB Off-ramp and at Stevenson Road met the Four-Hour Warrant if analysis is calibrated to reflect the high percentage of large trucks in the traffic stream. However, PennDOT District 1-0 Traffic Unit did not accept this calibration.			

Roundabout

A third option is the installation of a roundabout at the intersection of Route 8 and Route 208, as shown in Figure 20. A modern roundabout is designed to operate in a free-flowing manner, with traffic entering the roundabout yielding the right-of-way to traffic circulating around the roundabout. Such roundabouts have recently returned to favor as an option for traffic control due to their many advantages over all-way stop or signal control.

Among these advantages are:

- Significant safety improvement,
- Reduced delay during off-peak periods,
- Increased capacity due to continuous flow,
- Lower maintenance costs,
- Potential focal point or gateway, and
- Traffic calming for traffic entering the community.

The Route 208/Route 8 intersection would be a suitable candidate for installation of a roundabout. Traffic volumes are reasonably well balanced, with significant percentages of traffic turning at the intersection.

The HCM 2000 does not explicitly define LOS for roundabouts, but indicates that this location would operate at a volume-to-capacity ratio of between 0.43 and 0.52 under projected 2030 conditions. This is comparable to the projected LOS for a signal at this location. Finally, the construction cost of a roundabout at this location is estimated to be comparable to that of a traffic signal and associated widening of approach roadways.

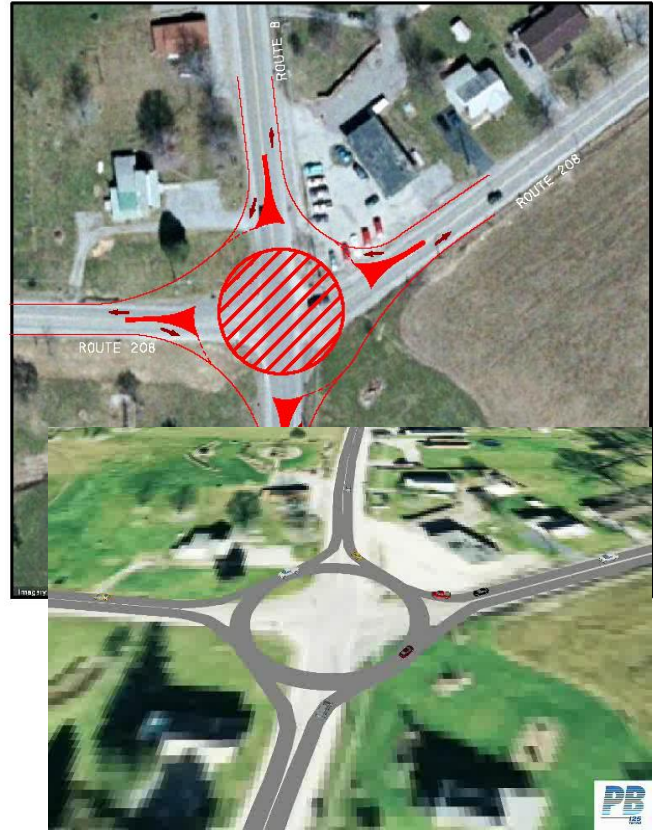


Figure 20: Route 208 Roundabout Potential Layout.

Land Use Control

The alternatives outlined previously all involve managing future traffic congestion by increasing roadway capacity through changes in traffic control combined with geometric improvements. As an alternative, future traffic congestion could be managed by land use controls, keeping future traffic growth within the capacity of the roadway network.

The 2030 Land Use Control Scenario outlined previously in this report was evaluated as an alternative. This scenario was based upon full build-out of the zoned land within the Borough, with the following restrictions and limitations:

- Downzone industrial land in the northeastern and southeastern sections of the Borough to Conservation.
- Limit commercial/retail development by right to 16,000 square feet per parcel.
- Restrict conditional uses within Conservation zones.

The trip generation from the resulting level of development was forecasted and analyzed it using the existing roadway network, with the traffic signal and configuration developed for the 2020 Medium-Term scenario. Preliminary analysis

indicated that the single-lane off-ramps would be unable to accommodate the resulting level of traffic, but a realistic widening of these ramps to accommodate left turn lanes could be accomplished within the existing right of way at a moderate construction cost. The results of this analysis are presented in Table 12. The results of the analysis indicated that the imposition of reasonable land use controls could limit traffic growth to a level that could be accommodated with only moderate additional capital improvements to the transportation system. A somewhat more restrictive set of controls could further reduce projected traffic growth to a level that would not require additional capacity improvements. Such a set of controls has not been fully detailed as part of this study, but might include:

- Downzoning industrial land,
- Limiting commercial/retail development by right to 16,000 square feet per parcel,
- Restricting conditional uses within Conservation zones,
- Restricting the maximum size of warehouses, and
- Downzoning some sections of the Interchange Development Corridor to Conservation.

Table 12: LOS with Land Use Control.

LOS with Land Use Control								
Intersection	2010 Existing		2020 Medium-Term		2030 Long-Term			
	TWSC		Without Control	Without Control	Signalized			
	Existing				Without Control		With Land Use Control	
	Delay	L O S			Delay	L O S	Delay	L O S
Gibb Road	14.0 sec	B	N/A	-	32.7 sec ⁽¹⁾	D	56.6 sec ⁽²⁾	E
I-80 WB Off-ramp	81.2 sec	F	18.2 sec	B	57.1 sec ⁽¹⁾	E	278 sec ⁽²⁾	F
I-80 EB Off- ramp	18.1 sec	C	19.1 sec	B	46.0 sec ⁽¹⁾	D	219 sec ⁽²⁾	F
Stevenson Road	101.1 sec	F	22.4 sec	C	35.1 sec ⁽¹⁾	D	37.1 sec ⁽²⁾	D
Route 208	14.5 sec	B	N/A	-	36.2 sec	D	24.3 sec	C
N/A – Not analyzed								
TWSC – Two-way stop control								
⁽¹⁾ Assumes widening of Route 8 to 7 lanes across I-80								
⁽²⁾ Assumes addition of turn lanes on I-80 off-ramps; no widening of Route 8.								

Pedestrian Improvements

Currently, pedestrian accommodations within the Borough of Barkeyville are minimal. Pedestrians can walk along the shoulders of the roadway between Gilmore Road and Willow Street. South of Willow Street, the shoulders become narrow, and pedestrians walk alongside the road. No provisions are made for pedestrian crossings of Route 8 anywhere within the Borough. This was recognized by the Southern Venango County Comprehensive Plan, which included sidewalks and crosswalks as part of the Barkeyville Concept Plan.

Alternatives that could improve pedestrian accommodations within the study area are outlined below. The benefit of these alternatives would be in a significantly enhanced pedestrian environment. Such benefits are difficult to quantify, including benefits to roadway capacity and cannot be analyzed using the traditional traffic models.

Crosswalks

Crosswalks are anticipated to be installed as part of any all-way stop or traffic signal proposed in this study. Traffic signals would also include pedestrian walk/don't walk indications in accordance with PennDOT standards.

Sidewalks in Gateway Area

The Barkeyville Concept Plan includes proposed streetscape improvements throughout the Interchange Development Corridor. Sidewalks are one element, which could be installed independently as a pedestrian improvement, with other streetscape elements installed separately. This study recommends the installation of sidewalks between Dholu Road and Willow Street, connected by crosswalks at the signalized intersections. The 150- to 180-foot right of way throughout this section provides ample space to accommodate a sidewalk. Sidewalks cannot be installed on the I-80 overpass without replacement of the bridge, but the shoulder can accommodate pedestrian movements in this segment. Other elements included in the concept plan for the Gateway area are street lighting, street trees, screening of the parking lots and landscaping and signage at the Interchange ramps.

Sidewalks in Village Area

Sidewalks could be extended through the village area between Willow Street and Route 208. Sidewalks in this area would enhance the village atmosphere, and make it easier for residents to walk to churches and the commercial areas. The 60-foot right of way can accommodate sidewalks.

Walkways in Village Area

A lower-cost alternative to sidewalks in the village area would be an enhanced network of pedestrian walkways, as shown in Figure 21. This network appears to be the remnants of the original street grid established for the village of Barkeyville. These walkways are separate from adjacent land parcels, although their legal status as rights of way is not clear. This network could be cleared of brush and resurfaced with aggregate to provide an improved pedestrian network at a fraction of the construction cost of sidewalks. However, this network does not extend throughout the village area and has some gaps resulting from private land ownership.



Figure 21: Potential Pedestrian Walkways.

Relocation of TA Driveway

The 2007 Barkeyville Industrial Park Traffic Impact Study included recommendations for the relocation of the TA service plaza exit a minimum of 250 feet further west along Stevenson Road in order to simplify the operations of the Stevenson Road Route 8 intersection. However, site constraints detract from the feasibility of this option.

Stevenson Road descends westward from Route 8 at a 6% grade, while the TA service plaza is constructed on fill at grade with Route 8. As a result, Stevenson Road is approximately 10 to 12 feet lower than the service plaza in this location. Relocation of the driveway would either require raising the grade of Stevenson Road or lowering the service plaza.

Raising the grade of Stevenson Road would be challenging due to the presence of a pond and wetland located 700 feet west of Route 8. These constraints can be seen in the three-dimensional view shown in Figure 22.



Figure 22: Aerial view of Stevenson Road adjacent to TA Service Plaza.

Lowering the service plaza exit to match the Stevenson Road grade would also be challenging. The exit driveway needs to accommodate a traffic mix that effectively consists of 100% tractor-trailer combinations. These vehicles have shallow acceleration and deceleration profiles, and are strongly influenced by roadway grades. In order to avoid an unacceptable sag vertical curve at the

driveway portal and to maintain an acceptable grade, the exit drive would need to extend approximately 300 feet into the service plaza site. This would seriously disrupt plaza operations, and could result in a loss of half of the truck parking area on that site.

An alternate alignment could bring the driveway from the TA Service Plaza over Stevenson Road via a structure to the Kwik Fill Service Plaza, allowing traffic from both plazas to exit onto Route 8 from a combined driveway located opposite Willow Street. Construction costs would be significant for this option, and it would require acquiring an easement through the Kwik Fill property. Traffic exiting the combined driveway would face capacity issues similar to those at Stevenson Road. This alternative is not considered to be cost effective.

We also investigated relocating the TA exit to a location on Route 8 midway between Stevenson Road and the TA service plaza entrance. This location would maintain an approximately 200-foot spacing between the driveways and the intersection. As shown in Figure 23 and Figure 24 Turning movements from this potential driveway would have a limited impact on internal TA site operations and would work acceptable on Route 8. This configuration would simplify operations at the Stevenson Road intersection and would greatly improve LOS at that location. However, it would not significantly improve projected LOS for traffic exiting the TA service plaza. It would also work contrary to the project goal of limiting driveway access throughout the corridor. Relocation of this driveway would thus be a short-term solution.

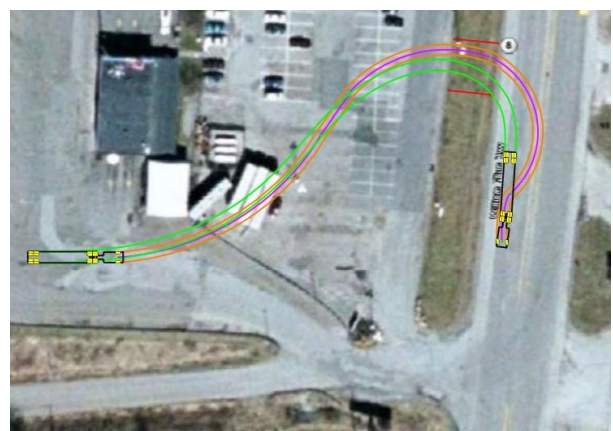


Figure 23: Right Turns from Relocated TA Exit

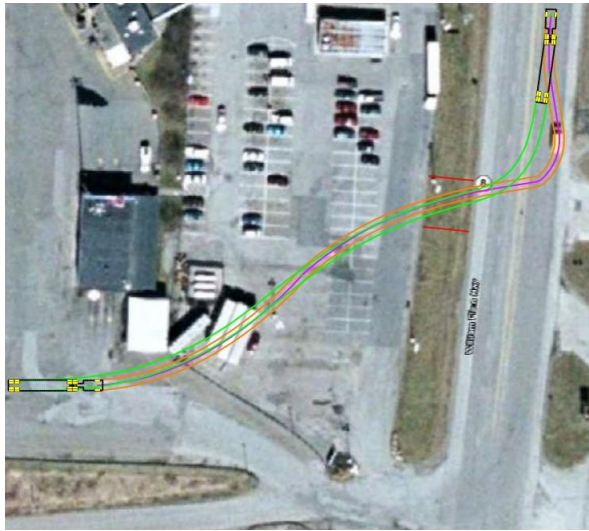


Figure 24: Left Turns from Relocated TA Exit.

A longer-term solution that is recommended is the relocation of the driveway closer to Route 8, which was discussed previously as part of the signalization of the Stevenson Road intersection. However, this solution could only be implemented after traffic volumes increase to the point where signalization would be warranted.

Center Turn Lane

A center median lane could improve the operation of left turns from intersecting streets and ramps. Conceptually, this lane could allow left turns to be made in two stages, from the intersecting street into the median, and then merging from the median lane into the traffic flow. Theoretically, this would allow each stage of the turn to occur with a gap only in the one conflicting traffic flow. The existing cartway could be restriped to provide such a media, either through narrowing shoulders or removing one or more existing through lanes. However, review of the turning envelope of large trucks indicates that this median lane would impede left turns from Route 8 onto the I-80 ramps and intersecting streets. Large vehicles paused in the median between stages of the turn would also create potential sight distance and safety impacts. This alternative is not recommended for further consideration.

PREFERRED ALTERNATIVE

Community Input

The alternatives outlined in this study were presented to the community at the second public meeting and at the Barkeyville Borough Council meeting. Some alternatives raised strong concern among members of the community. Among the elements of concern were:

Extensive Development

The 2030 Long-Term full build-out scenario is unacceptable to many members of the community given that the projected traffic congestion and required mitigation measures would drastically alter the nature of the community.

Land Use Controls

Land use controls also are unacceptable to many members of the community. Individual property owners and businesses were opposed to restrictions on their ability to develop their property. Some community leaders were concerned that excessive land use controls would stifle economic development.

Implementation Costs

Implementation costs are a significant concern to the Borough and to the citizens. The financial resources of the Borough are extremely limited. The projects capital costs of the alternatives are far beyond the Borough's capacity, and even the annual maintenance costs of traffic signal operation could be problematic.

Land Acquisition

While most alternatives could be constructed within the existing right-of-way, the Route 208 improvements would encroach onto adjacent properties.

Based upon the goals and objectives established for this study and the input from the community, Preferred Alternatives for the Route 8 Corridor are outlined below.

Preferred Alternatives

Signalization of Stevenson Road

The intersection of Route 8 and Stevenson Road will be signalized, combined with geometric improvements to Stevenson Road and the TA

Service Plaza driveway at the intersection. No widening of Route 8 is anticipated. The signal will include crosswalks and pedestrian indications. Signal warrants are not met for this location under 2010 conditions, and until signalization is warranted, relocation of the TA driveway to Route 8 may provide mitigation in the interim.

Signalization of I-80 Westbound Off-Ramp

The intersection of the I-80 westbound off-ramp with Stevenson Road will be signalized. No widening of the ramp or Route 8 is anticipated. The signal will include crosswalks and pedestrian indications.

Signalization of I-80 Eastbound Off-Ramp

The intersection of the I-80 eastbound off-ramp with Stevenson Road will be signalized. No widening of the ramp or Route 8 is anticipated. The signal will include crosswalks and pedestrian indications.

Sidewalks in Gateway Area

Sidewalks will be constructed along both sides of Route 8 between Dholu Road and Willow Street. The sidewalks will be constructed within the existing right of way. Sidewalks will not be constructed on the bridge over I-80.

Access Management Controls

The Borough of Barkeyville will implement access management controls including:

- Restrictions on the locations of driveways and future traffic signals,
- Implementation of requirements for traffic impact studies for all new developments, and
- Transferring the responsibility of mitigating the traffic impact of site development projects to developers.

These controls will be implemented through the Venango County Subdivision and Land Development Ordinance (SALDO). Venango County is currently reviewing this ordinance, and anticipates revisions next year incorporating the access management and traffic impact study requirement recommendations of this study.

Implementation Costs

Capital Costs

Capital cost estimates for the Preferred Alternatives are presented in Table 13: Preferred Alternative Capital Costs. These estimates are based upon conceptual designs and unit costs obtained from recently-bid PennDOT projects.

The cost estimates include design, construction, and project management costs. Detailed calculations are presented in Appendix C.

These cost estimates are based upon 2010 data. Construction costs have been extremely volatile in the past decade, but generally costs can be expected to increase by 5% to 7% per year.

Preferred Alternative Capital Costs				
Alternative	Estimated Capital Costs			
	Design	Construction	Management	Total
Signalization of I-80 WB Off-Ramp	\$24,000	\$171,241	\$19,524	\$214,765
Signalization of I-80 EB Off-Ramp	\$24,000	\$169,964	\$19,396	\$213,360
Signalization of Stevenson Road	\$24,000	\$194,910	\$21,891	\$240,800
Geometric Improvements at Stevenson Road	\$50,000	\$186,250	\$23,625	\$259,875
Sidewalks in Gateway Area	\$100,000	\$853,070	\$95,307	\$1,048,377
Access Management	--	--	--	--
Total	\$222,000	\$1,575,435	\$159,743	\$1,977,177

Table 13: Preferred Alternative Capital Costs.

Preferred Alternative Annual Operations and Maintenance Costs	
Signalized Intersection	Annual Cost
Signal at I-80 WB Off-Ramp	\$3,000
Signal at I-80 EB Off-Ramp	\$3,000
Signal at Stevenson Road	\$3,000
Total	\$9,000
Includes routine maintenance, electrical power and replacement of LED signal heads. Does not include replacement of damaged equipment.	

Table 14: Preferred Alternative Operating Costs.

Operating Costs

The Borough of Barkeyville will be responsible for operation and maintenance of the traffic signals included in the Preferred Alternative. Estimated annual operating costs are presented in Table 14. These cost estimates include contracted routine maintenance, electrical service, and routine replacement of LED signal heads.

These estimates do not include replacement of damaged equipment, as such needs are sporadic and impossible to predict. Such costs could reach as high as \$20,000 per incident, but may be recoverable from the party responsible for the damage.

Future Consideration

A number of alternatives evaluated during this study have the potential to meet projected or potential needs. However, in the near-term, there is either no current need or no consensus for implementation. These are outlined here, and may be candidates for future implementation as land use and transportation needs change in the future.

Land Use Controls

The impact of the 2030 Long-term Full Build-out land use scenario was clearly unacceptable to the community. However, the specific restrictions outlined in the Land Use Control scenario were unacceptable to a number of property owners. At the present time, economic conditions do not favor even the smallest development projects, making the full build-out appear unlikely within the foreseeable future. However, the zoning, accessibility, and utilities are present in the Borough to support this level of development should economic conditions change in the future. Some balance of land use management and transportation capacity will need to be negotiated between the competing visions of the community.

Widening of Route 8

The future growth scenarios outlined in this study indicate that at some future time, the basic capacity of the roadway network could be exceeded, requiring additional capacity which will most likely entail widening of Route 8. Again, some appropriate balance of land use

management and transportation capacity will need to be negotiated.

Additional Signals

This study has identified signalization of three intersections as part of the Preferred Alternative. The analysis indicates that depending on the level of future development, additional traffic signals may be required at other locations in the future. These signals are neither warranted nor required at this time, but an appropriate traffic signal spacing plan will allow for their eventual installation if needed.

Pedestrian Walkways

Early in the study, the community identified the need for improved pedestrian accommodations in the village area. This is consistent with needs identified in previous planning studies. Neither of the options presented, sidewalks along Route 8 or enhanced walkways behind the residences, appeared to have strong support for implementation at this time.

Route 208 Roundabout

A roundabout at the Route 8 Route 208 intersection shows promise as an alternative to a traffic signal. However, the need for any such level of control at this location would not occur until many years in the future, and the need would depend upon actual land use and traffic changes. The roundabout appears to offer many potential benefits to the community, and should be considered as a future mitigation if conditions should warrant.

TRAFFIC SIGNAL AND DRIVEWAY SPACING PLANS

Traffic Signal Spacing Plan

Ideal Spacing

Appropriate spacing of signalized intersections is required in order to provide acceptable progression of through traffic. Intersections that are too closely spaced cannot provide progression in both directions with realistic cycle lengths. Based upon the Transportation Research Circular #456, published by the Transportation Research Board, optimal spacing of signals with a 60-second cycle is 1,540 feet for a roadway with a 35-mph speed limit, or 1,980 feet for a roadway with a 45-mph speed limit.

Preferred Alternative

The community's preferred alternative includes traffic signals at the intersections of Route 8 with the I-80 westbound ramps, I-80 eastbound ramps, and Stevenson Road. The spacing between these intersections is significantly less than the optimal spacing, with 760 feet between the I-80 off-ramps and 890 feet between the I-80 eastbound off-ramp and Stevenson Road.

A Synchro analysis indicates that acceptable corridor levels of service can be maintained with this signalization under projected 2020 traffic conditions. As shown in the Synchro green band analysis in Appendix D, northbound, link green bands of 23 seconds will be provided between Stevenson Road and I-80 eastbound on-ramp, and 35 seconds between the I-80 on-ramps. Southbound link green bands of 11 seconds will be provided between the I-80 on-ramps and 16 seconds between I-80 westbound and Stevenson Road.

To a significant degree, the traffic patterns at these intersections minimize the need for optimal progression. Relatively little traffic travels through on Route 8 through the entire corridor, with most traffic traveling between the I-80 ramps and destinations within the corridor. This traffic would turn onto Route 8 during the side street phase at one intersection and travel through the next intersection. Essentially, this would allow for progression of some traffic during all signal phases.

Potential Future Signals

There is the potential for future signalization at a number of other intersections, although this is neither warranted nor recommended at this time. Gilmore Road and Route 208 are east-west corridors at the ends of the study area, and could potentially require signalization at some time in the future.

The intersections of Route 8 with Gibb Road, Log Cemetery Road, and Willow Street could potentially warrant signalization at some future time. These Borough streets have the potential to provide consolidated access to adjacent developments, a situation that currently occurs at Gibb Road, and that could occur at Willow Street or Log Cemetery road with future development. The analysis indicates that these intersections will not require signalization under 2020 conditions, but should be readdressed as part of any future traffic impact studies affecting these locations.

Finally, there are long stretches of Route 8 that are currently sparsely developed, between Gilmore Road and Gibb Road, between Willow Street and Route 208, and south of Route 208. Access to any future developments in these areas should be consolidated at streets or common driveways spaced appropriately to provide efficient operation should signalization be required.

Recommended Signal Spacing Plan

Based upon these conditions, the signal spacing shown in Table 14 on the following page is recommended.

Intersection	Spacing
Gilmore Road (Irwin Township)	1,980 feet
Potential Future Intersections	1,980 feet
Gibb Road	365 feet
I-80 WB Off-Ramp	760 feet
I-80 EB Off-Ramp	375 feet
Log Cemetery Road	515 feet
Stevenson Road	440 feet
Willow Street	1,540 feet
Potential Future Intersections	1,540 feet
Route 208	1,980 feet
Potential Future Intersections	
Note: Row alignment between columns reflects spacing between intersections.	

Table 14: Recommended Traffic Signal Spacing

It should be noted that not all of these signals are warranted or recommended at this time; this table identifies potential locations and spacing. Signals at any of these locations would only be installed upon traffic study demonstrating that signalization is appropriate and would improve traffic operations within the corridor. Traffic signal installation should not be considered at any location inconsistent with this table.

Driveway Spacing Plan

Recommended Spacing

Based upon recommended highway access management ordinances presented in the Appendix, driveways along a principal arterial such as Route 8 should not be located closer than 600 feet to an intersection or to other driveways.

Within the developed area of Barkeyville, it may not be feasible to maintain this spacing. Site-specific variances may be acceptable following a traffic study, in accordance with the guidelines below.

Signalized Intersections

Based upon criteria established in the AASHTO *Policy on Geometric Design of Highways and Streets* ("Green Book") and in 67 PA Code Chapter 414, driveways should not be located within the functional area of an intersection.

Based upon these criteria, a set of guidelines has been developed to govern the location of driveways within the Route 8 corridor. The required spacing depends on the posted speed limit for that roadway segment. Detailed calculations are presented in Appendix E.

For a roadway with a speed limit of 45-mph (e.g., Route 8 north of Willow Street or south of Route 208), driveways should not be installed within 405 feet upstream or 300 feet downstream of a signalized or potentially signalized intersection. Furthermore, any driveway between 300 and 405 feet downstream from a signalized intersection should be restricted to right turn in, right turn out only. Driveways located between 405 and 718 feet upstream from a signalized intersection should be restricted to right turn in, right turn out only, although left turns in may be permitted if so determined by a traffic engineering study. Left turns should be prohibited from driveways within this zone. These restrictions are shown graphically in Figure 25.

For a roadway with a speed limit of 35-mph (between Willow Street and Route 208), driveways should not be installed within 270 feet upstream or 150 feet downstream of a signalized or potentially signalized intersection. Furthermore, any driveway between 150 and 270 feet downstream from a signalized intersection should be restricted to right turn in, right turn out only. Driveways located between 270 and 408 feet upstream from a signalized intersection should be restricted to

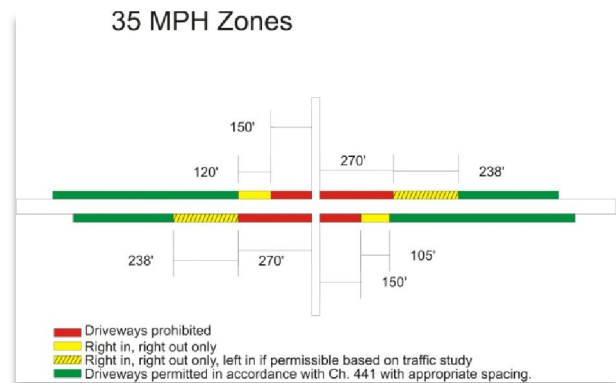


Figure 25: Driveway Restrictions 45 MPH.

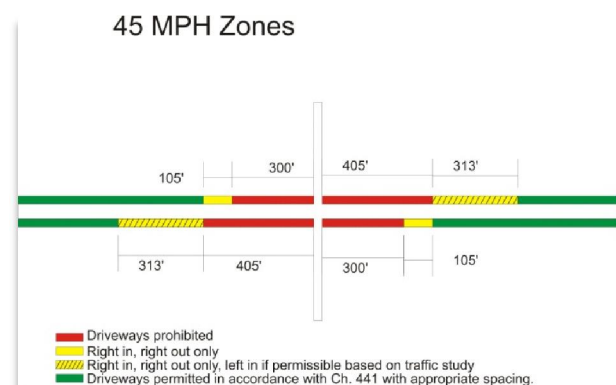


Figure 26: Driveway restrictions at 35 MPH.

right turn in, right turn out only, although left turns in may be permitted if so determined by a traffic engineering study. Left turns should be prohibited from driveways within this zone. These restrictions are shown graphically in Figure 26.

Spacing between Driveways

To reduce conflicts between turning vehicles, driveways should be located at least 150 feet apart in a 35-mph zone, and at least 300 feet apart in a 45-mph zone. This minimum spacing does not apply for minimum use driveways, serving single-family residential properties.

Implementation

Currently, there are numerous driveways along Route 8 that do not conform to this requirement. Where possible, as part of signalization or access management, nonconforming driveways should be removed and access rerouted through signalized intersections.

New driveways may be approved conditionally at nonconforming locations if signals have not yet been installed, with turn restrictions to be imposed upon signalization.

Key nonconforming locations are discussed below.

Gibb Road

Gibb Road is located approximately 375 feet downstream from the I-80 westbound off-ramp, which is proposed for signalization. By these criteria, a driveway at the Gibb Road location should be limited to right turns in, right turns out only, while no driveway should be permitted across from Gibb Road. However, Gibb Road provides a consolidated access point for three high-volume businesses. This access is critical and should be maintained despite these proposed restrictions.

TA Service Plaza Entrance/Auto Exit

This driveway is located approximately 350 feet downstream from the I-80 eastbound off-ramp and

520 feet upstream from the Stevenson Road intersection. Within this zone, a driveway should be right-turn in, right turn out only, although left turns in may be permitted. As part of the signalization of Stevenson Road, automobile exits should be relocated to that signal.

Kwik Fill Service Plaza

The existing entrance is located approximately 100 feet downstream from the Stevenson Road intersection. Entering traffic should be relocated to the existing exit opposite Willow Street.

CITGO and adjacent properties

The existing multiple driveways should be consolidated at Stevenson Road or at Log Cemetery Road.

IMPLEMENTATION AND FUNDING PLAN

The implementation and funding of the proposed transportation improvements and land use recommendations outlined as part of the preferred alternative will require a coordinated effort between the borough, county and the NWPRPDC which serves as the region's Rural Planning Organization (RPO).

The signalization of the I-80 ramps, signalization and geometry improvements at the intersection of Stevenson Road and Route 8 should be recommended by Venango County to the region's 2011-2014 Transportation Improvement Program (TIP). In addition, other funding sources are available to finance these improvements and should be considered. These sources include the Pennsylvania Infrastructure Bank (PIB) loan, the Appalachian Regional Commission (ARC) grant, and the relatively new Pennsylvania Community Transportation Initiative (PCTI). The ARC and PCTI grants are made available on a modestly competitive basis.

The PIB loan is administered by the Pennsylvania Department of Transportation. The interest rate is a fixed rate at one half prime and is set upon receipt of the loan application. The maximum loan term is 10 years. This loan is available for the design, engineering, right-of-way and repair, reconstruction and construction of public highways, as well as other transportation needs such as bridges, public and private airports and railroads and public transportation systems. Application for the PIB loan can be made at any time by contacting the PIB Manager at (717) 787-5798.

The ARC grant provides funds for basic infrastructure services that enhance economic development opportunities or address serious health issues for residents. The NWPRPDC region is eligible to apply for this grant and at the time of this report has made application to ARC.

The PCTI program is sponsored by the Pennsylvania Department of Transportation and provides both planning and construction funds to communities on a statewide competitive basis. Although the second round for PCTI applications recently closed, consideration of the program should be given should a future call for applications occur. Eligible projects must improve the integration of transportation and land use by

implementing one or more of the Smart Transportation themes (outlined earlier in this document). It is highly recommended that gateway improvements identified in the Barkeyville Concept Plan within the 2007 Southern Venango County Regional Comprehensive Plan is included in the PCTI application in association with recommended transportation improvements identified in the preferred alternative if application is made to a future third round of the program.

In addition to the above mentioned funding opportunities, Barkeyville and Venango County should also leverage negotiation opportunities with developers to help implement various elements of the transportation improvements (i.e., sidewalks, access roads, and signals) identified as part of the preferred alternative. Transportation Impact Fees, as authorized by the Pennsylvania Municipalities Planning Code (MPC), can also be an effective funding mechanism for municipalities that are projected to experience moderate or intense land development pressures. Impact fees can be used to leverage state and federal funds for improvements to state-owned roadways by funding 50 percent of the total project cost. The implementation and administration of an impact fee ordinance requires specific studies that lead to the development of a capital improvement plan and impact fee. This option may not be appropriate for Barkeyville due to the relatively low level of projected development and costs associated with the required process to establish impact fees. Barkeyville should carefully evaluate the costs and feasibility of developing an impact fee ordinance should this funding option be taken into consideration.

Land use improvements can be implemented through various tools authorized by the MPC. These tools are described in detail with actual Pennsylvania community examples in a recent Pennsylvania Department of Transportation Publication (Pub 662), "Improving the Land Use-Transportation Connection through Local Implementation Tools." This publication is available on the Department's website: <ftp://ftp.dot.state.pa.us/public/PubsForms/Publications/PUB%20662.pdf>.

CONCLUSION

Project Summary

The Route 8 Land Use and Transportation Study was conducted in close cooperation with the sponsoring agencies and key stakeholders. The study included an analysis of transportation and land use conditions. Future land use scenarios were developed, and traffic conditions were projected for these scenarios. A range of alternatives were developed to mitigate projected future transportation conditions, including roadway capacity improvements and land use controls.

Based upon public input, the Preferred Alternatives were selected. These alternatives meet the goals and objectives established for this study.

Meets Project Goals

The Preferred Alternative, if implemented, will meet the goals established for this study.

Signalization at the three intersections proposed will improve operation in the study corridor, by reducing peak hour congestion.

Pedestrian improvements, including crosswalks, sidewalks and signal indications, will provide accommodation for pedestrians and bicycles.

The signalized intersections will improve safety for vehicular and non-vehicular traffic. The sidewalks will improve safety for non-vehicular traffic by providing a route other than the roadway shoulder or the roadway itself.

The proposed driveway spacing plan will provide the tools to limit and control driveway access throughout the corridor.

The proposed access management regulations will provide a mechanism for the Borough to assess developers for a fair share of the cost of future transportation improvements.

By assessing developers a fair share of the cost of transportation improvements, the access management regulations will encourage land use policies that are more sustainable and efficient.

Meets Project Objectives

The Preferred Alternative, if implemented will meet the goals established for the study.

Signalization and realignment of the TA Service Plaza exit will improve operations at Stevenson Road.

Signalization will address the safety problems associated with conflicts between large and small vehicles at unsignalized intersections.

Signalization will maintain acceptable levels of service at the Stevenson Road and I-80 intersections.

The proposed access management regulations will allow the Borough to fairly evaluate and control the impacts of proposed developments.

The proposed access management regulations will provide a mechanism for identifying the transportation impacts of developments and for capturing the cost of implementing those developments.

This study has identified a number of changes to the zoning code that would allow the Borough to better manage future growth. The proposed driveway spacing plan and access management regulations will provide the Borough with the tools to manage land uses and direct future development.

Next Steps

Implementation of the Preferred Alternatives will require further action by the Borough of Barkeyville. The Borough has already begun this process by authorizing Venango County to apply for funding for the proposed signalization of Stevenson Road. Similar actions will be required to authorize, fund and eventually construct the other alternatives.

As the Borough moves forward with revisions to its zoning code, it will need to address the requirements for access control. For each new development within the study area, a traffic impact study should be conducted. Among site-specific evaluations, each study should conduct traffic counts and analysis to determine whether signal warrants are met at the intersections of Stevenson Road or the I-80 ramps.

APPENDIX A:

PUBLIC ENGAGEMENT



APPENDIX B:

TRAFFIC DATA



APPENDIX C:

COST ESTIMATES



APPENDIX D:

SIGNAL SPACING PLAN



APPENDIX E:

DRIVEWAY SPACING PLAN



APPENDIX F:

DRAFT ACCESS MANAGEMENT ORDINANCES



APPENDIX A:

PUBLIC ENGAGEMENT

Newsletter #1

Public Meeting #1

Advertisement

Sign-In Sheet

Public Comments

Newsletter #2

Public Meeting #2

Advertisement

Sign-In Sheet

Public Comments

Newsletter #3

APPENDIX B:

TRAFFIC DATA

ATR Counts

Manual Turning Movement Counts

Travel Time Runs

Crash Analysis

Warrant Analysis

I-80 WB

I-80 EB

Stevenson Road

HCS Analysis

2010 Existing Conditions

2020 Mid-Term Projected Conditions

2030 Full Buildout Projected Conditions

2020 All-Way Stop Control

2020 Signalization

Projected Traffic Volumes

Trip Generation