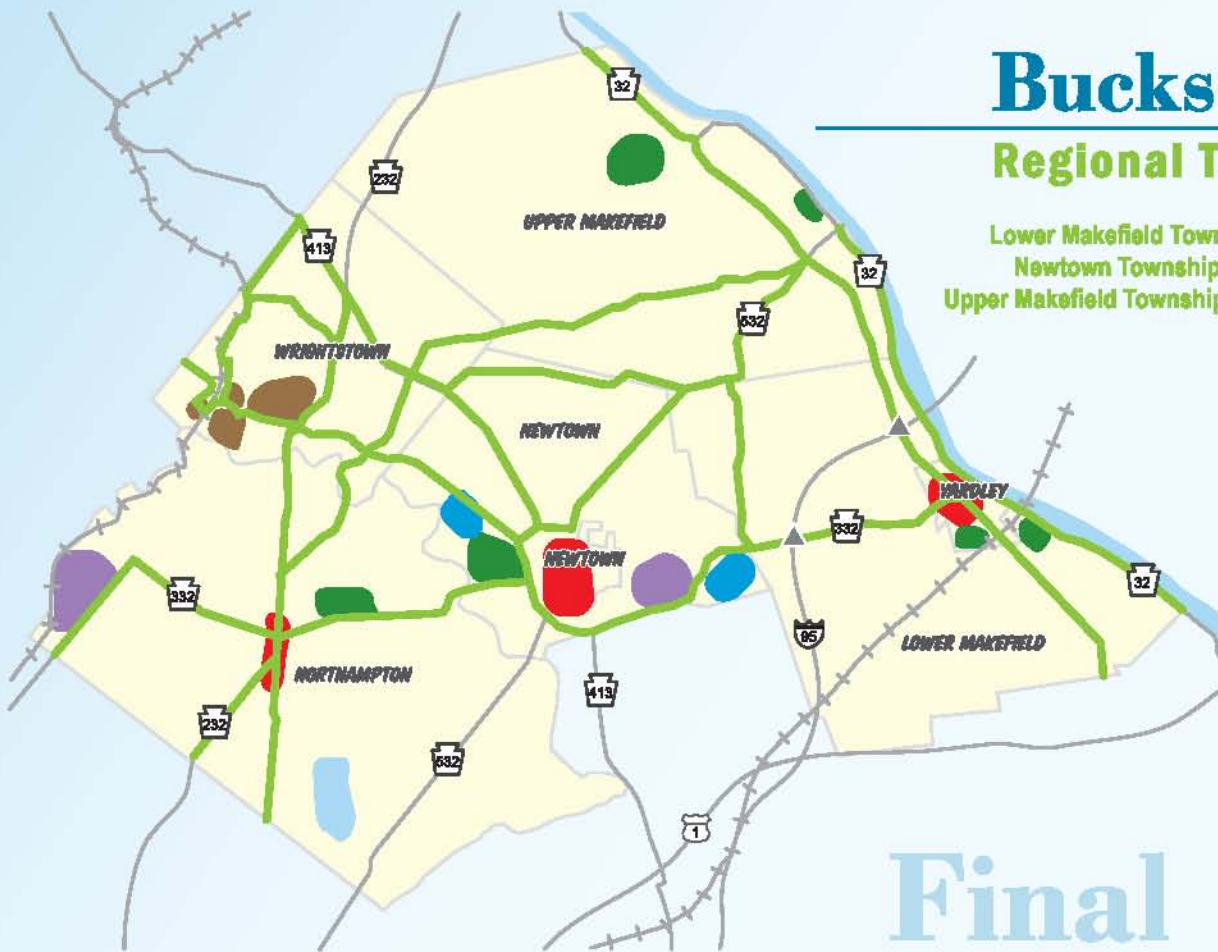


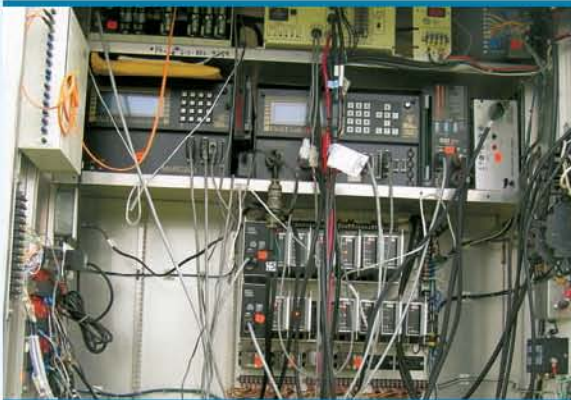
October 2007

Bucks County Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township
Yardley Borough



Final Report



Prepared for:

**REGIONAL
TRAFFIC PLANNING
TASK FORCE**

Prepared by:


**DELAWARE VALLEY
REGIONAL PLANNING
COMMISSION**

with the Assistance of:

JACOBS
Edwards and Kelcey

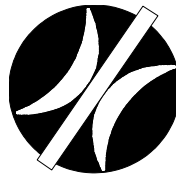
in Association with:
KMJ Consulting, Inc

and the Support of:


**Bucks County
Planning Commission**


PENNDOT

Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency that provides continuing, comprehensive and coordinated planning to shape a vision for the future growth of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties, as well as the City of Philadelphia, in Pennsylvania; and Burlington, Camden, Gloucester and Mercer counties in New Jersey. DVRPC provides technical assistance and services; conducts high priority studies that respond to the requests and demands of member state and local governments; fosters cooperation among various constituents to forge a consensus on diverse regional issues; determines and meets the needs of the private sector; and practices public outreach efforts to promote two-way communication and public awareness of regional issues and the Commission.



Our logo is adapted from the official DVRPC seal, and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole, while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

DVRPC is funded by a variety of funding sources including federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the Pennsylvania and New Jersey departments of transportation, as well as by DVRPC's state and local member governments. Funding to conduct this study was provided in part by a grant from the Pennsylvania Department of Community and Economic Development (DCED), and funds from the Pennsylvania Department of Transportation (PennDOT). The authors, however, are solely responsible for its findings and conclusions, which may not represent the official views or policies of the funding agencies.

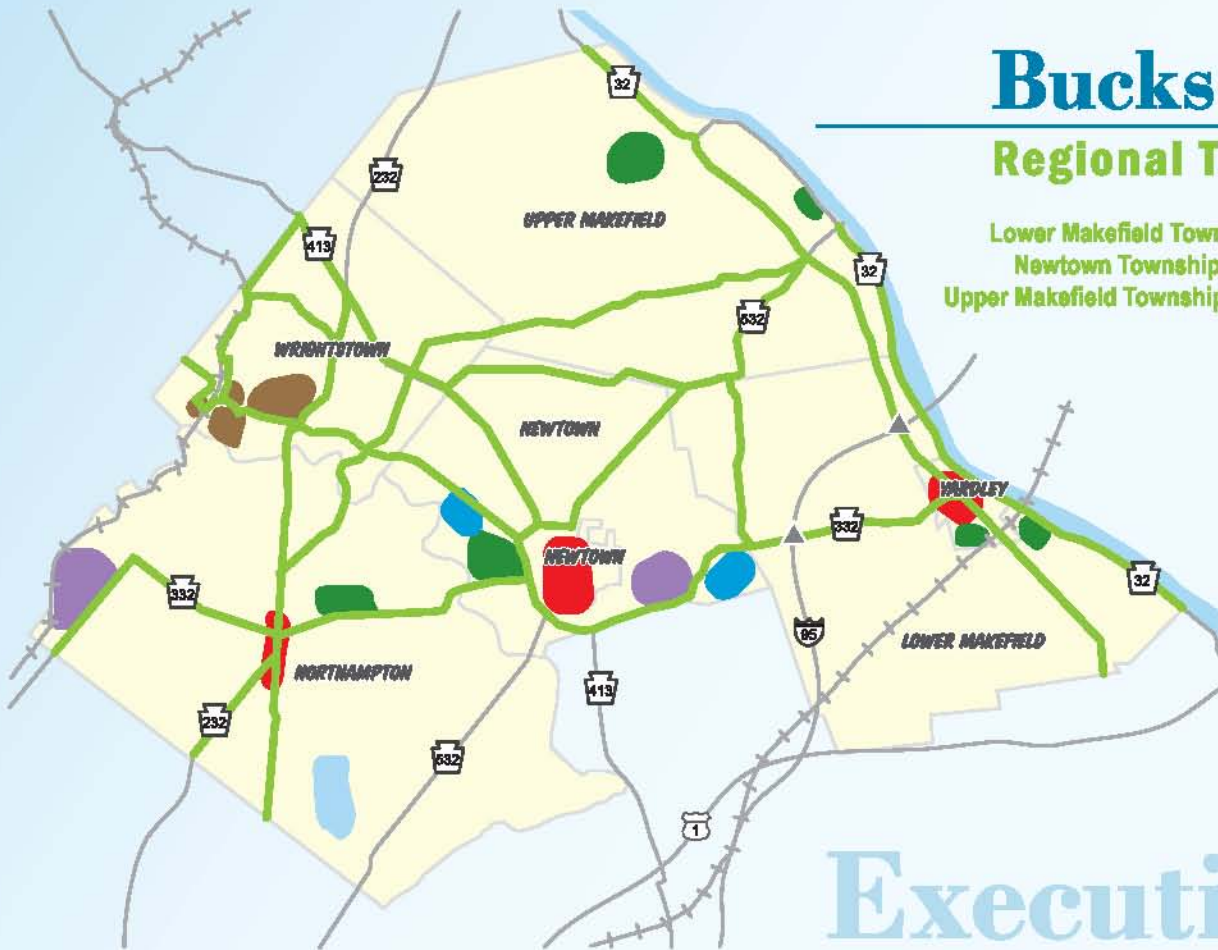
DVRPC fully complies with Title VI of the Civil Rights Act of 1964 and related statutes and regulations in all programs and activities. DVRPC's website may be translated into Spanish, Russian, and Traditional Chinese online by visiting www.dvrpc.org. Publications and other public documents can be made available in alternative languages or formats, if requested. For more information, please call (215) 238-2871.

Table of Contents

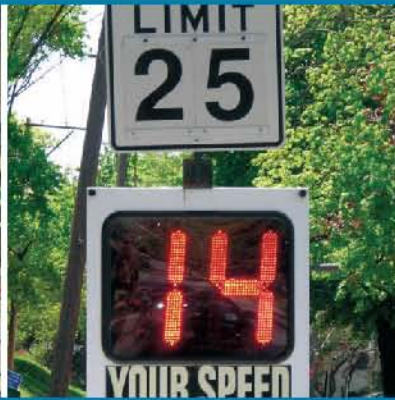
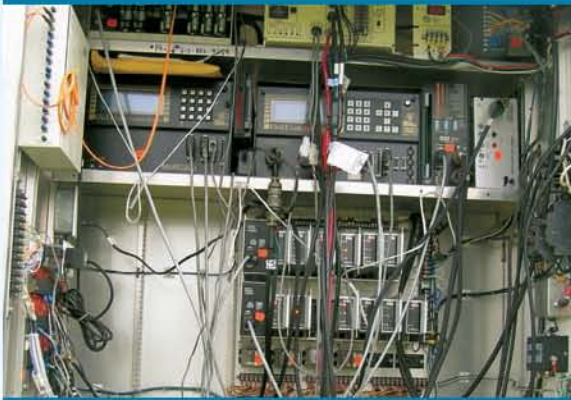
	Chapter
EXECUTIVE SUMMARY	
INTRODUCTION.....	1
PLANNING ACTIVITIES.....	2
WRIGHTSTOWN QUARRIES REPORT.....	3
WEIGHT, SIZE, & LOAD RESTRICTIONS STUDIES Summaries.....	4
TRAFFIC ENGINEERING & SAFETY STUDIES Summaries	5
TRAFFIC CALMING FEASIBILITY STUDIES Summary	6
RECOMMENDATIONS & IMPLEMENTATION SCHEDULE	7
 APPENDICES:	
Regional Traffic Planning Task Force & Project Team Members	Appendix A
Summary Notes of the Public Open House Meetings (3)	Appendix B
Engineering and Traffic Study Elements Summary Matrix.....	Appendix C
Illustrations of the Concurrent Transportation Improvement Projects Being Developed by Others Within the Study Area	Appendix D
Inventory of Traffic Calming Measures & Applications	Appendix E
Criteria for Highway Safety Corridor Designation & Assessment of the Key Roadway Network.....	Appendix F
Criteria for Brake Retarder Prohibition Signage & Assessment of the Key Roadway Network.....	Appendix G
Multi-use Trail Network.....	Appendix H

Bucks County Regional Traffic Study

Lower Makefield Township / Newtown Borough
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Executive Summary



Prepared for:
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PURPOSE

As the Newtown-Yardley region of Bucks County develops traffic volume mounts, congestion worsens, and vehicles are prone to take “short cuts” along roads and streets less suited for the volume. Traffic safety concerns follow the spreading traffic demand. The *Bucks County Regional Traffic Study (BCRTS)* addressed these interrelationships, focusing on a set of key study area roadways. The study actively engaged the participation of the elected representatives from the participating municipalities guiding the study (i.e., the Regional Traffic Planning Task Force, RTPTF), their staff, stakeholder and community organization group representatives and interested citizens. Ultimately, an improvement program, incorporating area-wide education and enforcement elements and engineering recommendations was prepared that would be tested with community input and grounded in the support of the local governments and PennDOT to assure its meaningfulness.

STUDY OVERVIEW

The *BCRTS* was a cooperative effort of Lower Makefield, Newtown Borough, Newtown Township, Northampton, Upper Makefield, Wrightstown and Yardley Borough to collectively identify, systematically investigate and comprehensively address concerns surrounding traffic and truck safety and mobility in the region. Elected representatives from each municipality served as the study’s directors (e.g., the RTPTF). Pennsylvania State Representative David J. Steil (31st District) and State Representative Scott A. Petri (178th District) initiated the RTPTF in 2004 and actively supported its proceedings through the completion of this study. Active representation from interested stakeholder groups, community organizations and citizens in the region was garnered through the study process, and their input was used to help guide the study and gauge its products.

Common concerns that the study should address were outlined by the RTPTF. These included:

- general traffic safety and mobility concerns;
- large volumes of heavy trucks generated by four quarries in Wrightstown Township, among other uses and locations, traveling the study area road network;
- traffic speeds, and the appropriateness / consistency of speed limit zones; and
- traffic growth occurring as a consequence of regional development.

During the spring of 2005, the RTPTF commissioned the Delaware Valley Regional Planning Commission (DVRPC) to execute and manage the study. DVRPC immediately began researching and collecting background information, enlisting support from staff of the Pennsylvania Department of Transportation (PennDOT) and the Bucks County Planning Commission (BCPC); conducting a search for a transportation engineering consultant to assist, and seeking funding to conduct the engineering components of the study.¹

The work program focused upon a core network of 16 Key Roadways, determined by the RTPTF to be major roadways or roadways of specific concern, serving local and through-travel in the study area, that carry the highest traffic or truck volumes or are particularly sensitive to the volumes. The Key Roadways, illustrated in Figure ES-1, represent approximately 70 miles of state-owned highways. Study elements consisted of:

- performing area-wide planning;
- conducting outreach and public involvement activities with stakeholders, community organizations and the general public;
- informing, updating and taking direction from the RTPTF;
- inventorying the Key Roadway facilities, and assessing their integrity;
- evaluating safety and operating conditions along the Key Roadways;
- examining the feasibility of implementing traffic calming measures on the Key Roadways; and
- identifying a recommended improvement program (implementable over immediate, short-term and long-term horizons) which would adequately accommodate all legal road users and provide regional access to / from the area’s operating quarries.

The study effort coordinated with, and integrated its analyses with, four transportation improvement proposals being independently developed, along the Key Roadway network, by PennDOT and the study area municipalities. These included:

¹ Funding to conduct the complete study was provided by a grant from the Pennsylvania Department of Community and Economic Development (DCED) and by PennDOT.

1. the Swamp Road Corridor Improvement Project (Key Roadway #2), full roadway reconstruction sponsored by PennDOT, in Wrightstown and Newtown townships—currently involving the community in its environmental clearance and preliminary engineering phases, and slated for completion in mid-2012;
2. the Traffic Signal Enhancement Initiative (TSEI) to provide a traffic responsive and coordinated traffic signal operating system along the Newtown Bypass (Key Roadway #6, and the first segment of Key Roadway #13), in Newtown Township—initially implemented by PennDOT in the summer of 2007;
3. the Lindenhurst Road Traffic Calming Project (Key Roadway #3), raised medians, narrowed travel lanes and textured crosswalks, sponsored by Lower Makefield Township—construction initiated in September 2007; and
4. the Stoopville Road Traffic Calming Plan (Key Roadway #4), roundabouts, chicanes, narrowed travel lanes, textured crosswalks, multi-use trail, and gateway treatments sponsored by Newtown Township—in conceptual development, and under review by PennDOT.

Each Key Roadway was subjected to specific engineering evaluations conducted in compliance with PennDOT's procedures. The studies were prepared by a team of engineers led by staff from Jacobs Edwards and Kelcey, and included:

- *Weight, Size, and Load Restrictions Studies* - to judge the integrity of all 16 Key Roadways;
- *Traffic Engineering, and Safety Studies* - to determine the safety and efficiency of Swamp Road separately, and the remaining segments of the Key Roadway network; and
- *Traffic Calming Feasibility Studies* - to determine a role for traffic calming along the Key Roadways.

THE REPORT

Highlights of the work performed and its findings follow. Topics are arranged in line with the chapters in the full report.

Planning Activities (Chapter 2)

Extensive data collection and information gathering preceded and continued during the study. Project staff coordinated with and participated in eleven formal meetings with the RTPTF which were also open to the public. Municipal outreach was conducted through individual meetings with each municipality, their police departments and the two area school districts to delve deeper into specific concerns, and uncover more. Three Public Open Houses were conducted to obtain input from stakeholders, community organization representatives and the public-at-large on the study, its process, and its deliverables; and to serve as a gauge on the viability of the recommendations. Coordination meetings with the staff responsible for the four independent transportation projects were also conducted.

Vehicle classification traffic counts were performed to quantify the type and volume of vehicles traveling the Key Roadway network, and to support the engineering work. Analysis of the traffic count data revealed that truck volumes are proportionally / evenly distributed relative to overall traffic volumes for the vast majority of the study roadway network. Three substantial observations were drawn from the planning, coordinating and communicating:

1. Truck traffic and travel pattern concerns associated with the Wrightstown quarries, on the west side of the study area, were largely unknown. The east side of the study area had its own issues with trucks which revolved around Taylorsville Road (Key Roadway #14) and its interchange with I-95.
2. Registered concerns about traffic congestion, volume or safety, and roadway alignment conditions suggested that few if any segments of the Key Roadway network were not subject to at least one concern expressed by the municipalities.
3. Of the entire network of Key Roadways, there is a subset which is of overarching public concern: the Newtown Bypass (Key Roadways #6 and part of #13); Swamp Road (Key Roadway #2); Durham Road, PA 413 (Key Roadway #5); Stoopville Road (Key Roadway #4); and Lindenhurst Road (Key Roadway #3).

Wrightstown quarry truck travel patterns and alternative means to convey the quarries' products are addressed in Chapter 3. The study's engineering tasks addressed suitability, congestion, volume, safety, roadway alignment conditions; and traffic calming opportunities—comprehensively and uniformly for the entire Key Roadway network for all legal vehicles. These activities are addressed in greater detail in chapters 4, 5 and 6. The core network of study area roadways, which are of particular concern to the citizenry, was subject to a "traffic impact analysis" to assess possible cause and effects associated with traffic growth and the four independent transportation improvements being advanced by PennDOT, Lower Makefield and Newtown Township. That work is integrated into the contents of Chapter 5.

Wrightstown Quarries Report (Chapter 3)

Much has been done over the past ten years to investigate, upgrade and ameliorate conditions along Swamp Road (Key Roadway #5) to safely and efficiently accommodate the movement of general traffic, and heavy trucks oriented to and from the four stone quarries situated on the western edge of the study area. Collateral beneficiaries include Swamp Road residents, Bucks County Community College traffic and through travelers along Swamp Road. As this report is being written, PennDOT and its design consultants are evaluating alternate improvement designs addressing roadway and shoulder widths, alignments in the vicinity of curves and hills, drainage problems, and culvert and intersection conditions with input from the community.

Public dissatisfaction with the volume, spread and characteristics of the quarry trucks required that the *BCRTS* include two specific evaluations related to the matter. These were:

1. a study of the Wrightstown quarries and their transportation characteristics, and
2. an independent traffic engineering study for Swamp Road.

The traffic engineering and safety study of Swamp Road determined a more timely set of traffic safety and mobility improvements that might be pursued independently for the corridor, but which could be complementary with any further improvement of the corridor. The traffic and safety study's examination and findings are addressed in Chapter 5.

It was an expressed requirement that the *BCRTS*'s study of the Wrightstown quarries include an investigation into the opportunity that existing railroad facilities, located adjacent to the quarries, may present in conveying quarry products, and thereby reduce truck volumes and impacts along Swamp Road (and elsewhere in the region). Coordination meetings took place early-on between staff from PennDOT's Bureau of Rail Freight, Ports and Waterways; CSX-Transportation; the Winchester and Western Railroad; the New Hope and Ivyland Railroad; Hanson Aggregates; and DVRPC to explore the feasibility and economic viability of investing in and promoting the trans-shipment of quarry products between truck and rail at an existing rail hub with the New Hope and Ivyland Railroad, located on Mill Creek Road (Key Roadway #11).

Holding aside capital investment requirements and environmental consequences associated with expanding / promoting the rail hub, the bottom-line to the investigation was that the volume of product from the carrier's perspective (i.e., CSX-T) made sufficient economic sense to prepare a rate offer to convey the stone. However, the offer was not considered favorably nor accepted by the shipper (Hanson). It was concluded that, for the foreseeable future, the rail option was not a viable solution for reducing heavy truck travel surrounding the Wrightstown quarries.

Chapter 3 also documents quarry truck travel patterns to determine their needs for regional access. It shows that approximately two-thirds of the Wrightstown quarry truck trips are oriented to and from the vicinity of the I-95 interchange with the Newtown Bypass (PA 332). Swamp Road and the Newtown Bypass most directly serve these desire lines of travel. Improvements to the Bypass's mobility, delivered through the Traffic Signal Enhancement Initiative, and mobility and safety improvements for Swamp Road will support the quarries' need for access to the region's interstate; and a safer, more efficient travel corridor for all other users.

Weight, Size & Load Restrictions Studies Summaries (Chapter 4)

The full studies were performed in agreement with PennDOT's procedures. Chapter 4 contains a summary of the engineering analyses of each Key Roadway's functional integrity and ability to safely accommodate general traffic and truck traffic. Where these conditions are not met, there would be a legal basis for restricting or prohibiting certain vehicles from a state highway. Roadway and traffic elements examined in the studies were: horizontal and vertical alignment, prevailing traffic speeds, compatibility of various types of traffic, history of vehicle crashes, and vehicular characteristics.

Noteworthy from the work were the following observations:

- Truck travel speeds were not appreciably different (higher or lower) than the rest of the vehicles traveling the roadway network, and therefore do not by themselves create congestion or unsafe situations due to their speed;
- Truck volumes were evenly represented in the crash histories of the Key Roadways—in line with their composition in the overall traffic stream. Trucks are not over-represented in the accident statistics.
- Roadway geometry conditions do not present a safety hazard for large trucks.

The overall conclusion of the studies indicated that the criteria for establishing truck restrictions along any of the 16 Key Roadways are not met at this time.

Traffic Engineering & Safety Studies Summaries (Chapter 5)

A separate analysis of Swamp Road was required in the scope of services, but detailed evaluations of current traffic safety conditions and current and projected future traffic operating characteristics along each of the 16 Key Roadways were ultimately prepared in agreement with PennDOT's procedures. The studies also accounted for the possible traffic effects of the four independent transportation improvement projects advancing in the study area.

The traffic engineering and safety study of Swamp Road determines a timely set of traffic safety and mobility improvements that might be pursued independently for the corridor, but which could be complementary with any further improvement of the corridor. Immediate and short-term traffic recommendations identified for Swamp Road include: stabilizing and evening-out the roadway's edge by installing stone base material (identified throughout); signage; pavement markings; tree trimming and highway lighting improvements (typically at locations within Wrightstown Township); and geometric and signalization improvements at Swamp Road's intersection with the Bucks County Community College's Eastern Driveway / the entrance road to Helen Randle Park in Newtown Township. Given funding, these improvements can be implemented within three years.

Engineering recommendations, and related improvement costs, to address immediate, near-term and long-term needs were also identified along each of the remaining Key Roadways. Safety-oriented improvements included: performing highway maintenance (installing stone base material to even out ruts at identified roadway-shoulder-edge areas; repairing drainage structures, including headwalls and inlets; and installing guiderail, bridge railings and reflectors), improving roadway signage, installing pavement markings and highway lighting. Mobility improvements included traffic signal improvements (timing optimizations mostly, and one modernization) and geometric improvements along identified roadway segments and for major intersections.

The engineering recommendations were stratified into three time frames for implementation. Dependent upon degree of complexity, time needed to develop, and/or costliness, the recommendations are identified for implementation immediately (within one year or less of secured funding); in the short-term (between one and three years of secured funding) and over the long-term (more than three years after securing funding). Tabulations of the recommended engineering improvements for each Key Roadway are contained in Chapter 5. Figures ES-2, ES-3, and ES-4 illustrate the geographic distribution of the improvements for the immediate, short-term and long-term futures, respectively.

Construction of the Lindenhurst Road Traffic Calming Improvement Project has recently been initiated. Funding is being provided by the Pennsylvania Department of Community and Economic Development (DCED). PennDOT District 6-0 Office personnel, who supported this study's technical and outreach efforts, have also indicated a willingness to implement some of the immediate and short-term maintenance improvements with its forces and funds. The vast majority of the recommended engineering improvements remain unfunded. Procurement contracts for goods and services; and petitioning and competing for federal-aid highway funding assistance through the Regional Transportation Improvement Program process are two means of stretching financial resources. The participating municipalities can influence the viability for successful outcomes in each by forming a coalition with common purpose(s).

Traffic Calming Feasibility Studies Summary (Chapter 6)

Eligibility analyses for pursuing traffic calming measures along the Key Roadway network were prepared in accordance with PennDOT's procedures. Key parameters in the assessment are highway functional classification, adjacent land use, and measured 85th percentile traffic speeds versus posted speed limits.

Ranges of appropriate traffic calming measures are suggested for identified segments of the following Key Roadways—which either meet criteria today or exhibit the potential in the foreseeable future. These include:

- Worthington Mill Road (Key Roadway #1),
- Lindenhurst Road (Key Roadway #3),
- Stoopville Road (Key Roadway #4),
- Second Street Pike (Key Roadway #8),
- Wrightstown Road (Key Roadway #10),
- Township Line Road/Mill Creek Road (Key Roadway #12),
- Main Street in Yardley (Key Roadway #14), and
- Afton Avenue in Yardley (Key Roadway #15).

In all cases, the study's suggested traffic calming measures would work to tame speeds, but would leave traffic in place—so there are no cascading effects on other roadways as a result. The methodology conducted in the study

(and described in Chapter 6) can serve as a model for the study area municipalities to independently evaluate and introduce traffic calming measures along a wider roadway network. Lower Makefield's Lindenhurst Road Traffic Calming Project, by example, represents a model in municipal initiative to plan and implement traffic calming measures along a state highway. This study's recommended measures for Stoopville Road, by-and-large, mimics the Lindenhurst project.

Recommendations & Implementation Schedule (Chapter 7)

The study's scope charged the project team to identify programmatic education and enforcement recommendations as a complement to the engineering improvements. In contrast to the engineering improvements which are facility specific, the programmatic recommendations are applicable on an area-wide basis.

Continued and expanded activities directed at communication, collaboration and cooperation—most notably through the RTPTF—form the basis of most of the study's education-based recommendations. Candidate activities or subject matters that the RTPTF might embrace in expanding its role were identified through the study process. In partnership with other members, the community and the participating municipalities, the RTPTF might consider:

- developing or refining the *BCRTS*'s engineering recommendations for implementation;
- broadening membership to the task force to include Council Rock and Pennsbury school district representatives, or regularly address appropriate school districts transportation concerns through the RTPTF meeting proceedings;
- meeting annually for a "Transportation Summit" to assess, update and advocate for its overall recommended improvement program;
- advancing traffic calming measures to a wider Key Roadway network and/or local roadway network in cooperation with PennDOT;
- designating appropriate Key Roadway segments as "Highway Safety Corridors;"
- evaluating the Key Roadway network, with the community, for the purpose of installing brake retarder prohibition signage; and
- integrating land use and multi-use trail planning themes and activities into its mission.

Measures to improve the efficiency of existing municipal traffic enforcement capabilities and practices are identified; but recognize the need for additional funding to expand these most effective services, particularly manpower. Suggested actions to improve the efficiency of the region's existing capabilities included:

- establishing a collaborative relationship between the school districts' transportation departments, the school bus drivers and the municipal police to monitor, report and communicate events and situations involving errant or aggressive unsafe driving along all roadways on a regular and on-going basis;
- deploying trailer-mounted driver feedback signs on a regular and rotating basis to reinforce driver behavior; and
- lobbying for statewide legislation allowing the use of radar and laser technologies for traffic enforcement by municipal police department personnel.

CONCLUSION

Many accomplishments have been achieved through and during the performance of the *Bucks County Regional Traffic Study*, including: involving, listening to, educating, and eliciting concerns from the community. Implementation successes were scored by the Traffic Signal Enhancement Initiative along the Newtown Bypass (initiated by PennDOT in the summer of 2007), and construction of the Lindenhurst Road Traffic Calming Improvements Project (initiated in September 2007 by Lower Makefield Township).

The *BCRTS*'s technical work integrated the public's perspectives and documented traffic and truck safety and mobility conditions along a 70 mile Key Roadway study highway network, and identified many traffic improvement recommendations—with an eye toward implementation. Practical solutions were identified which can deliver safer and more reliable traffic conditions in immediate or short-term horizons. Other recommendations from the study are creative and new approaches applied to well known problem areas, and will need more time to develop. All are valid, and are offered for the RTPTF member's consideration.

Through the work, an independent and timelier improvement program for Swamp Road was identified that would be complementary with any further improvements for the corridor. PennDOT District 6-0 management staff have agreed to implement some of the study's immediate- or short-term improvement recommendations using PennDOT

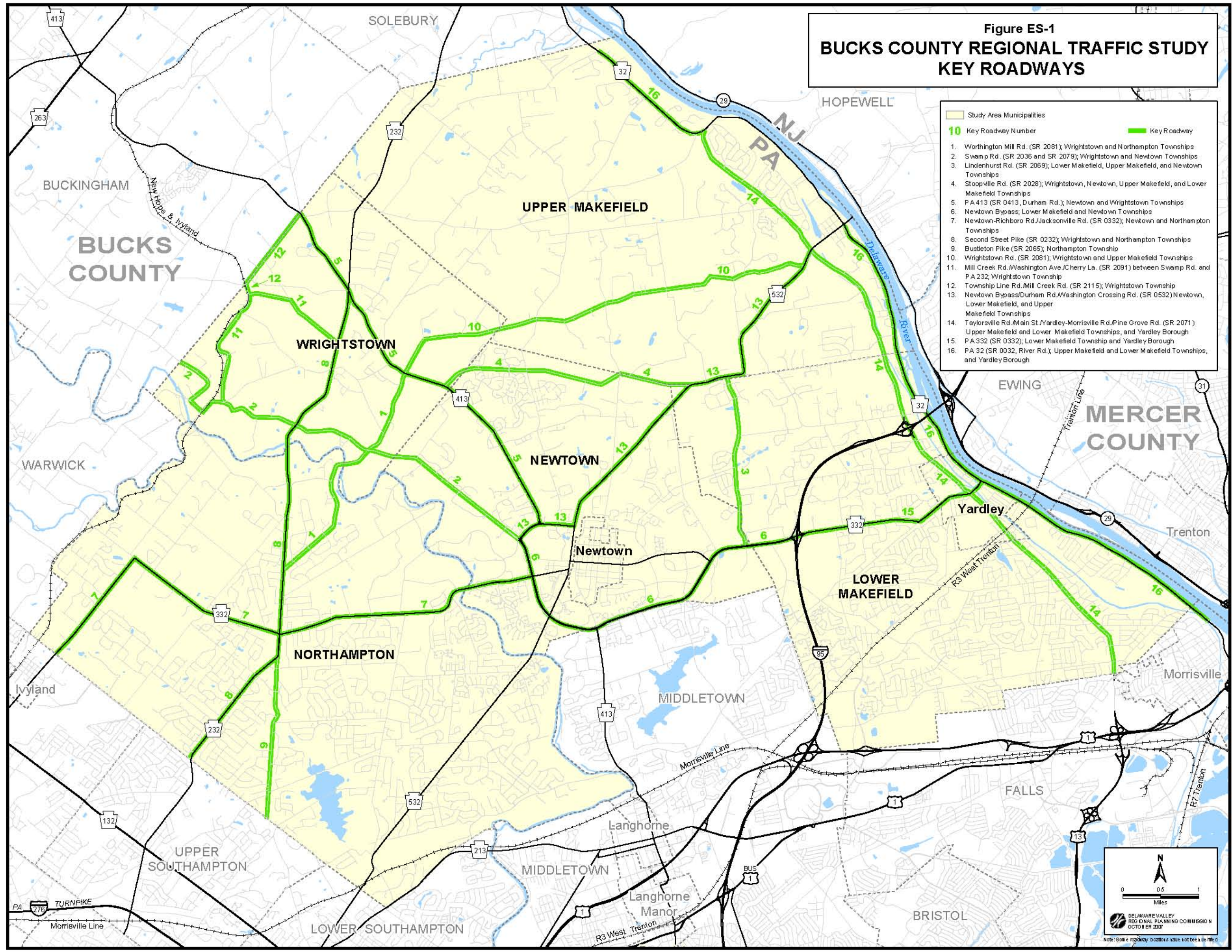
maintenance forces and funds. The study identified seven other Key Roadways, or segments thereof, which offer the opportunity for implementing traffic calming along a broader highway network in the future, without diverting traffic to alternate locations. Still, many of the *Bucks County Regional Traffic Study* recommendations remain unfunded, and some “untested.”

As the formal study drew to a close, with the release and public review and comment of the draft report, it became clear that support or consensus on some of the report’s recommendations, within the participating municipalities or the wider community, was unknown or would not be reached without a protracted additional effort. The *BCRTS*’s technical work was prepared soundly, with professional judgment and in agreement with the scope of the services. Practicality and value suggested that a final report be prepared, with consideration of the comments received (citizens, stakeholders and municipal), and submitted to the RTPTF to serve the task force’s continuing planning work. The final report’s presentation in a ring binder allows the document to be used in continual reference, and be added to—to stay current with the ongoing activities of the task force.

This report and its recommendations represents a first step, and foundation for further discussions, and future development of the study’s identified traffic related improvements, and the continued activities of the Regional Traffic Planning Task Force—with the involvement of the community-at-large and the governing boards of the participating municipalities. The continued demonstration of education, cooperation, collaboration, and partnerships, evidenced by the RTPTF activities to-date, will be necessary to further develop this report’s recommendations, and fund and implement traffic improvements in the region. Multi-municipal coalitions make sense for procurement contracts of equipment and services. They also can aid petitions for state and federal transportation funding assistance (e.g., through the Bucks County Planning Commission and DVRPC Transportation Improvement Program process).

Mutually supported improvement projects emanating from a regional plan such as the *Bucks County Regional Traffic Study* improve, but do not guarantee, success in obtaining implementation funding for capital intensive improvements. Given the keenly competitive atmosphere existent for a very limited pool of transportation assistance funds, vigilance and flexibility, with regard to funding and implementation opportunities, will also be required. The roles that multi-municipal comprehensive planning; the land development application, review and approval process; and individual initiative can play in delivering traffic and transportation improvements should not be overlooked.

**Figure ES-1
BUCKS COUNTY REGIONAL TRAFFIC STUDY
KEY ROADWAYS**



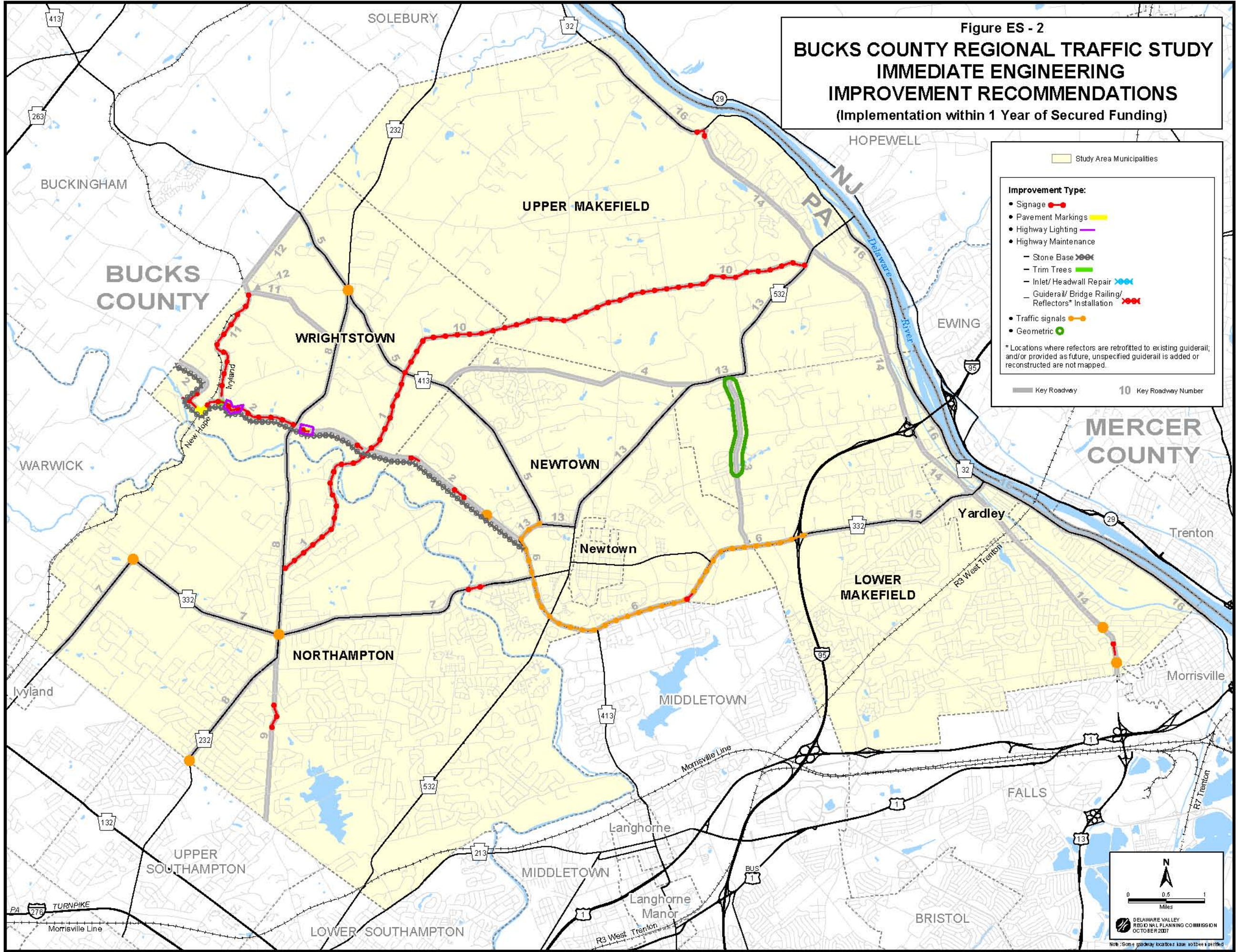
- Study Area Municipalities
- 10** Key Roadway Number
- Key Roadway
1. Worthington Mill Rd. (SR 2081); Wrightstown and Northampton Townships
 2. Swamp Rd. (SR 2036 and SR 2079); Wrightstown and Newtown Townships
 3. Lindenhurst Rd. (SR 2069); Lower Makefield, Upper Makefield, and Newtown Townships
 4. Stoopville Rd. (SR 2028); Wrightstown, Newtown, Upper Makefield, and Lower Makefield Townships
 5. PA 413 (SR 0413, Durham Rd.); Newtown and Wrightstown Townships
 6. Newtown Bypass; Lower Makefield and Newtown Townships
 7. Newtown-Richboro Rd./Jacksonville Rd. (SR 0332); Newtown and Northampton Townships
 8. Second Street Pike (SR 0232); Wrightstown and Northampton Townships
 9. Bustleton Pike (SR 2065); Northampton Township
 10. Wrightstown Rd. (SR 2081); Wrightstown and Upper Makefield Townships
 11. Mill Creek Rd./Washington Ave./Cherry La. (SR 2091) between Swamp Rd. and PA 232; Wrightstown Township
 12. Township Line Rd./Mill Creek Rd. (SR 2115); Wrightstown Township
 13. Newtown Bypass/Durham Rd./Washington Crossing Rd. (SR 0532) Newtown, Lower Makefield, and Upper Makefield Townships
 14. Taylorsville Rd./Main St./Yardley-Morrisville Rd./Pine Grove Rd. (SR 2071) Upper Makefield and Lower Makefield Townships, and Yardley Borough
 15. PA 332 (SR 0332); Lower Makefield Township and Yardley Borough
 16. PA 32 (SR 0032, River Rd.); Upper Makefield and Lower Makefield Townships, and Yardley Borough

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Miles

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
OCTOBER 2010

Note: Some roadway locations have not been verified.

Figure ES - 2
BUCKS COUNTY REGIONAL TRAFFIC STUDY
IMMEDIATE ENGINEERING
IMPROVEMENT RECOMMENDATIONS
 (Implementation within 1 Year of Secured Funding)



Study Area Municipalities

Improvement Type:

- Signage
- Pavement Markings
- Highway Lighting
- Highway Maintenance
- Stone Base
- Trim Trees
- Inlet/ Headwall Repair
- Guiderail/ Bridge Railing/ Reflectors* Installation
- Traffic signals
- Geometric

* Locations where reflectors are retrofitted to existing guiderail, and/or provided as future, unspecified guiderail is added or reconstructed are not mapped.

Key Roadway 10 Key Roadway Number

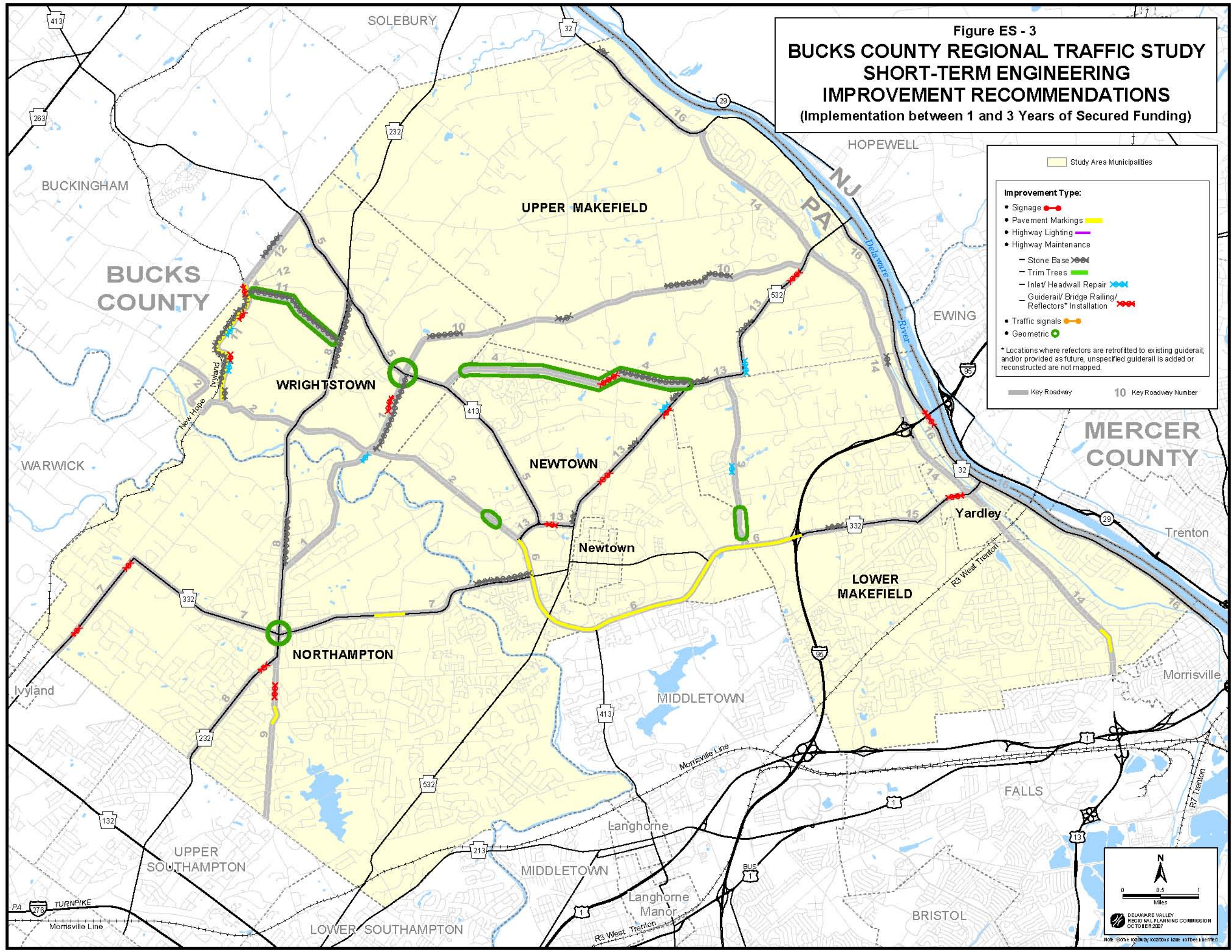
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Miles

DELAWARE VALLEY
 REGIONAL PLANNING COMMISSION
 OCTOBER 2007

NOT: Some roadway locations have not been verified.

Figure ES - 3
BUCKS COUNTY REGIONAL TRAFFIC STUDY
SHORT-TERM ENGINEERING
IMPROVEMENT RECOMMENDATIONS
 (Implementation between 1 and 3 Years of Secured Funding)



Study Area Municipalities

Improvement Type:

- Signage
- Pavement Markings
- Highway Lighting
- Highway Maintenance
- Stone Base
- Trim Trees
- Inlet/ Headwall Repair
- Guidrail/ Bridge Railing/ Reflectors* Installation
- Traffic signals
- Geometric

* Locations where reflectors are retrofitted to existing guidrail, and/or provided as future, unspecified guidrail is added or reconstructed are not mapped.

Key Roadway 10 Key Roadway Number

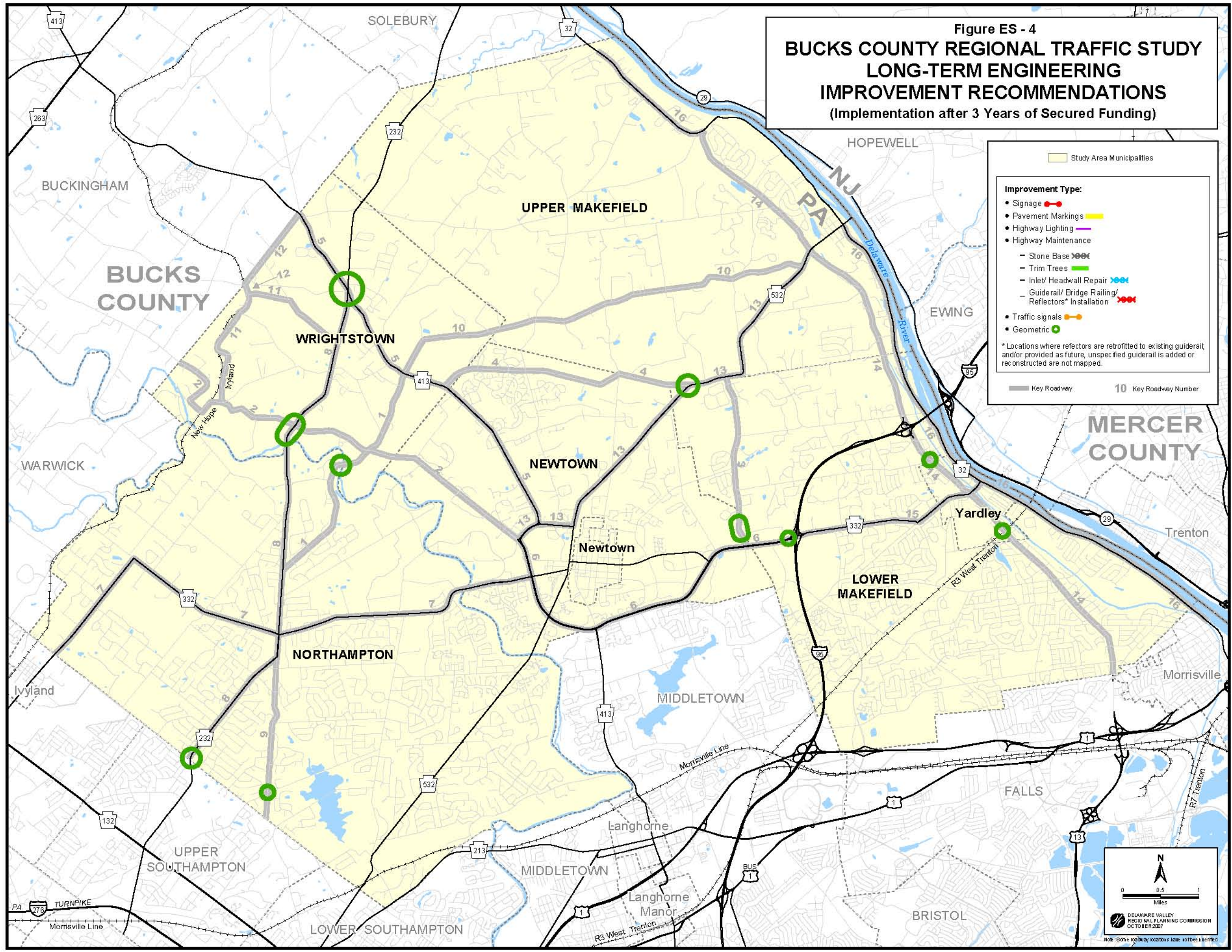
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DELAWARE VALLEY
 REGIONAL PLANNING COMMISSION
 OCTOBER 2007

NOT: Some roadway locations have not been verified.

Figure ES - 4
BUCKS COUNTY REGIONAL TRAFFIC STUDY
LONG-TERM ENGINEERING
IMPROVEMENT RECOMMENDATIONS
 (Implementation after 3 Years of Secured Funding)



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DELAWARE VALLEY REGIONAL PLANNING COMMISSION
 OCTOBER 2007

NOT: Some roadway locations have not been verified



Bucks County

Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township / Yardley Borough

1



Introduction



Prepared by:

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

October 2007

Table of Contents

BACKGROUND AND PURPOSE 1-1

STUDY OVERVIEW 1-1

KEY ROADWAY NETWORK..... 1-2

THE FINAL REPORT..... 1-3

List of Figures

Figure 1-1: Study Area and Regional Setting 1-5

Figure 1-2: Key Roadways 1-6

BACKGROUND AND PURPOSE

The seven municipality study area covers approximately 88 square miles and supports a variety of active and passive land uses. Significant development pressure is present as a consequence of the area's character, location and land availability. In 2000, approximately 105,000 residents and 32,000 jobs occupied the study area. The Delaware Valley Regional Planning Commission (DVRPC) forecasts growth of approximately 30 percent for population, and 40 percent for employment by the year 2030.¹ A map of the study area and its setting is provided at the end of the chapter (Figure 1-1).

Access to the broader region is afforded via Interstate 95; the Washington Crossing Bridge to Mercer County, New Jersey; and SEPTA's R3-West Trenton Regional Rail service to Central Philadelphia and Elwyn. The centerpiece to the study area's highway network is the circumferential Newtown Bypass. The four-lane arterial highway is hub to a spoked set of two-lane radial highways. The bypass functions to collect and accommodate through-travel while preserving the distinctive village environment in the Borough of Newtown.

As the region develops, traffic volume mounts, congestion worsens, and vehicles are prone to take "short cuts" along roads and streets less suited for the volume. Traffic safety concerns follow the spreading traffic demand. The *Bucks County Regional Traffic Study (BCRTS)* addressed these interrelationships, focusing on a set of key study area roadways.



Posted speed limits, and traffic signal timing and coordination plans along the Newtown Bypass have been optimized by PennDOT to promote mobility. The BCRTS will assess the highway's long-term requirements.
Photo by: DVRPC

STUDY OVERVIEW

The *BCRTS* was a cooperative effort of Lower Makefield, Newtown Borough, Newtown Township, Northampton, Upper Makefield, Wrightstown and Yardley Borough to systematically investigate and comprehensively address traffic and truck safety and mobility in the Newtown-Yardley area of Bucks County. Elected representatives from each municipality, collectively referred to as the Regional Traffic Planning Task Force (RTPTF), served as the study's directors. [RTPTF members are identified in Appendix A.]

Pennsylvania State Representative David J. Steil (31st District) and State Representative Scott A. Petri (178th District) initiated the RTPTF in 2004 and actively supported its proceedings throughout this study. Following its inception and after much consideration and discussion, the RTPTF identified the need for a regional traffic study that would systematically investigate and address their common concerns. Those included:

- general traffic safety and mobility concerns;
- large volumes of heavy trucks generated by four quarries in Wrightstown Township, among other uses and locations, traveling the study area road network;
- traffic speeds, and the appropriateness / consistency of speed limit zones; and
- traffic growth occurring as a consequence of regional development.

A work program was subsequently developed by the task force to conduct the *BCRTS*.

In the Spring of 2005, the RTPTF commissioned DVRPC to execute and manage the study. DVRPC immediately began researching project-related background information, conducting traffic classification traffic counts, meeting with the RTPTF and its staff, and police personnel providing coverage in the study area municipalities. Meetings were also conducted with representatives of the Council Rock and Pennsbury school districts, and the Bucks County Community College to prepare the regional planning foundation for the study. DVRPC moved forward with the participation of staff from the Pennsylvania Department of Transportation (PennDOT) and the Bucks County Planning Commission (BCPC), and conducted a search for a transportation engineering consultant, and sought funding to conduct the study.

¹ Source: *Destination 2030*, the Year 2030 Plan for the Delaware Valley (DVRPC, May 2005 Draft).

Funding to conduct the study was provided by a grant from the Pennsylvania Department of Community and Economic Development (DCEd) and PennDOT. Technical assistance was provided to the RTPTF throughout the study by:

- DVRPC,
 - PennDOT,
 - BCPC, and
 - an engineering team led by the consulting firm Jacobs Edwards and Kelcey.
- [Project management and technical team members are identified in Appendix A.]

The work program pursued by the technical team addressed planning and engineering elements focused upon a core network of 16 Key Roadways (determined by the RTPTF) representing approximately 70 miles of state-owned highways. Study components consisted of:

- performing area-wide planning;
- conducting outreach and public involvement activities with stakeholders, community organizations and the general public;
- informing, updating and taking direction from the RTPTF;
- inventorying the Key Roadway facilities, and assessing their integrity;
- evaluating safety and operating conditions along the Key Roadways;
- examining the feasibility of implementing traffic calming measures on the Key Roadways; and
- identifying viable mobility and safety improvements including education, enforcement and engineering elements, which would adequately accommodate all legal road users and provide regional access to / from the area's operating quarries.



Swamp Road serves area residents, quarry trucks, the Bucks County Community College's Newtown Campus and through-travelers. The roadway's long-term future is the subject of independent study and design, which the BCRTS work is complementing.
Photo by: DVRPC

The study effort coordinated with, and integrated its analyses with, four transportation improvement proposals being independently developed, along the Key Roadway network, by PennDOT and the study area municipalities. These included:

- PennDOT's Swamp Road Corridor Improvement Project (SRCIP), in Wrightstown and Newtown townships;
- PennDOT's Traffic Signal Enhancement Initiative (TSEI) for the Newtown Bypass, in Newtown Township;
- Lower Makefield Township's Lindenhurst Road Traffic Calming Project; and
- Newtown Township's Stoopville Road Traffic Calming Plan.

KEY ROADWAY NETWORK

Sixteen Key Roadways were identified as the spine network for the study's detailed evaluations. They are major roadways or roadways of specific concern, serving local and through-travel in the study area, that carry the highest traffic or truck volumes or are particularly sensitive to the volumes.

The Key Roadway network is illustrated on Figure 1-2. Individual roadway segments are described below:

1. Worthington Mill Road (SR 2081) in Wrightstown and Northampton townships;
2. Swamp Road (SR 2036 and SR 2079) in Wrightstown and Newtown townships;
3. Lindenhurst Road (SR 2069) in Lower Makefield, Upper Makefield, and Newtown townships;
4. Stoopville Road (SR 2028) in Wrightstown, Newtown, Upper Makefield, and Lower Makefield townships;
5. Durham Road (SR 0413) between the Newtown Bypass and Township Line Road in Newtown and Wrightstown townships;
6. Newtown Bypass between I-95 and Swamp Road in Lower Makefield and Newtown townships;
7. Newtown-Richboro Road / Jacksonville Road (SR 0332) in Newtown and Northampton townships;

8. Second Street Pike (SR 0232) between Bristol Road and PA 413 in Wrightstown and Northampton townships;
9. Bustleton Pike (SR 2065) between Bristol Road and PA 232 in Northampton Township;
10. Wrightstown Road (SR 2081) between PA 413 and PA 532 in Wrightstown and Upper Makefield townships;
11. Mill Creek Road / Washington Avenue / Cherry Lane (SR 2091) between Swamp Road and PA 232 in Wrightstown Township;
12. Township Line Road / Mill Creek Road (SR 2115) between PA 413 and Washington Avenue in Wrightstown Township;
13. Newtown Bypass / Durham Road / Washington Crossing Road (SR 0532) between Swamp Road and Taylorsville Road in Newtown, Lower Makefield, and Upper Makefield townships;
14. Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road (SR 2071) between PA 32 and Trenton Avenue in Upper Makefield and Lower Makefield townships and Yardley Borough;
15. Newtown-Yardley Road / Afton Avenue (SR 0332) between I-95 and PA 32 in Lower Makefield Township and Yardley Borough; and
16. River Road (SR 0032) from Lurgan Road to Taylorsville Road, and from PA 532 to Trenton Avenue in Upper Makefield and Lower Makefield townships, and Yardley Borough. (NOTE: The section of PA 32 between Taylorsville Road and PA 532 has been omitted from the inventory since the PA 32 bridge over the Pennsylvania Canal is closed.)

Each Key Roadway was subjected to very specific engineering evaluations conducted in compliance with PennDOT's procedures. The engineering studies, prepared by the engineering consultants, included:

- *Weight, Size, and Load Restrictions Studies* - to judge the integrity of all 16 Key Roadways;
- *Traffic Engineering, and Safety Studies* - to determine the safety and efficiency of Swamp Road separately, and the remaining segments of the Key Roadway network; and
- *Traffic Calming Feasibility Studies* - to determine a role for traffic calming along the Key Roadways.

Where recommendations are identified—particularly traffic calming measures—the study has considered the possible traffic effects that might cascade to secondary roadways.



*Streetscape improvements recently constructed along Sycamore Street in Newtown Township contain curb extensions and other traffic calming elements
Photo by: DVRPC*

THE FINAL REPORT

The report represents a summary of the undertakings and findings of the work program—arrayed in-line with the project's deliverables. DVRPC was responsible for its overall preparation. Selected chapters were wholly prepared by the project's consultants to preserve the integrity of the engineering work and expedite the product. The final report was prepared taking into consideration written comments received during a public comment period on the draft report (between July, 31, 2007 and September 26, 2007) from citizens, study area stakeholders and the participating municipalities.

An overview of the remaining report chapters is presented below.

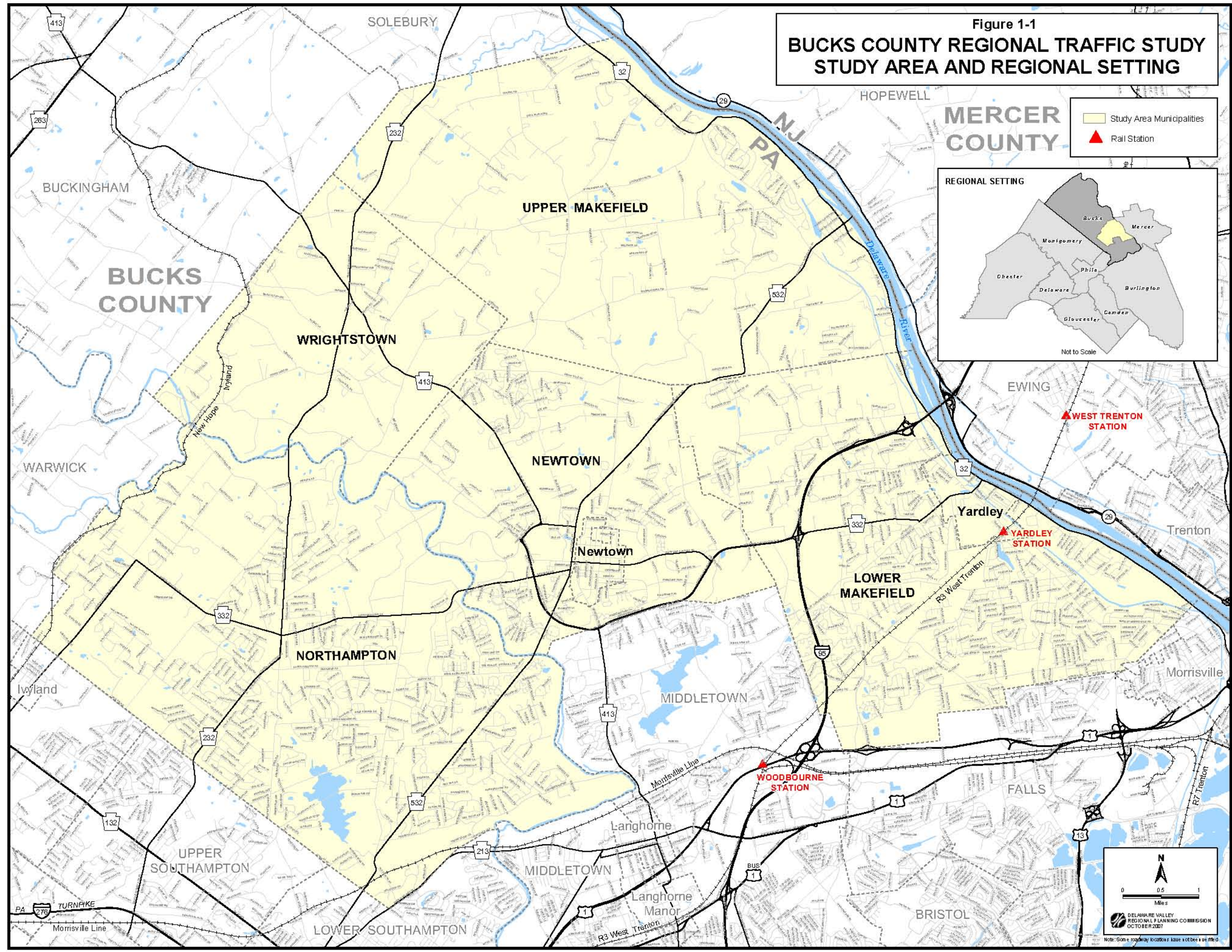
- Chapter 2, Planning Activities – Describes the steps taken and the information obtained through the planning work, which preceded the official start of the project and continued through the formal study. Coordination through the RTPPTF, municipal outreach and public involvement is explained.
- Chapter 3, Wrightstown Quarries Report – Describes investigations and actions taken, previously and within the scope of the *BCRTS*, to understand and accommodate the movement of heavy trucks to and from the four stone quarries situated on the western edge of the study area.
- Chapter 4, Weight, Size & Load Restrictions Studies Summaries – Contains a summary of the engineering analyses of each Key Roadway's functional integrity and ability to safely accommodate general traffic and truck traffic.
- Chapter 5, Traffic Engineering & Safety Studies Summaries – Contains a summary of the detailed evaluations of current traffic safety conditions, and current and projected future traffic operating characteristics along the Key Roadways; including the study's integration with four ongoing state and municipal transportation

improvement projects. Engineering recommendations, and related improvement costs, to address immediate, short-term and long-term needs along the Key Roadways are identified.

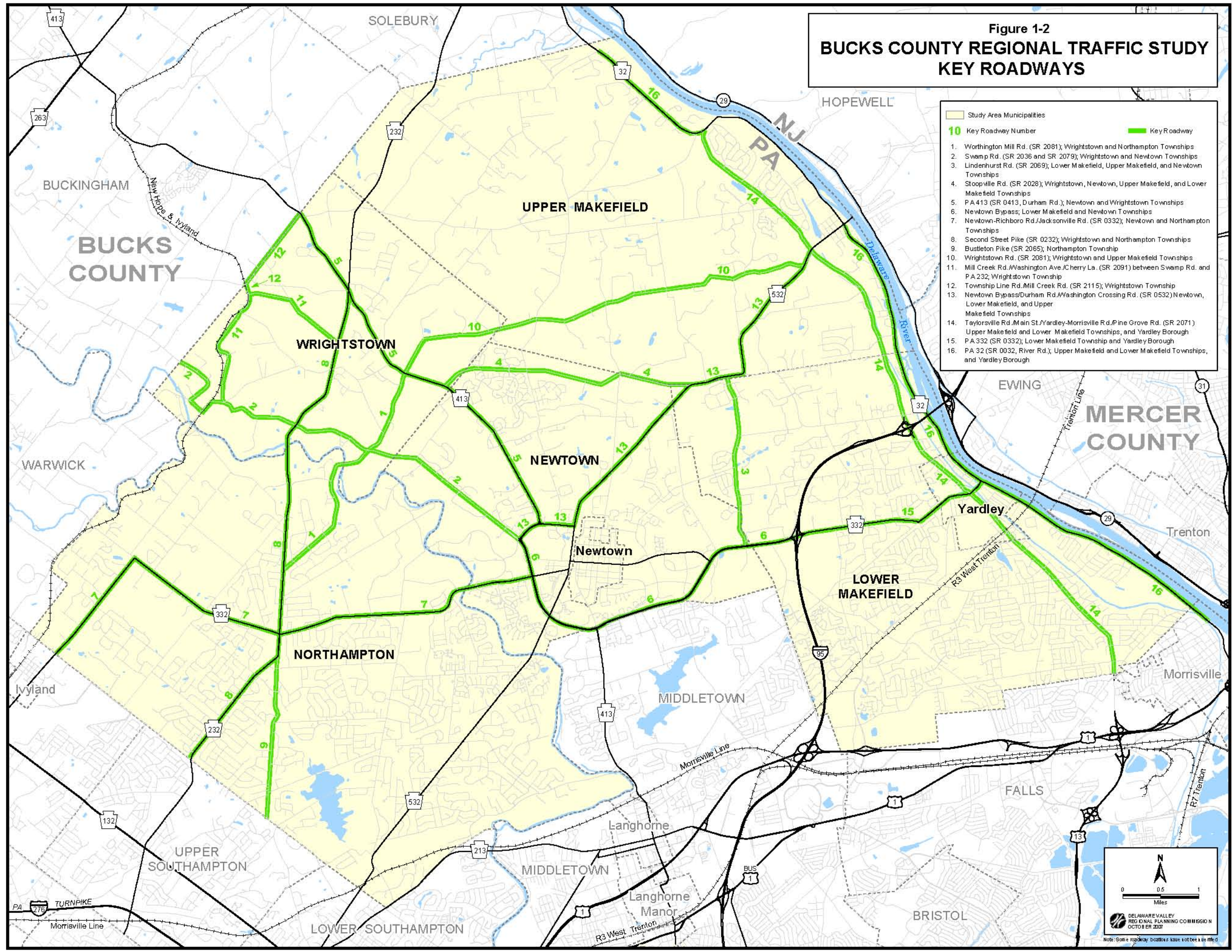
- Chapter 6, Traffic Calming Feasibility Studies Summary – Summarizes eligibility analyses for pursuing traffic calming along the Key Roadway network in accordance with PennDOT’s procedures. Ranges of appropriate traffic calming measures are identified, and potential secondary effects are assessed.
- Chapter 7, Recommendations & Implementation Schedule – Identifies the final report’s recommended transportation improvement plan incorporating engineering, education and enforcement elements—accounting for written comments received on the draft report from citizens, stakeholders and the municipalities—for the consideration and support of the Regional Traffic Planning Task Force’s continuing planning work.

The final report’s format, presented in a ring binder, allows the document to be used in continual reference, and be added to—to stay current with the ongoing activities of the task force.

**Figure 1-1
BUCKS COUNTY REGIONAL TRAFFIC STUDY
STUDY AREA AND REGIONAL SETTING**



**Figure 1-2
BUCKS COUNTY REGIONAL TRAFFIC STUDY
KEY ROADWAYS**



- Study Area Municipalities
- 10** Key Roadway Number
- Key Roadway
1. Worthington Mill Rd. (SR 2081); Wrightstown and Northampton Townships
 2. Swamp Rd. (SR 2036 and SR 2079); Wrightstown and Newtown Townships
 3. Lindenhurst Rd. (SR 2069); Lower Makefield, Upper Makefield, and Newtown Townships
 4. Stoopville Rd. (SR 2028); Wrightstown, Newtown, Upper Makefield, and Lower Makefield Townships
 5. PA 413 (SR 0413, Durham Rd.); Newtown and Wrightstown Townships
 6. Newtown Bypass; Lower Makefield and Newtown Townships
 7. Newtown-Richboro Rd./Jacksonville Rd. (SR 0332); Newtown and Northampton Townships
 8. Second Street Pike (SR 0232); Wrightstown and Northampton Townships
 9. Bustleton Pike (SR 2065); Northampton Township
 10. Wrightstown Rd. (SR 2081); Wrightstown and Upper Makefield Townships
 11. Mill Creek Rd./Washington Ave./Cherry La. (SR 2091) between Swamp Rd. and P.A. 232; Wrightstown Township
 12. Township Line Rd./Mill Creek Rd. (SR 2115); Wrightstown Township
 13. Newtown Bypass/Durham Rd./Washington Crossing Rd. (SR 0532) Newtown, Lower Makefield, and Upper Makefield Townships
 14. Taylorsville Rd./Main St./Yardley-Morrisville Rd./Pine Grove Rd. (SR 2071) Upper Makefield and Lower Makefield Townships, and Yardley Borough
 15. PA 332 (SR 0332); Lower Makefield Township and Yardley Borough
 16. PA 32 (SR 0032, River Rd.); Upper Makefield and Lower Makefield Townships, and Yardley Borough

0 0.5 1
Miles

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
OCTOBER 2010

Note: Some roadway locations have not been verified.



Bucks County

Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township / Yardley Borough

2.



Planning Activities



Prepared by:

DELAWARE VALLEY REGIONAL PLANNING COMMISSION
October 2007

Table of Contents

BACKGROUND 2-1

PLANNING RESEARCH MATERIALS..... 2-1
 Land Use and Development Conditions 2-1
 Transportation Facilities and Improvement Programs..... 2-5

ENVIRONMENTAL SCREENING 2-6
 Environmental Justice Considerations..... 2-11
 Human and Natural Environments..... 2-11

OUTREACH AND INVOLVEMENT 2-12
 Municipal Outreach 2-12
 Public Involvement 2-17

List of Tables

Table 2-1: Population and Employment in the Study Area (2000 and 2030)..... 2-5
 Table 2-2: Study Stakeholder and Community Group Representatives 2-18

List of Figures

Figure 2-1: 2000 Land Use 2-3
 Figure 2-2: Major Land Development Proposals..... 2-4
 Figure 2-3: Traffic Classification Counts 2-7
 Figure 2-4: Highway Classification 2-8
 Figure 2-5: Current Transportation Improvement Projects 2-9
 Figure 2-6: Long-Range Transportation Improvement Projects..... 2-10
 Figure 2-7: Degrees of Disadvantage 2-13
 Figure 2-8: Cultural Landmarks and Historical Resources..... 2-14
 Figure 2-9: Natural Features 2-15
 Figure 2-10: Truck Travel Pattern Concerns 2-19
 Figure 2-11: Traffic and Roadway Concerns..... 2-20
 Figure 2-12: Improvements and Quality of Life Areas of Concern..... 2-23

BACKGROUND

As a foundation for the study, DVRPC dedicated considerable effort at identifying specific concerns with representatives of the RTPTF, researching related matters, and collecting background data. After the official study was initiated, staff continued coordinating with the RTPTF, through its regular meetings, and expanded outreach to involve study stakeholders and the public-at-large. A project web site was established and actively maintained throughout the project to inform interested parties of the project's developments and its products, and to elicit input. These activities became increasingly important as a means of guiding the study and gauging its findings in developing a viable and supported improvement program for the region.

PLANNING RESEARCH MATERIALS

Much of the planning work was conducted before the official start of the study. This necessarily occurred so that project planners could familiarize themselves with traffic and land use conditions in the study area. Most of that research was summarized into a series of thematic maps. In turn, those maps were used in meetings with the RTPTF and its staff to determine perceptions and garner more information. Important findings of those working meetings were subsequently illustrated on thematic maps and used in public meetings. The final mapping set was used as the basis for the information presented in this chapter.

Land Use and Development Conditions

The relationship between land use and transportation facilities is central to any traffic study. The use of the land—where people live, work and play—and its intensity is responsible for trip generation and its magnitude. The aerial spread of the uses and the transportation facilities connecting or serving the uses is responsible for how trips may be accomplished (e.g., by highway, transit, walking, etc.). Temporal demands (or direct costs) placed on individual transportation facilities may influence the mode or route selected.

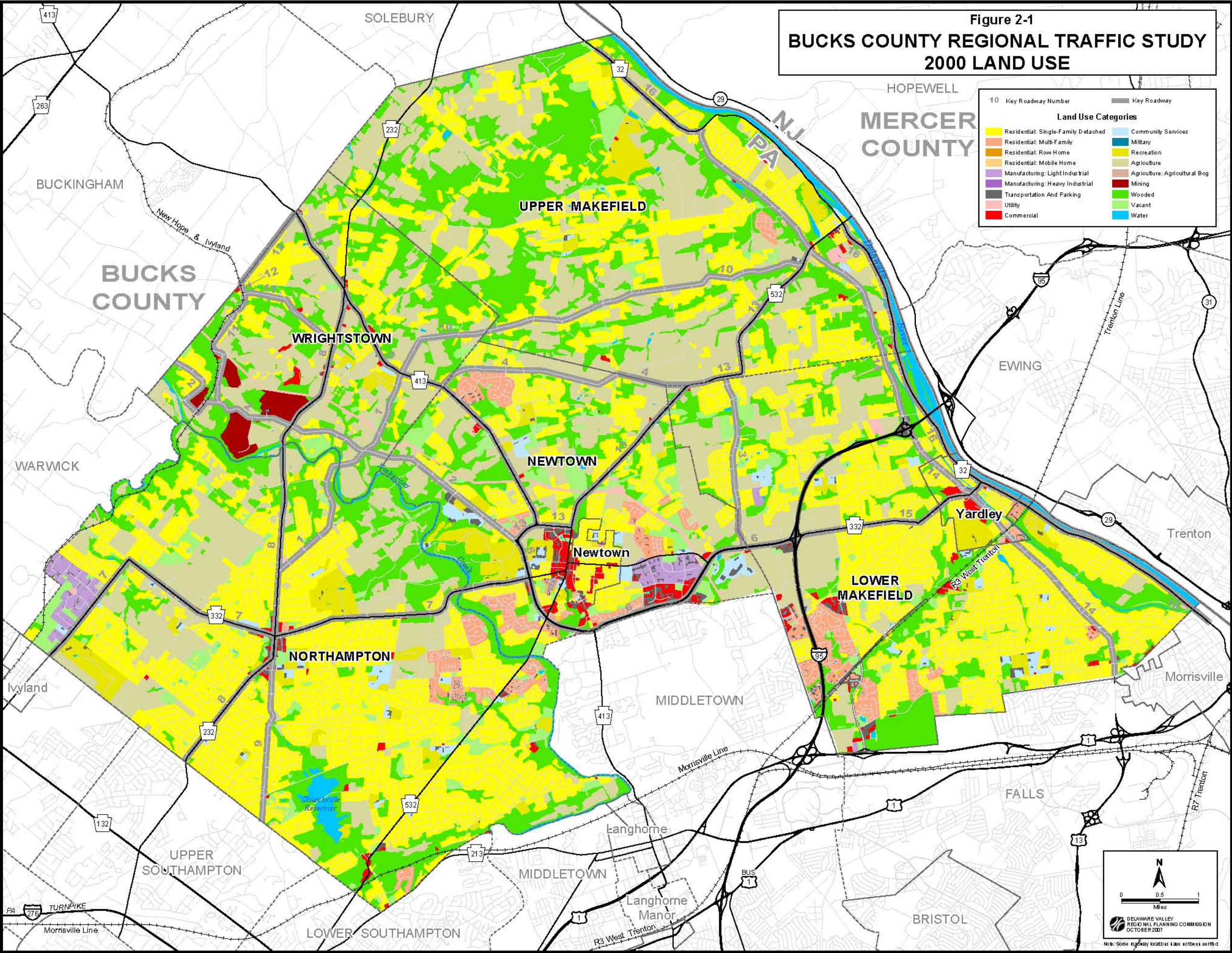
Figure 2-1 displays the categories and spread of land coverage in 2000. Observations were made in its regard. The maturity of the southern half of the study area is reflected in its degree of suburbanization—predominantly devoted to single family residential use. Much of the area in Wrightstown and Upper Makefield townships are devoted to agricultural use, or stand vacant or wooded. Commercial centers exist in Richboro, Northampton Township, and in the boroughs of Newtown and Yardley. Major business parks are located on Jacksonville Road in Northampton, and at the Newtown Bypass' intersection with Newtown-Yardley Road in Newtown Township. Four stone quarries are located in Wrightstown Township near the intersection of Swamp Road and Second Street Pike (PA 232). Tyler State Park, in Newtown Township, and Washington Crossing State Park, in Upper Makefield, provide recreational opportunities in the study area. Institutions of higher learning are also present in the study area. The Newtown Campus of the Bucks County Community College (BCCC) is located on Swamp Road. Holy Family University and LaSalle University also have annex campuses just off the Newtown Bypass. All of the land use is responsible for producing trips to, from and within the study area. At the same time, through-travel is taking place between like uses external to the study area.



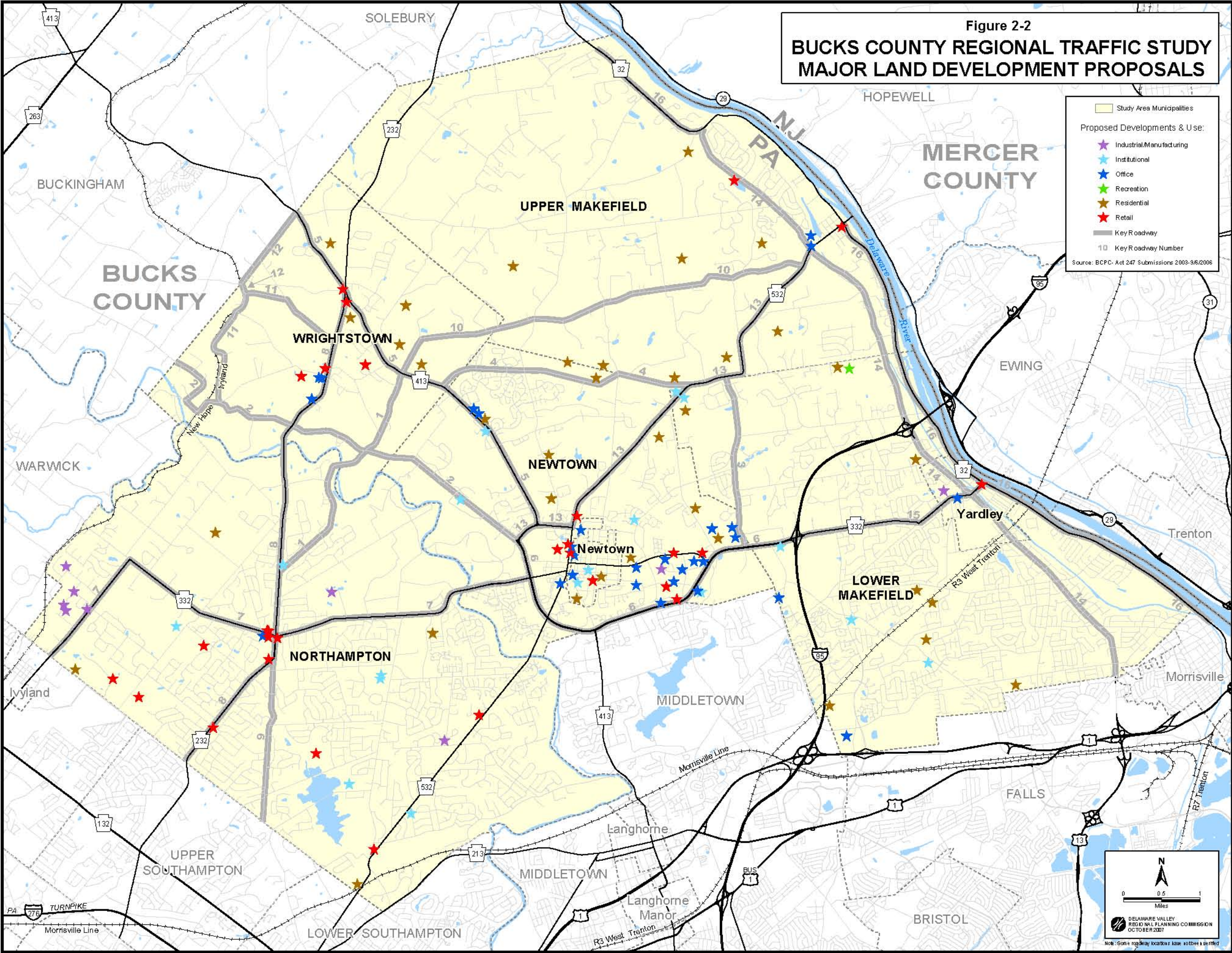
Office development infill in the Newtown Commons Business Park
Photo by: DVRPC

Future development trends and growth in the study area were drawn from an examination of land development applications submitted to the BCPC between 2003 and September 2006, and DVRPC's forecasts of population and employment. In Figure 2-2, all nonresidential development applications to the BCPC were mapped and residential applications containing 10 or more dwellings were mapped. The active proposals collectively represent in excess of 550,000 square feet of retail space, approximately 1.7 million square feet of office use, almost 300,000 square feet of light industrial / manufacturing use, one-quarter million square feet of institutional use, and 2,500 more homes. The information in Figure 2-2 suggests that growth will trend and amplify current land development patterns in the foreseeable future.

Figure 2-1
BUCKS COUNTY REGIONAL TRAFFIC STUDY
2000 LAND USE



**Figure 2-2
BUCKS COUNTY REGIONAL TRAFFIC STUDY
MAJOR LAND DEVELOPMENT PROPOSALS**



A potential use of this information is to pursue traffic improvements that will simultaneously accommodate the proposed land development and address known or expected nearby deficiencies through the land development review and approval process.¹

DVRPC’s long-range forecasts of population and employment agree with the development trends. Table 2-1 indicates that the municipalities having the highest levels of residents and jobs will generally be the receivers of the vast majority of new growth.

Table 2-1: Population and Employment in the Study Area (2000 and 2030)²

Municipality (area in square miles)	2000		Change: 2000 to 2030		2030		Change: 2000 to 2030	
	US Census	DVRPC	Absolute	Percent	DVRPC	DVRPC	Absolute	Percent
		2030				2030		
	Population				Employment			
Lower Makefield Twp. (17.9)	32,681	37,825	5,144	15.70%	4,934	6,326	1,392	28.20%
Newtown Boro. (0.5)	2,312	2,595	283	12.20%	3,609	3,852	243	6.70%
Newtown Twp. (12.0)	18,206	25,775	7,569	41.60%	9,295	15,805	6,510	70.00%
Northampton Twp. (25.8)	39,384	47,540	8,156	20.70%	9,611	12,134	2,523	26.20%
Upper Makefield Twp. (20.9)	7,180	13,780	6,600	91.90%	1,271	2,970	1,699	133.70%
Wrightstown Twp. (9.9)	2,839	4,460	1,621	57.10%	1,176	1,338	162	13.80%
Yardley Boro. (0.9)	2,498	2,730	232	9.30%	2,055	2,108	53	2.60%

Transportation Facilities and Improvement Programs

In preparation for this study, DVRPC conducted about 60 vehicle traffic classification counts along the Key Roadway network. The counts were performed on non-holiday weekdays, while schools were in session, during the spring and fall of 2005, and during the winter of 2006. The count data is displayed on Figure 2-3. The average daily traffic (ADT) count data provides a snapshot of the volume and mix of vehicles traveling the Key Roadways on the day of the count. Ultimately, the data was used in the engineering components of this study.

Highway functional classification is a term that implies the hierarchy and interconnectivity of a highway network. Typically, expressways and arterial highways provide for through-travel and mobility over longer distances. Local travel, comprised of shorter trips and land access, is served by collector roads and local streets. More often than not, trips include both local and longer-distance elements, and hence the importance of interconnectivity and continuity of the system to support all highway trips.

The highway network highlighted on Figure 2-4 is the federal-aid highway system, which indicates the routes that are most important to the region, the state and the country; and may be eligible for funding assistance through federal-aid highway programs.³ The 16 Key Roadways are also indicated on the figure. Each is included in the system, classified as a collector or higher. Functional classification is an important parameter in determining initial eligibility of the Key Roadways for traffic calming measures (see Chapter 6). Where secondary effects of improvement recommendations along the Key Roadways were to be considered, it is upon the full federal-aid highway network that the evaluation would be performed.

State and federal-aid highway improvement financing programs in the Philadelphia metropolitan area are administered by DVRPC, and reflected in the region’s Transportation Improvement Program (TIP). Study area projects that are on the current TIP are shown on Figure 2-5. Many are bridges, and since beginning the BCRTS project some projects have advanced through completion. The reconfiguration of the I-95 interchange with the Newtown Bypass (MPMS project #13518) was completed in the fall of 2006. The replacement of the Richboro Road Bridge over Neshaminy Creek (MPMS # 13357) and PennDOT’s Traffic Signal Enhancement project to provide a responsive and coordinated traffic signal system along the Newtown Bypass were delivered by summer

¹ To accomplish this, the final BCRTS recommendations and the comprehensive inventory of traffic and roadway concerns identified by the municipalities (illustrated in Figure 2-11) might be matched to the developments shown in Figure 2-2.

² Source: *Destination 2030*, the Year 2030 Plan for the Delaware Valley (DVRPC, May 2005 Draft).

³ Typical funding assistance programs are available to streets and highways above “local” systems in urbanized areas, and for roads and highways above the “minor collector” category in rural areas.

2007. The *BCRTS* is supplementing the TSEI project by examining a longer-term perspective of the Bypass' traffic operations.

PennDOT is advancing environmental clearance evaluations, preliminary engineering, and public outreach and community involvement activities for the Swamp Road Corridor Improvement Project through Wrightstown and Newtown Townships (MPMS #64780). Pending the outcome of those activities and interactions a project scope will be determined and final design will be initiated. PennDOT anticipates a completed project in mid-2012. The *BCRTS* is working in parallel to the long-term reconstruction project, specifically to determine a timelier set of traffic safety and mobility improvements that might be pursued independently, but which could be complementary with any further improvement of the corridor.

Traffic calming initiatives along two Key Roadways are being advanced locally. Lower Makefield Township initiated construction of its Lindenhurst Road Traffic Calming Program during September 2007. Various traffic safety measures will be constructed to reduce speeds and enhance safety to pedestrians and motorists (according to an aerial depiction / summary of the project, dated 4/25/07). Construction funding is being provided by the Department of Community and Economic Development (DCED). Newtown Township has recently completed a preliminary traffic calming plan for Stoopville Road. The conceptual plan (Alternate 2, dated 1/11/07) contains roundabouts, landscaped medians, decorative crosswalks, chicanes and a gateway treatment in the cartway. A multiuse trail along one side of the highway is also proposed. The plan is being circulated for public review and comments from PennDOT prior to initiating design activities. No construction monies have been secured to implement the Stoopville Road project. Traffic engineering analyses conducted in the *BCRTS* has integrated the potential effects of each of these projects.

DVRPC also conducts long-range land use and transportation planning for the metropolitan area. Figure 2-6 displays transportation projects within or adjacent to the *BCRTS* area, which are included in *Destination 2030*, the current long range plan for the Delaware Valley. The current plan for the region supports efforts to:

- Widen I-95 north of PA 332 and into New Jersey, via a replacement and widening of the Scudder Falls Bridge;
- Reconstruct I-95 South of PA 332 in Bucks County;
- Reconstruct US 1 from the Pennsylvania Turnpike to the NJ state line; and
- Pursue access management initiatives along PA 413 through the county.

As part of the FY 2007 annual planning work program, and as a complement to the traffic engineering and safety study performed for Key Road #5 in the *BCRTS*, DVRPC staff are preparing an access management case study for the Durham Road (PA 413) corridor between the Newtown Bypass and PA 232. The case study will include specific recommendations for driveway locations and access designs (among other techniques) given the broader, long-term recommendations emanating from the *BCRTS*.



Lindenhurst Road is proposed to include raised median islands, textured cross-walks, and narrowed travel lanes
Photo by: DVRPC

ENVIRONMENTAL SCREENING

Planning and engineering for public works projects financed by the federal government are subject to defined rules and regulations to inventory, determine and mitigate a project's negative affects upon resident populations and resources. To be deliverable, the study and project development process must appropriately involve the resident population. Additionally, recommendations that emanate from the technical analysis of traffic volume and safety conditions must be clear of, or include steps to mitigate, adverse environmental consequences of the constructed project. The detail and levels of effort required to properly conduct environmental clearance is beyond the scope and scale of the *BCRTS*. Still, some advance screening work was required at this conceptual stage to engage targeted residents, help identify avoidance steps and/or prepare for the eventuality of compliance with the requirements of the federal mandates (including: Title VI of the Civil Rights Act of 1964 and the 1994 President's Executive Order on Environmental Justice, #12898; and the National Environmental Policy Act of 1969 as amended).

**Figure 2-3
BUCKS COUNTY REGIONAL TRAFFIC STUDY
TRAFFIC CLASSIFICATION COUNTS**

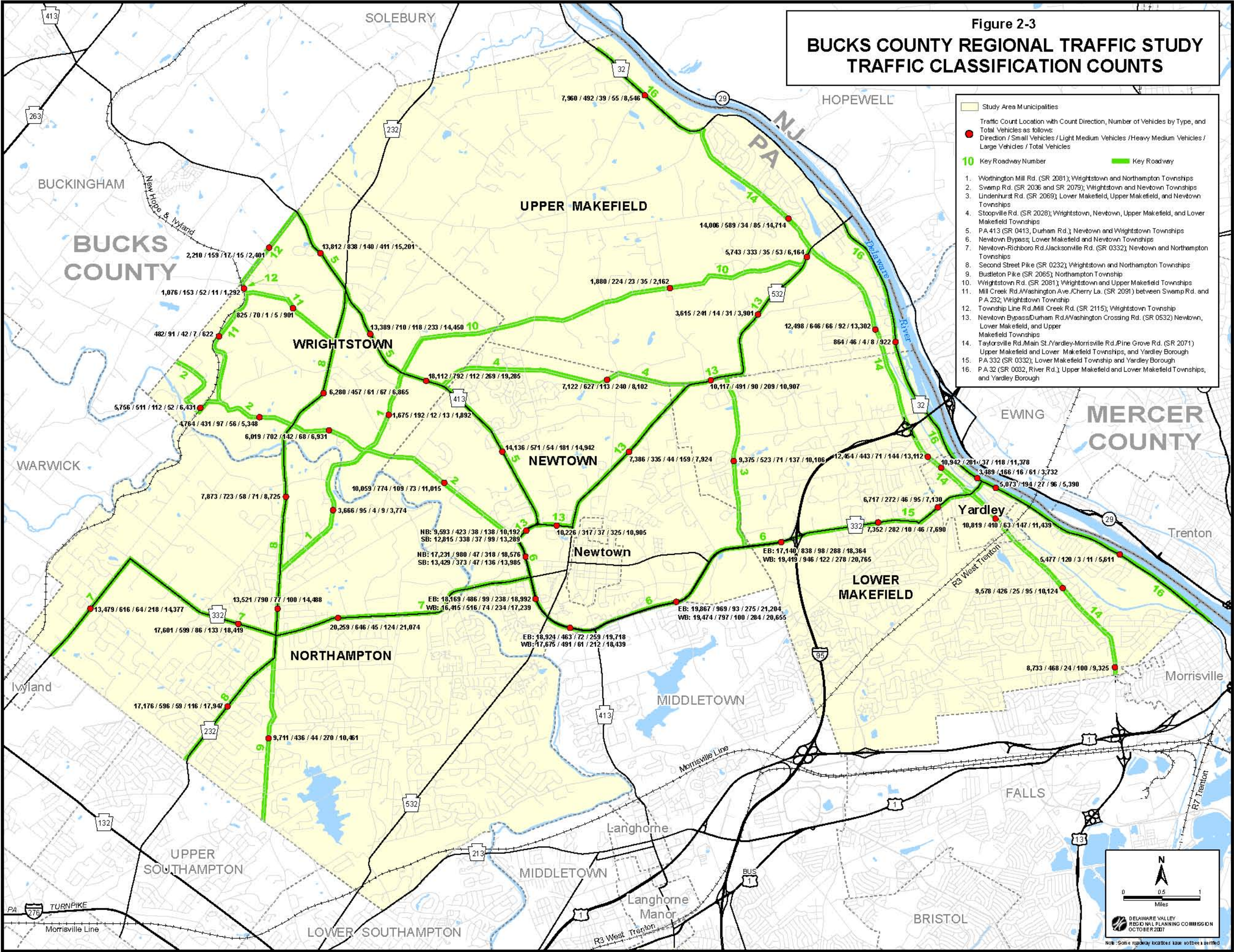
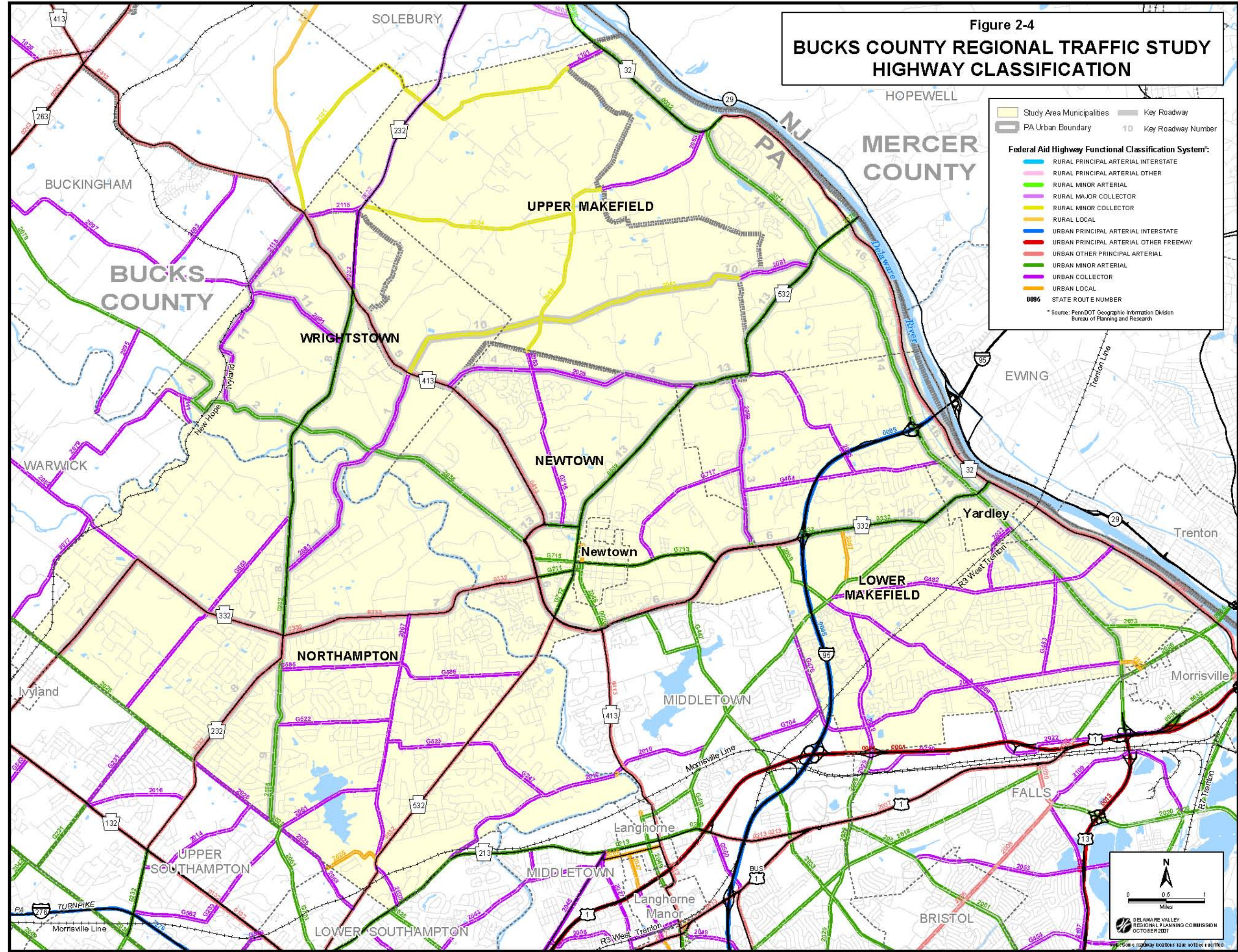


Figure 2-4
BUCKS COUNTY REGIONAL TRAFFIC STUDY
HIGHWAY CLASSIFICATION

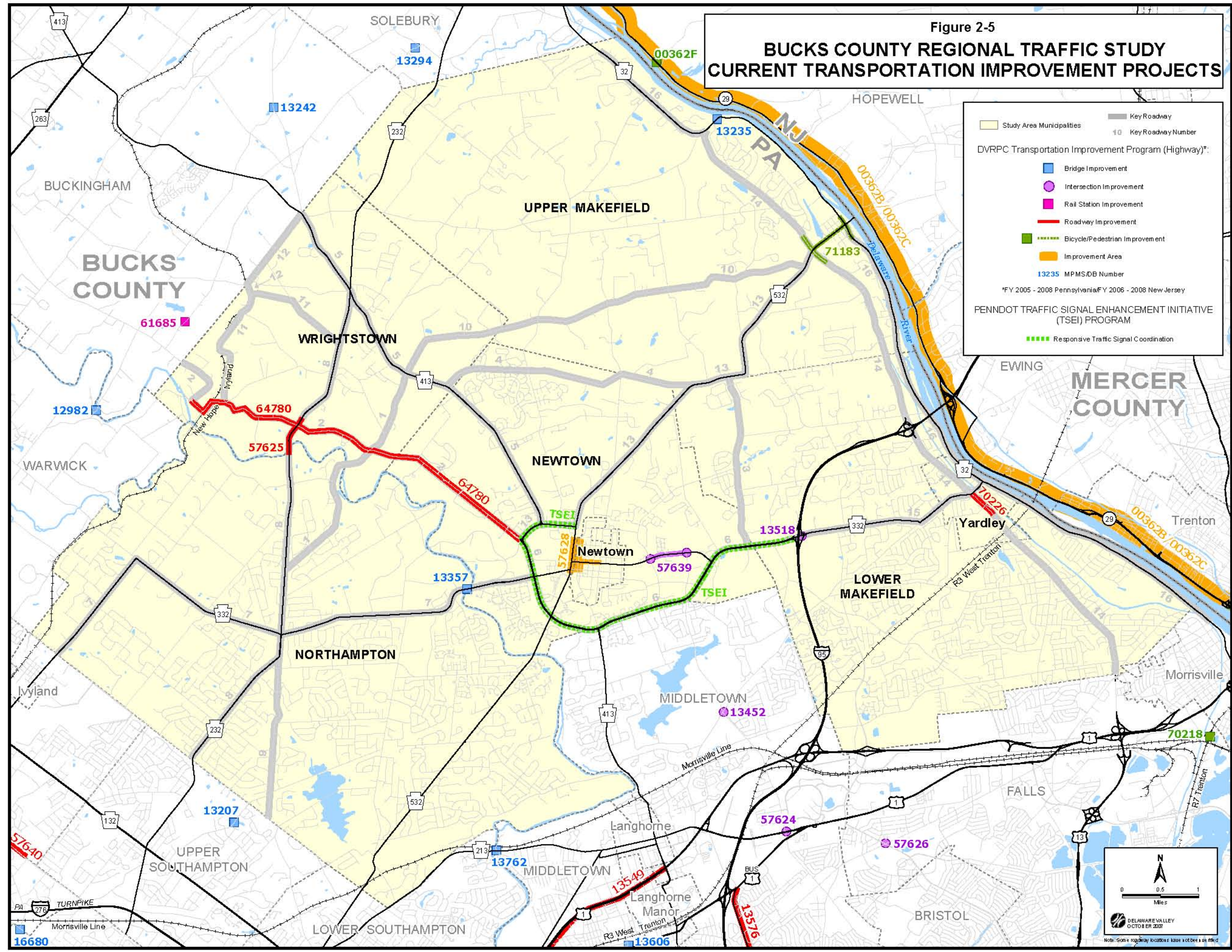


N

0 0.5 1
 Miles

DELAWARE VALLEY
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 OCTOBER 2007

Figure 2-5
BUCKS COUNTY REGIONAL TRAFFIC STUDY
CURRENT TRANSPORTATION IMPROVEMENT PROJECTS



Legend

Study Area Municipalities

Key Roadway

Key Roadway Number

DVRPC Transportation Improvement Program (Highway)*:

- Bridge Improvement
- Intersection Improvement
- Rail Station Improvement
- Roadway Improvement
- Bicycle/Pedestrian Improvement
- Improvement Area

13235 MPMS/DB Number

*FY 2005 - 2008 Pennsylvania/FY 2006 - 2008 New Jersey

PENNDOT TRAFFIC SIGNAL ENHANCEMENT INITIATIVE (TSEI) PROGRAM

- Responsive Traffic Signal Coordination

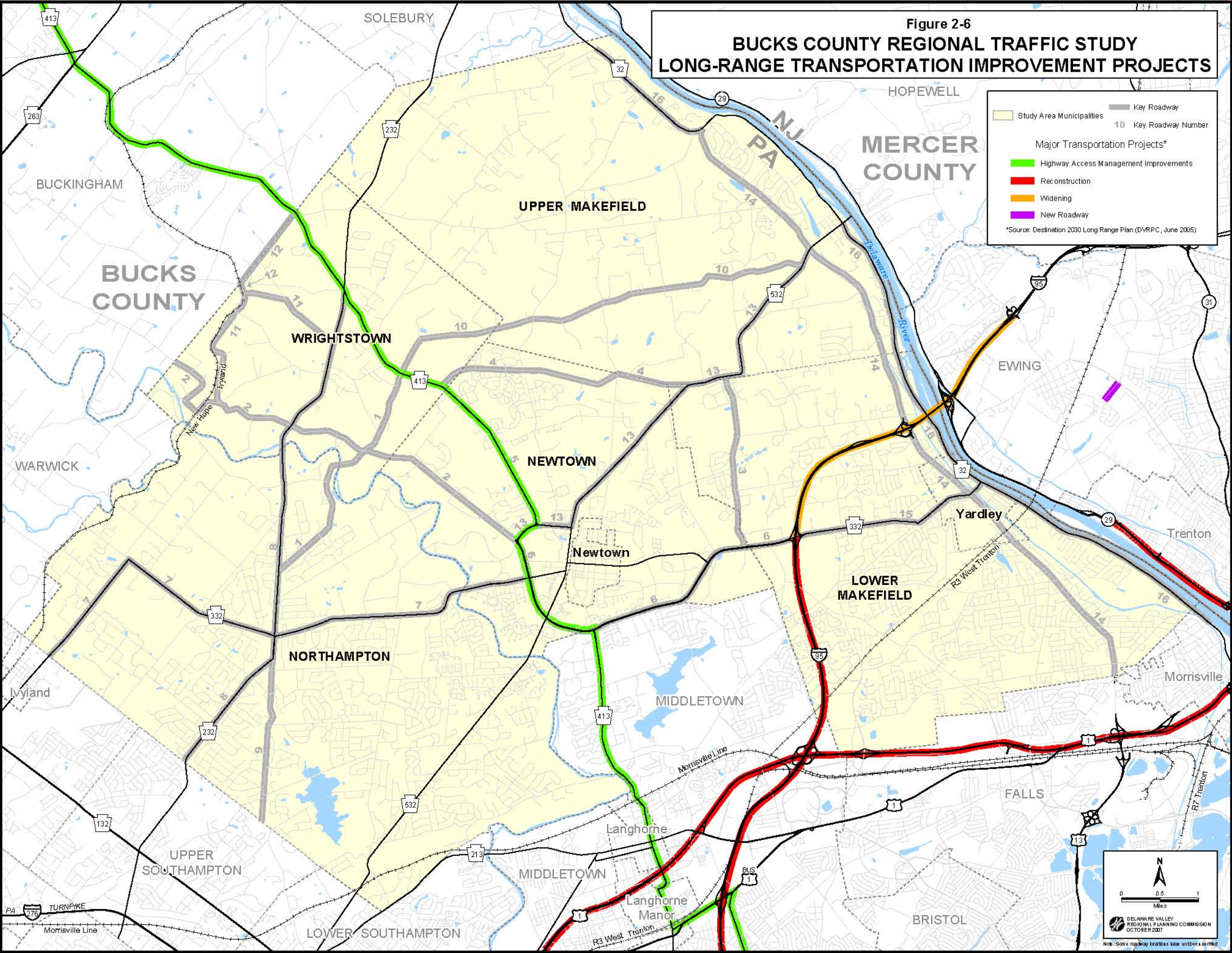
Scale: 0, 0.5, 1 Miles

North Arrow

DELAWARE VALLEY
 OCTOBER 2007

Note: Some roadway locations have not been updated

Figure 2-6
BUCKS COUNTY REGIONAL TRAFFIC STUDY
LONG-RANGE TRANSPORTATION IMPROVEMENT PROJECTS



0 0.5 1
Miles

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
OCTOBER 2007

Note: Some roadway locations have not been verified.

Environmental Justice Considerations

Federal law states that no person or group shall be excluded from participation in, or denied the benefits of, any program or activity utilizing federal funds. Each federal agency is required to identify any disproportionately high and adverse health or environmental effects of its programs on minority and low-income populations. In turn, Metropolitan Planning Organizations, as part of the United States Department of Transportation's certification requirements, are charged with evaluating their plans and programs for environmental justice sensitivity, including expanding their outreach efforts to low-income, minority or other disadvantaged population groups.

DVRPC, as the metropolitan planning organization for the Philadelphia region, fully complies with these mandates, and uses eight categories of disadvantage identified through the use of U.S. Census data. The eight categories include: minorities, Hispanic, elderly, disabled, car less households, impoverished households, female head of household with child, and limited English proficiency. DVRPC has determined a regional threshold, or average, for each population category, and uses that threshold to assess whether census tracts throughout the region meet or exceed the averages. Each census tract that meets or exceeds the regional average is considered an environmental justice area, and the frequency that these factors are found within any given tract represents the degree of disadvantage of the tract.

The Degrees of Disadvantage process was applied to the census tracts in the *BCRTS* study area. Figure 2-7 identifies census tracts containing resident populations that exceed the defined regional threshold for the particular disadvantaged group. Disadvantaged tracts within the study area are as follows:

- Newtown Borough: Tract 1053.00 (i.e., the whole borough) – meets or exceeds for elderly population; and
- Northampton Township: Tract 1050.03 – meets or exceeds for elderly population; and Tract 1050.09 – meets or exceeds for elderly and disabled populations (e.g., the tract shows two degrees of disadvantage).

The decision to pursue any federally funded public works project along portions of Key Roadways #1, #7, #8 and #9 (which traverse or border census tract 1050.03 in Northampton Township) must document that disadvantaged population groups have been actively identified and engaged throughout the course of the project's development process—planning, discussions, assessments, etc. It would be fair to point out that during the study DVRPC staff actively communicated with the Director of the Northampton Township Senior Center (located within the tract) for the purposes of: enlisting a representative from the Center as a named project Stakeholder; advertising all three public meetings and notifying its governing board and members of the forthcoming meetings; and sponsoring a project public open house meeting at its facility on Township Road. The first request was never responded to, and institutional constraints on the supply of parking precluded the last request. The final public open house meeting for the project was ultimately held at the Richboro Elementary School located in the census tract.

Human and Natural Environments

Natural and cultural resources sustain environmental functions, provide recreational opportunities and enhance the quality of life for local residents.



*Yardley's business district is a historical landmark
Photo by: DVRPC*

Cultural landmarks and historical resources, identified through online and DVRPC's in-house GIS mapping resources, are illustrated on Figure 2-8. Schools, colleges, municipal services buildings and medical sites are distributed throughout the study area. The study area contains a substantial amount of historic sites and historical districts (listed on the federal register, and/or eligible for listing) that will require special review and clearance (from local interest groups to the Pennsylvania Historical and Museum Commission). Preservation codes may limit the scale of physical changes and/or influence the appearance of the recommendations proposed for the Key Roadways.

Natural features including floodplains, wetlands, and protected lands, etc. were identified through online and DVRPC's in-house GIS mapping resources, and are illustrated on Figure 2-9. Impacts to these features, as a consequence of physical changes along the Key Roadway network, will require proper mitigation emanating from review and approvals by:

- the Pennsylvania Department of Environmental Protection, the US Army Corps of Engineers, and, where local ordinances require, the municipality for water and wetlands; and
- the Pennsylvania Department of Conservation and Natural Resources, county and municipal owners for public lands.

OUTREACH AND INVOLVEMENT

Between March 2005 and September 2006, while preparing for the formal study, DVRPC staff participated in the regular meetings of the RTPTF, which were open to the public. Project staff also met individually with the participating municipalities and the police departments providing coverage in the study area to get background into the issues driving the study and perceptions of existing transportation conditions. Staff also met with personnel from the Council Rock and Pennsbury school districts and the Bucks County Community College.

As the formal study got underway⁴ staff continued to participate in the regular RTPTF meetings and also conducted three public open house meetings to actively elicit input from members of the study stakeholders group, leaders of community organizations and homeowner associations, and the general public. The purposes of the public outreach were to get informed opinions on transportation conditions as background to the investigations and to serve as a sounding board for the study's process and products. The public open house meetings were also useful to gauge public reaction for the decision makers.

As deemed appropriate or timely, project representatives from the independent studies taking shape in the study area (e.g., the TSEI, the SRCIP, the Stoopville Road Traffic Calming Plan and the Lindenhurst Road Traffic Calming Project) were invited to attend and present at the RTPTF and the public open house meetings. A *BCRTS* project website was developed and launched (approximately two weeks before the first public open house meeting) and maintained throughout the official project to disseminate information and receive feedback. All meeting materials (RTPTF, and public open house meetings), displays, handouts and meeting notes, and project deliverables were posted online for all to see and/or download.

Municipal Outreach

During the summer of 2005, staff met individually with each municipality. DVRPC requested the meetings, but the invitations were extended by the municipal managers. Typically the meetings were attended by elected representatives from the participating municipality, including, but not limited to the RTPTF members. Other members of the municipal staff likely to be present included: municipal managers or administrators, engineers, public works personnel, and police department representatives. When the police were not represented at the initial meeting, a follow-up meeting was scheduled with them.

Materials assembled from the earliest background planning activities (e.g., the thematic maps) were taken to the meetings to spur conversations about:

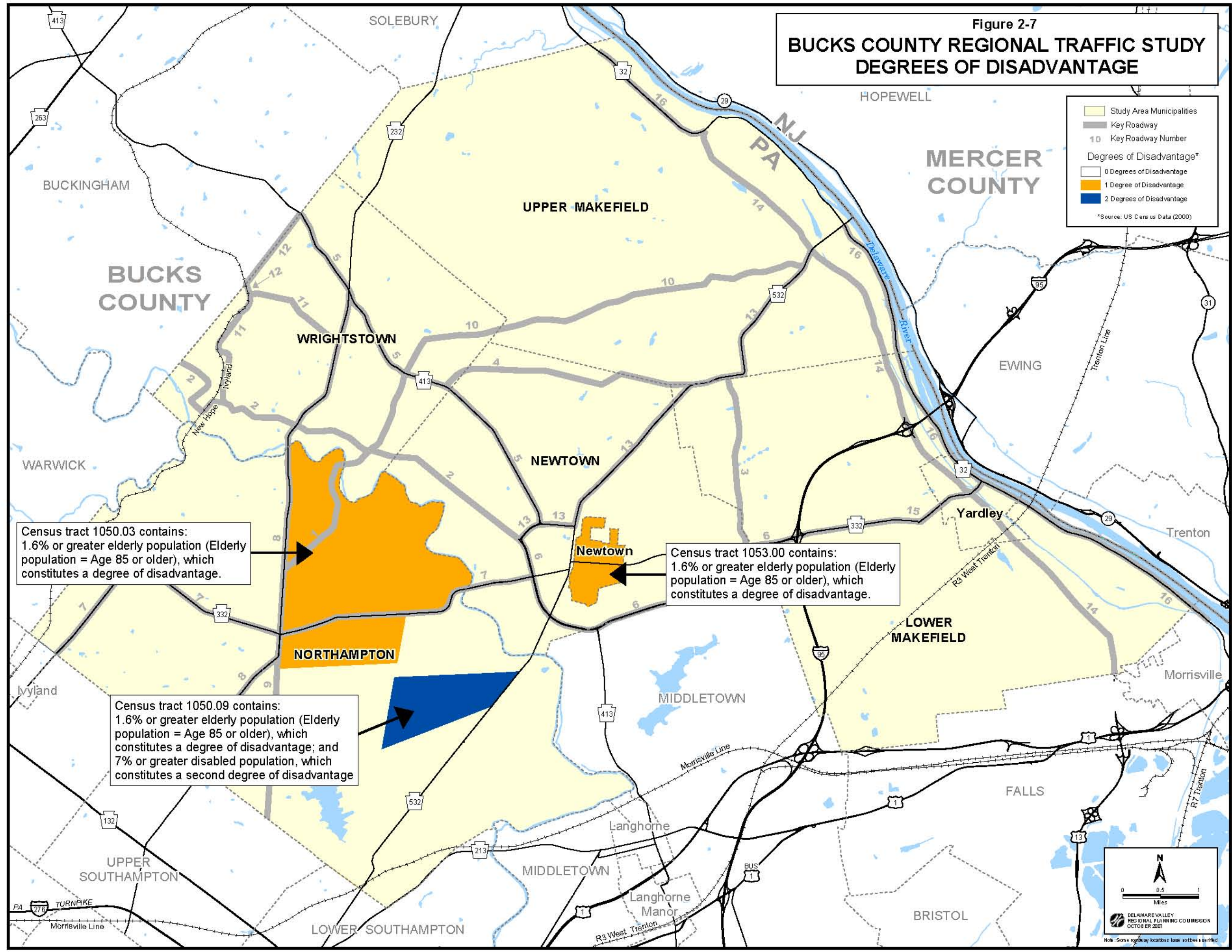
- Key Roadway network completeness;
- Concerns with truck traffic (in general or specific);
- Locations of deficiencies or concerns related to traffic congestion, traffic volumes, and roadway alignment and safety (present or anticipated, and anywhere in or near the study area—i.e., not just the Key Roads and not just within their municipality);
- Available traffic studies and improvement suggestions, plan or projects (including, but not limited to those that address the identified deficiencies);
- Traffic calming initiatives (candidate locations and projects);



*Taylorsville Road is closely paralleled by the Pennsylvania Canal
(on the right in this view)
Photo by: DVRPC*

⁴ Official "Notice-to-Proceed" for the *BCRTS* was granted on September 1, 2006.

**Figure 2-7
BUCKS COUNTY REGIONAL TRAFFIC STUDY
DEGREES OF DISADVANTAGE**



Study Area Municipalities
 Key Roadway
 10 Key Roadway Number

Degrees of Disadvantage*

- 0 Degrees of Disadvantage
- 1 Degree of Disadvantage
- 2 Degrees of Disadvantage

*Source: US Census Data (2000)

Census tract 1050.03 contains:
 1.6% or greater elderly population (Elderly population = Age 85 or older), which constitutes a degree of disadvantage.

Census tract 1053.00 contains:
 1.6% or greater elderly population (Elderly population = Age 85 or older), which constitutes a degree of disadvantage.

Census tract 1050.09 contains:
 1.6% or greater elderly population (Elderly population = Age 85 or older), which constitutes a degree of disadvantage; and
 7% or greater disabled population, which constitutes a second degree of disadvantage

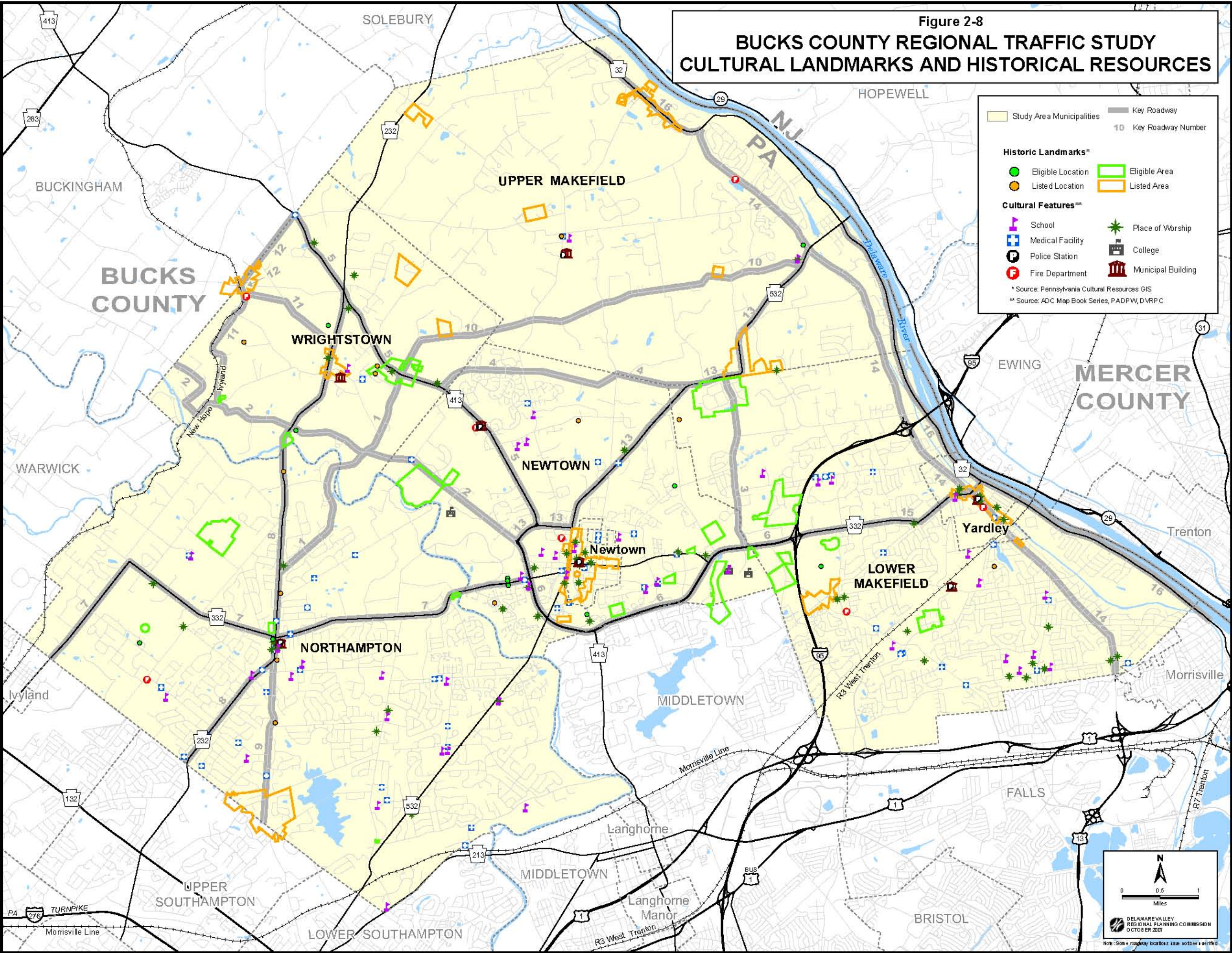
N

0 0.5 1
 Miles

DELAWARE VALLEY
 REGIONAL PLANNING COMMISSION
 OCTOBER 2007

Note: Some roadway locations have not been verified

**Figure 2-8
BUCKS COUNTY REGIONAL TRAFFIC STUDY
CULTURAL LANDMARKS AND HISTORICAL RESOURCES**



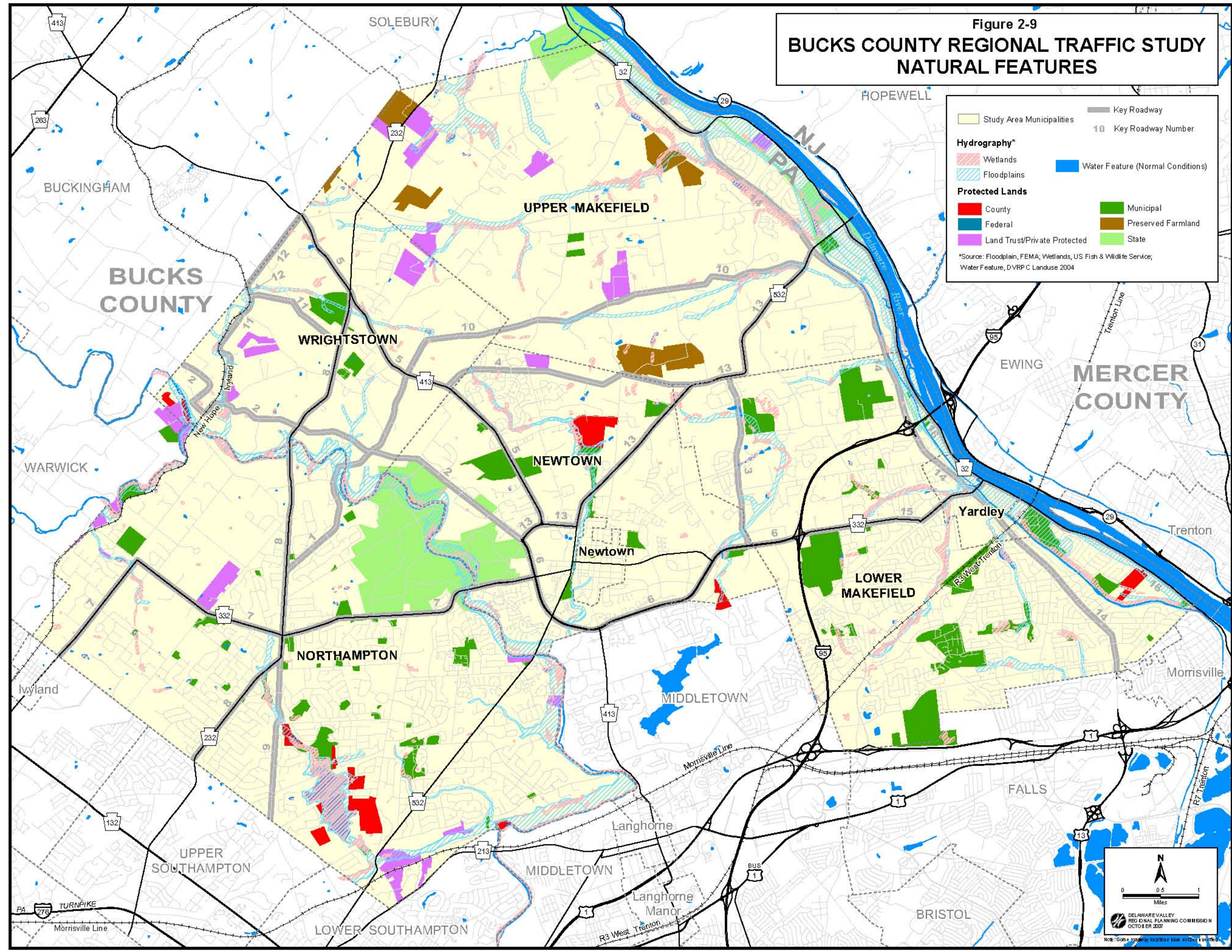
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Miles

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
OCTOBER 2017

Note: Some roadway locations have not been verified.

**Figure 2-9
BUCKS COUNTY REGIONAL TRAFFIC STUDY
NATURAL FEATURES**



N

0 0.5 1
Miles

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
OCTOBER 2010

Note: Some roadway locations have not been verified.

- “Near-miss” conflict reports, information, or data (e.g., locations where trucks and/or school buses may be involved in, or affected by aggressive or inattentive driving situations, but where no collisions took place); and
- Any other related topic that the participants wanted to raise.

Meeting notes were prepared following each session and sent to each attendee as a record of the conversations.

The information obtained from the municipal meetings was summarized into additional thematic maps. These were added to the planning background research map series, and used for display at RTPTF meetings, the public open house meetings, and posted on the project website. For this report, the contents of four of the municipal meeting maps were consolidated into two illustrations to best summarize conditions and perceptions about trucks, and general traffic and roadway concerns ascertained during the municipal meetings.

Figure 2-10 illustrates heavy truck travel patterns and related concerns as cited in the municipal meetings. On the west side of the study area, the volume and movement of large, stone carrying quarry trucks are the concern, but the patterns of that travel are not clearly understood. Conversely, on the east, truck movements through the study area are known, and are comprised of overlapping patterns. The concerns revolve around the following heavy truck travel patterns focused on Taylorsville Road / Main Street, including:

- Tractor trailers hauling home building materials through the study area,
- Trash trucks entering the study area from New Jersey at the I-95 interchange, and
- Weigh-station “jumpers” from southbound I-95.

The second graphic (Figure 2-11) is a composite of three individual thematic maps. A description of the layered themes follows:

- Traffic congestion concerns – typically the locations of recurring traffic congestion;
- Traffic volume concerns – locations that are experiencing or are sensitive to high volumes of general or truck traffic, cut-through or pass-through traffic, seasonal traffic, and/or those locations that are expected to experience traffic growth as a consequence of regional development; and
- Traffic safety and roadway alignment concerns – areas or segments of the study area’s highways that are hilly or winding; where side-street sight distances are limited; and/or where speeds or pedestrian activity is of concern.

Note in the graphic that all comments on all roadways were mapped as part of the inventory, not just conditions along the Key Roadways.⁵

As the composite suggests, few segments of the Key Roadway network aren’t subject to at least one concern expressed by the municipalities⁶. Accordingly, engineering tasks performed for the *BCRTS* (i.e., the *Weight, Size, and Load Restrictions Studies*, summarized in Chapter 4, the *Traffic Engineering and Safety Studies*, summarized in Chapter 5, and the *Traffic Calming Feasibility Study*, summarized in Chapter 6) were prepared comprehensively and uniformly for all 16 Key Roadways corridors—to supply the facts behind the perceptions. Conducting the comprehensive engineering evaluations for the entire Key Roadway network also compensated for any lapse in the inventorying process (either by DVRPC or the municipal representatives).

Public Involvement

Views and opinions of the study stakeholders, community group leaders and the general public were obtained via the proceedings of the regular RTPTF meetings and special public open house meetings held during the project. Five RTPTF meetings were held in the 17 months preceding the study’s official start. Seven RTPTF meetings were conducted during the course of the 14-month-long formal study. During the formal study, official representation was actively sought from known stakeholder representatives from the Wrightstown quarries, the Bucks County Community College, the Council Rock and Pennsbury school districts, Residents for Regional Traffic Solutions Inc., the Swamp Road Residents Group, and the Southeastern Pennsylvania Transportation Authority (SEPTA). To be as broad-based as possible the RTPTF directed staff to also reach out and enlist leaders of local community organizations and homeowners associations, among others at the municipal level. Ultimately the 43 individuals listed in Table 2-2 agreed to serve or were identified as formal stakeholder representatives to the study.⁷ Public open house meetings were held during the formal study to directly engage the interests of the public, community groups and the stakeholders.

⁵ Comprehensively inventorying all roads provided a basis for judging the possible consequences of the study’s recommendations upon secondary roadways.

⁶ Similarly, the reader may wish to compare the truck travel patterns (Figure 2-10) with the traffic and roadway concerns (Figure 2-11) to see how specific issues along Key Roadways #14, #15 and #16 are impacted by the overlapping truck travel patterns.

⁷ It should be noted that representatives from the quarries did not respond to invitations to participate in the study.

Table 2-2: Study Stakeholder and Community Group Representatives**REGIONAL...**

David Fogel, SEPTA
Steve Harris, Miller & Son Quarry
Susan Herman, Residents for Regional Traffic Solutions, Inc.
Mark E. Kendrick, Hanson Aggregates East
Mark J. Klein, Council Rock School District
Charlie Williams, Pennsbury School District
James J. Links, Bucks County Community College
Isabel Miller, Pennsbury School District
Robert Miller, Miller & Son Quarry
James D. Morrissey, Eureka Stone Quarry
Jack Pinheiro, Council Rock School District
William Rickett, Bucks County Transportation Management Association
Mark Shablin, Swamp Road Residents Group

MUNICIPAL...

Lower Makefield Township... **Gary Gilman**, Lower Makefield Citizen Traffic Committee
Steve Santarsiero, Southeast Bucks County League of Municipalities

Newtown Township... **John D'Aprile**, Raven's View II
James A. Downey, Newtown Crossing Community Association
Peggy Driscoll, Waterford Estates
Barry Hertzberg, Headley Community Association
Bonnie Larzelere, Country Bend Homeowners Association
Paul A. Losch, Colonial Commons Homeowners Association
Jim McCrane, St. Andrews Briar Homeowners Association
William McManimon, Newtown Grant Master Board
Frank Mendicino, Tyler Walk Homeowners Association
George Pollitt, Raintree
Fran Poole, Cliveden
Laurie Samuels, Eagleton Farms
John Selitto, Nob Hill Homeowners Association
John Weghorst, Crown Pointe
Taylor Welsh, Brookside
Margaret White, Whispering Woods

Northampton Township... **Anthony J. Brummans**, Village Shires Community Association
Kim Lucotch, Woods at Northampton Homeowners Association
Stephen E. Moiles, Tall Timbers Homeowners Association

Upper Makefield Township... **Rob Attanasio**, Washington Meadows
Paul R. Day, Buckland Valley Farms Civic Association
Kim Gibbons, Sol Feinstone PTA
Ned Graney, Lafayette Place
Mike Palm, East Grant
Rick Pushman, River Knoll
Ronald Schmidt, Save Historic Dolington Committee
Thomas Sybil, Shires Crossing Homeowners Association
Rich Vassil, Heritage Hills

**Figure 2-10
BUCKS COUNTY REGIONAL TRAFFIC STUDY
TRUCK TRAVEL PATTERN CONCERNS**

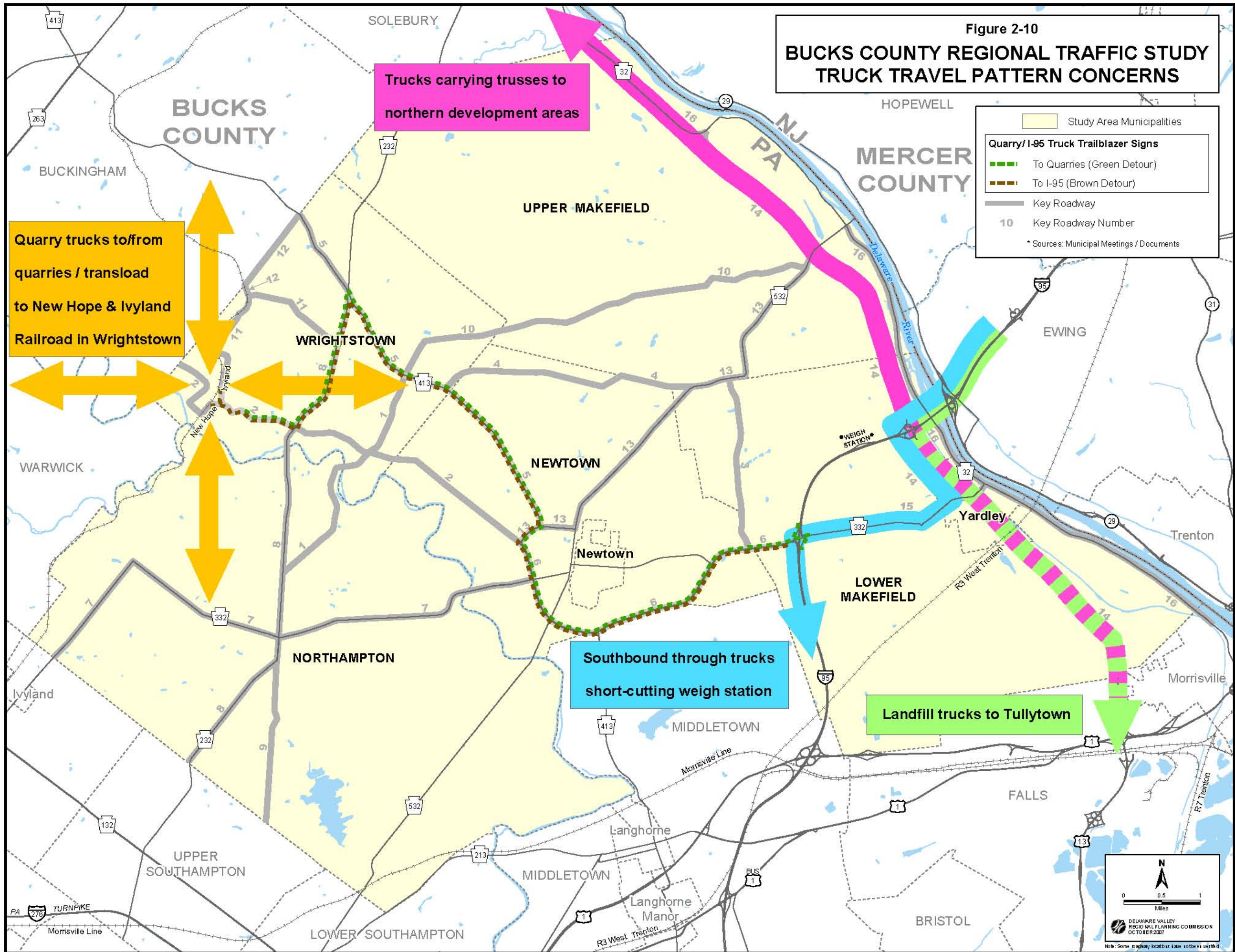
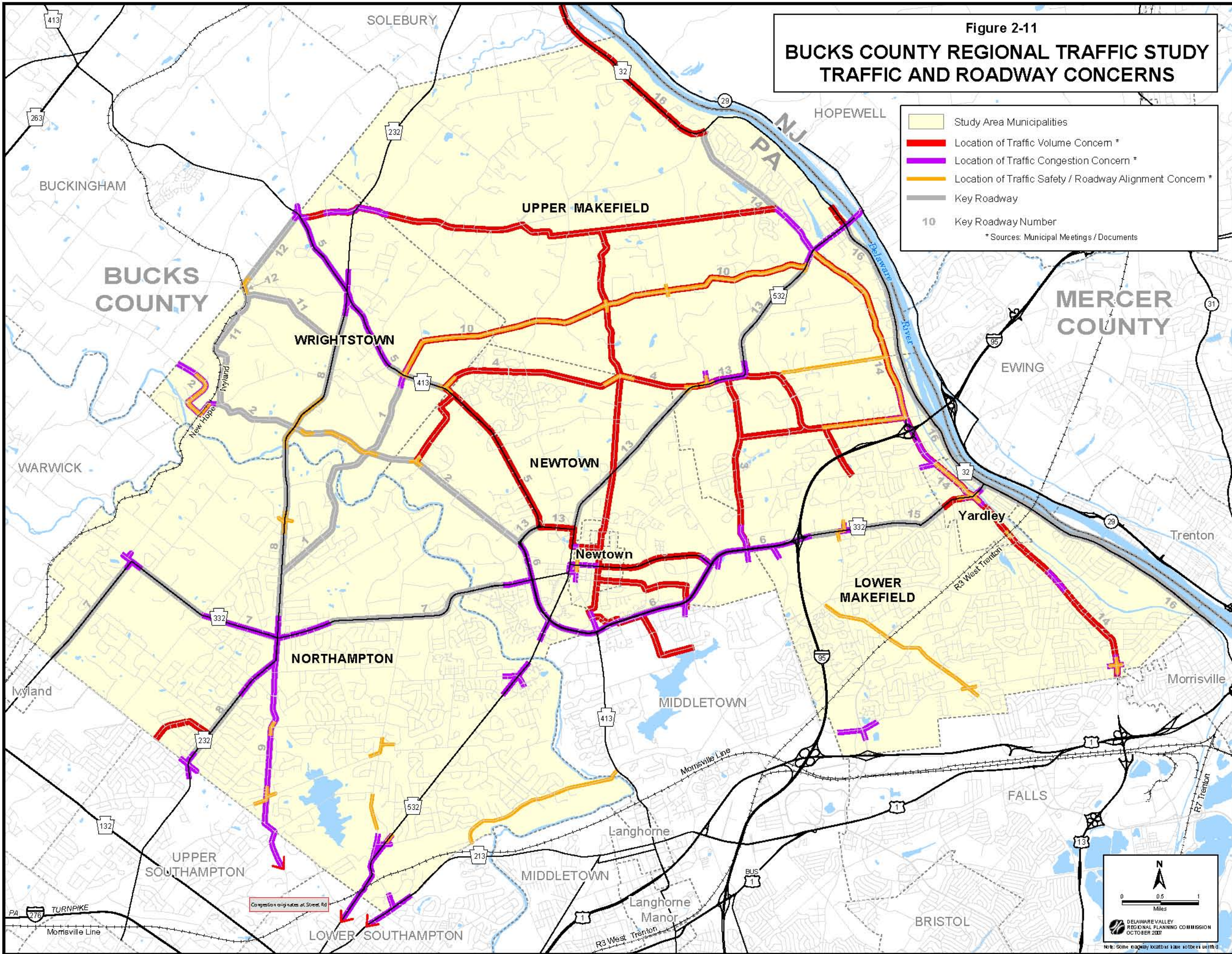


Figure 2-11
BUCKS COUNTY REGIONAL TRAFFIC STUDY
TRAFFIC AND ROADWAY CONCERNS

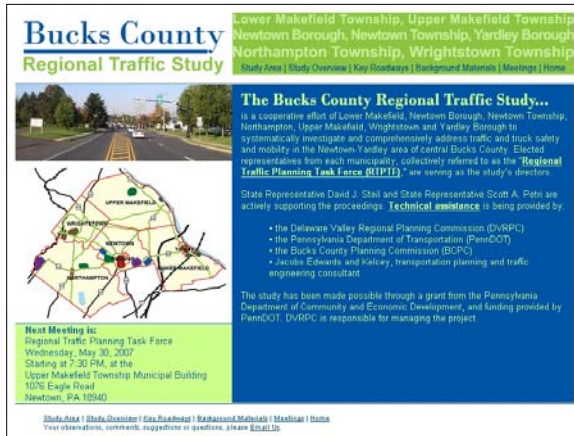
	Study Area Municipalities
	Location of Traffic Volume Concern *
	Location of Traffic Congestion Concern *
	Location of Traffic Safety / Roadway Alignment Concern *
	Key Roadway
	Key Roadway Number
* Sources: Municipal Meetings / Documents	



0 0.5 1
Miles

DELAWARE VALLEY
 REGIONAL PLANNING COMMISSION
 OCTOBER 2007

Note: Some roadway locations have not been verified.



The project website
 { www.BucksCountyRegionalTrafficStudy.org }
 was actively maintained to disseminate
 information and elicit input
 Graphic by: DVRPC

The proceedings of the RTPTF meetings were directed by State Representative David Steil and the RTPTF members, as there may have been other matters to address that were beyond, but still related to, the scope of the *BCRTS*. The RTPTF meetings provided a forum to present study deliverables, supply observations of the public meetings, and take direction from the study directors. The meetings were open to the public, and the public was free to comment on all matters conducted during the meeting. The meetings rotated between the four municipalities that had suitable facilities (i.e., Lower Makefield, Newtown, Northampton and Upper Makefield townships). Meeting agendas, notes and products related to the *BCRTS* were prepared, distributed and presented as part of these meetings. The vast majority of these items were posted on the project website prior to, or soon after the meetings to further disseminate information.

Three public open houses were held during the course of the formal study to garner input on study area conditions, the

study’s processes and its products from stakeholder interest groups, community organizations and individual citizens. The proceedings of these meetings were the responsibility of *BCRTS* project staff. The meetings were duly advertised in six area newspapers, and supported with media releases and email notifications (or hardcopy notifications where there were no email addresses) to public libraries in the area, the Northampton Township Senior Center, the study stakeholders, the RTPTF members and their staff, and members of the project team and related professionals.

The public meetings were held between 6:00 PM and 9:00 PM, with project personnel and subject matter experts stationed at presentation displays to personally address the attendees’ questions and comments. A general overview of the public meetings follows.

1. Wednesday, January 17, 2007, at the Bucks County Community College in Newtown Township. Presented: *BCRTS* background planning materials, preliminary Key Road traffic engineering data, quarry truck origin-destination survey results, existing conditions surrounding the Newtown Bypass TSEI project, and preliminary conceptual designs proposed for Swamp Road as part of the SRCIP.
2. Thursday, April 26, 2007, at the Charles H. Boehm Middle School in Lower Makefield Township. Presented: illustrations of the public comments from the first open house in summary of ongoing planning activities; summaries of the *Weight, Size, and Load Restrictions Studies*; preliminary recommendations for Swamp Road emanating from the Key Roadway traffic engineering and safety studies; findings of the eligibility analyses for traffic calming along the 16 Key Roadways; proposed optimized conditions for the Newtown Bypass TSEI project; the proposed Lindenhurst Road Traffic Calming Project in Lower Makefield; and the preliminary Stoopville Road Traffic Calming Plan prepared by Newtown Township.
3. Thursday, September 20, 2007, at the Richboro Elementary School in Northampton Township. Addressed: the treatment of comments received on the draft final report, dated June 2007; took in any outstanding comments; concluded the public comment period on the draft report—for consideration in preparing the final report.



86 guests signed in at the second Public Open House meeting
 Photo by: DVRPC

During each of these meetings, comment forms were available for the attendees to complete regarding the materials presented that evening, etc. The submitted forms were evaluated by project staff, summarized for reporting purposes and incorporated into the project. Copies of summary notes, comment forms, tabulations and exhibits

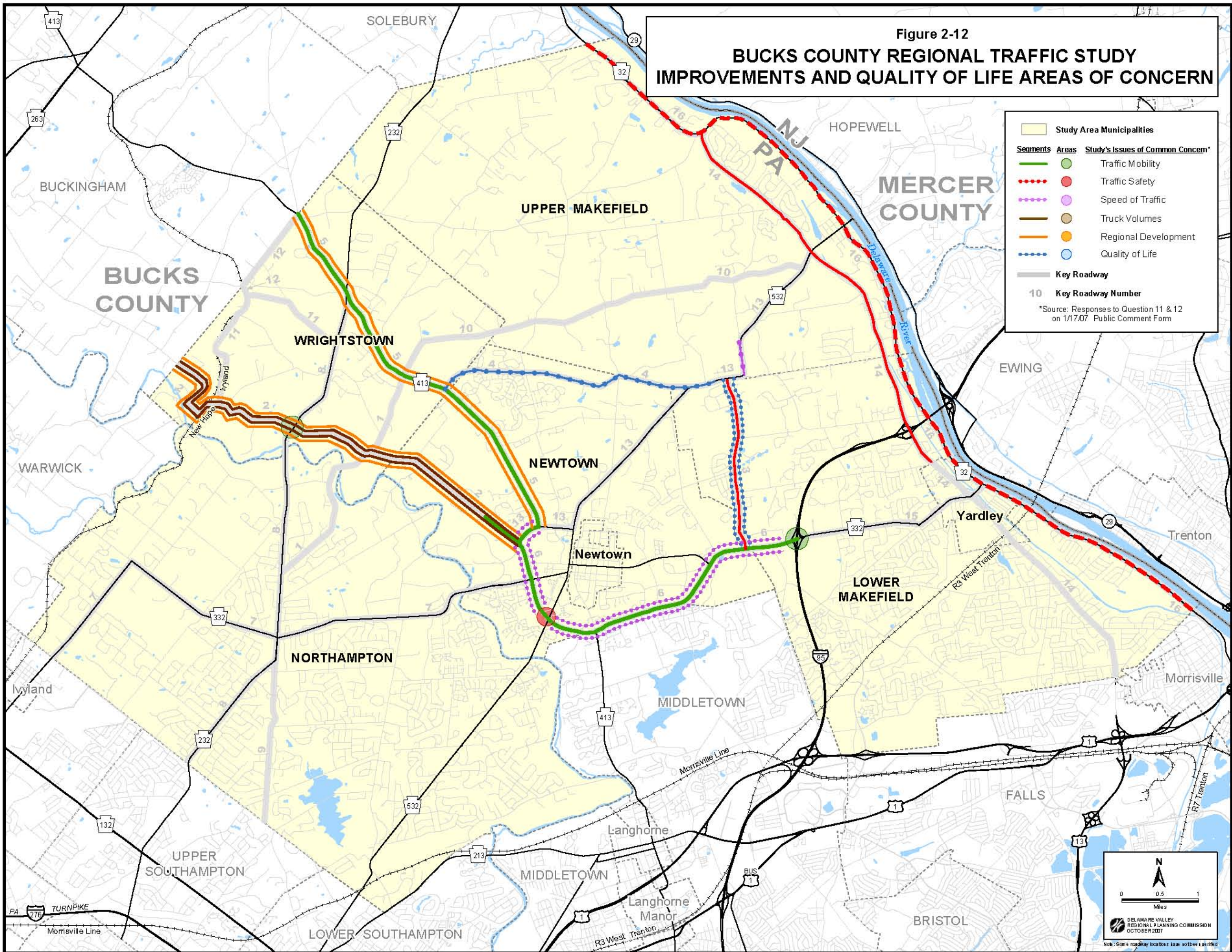
prepared, distributed and/or posted on the website for each of the Public Open House meetings are contained in Appendix B of this report.

Of particular interest were comments received at the January open house meeting which sought to gain attendees' insight into: the broad challenges facing the study area, their specific improvement ideas, and their impressions of the most important improvements and quality of life issues in the region. It is worth noting that, as was the case in the municipal meetings, the public was never guided to limit their observations or suggestions to any particular transportation mode or specific set of facilities (e.g., the Key Roadway network).

The diversity of the comments (e.g., varying interpretations of the questions, multiple levels of descriptive information provided, ranges in opinions and degree of conflicting responses) suggested that a more useful way of examining the data was to map the particular transportation facility or geographic area cited in the response in relation to the study's common issues of concern defined by the RTPTF. Three illustrations were subsequently prepared and displayed at the April public open house. The exercise culminated in directly pointing to the set of Key Roadways that are of overarching concern to the public and the crux of the *BCRTS*: the Newtown Bypass, Swamp Road, PA 413, Stoopville Road and Lindenhurst Road (see Figure 2-12).

The comprehensive analytical treatment of all 16 Key Roadway corridors, through the study's engineering analyses, assured a fair and even consideration of the broad concerns and specific improvement proposals. Additionally, the core network, depicted in Figure 2-12, was subjected to a "traffic impact analysis" (employing Synchro / SimTraffic software) to assess causes and effects associated with traffic growth and the independent transportation improvement proposals within the network (i.e., the SRCIP, the TSEI, the Lindenhurst Road Traffic Calming Project, and the Stoopville Road Traffic Calming Plan). These traffic engineering steps are detailed in Chapter 5.

Figure 2-12
BUCKS COUNTY REGIONAL TRAFFIC STUDY
IMPROVEMENTS AND QUALITY OF LIFE AREAS OF CONCERN





Bucks County

Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township / Yardley Borough

3.



Wrightstown Quarries Report



Prepared by:
DELAWARE VALLEY REGIONAL PLANNING COMMISSION

with the Assistance of:

JACOBS
Edwards and Kelcey

October 2007

Table of Contents

BACKGROUND AND PURPOSE..... 3-1

PRIOR PLANNING EFFORTS..... 3-2

Brown and Green Routes 3-2

The Rail Option..... 3-3

CURRENT STUDIES..... 3-4

Traffic Classification Counts 3-4

Origin-Destination Studies..... 3-5

CONCLUSIONS 3-5

List of Figures

Figure 3-1: Quarry Location Area – Truck Origins..... 3-7

Figure 3-2: Quarry Location Area – Truck Destinations..... 3-8

BACKGROUND AND PURPOSE

Large volumes of heavy trucks traveling the study area roadway network are an identified concern of the Regional Traffic Planning Task Force (RTPTF).



*An eastbound quarry truck on Swamp Road
Photo by: DVRPC*

A significant contributor of those vehicles, at least in the western portion of the study area, are four stone quarries accessing Swamp Road and Mill Creek Road, west of Second Street Pike (PA 232), in Wrightstown Township. The volume of trucks is just one aspect of the issue. Their size, characteristics of operation (time of arrival, speeds, noise, dust, etc.), and the routes taken for regional access amplify emotions and pit neighborhoods against one another. For this reason, among others, it was deemed important to conduct this traffic study with a regional perspective.

The quarries are owned and operated by three companies:

- Eureka Stone Quarry Inc. has two sites accessing Swamp Road. One (Rush Valley #1 - crushed stone and bituminous concrete) is located on the south side of Swamp Road between PA 232 and Mill Creek Road, and the other (Rush Valley #2) is on the north side of the road, west of the Mill Creek Road intersection.
- Hanson Aggregates (Penns Park - stone and hot mix asphalt) is located on the north side of Swamp Road. Their access driveway is located between PA 232 and Mill Creek Road.

- Miller Stone Quarries is located on, and takes access from the east side of Mill Creek Road is just north of Swamp Road.

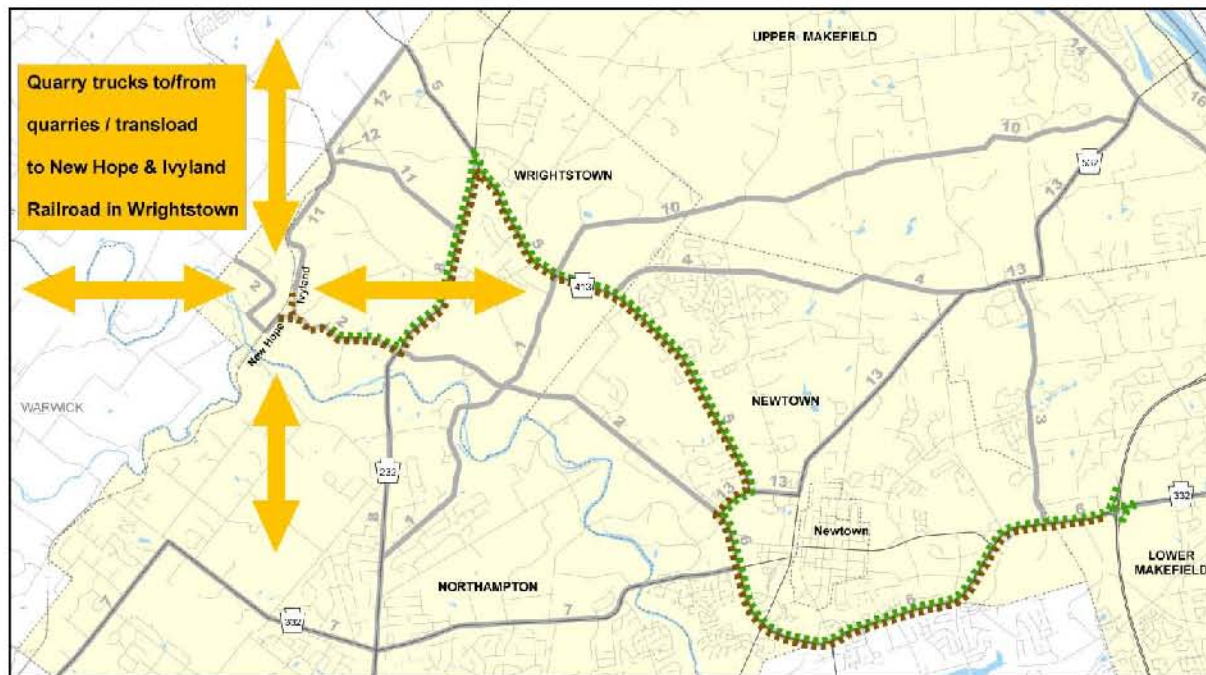
Each roadway providing access to the quarry properties is an undivided, two-lane, state owned highway. Each access road is included in the set of 16 Key Roadways which are serving as the core highway network for safety and mobility evaluations.

It is important to understand that assuming the trucks have valid inspection stickers, are not overweight nor speeding, and are properly tarped when loaded, the vehicles are deemed by the Commonwealth of Pennsylvania and the Township of Wrightstown to be safe, and are legally permitted to operate on the roadways serving the properties and the other state owned highways in the region (presuming the roadways themselves are not restricted for weight or vehicle dimensions).



*The quarries are located on the western fringe of the study area.
Graphic by: DVRPC*

Still, there was a fundamental lack of information about the volumes of trucks in general, and the patterns of quarry trips in particular—basic considerations if fair and adequate accommodation of all legal road users is intended. Attempts to directly engage the quarry owners in this study to ascertain information about their operations, and characteristics of the trips entering and leaving their properties received no reply. Even so, the owners have been advised of the study, were invited to participate as “regional stakeholders” to contribute to the study and advocate their points-of-view, and were notified of the Public Open House meetings sponsored through this study effort.



*Truck volumes and travel patterns to and from the quarries were unknown
 {note: Brown and Green Detour routes}
 Graphic by: DVRPC*

The BCRTS has been commissioned in part to investigate perceptions and facts associated with the Wrightstown quarry truck movements and the roadway network available to them. Ultimately, potential solutions will be identified, and considered for action by the RTPTF.

PRIOR PLANNING EFFORTS

Prior attempts to manage truck flows in the area have included establishing signing plans for a designated truck route between the quarries and I-95, and promoting a rail alternative for some of the truck trips.

Brown and Green Routes

In 1997, a culvert on Swamp Road, just east of Worthington Mill Road, was posted with a 15-ton weight restriction. Subsequent attempts to re-direct trucks away from the weight restricted culvert were implemented by PennDOT via a Brown and Green route detouring plan between the quarries and the I-95 interchange at the Newtown Bypass (PA 332).



*The Brown Detour Route to I-95 at Miller's exit to Mill Creek Road {note: Wrightstown's tarping ordinance sign on the right}
 Photo by: DVRPC*

The routing from the quarries (the Brown detour) was signed via: Swamp Road - east, to PA 232 - north, to Durham Road (PA 413) - east, to the Newtown Bypass - and east to the interchange. Inbound trips to the quarries from the interchange (the Green detour) were signed along the same highways in the opposite order and direction.

It is not clear how well the detour plan was observed by truck drivers or enforced by the police. In 2003, while the Swamp Road culvert was posted with a 10-ton weight restriction and the signing plan was in effect, there were more trucks traveling on Worthington Mill Road between Swamp Road and PA 413 than were documented in 2005 according to traffic classification counts performed for this study (i.e., after the culvert was replaced and Swamp Road was reopened to all traffic). This indicates that the drivers will logically choose the most efficient route available.

The detour signing was not removed, nor was it maintained following the culvert’s replacement in 2004, and the lifting of travel restrictions along Swamp Road. Vestiges of the detouring plan remain along the cited roadways.



*The Green Detour to the quarries on the Newtown Bypass between Swamp and Durham (PA 413) roads
Photo by: DVRPC*

The Rail Option

Prior to formally initiating this study, conversations and meetings took place between staff of PennDOT’s Bureau of Rail Freight, Ports and Waterways; CSX-Transportation; the Winchester and Western Railroad; the New Hope and Ivyland Railroad; Hanson Aggregates; and DVRPC to examine the feasibility and economic viability of investing in and promoting the trans-shipment of quarry products between truck and rail at an existing transload point with the New Hope and Ivyland Railroad on Mill Creek Road (approximately mid-way between Swamp Road and Township Line Road). This was proposed as a means of reducing the number of quarry trucks traveling the study area roadways. No formal summary of these proceedings was produced.



Transloading in operation at the Mill Creek Road rail hub site [note: Wrightstown’s quarries produce “blue” stone. The red stone is from remote quarries—indicative that quarry trucks from outside of Wrightstown are also present on the Key Roadways.]

Photo by: New Hope and Ivyland Railroad

Knowing that the conversations were taking place, the Wrightstown Township supervisors weighed in on the matter and issued correspondence, which was also taken into account for this report. From these activities and documents, several observations and conclusions were drawn:

- The volume of quarry product was sufficient to generate interest from the railroads, such that CSX-T prepared a rate offer for Hanson Aggregate’s consideration.¹
- Aside from operating considerations at the transloading site, substantial capital investment would be required to convey the stone from the quarries to the rail head (just one quarry is physically adjacent to the railroad).
- While the conveyor technology exists, the constructability and consequences to human and natural environments in the vicinity, during operations, were called into question.
- Indications from the Township contained concerns over focusing of truck trips, and/or attracting increased truck volumes (e.g., new trips) to the vicinity of the rail depot.
- The majority of trucks transporting stone from the quarries are independently owned and operated, and the drivers are paid by the customers of the quarries. As such, quarry business models may not be sufficiently sensitive to transportation costs (fuel, operating, etc.) to warrant consideration of alternate modes.

¹ Hanson’s Penns Park operation was targeted as the most viable for this freight marketing opportunity for two reasons. At the present time, Hanson’s quarry is by far the busiest of the four operating in Wrightstown. Additionally, Hanson’s facility has a symbiotic relationship with facilities in Deerfield and Newport, New Jersey. Each of the South Jersey operations is proximate with and served by an intermodal rail hub, and could therefore support a two-way rail move with Penns Park (e.g., stone out—from Penns Park to South Jersey; and sand in—from New Jersey to Penns Park).

- Ultimately, and excluding consideration of any capital investment, CSX-T’s rate offer to transport quarry products by rail was not considered favorable by the Hanson Organization.

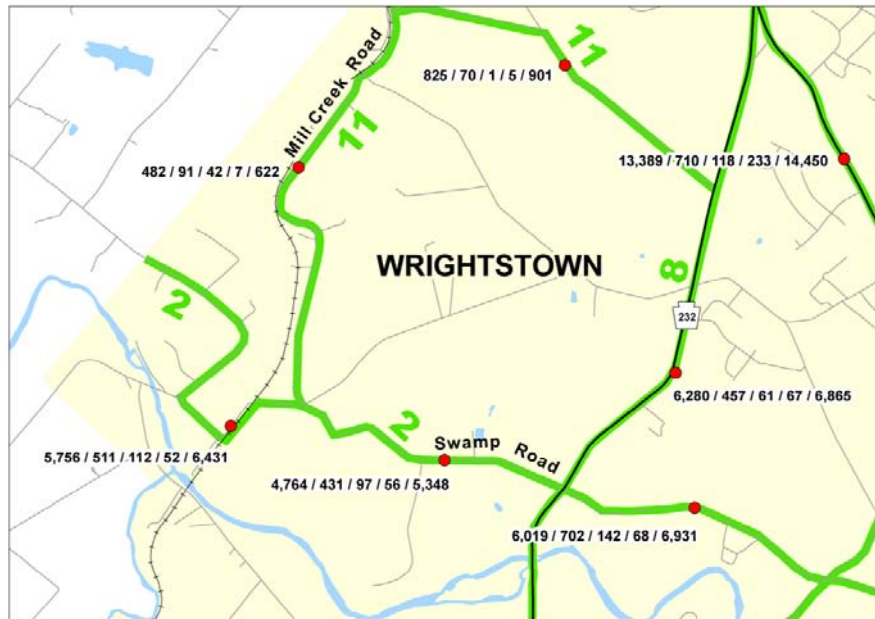
For the foreseeable future, and not knowing what exogenous factors might make intermodalism financially attractive to the quarries and environmentally friendly to the Township, it appears that the rail option is not a viable solution for reducing heavy truck travel surrounding the Wrightstown quarries.

CURRENT STUDIES

To plan for continued quarry truck travel, two important area-wide data collection steps were taken to initiate the BCRTS: collecting traffic classification count data, to determine existing truck and traffic demands, and performing license plate surveys, to establish travel patterns of quarry trucks.

Traffic Classification Counts

DVRPC conducted approximately 60 automatic traffic classification counts during the Spring and Fall of 2005 while schools were in session to establish a baseline of truck demands upon the Key Roadway network. The counts provide a snapshot of the mix of vehicles (cars, trucks², and total vehicles) traveling the Key Roadways on the day the count was performed.³ Besides providing a measure of activity along the Key Roadways, the data was used in the engineering evaluations conducted in the study (e.g., the *Weight, Size and Load Restrictions Studies*).



DVRPC’s 2005 traffic classification counts in the vicinity of the quarries (autos / small trucks / medium trucks / large trucks / total vehicles)
Graphic by: DVRPC

The graphic shown in the inset on the right displays a summary of the counts performed in the immediate area of the quarries. A total of 5,348 vehicles were recorded traveling in both directions of Swamp Road between PA 232 and Mill Creek Road over the course of the weekday count. Of the total, 4,764 were automobiles or vehicles with similar dimensions (two closely spaced axles) and operating characteristics. The balance (584 or 11%) was trucks. The graphic also contains a relative distribution of the trucks (e.g., small, medium, and large) based on axle count. Total truck volumes (e.g., the sum of small, medium and large trucks) provide a more inclusive indication of truck activity—one which has been adopted in the engineering aspects of this project.

² “Trucks” are considered to be vehicles having two or more axles and six or more tires on the pavement.
³ Classification counts differ from Annual Average Daily Traffic Volumes (AADTs). Traffic classification counts represent the straight results of the traffic count, identifying up to 15 possible vehicle classes. AADTs represent an average day’s traffic volume within a year (e.g., weekday, weekend, and holiday), and are calculated by applying factors to raw count data to adjust for typical truck composition, and daily and seasonal variation in traffic flow. On average within the study area, the classification count totals depicted in the figure are about eight percent higher than AADTs for the same roadway segment.

Origin-Destination Studies

Quarry truck travel patterns were ascertained through license plate surveys of entering and exiting trucks operating between the Wrightstown quarries and the regional highway network. The license plate surveys were conducted by Jacobs Edwards and Kelcey staff at 16 gateway locations throughout the broad study area on Wednesday, October 11, 2006 between 8:00 AM and 11:00 AM—the area-wide peak truck traffic activity period (according to DVRPC’s traffic classification counts). Sample sizes approximating 250 entering trucks, and an equal number of exiting trucks were collected and synthesized to the information shown in Figure 3-1 and Figure 3-2 on the following pages.

Without regard to the actual path followed (and it is noted that Stoopville Road was closed for a roadway project at Linton Hill Road at the time of the license plate survey), approximately 65 percent of the analyzed truck trips were oriented between the quarries and the vicinity of the I-95 interchange with the Newtown Bypass (PA 332).

CONCLUSIONS

The heavy directional distribution of quarry truck trip desire lines implies the importance of Swamp Road and the Newtown Bypass in most directly serving regional travel to and from the Wrightstown quarries.

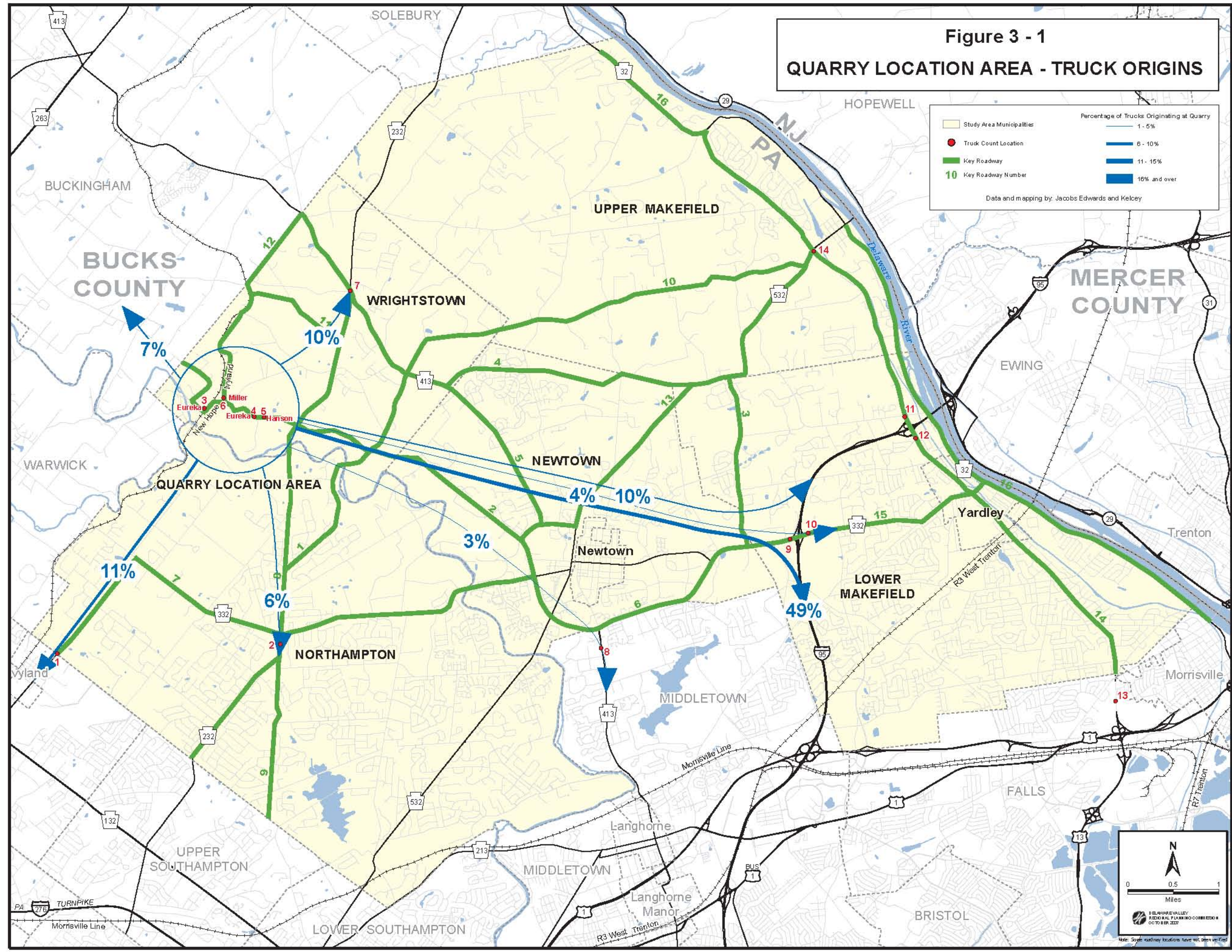
Traffic safety and mobility improvements for Swamp Road (detailed in Chapter 5), and mobility improvements delivered through the Traffic Signal Enhancement Initiative (TSEI) for the Newtown Bypass will support the quarries’ need for access to the region’s interstate and provide a safer and more efficient travel corridor to all other users.

Environmental clearance and preliminary engineering studies are underway in support of the Swamp Road Corridor Improvement Project between Rushland and the Bypass. A public information and involvement campaign is accompanying the project. The engineering work is addressing: roadway and shoulder widths, the roadway’s alignment in the vicinity of curves and hills (to improve sight distances, etc.), drainage problems, and culvert and intersection conditions. Alternate improvement designs are being explored by PennDOT and its design consultants with residents, stakeholders and the municipalities. The discussions were ongoing at the time of this study, and the ultimate scope of the project was still evolving. PennDOT’s project scheduling tentatively foresaw a completed project in mid-2012 as the *BCRTS* was in progress.

The TSEI project is a non-capital project which will supply traffic signal timing plans to yield optimized, traffic responsive signal operations at 11 signalized intersections along the Newtown Bypass (between the PA 413 / Durham Road intersection and the I-95 interchange). The timing plans were initially implemented within the traffic signal system regulating the Bypass by Newton Township in the summer of 2007 to reduce stop-and-go conditions and increase the traffic carrying capacity of the Newtown Bypass. After-studies and signal timing adjustments are proposed to take place in the fall, after schools resume.

Subsequent steps in the *BCRTS* evaluated and defined a timelier set of measures to improve safety and mobility along Swamp Road, which could be complementary with any further improvement of the corridor. Additionally, the *BCRTS* will investigate long-term conditions and identify recommendations to ensure that the Bypass continues to operate efficiently for the foreseeable future.

Figure 3 - 1
QUARRY LOCATION AREA - TRUCK ORIGINS

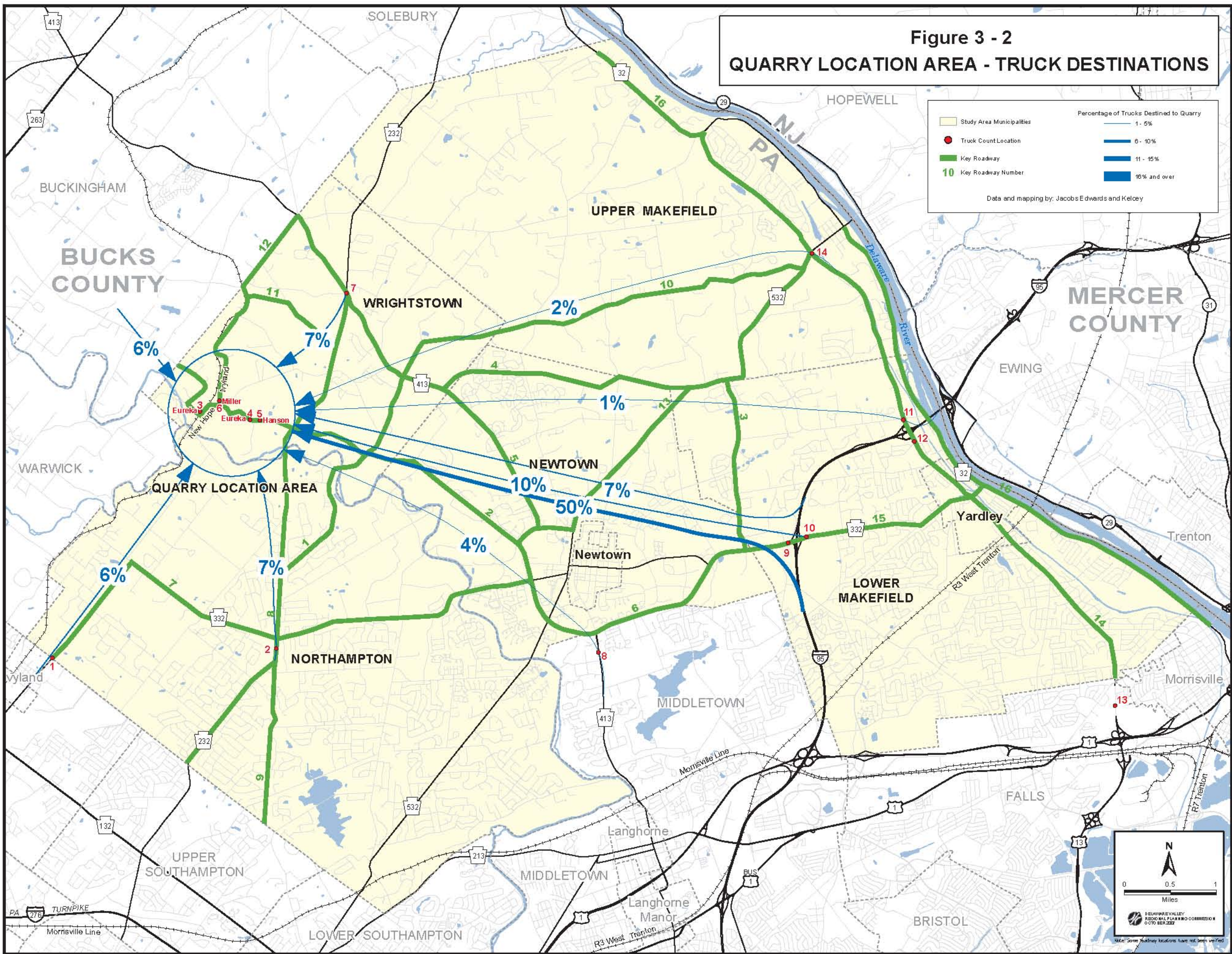


0 0.5 1
Miles

DELAWARE VALLEY REGIONAL PLANNING COMMISSION
OCTOBER 2022

Note: Some roadway locations have not been verified.

Figure 3 - 2
QUARRY LOCATION AREA - TRUCK DESTINATIONS





Bucks County

Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township / Yardley Borough

4.



Weight, Size, & Load Restrictions Studies Summaries

Prepared by:

JACOBS
Edwards and Kelley



For:

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

October 2007

Table of Contents

BACKGROUND AND PURPOSE..... 4-1

WEIGHT, SIZE AND LOAD RESTRICTION STUDY SUMMARIES..... 4-1

1. Worthington Mill Road..... 4-1

2. Swamp Road 4-1

3. Lindenhurst Road..... 4-2

4. Stoopville Road..... 4-2

5. Durham Road (Route 413)..... 4-3

6. Newtown Bypass (Route 413) 4-3

7. Newtown-Richboro Road / Almshouse Road / Jacksonville Road (Route 332) 4-4

8. Second Street Pike (Route 232) 4-4

9. Bustleton Pike 4-5

10. Wrightstown Road 4-5

11. Mill Creek Road / Washington Avenue / Cherry Lane..... 4-5

12. Township Line Road / Mill Creek Road..... 4-6

13. Newtown Bypass / Durham Road / Washington Crossing Road (Route 532) 4-6

14. Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road 4-7

15. Yardley-Newtown Road (PA 332)..... 4-7

16. River Road / PA 32 4-8

CONCLUSION 4-8

BACKGROUND AND PURPOSE

Concerns have arisen from the local community that a large number of trucks travel to and from the local quarries along many of the study area roadways and create a potentially hazardous situation. These engineering and traffic studies have been conducted to determine if trucks should be restricted on any of the 16 Key Roadways. The engineering and traffic studies have been prepared in accordance with PennDOT Publication 212, *Official Traffic Control Devices*, March 2006, Subchapter B, Section 212.117 (d), "Weight and size restrictions based on traffic conditions." This publication states that vehicles may be prohibited or restricted if it has been determined that the movement of certain vehicles constitutes a safety hazard after an evaluation of:

- horizontal and vertical alignment,
- prevailing traffic speeds,
- compatibility of the various types of traffic,
- history of vehicle crashes, and
- vehicular characteristics.

The full studies were submitted to PennDOT Engineering District 6-0 by Jacobs Edwards and Kelcey on behalf of the Delaware Valley Regional Planning Commission (DVRPC) on January 31, 2007.

WEIGHT, SIZE AND LOAD RESTRICTION STUDY SUMMARIES

Summaries of each of the 16 individual studies are below. Considering the crash history statistics and other corridor-specific data included therein, the full reports are confidential pursuant to 75 Pa. C.S. §3754 and 23 U.S.C. §409 and may not be disclosed or used in litigation without written permission from PennDOT.

1. Worthington Mill Road

This engineering and traffic study has been conducted to determine if trucks should be restricted on Worthington Mill Road, from Second Street Pike (Route 232) to Durham Road (PA 413). Worthington Mill Road (S.R. 2081) is an undivided, two lane, urban collector that generally runs in a north-south direction in Northampton Township and Wrightstown Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that three (3) large trucks were involved in crashes on Worthington Mill Road during a five (5) year period from 2001 to 2005, which constitutes less than five (5) percent of the total vehicles involved in crashes on this road in the same time period. Trucks were observed negotiating the corridor and passing each other in opposite directions without difficulty. Based on the speed data collected by Jacobs Edwards and Kelcey on Tuesday, January 30, 2007, trucks do not create a situation where trucks travel at speeds much higher or lower than the rest of traffic. Based on the traffic data collected by DVRPC on Tuesday, April 26, 2005 and Thursday, June 2, 2005, truck traffic represents approximately two (2) percent of the total traffic on a daily basis between Second Street Pike and Swamp Road; and approximately 10 percent of the total traffic on a daily basis between Swamp Road and Durham Road. The average daily traffic volume on Worthington Mill Road is relatively low, which affects the percentage of trucks calculation. The number of trucks using Worthington Mill Road has decreased since the June 4, 2003 *Worthington Mill Road Weight, Size and Load Restriction Engineering and Traffic Study*, which is likely a result of the replacement of a weight-posted culvert on Swamp Road and a nearby bridge superstructure replacement in 2004 by PennDOT District 6-0.



*Worthington Mill Road at Lantern Way,
looking northbound
Photo by: Jacobs Edwards and Kelcey*

2. Swamp Road

This engineering and traffic study has been conducted to determine if trucks should be restricted on Swamp Road, from Smith Road to the Newtown Bypass (S.R. 0332). Swamp Road (S.R. 2036 / S.R. 2079) is an undivided, two lane, urban minor arterial that generally runs in an east-west direction in Wrightstown Township and Newtown Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that 16 large trucks were involved in crashes on Swamp Road during a five (5) year period from 2001 to 2005, which constitutes less than five (5) percent of the total vehicles involved in crashes on this road in the same time period. Trucks were observed passing each other on the curves without difficulty. Based on the speed data collected by Jacobs Edwards and Kelcey on Monday, November 20, 2006 and Thursday, November 30, 2006, trucks do not create a situation where trucks travel at speeds much higher or lower than the rest of traffic. Based on the traffic data collected by DVRPC on Tuesday, April 26, 2005, Wednesday, April 27, 2005, and Thursday, June 2, 2005, truck traffic represents approximately:



*Swamp Road, between Second Street Pike and Worthington Mill Road, looking eastbound
Photo by: Jacobs Edwards and Kelcey*

- ten (10) percent of the total traffic on a daily basis between Old Sackettsford Road and Mill Creek Road / Penns Park Road,
- ten (10) percent of the total traffic on a daily basis between Mill Creek Road / Penns Park Road and Second Street Pike,
- 12 percent of the total traffic on a daily basis between Second Street Pike and Worthington Mill Road, and
- eight (8) percent of the total traffic on a daily basis between Penns Woods and Liberty Drive.

3. Lindenhurst Road

This engineering and traffic study has been conducted to determine if trucks should be restricted on Lindenhurst Road, from the Newtown Bypass (Route 332) to Washington Crossing Road (Route 532). Lindenhurst Road (S.R. 2069) is an undivided, two lane, urban collector that generally runs in a north-south direction in Lower Makefield Township and Newtown Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that four (4) large trucks were involved in crashes on Lindenhurst Road during a five (5) year period from 2001 to 2005, which constitutes less than six (6) percent of the total vehicles involved in crashes on this road in the same time period. There are no sharp curves or steep grades that present a safety hazard for large trucks and the narrow bridge has adequate sight distance. Based on the speed data collected by Jacobs Edwards and Kelcey on Friday, November 17, 2006, trucks do not create a situation where trucks travel at speeds much higher or lower than the rest of traffic. Based on the traffic data collected by DVRPC on Tuesday, June 7, 2005, truck traffic represents approximately seven (7) percent of the total traffic on a daily basis between Twining Road and Heather Ridge.



*Typical section of Lindenhurst Road
Photo by: Jacobs Edwards and Kelcey*



*Curve in the road near new development on Stoopville Road
Photo by: Jacobs Edwards and Kelcey*

4. Stoopville Road

This engineering and traffic study has been conducted to determine if trucks should be restricted on Stoopville Road from Durham Road (PA 413) to Washington Crossing Road (Route 532). Stoopville Road (S.R. 2028) is an undivided, two lane, urban collector that generally runs in an east-west direction in Wrightstown Township, Newtown Township and Lower Makefield Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that one (1) large truck was involved in a crash on Stoopville Road during a five (5) year period from 2001 to 2005, which constitutes less than two (2) percent of the total vehicles involved in crashes on this road in the same time period. Advisory signs with speed restrictions are posted to warn motorists of upcoming curves and adequate sight distance

and cartway widths are provided. Based on the speed data collected by Jacobs Edwards and Kelcey on Friday, November 17, 2006, traffic speeds of large trucks are somewhat lower than passenger vehicles, however, large trucks do not create a situation where they negatively impact the flow of traffic or create an undue hazard. Based on the traffic data collected by DVRPC on Tuesday, June 7, 2005, truck traffic represents approximately 11 percent of the total traffic on a daily basis between Milestone Drive and Linton Hill Road / Creamery Road.

5. Durham Road (Route 413)

This engineering and traffic study has been conducted to determine if trucks should be restricted on Durham Road, from the Newtown Bypass (S.R. 0332) to Township Line Road (S.R. 2115). Durham Road (Route 413) is an undivided, two lane, urban principal arterial that generally runs in a north-south direction in Newtown Township and Wrightstown Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that nine (9) large trucks were involved in crashes on Durham Road during a five (5) year period from 2001 to 2005, which constitutes less than four (4) percent of the total vehicles involved in crashes on this road in the same time period. There are no sharp horizontal curves and the several steep grades along Durham Road do not appear to pose a hazardous condition to large trucks. Based on the speed data collected by Jacobs Edwards and Kelcey on Thursday, November 30, 2006 and Monday, December 4, 2006, traffic speeds of large trucks are somewhat lower than passenger vehicles, however, large trucks do not create a situation where they negatively impact the flow of traffic or create an undue hazard. Based on the traffic data collected by DVRPC on Tuesday, May 3, 2005, Tuesday, May 17, 2005, and Tuesday, June 7, 2005, truck traffic represents approximately:

- five (5) percent of the total traffic on a daily basis between Chatham Place and Wrights Road,
- six (6) percent of the total traffic on a daily basis between Stoopville Road and Worthington Mill Road,
- seven (7) percent of the total traffic on a daily basis between Wrenwood Way and Midland Road, and
- nine (9) percent of the total traffic on a daily basis between Second Street Pike and Windy Bush Road.



*Route 413 at Second Street Pike
Photo by: Jacobs Edwards and Kelcey*

6. Newtown Bypass (Route 413)

This engineering and traffic study has been conducted to determine if trucks should be restricted on the Newtown Bypass, from Swamp Road (S.R. 2036) to Interstate 95 (S.R. 0095). The Newtown Bypass (S.R. 0332) is a divided, four lane, urban principal arterial that generally runs in an east-west direction in Newtown Township and Lower Makefield Township, Bucks County, Pennsylvania.



*Typical section of the Newtown Bypass
Photo by: Jacobs Edwards and Kelcey*

A review of the reportable crash data shows that 10 large trucks were involved in crashes on the Newtown Bypass during a five (5) year period from 2001 to 2005, which constitutes less than two (2) percent of the total vehicles involved in crashes on this road in the same time period. The Newtown Bypass was designed for high traffic volumes and use by all types of vehicles including large trucks. Based on the speed data collected by Jacobs Edwards and Kelcey on Monday, November 20, 2006, traffic speeds of large trucks are somewhat lower than passenger vehicles, however, large trucks do not create a situation where they negatively impact the flow of traffic or create an undue hazard. Based on the traffic data collected by DVRPC on Tuesday, May 3, 2005 and Tuesday, May 10, 2005, truck traffic represents approximately:

- four (4) percent of the total traffic on a daily basis between Swamp Road and Newtown Richboro Road,
- four (4) percent of the total traffic on a daily basis between Newtown Richboro Road and Buck Road / Sycamore Street,

- four (4) percent of the total traffic on a daily basis between Buck Road / S Sycamore Street and Newtown Langhorne Road / S State Street,
- six (6) percent of the total traffic on a daily basis between Summit Trace Road and Woodbourne Road / Penns Trail, and
- six (6) percent of the total traffic on a daily basis between Stony Hill Road and Patterson Lane.

7. Newtown-Richboro Road / Almshouse Road / Jacksonville Road (Route 332)

This engineering and traffic study has been conducted to determine if trucks should be restricted on Newtown Richboro Road / Almshouse Road / Jacksonville Road, from Bristol Road (S.R. 2025) to the Newtown Bypass (S.R. 0332). Newtown Richboro Road / Almshouse Road / Jacksonville Road (S.R. 0332) is an undivided, two lane, urban principal arterial that generally runs in an east-west direction in Northampton Township and Newtown Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that 14 large trucks were involved in crashes on Newtown-Richboro Road / Almshouse Road / Jacksonville Road during a five (5) year period from 2001 to 2005, which constitutes less than three (3) percent of the total vehicles involved in crashes on this road in the same time period. There are no sharp horizontal curves or steep grades that present a safety hazard for large trucks along the corridor. Based on the speed data collected by Jacobs Edwards and Kelcey on Monday, November 20, 2006, trucks do not create a situation where trucks travel at speeds much higher or lower than the rest of traffic. Based on the traffic data collected by DVRPC on Tuesday, April 26, 2005 truck traffic represents approximately:

- six (6) percent of the total traffic on a daily basis between Richard Road and Pulinski Road,
- four (4) percent of the total traffic on a daily basis between Golden Gate Drive and Friesland Drive, and
- three (3) percent of the total traffic on a daily basis between Harmony Drive and Fir Drive.



*Newtown-Richboro Road near E Pickering Road,
looking westbound
Photo by: Jacobs Edwards and Kelcey*

8. Second Street Pike (Route 232)

This engineering and traffic study has been conducted to determine if trucks should be restricted on Second Street Pike, from Bristol Road (S.R. 2025) to Durham Road (PA 413). Second Street Pike (S.R. 0232) is an undivided, two lane, urban principal arterial between Bristol Road and Newtown-Richboro Road (PA 332), and an urban minor north of PA 332. The arterial generally runs in a north-south direction in Northampton Township and Wrightstown Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that 16 large trucks were involved in crashes on Second Street Pike during a five (5) year period from 2001 to 2005, which constitutes less than three (3) percent of the total vehicles involved in crashes on this road in the same time period. There are no sharp horizontal curves along the corridor and the steep grades do not seem to present a safety hazard for large trucks. Based on the speed data collected by Jacobs Edwards and Kelcey on Monday, November 20, 2006, trucks do not create a situation where trucks travel at speeds much higher or lower than the rest of traffic. Based on the traffic data collected by DVRPC on Tuesday, April 26, 2005 and Thursday June 9, 2005, truck traffic represents approximately:



*Typical section of Second Street Pike in
Wrightstown Township
Photo by: Jacobs Edwards and Kelcey*

- four (4) percent of the total traffic on a daily basis between Locust Road and Merry Dell Drive,
- six (6) percent of the total traffic on a daily basis between Manor Drive and Glasgow Road,
- nine (9) percent of the total traffic on a daily basis between Sackettsford Road and Twining Road, and

- eight (8) percent of the total traffic on a daily basis between Swamp Road and Hallowell Drive.

9. Bustleton Pike

This engineering and traffic study has been conducted to determine if trucks should be restricted on Bustleton Pike, from Bristol Road (S.R. 2025) to Second Street Pike (S.R. 0232). Bustleton Pike (S.R. 2065) is an undivided, two lane, urban minor arterial that generally runs in a north-south direction in Northampton Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that four (4) large trucks were involved in crashes on Bustleton Pike during a five (5) year period from 2001 to 2005, which constitutes approximately two (2) percent of the total vehicles involved in crashes on this road in the same time period. There are no steep grades along the corridor and advisory signs with speed restrictions, adequate sight distance and cartway widths are provided for sharp horizontal curves. Based on the speed data collected by Jacobs Edwards and Kelcey on Monday, November 20, 2006, traffic speeds of large trucks are not much higher or lower than the rest of the traffic. Based on the traffic data collected by DVRPC on Tuesday, May 3, 2005, truck traffic represents approximately seven (7) percent of the total traffic on a daily basis between Schan Drive and New Road.



*Quarry truck navigating Bustleton Pike near Schan Drive
Photo by: Jacobs Edwards and Kelcey*

10. Wrightstown Road

This engineering and traffic study has been conducted to determine if trucks should be restricted on Wrightstown Road, from Durham Road (PA 413) to Washington Crossing Road (Route 532). Wrightstown Road (S.R. 2081) is an undivided, two lane, rural minor collector that generally runs in an east-west direction in Wrightstown Township and Upper Makefield Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that four (4) large trucks were involved in crashes on Wrightstown Road during a five (5) year period from 2001 to 2005, which constitutes less than four (4) percent of the total vehicles involved in crashes on this road in the same time period.



*Curve on Wrightstown Road
Photo by: Jacobs Edwards and Kelcey*

There are no steep grades along the corridor. There are several sharp horizontal curves but adequate sight distance and cartway widths are provided. Based on the speed data collected by Jacobs Edwards and Kelcey on Friday, November 17, 2006, traffic speeds of large trucks are somewhat lower than passenger vehicles, however, large trucks do not create a situation where they negatively impact the flow of traffic or create an undue hazard. Based on the traffic data collected by DVRPC on Tuesday, April 26, 2005, truck traffic represents approximately 12 percent of the total traffic on a daily basis between Highland Road and Caton Circle. The average daily traffic volume on Wrightstown Road is relatively low, which affects the percentage of trucks calculation. On a daily basis, approximately 2,162 vehicles use Wrightstown Road between Highland Road and Canton Circle, of which approximately 248 are large trucks.

11. Mill Creek Road / Washington Avenue / Cherry Lane

This engineering and traffic study has been conducted to determine if trucks should be restricted on Mill Creek Road / Washington Avenue / Cherry Lane, from Swamp Road (S.R. 2036) to Second Street Pike (S.R. 0232). Mill Creek Road / Washington Avenue / Cherry Lane (S.R. 2091) is an undivided, two lane, urban collector that generally runs in a north-south direction in Wrightstown Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that two (2) large trucks were involved in crashes on Mill Creek Road / Washington Avenue / Cherry Lane during a five (5) year period from 2001 to 2005, which constitutes less than 14 percent of the total vehicles involved in crashes on this road in the same time period. There are narrow bridges, sharp horizontal curves, steep grades and limited sight distance, which may pose a hazardous condition along the

corridor. However, large trucks do not seem to have difficulty navigating the roadway since there were only two (2) crashes in the last five (5) years. Based on the speed data collected by Jacobs Edwards and Kelcey on Thursday, November

30, 2006, traffic speeds of large trucks are not much higher or lower than the rest of the traffic. Based on the traffic data collected by DVRPC on Tuesday, April 26, 2005 and Tuesday, October 4, 2005, truck traffic represents approximately 21 percent of the total traffic on a daily basis between Swamp Road and Cedar Lane; and approximately seven (7) percent of the total traffic on a daily basis between Washington Avenue and Second Street Pike. The average daily traffic volume on Mill Creek Road / Washington Avenue / Cherry Lane is relatively low and Miller Quarry is located on Mill Creek Road near Swamp Road, which affect the percentage of trucks calculation. On a daily basis, approximately 622 vehicles use Mill Creek Road / Washington Avenue / Cherry Lane between Swamp Road and Cedar Lane, of which approximately 132 are large trucks; and approximately 901 vehicles use Swamp Road and Cedar Lane between Washington Avenue and Second Street Pike, of which approximately 60 are large trucks.



*Typical section on Mill Creek Road
Photo by: Jacobs Edwards and Kelcey*

12. Township Line Road / Mill Creek Road

This engineering and traffic study has been conducted to determine if trucks should be restricted on Township Line Road / Mill Creek Road, from Washington Avenue (S.R. 2091) to Durham Road (PA 413). Township Line Road / Mill Creek Road (S.R. 2115) is an undivided, two lane, urban collector that generally runs in a north-south direction in Wrightstown Township, Bucks County, Pennsylvania.



*Township Line Road, near Mill Creek Road
Photo by: Jacobs Edwards and Kelcey*

A review of the reportable crash data shows that there were no trucks involved in crashes on Township Line Road / Mill Creek Road during a five (5) year period from 2001 to 2005. There are no steep grades or sharp horizontal curves that impede traffic flow or present a hazardous condition. Based on the speed data collected by Jacobs Edwards and Kelcey on Thursday, November 30, 2006, trucks do not create a situation where trucks travel at speeds much higher or lower than the rest of traffic. Based on the traffic data collected by DVRPC on Tuesday, April 26, 2005 and Tuesday, October 4, 2005, truck traffic represents approximately 16 percent of the total traffic on a daily basis between Washington Avenue and Township Line Road / Forest Grove Road; and approximately eight (8) percent of the total traffic on a daily basis between Cherry Lane and Brian Lane. The average daily traffic volume on Township Line Road / Mill Creek Road is relatively low, which affects the percentage of trucks calculation. On a daily basis, approximately 1,292 vehicles use Township Line Road / Mill Creek Road between Washington Avenue and Township Line Road / Forest Grove Road, of which approximately 204 are heavy trucks; and approximately 2,401 vehicles use Township Line Road / Mill Creek Road between Cherry Lane and Brian Lane, of which approximately 180 are heavy trucks.

13. Newtown Bypass / Durham Road / Washington Crossing Road (Route 532)

This engineering and traffic study has been conducted to determine if trucks should be restricted on the Newtown By-Pass / Durham Road / Washington Crossing Road, from Swamp Road (S.R. 2036) to Taylorsville Road (S.R. 2071). The Newtown Bypass / Durham Road / Washington Crossing Road (S.R. 0532) is an undivided, two lane urban minor arterial that generally runs in a north-south direction in Newtown Township, Lower Makefield Township and Upper Makefield Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that six (6) large trucks were involved in crashes on the Newtown Bypass / Durham Road / Washington Crossing Road during a five (5) year period from 2001 to 2005, which constitutes less than three (3) percent of the total vehicles involved in crashes on this road in the same time period. There are no sharp curves or steep grades along the corridor that present a safety hazard for large trucks. Based on

the speed data collected by Jacobs Edwards and Kelcey on Monday, December 4, 2006, some traffic speeds of large trucks are somewhat lower than passenger vehicles, however, large trucks do not create a situation where they negatively impact the flow of traffic or create an undue hazard. Based on the traffic data collected by DVRPC on Tuesday, April 26, 2005, Tuesday, May 3, 2005, Tuesday, June 7, 2005, and Thursday, June 9, 2005, truck traffic represents approximately:

- four (4) percent of the total traffic on a daily basis on the Newtown Bypass between Swamp Road and Durham Road,
- six (6) percent of the total traffic on a daily basis on Durham Road between Eagle Road and Ice Cream Alley,
- six (6) percent of the total traffic on a daily basis on Washington Crossing Road between Highland Road and Balderston Drive,
- six (6) percent of the total traffic on a daily basis between Meadow View Drive and Little Road, and
- six (6) percent of the total traffic on a daily basis between Wrightstown Road and Taylorsville Road.



*Washington Crossing Road between Wrightstown Road & Meadowview Drive
Photo by: Jacobs Edwards and Kelcey*

14. Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road



*Main Street near W Afton Avenue
Photo by: Edwards and Kelcey*

This engineering and traffic study has been conducted to determine if trucks should be restricted on Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road, from West Trenton Avenue (S.R. 2018) to River Road (S.R. 0032). Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road (S.R. 2071) is an undivided, two lane, urban minor arterial that generally runs in a north-south direction in Lower Makefield Township, Yardley Borough and Upper Makefield Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that ten (10) large trucks were involved in crashes on Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road during a five (5) year period from 2001 to 2005, which constitutes less than three (3) percent of the total vehicles involved in crashes on this road in the same time period. There are no sharp curves or steep grades along

the corridor that present a safety hazard for large trucks. Based on the speed data collected by Jacobs Edwards and Kelcey on Monday, December 4, 2006, trucks do not create a situation where trucks travel at speeds much higher or lower than the rest of traffic. Based on the traffic data collected by DVRPC on Monday, May 2, 2005, Tuesday, June 7, 2005, and Tuesday, September 27, 2005, truck traffic represents approximately:

- six (6) percent of the total traffic on a daily basis between West Trenton Avenue and Big Oak Road,
- five (5) percent of the total traffic on a daily basis between East School Lane / Radcliffe Road and Edgewood Road / Black Rock Road,
- five (5) percent of the total traffic on a daily basis between Vanhorn Avenue and South Avenue,
- three (3) percent of the total traffic on a daily basis between Irving Street and Jervue Avenue,
- five (5) percent of the total traffic on a daily basis between Yardley Dolington Road / McKinley Avenue and Maplevale Drive,
- five (5) percent of the total traffic on a daily basis between Mt Eyre Road and Aqueduct Road, and
- four (4) percent of the total traffic on a daily basis between Terrell Drive and Heritage Hills Drive.

15. Yardley-Newtown Road (PA 332)

This engineering and traffic study has been conducted to determine if trucks should be restricted on Yardley-Newtown Road, from Interstate 95 (S.R. 0095) to Delaware Avenue (S.R. 0032). Yardley-Newtown Road (S.R. 0332) is an undivided, two lane, urban minor arterial that generally runs in an east-west direction in Lower Makefield Township and Yardley Borough, Bucks County, Pennsylvania.

A review of the reportable crash data shows that three (3) large trucks were involved in crashes on Yardley-Newtown Road during a five (5) year period from 2001 to 2005, which constitutes less than three (3) percent of the total vehicles involved in crashes on this road in the same time period. There are no sharp curves or steep grades along the corridor that present a safety hazard for large trucks. Based on the speed data collected by Jacobs Edwards and Kelcey on Monday, November 20, 2006, trucks do not create a situation where trucks travel at speeds much higher or lower than the rest of traffic. Based on the traffic data collected by DCRPC on Monday, May 2, 2005 and Tuesday, May 17, 2005, truck traffic represents approximately four (4) percent of the total traffic on a daily basis between Drew Drive and Hunt Drive; and approximately five (5) percent of the total traffic on a daily basis between Lehigh Drive and Sandy Run Road.



*Yardley-Newtown Road, looking eastbound, just past Mirror Lake Road
Photo by: Jacobs Edwards and Kelcey*

16. River Road / PA 32

This engineering and traffic study has been conducted to determine if trucks should be restricted on River Road, from East Franklin Street to Lurgan Road (S.R. 2101). River Road (S.R. 0032) is an undivided, two lane, urban principal arterial highway south of its intersection with Taylorsville Road, and an urban minor arterial to the north of Taylorsville Road. The roadway generally runs in a north-south direction in Lower Makefield Township, Yardley Borough and Upper Makefield Township, Bucks County, Pennsylvania.

A review of the reportable crash data shows that two (2) large trucks were involved in crashes on River Road during a five (5) year period from 2001 to 2005, which constitutes less than two (2) percent of the total vehicles involved in crashes on this road in the same time period. There are no steep grades or sharp horizontal curves along the corridor which pose a safety hazard to heavy vehicles. Based on the speed data collected by Jacobs Edwards and Kelcey on Monday, December 4, 2006, traffic speeds of large trucks are somewhat lower than passenger vehicles, however, large trucks do not create a situation where they negatively impact the flow of traffic or create an undue hazard.



*Typical River Road with residences to the west and the Delaware River to the east
Photo by: Jacobs Edwards and Kelcey*

Based on the traffic data collected by DVRPC on Tuesday, April 26, 2005, Tuesday, June 7, 2005, and Tuesday, September 27, 2005, truck traffic represents approximately:

- two (2) percent of the total traffic on a daily basis between Michael Road and Fenwood Place,
- five (5) percent of the total traffic on a daily basis between E College Avenue and Ferry Street,
- six (6) percent of the total traffic on a daily basis between E Afton Avenue and Brown Street,
- five (5) percent of the total traffic on a daily basis between Mt Eyre Road and Spring Court, and
- seven (7) percent of the total traffic on a daily basis between Cedar Glenn Drive and Brownsburg Road East.

The average daily traffic volume on River Road is relatively low, which affects the percentage of trucks calculation.

CONCLUSION

The data collected does not provide evidence that the large truck traffic is incompatible with the general traffic using any of the 16 key roadways. **Based on the data collected and in accordance with PennDOT Publication 212, Official Traffic Control Devices, March 2006, Subchapter B, Section 212.117 (d), the criteria for establishing a truck restriction for any of the 16 key roadways is not met at this time.**



Bucks County Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township / Yardley Borough

5.



Traffic Engineering & Safety Studies Summaries

Prepared by:

JACOBS
Edwards and Kelcey



For:
DELAWARE VALLEY REGIONAL PLANNING COMMISSION

October 2007

Table of Contents

BACKGROUND5-1

KEY ROADWAYS5-1

1. Worthington Mill Road.....5-1

2. Swamp Road5-9

3. Lindenhurst Road.....5-21

4. Stoopville Road.....5-24

5. Durham Road5-29

6. Newtown Bypass5-35

7. Newtown-Richboro Road / Almshouse Road / Jacksonville Road.....5-43

8. Second Street Pike5-51

9. Bustleton Pike5-59

10. Wrightstown Road5-65

11. Mill Creek Road / Washington Avenue / Cherry Lane.....5-69

12. Township Line Road / Mill Creek Road.....5-73

13. Newtown Bypass / Durham Road / Washington Crossing Road.....5-76

14. Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road.....5-82

15. Yardley-Newtown Road / Yardley-Langhorne Road / Afton Avenue.....5-91

16. River Road / Delaware Avenue5-94

OVERVIEW OF ENGINEERING RECOMMENDATIONS.....5-97

List of Tables

Table 5-1a: Worthington Mill Road Proposed Immediate Improvements.....5-7

Table 5-1b: Worthington Mill Road Proposed Short-term Improvements5-7

Table 5-1c: Worthington Mill Road Proposed Long-term Improvements.....5-8

Table 5-2a: Swamp Road Proposed Immediate Improvements5-13

Table 5-2b: Swamp Road Proposed Short-term Improvements5-15

Table 5-2c: Swamp Road Proposed Long-term Improvements.....5-15

Table 5-3a: Lindenhurst Road Immediate Improvements5-23

Table 5-3b: Lindenhurst Road Proposed Short-term Improvements5-23

Table 5-3c: Lindenhurst Road Proposed Long-term Improvements.....5-23

Table 5-4a: Stoopville Road Proposed Short-term Improvements5-26

Table 5-4b: Stoopville Road Proposed Long-term Improvements5-26

Table 5-5a: Durham Road Proposed Immediate Improvements.....5-32

Table 5-5b: Durham Road Proposed Short-term Improvements5-32

Table 5-5c: Durham Road Proposed Long-term Improvements.....5-32

Table 5-6a: Newtown Bypass Proposed Immediate Improvements5-38

Table 5-6b: Newtown Bypass Proposed Short-term Improvements.....5-39

Table 5-6c: Newtown Bypass Proposed Long-term Improvements5-39

Table 5-7a: Newtown-Richboro Road / Almshouse Road / Jacksonville Road Proposed Immediate Improvements5-46

Table 5-7b: Newtown-Richboro Road / Almshouse Road / Jacksonville Road Proposed Short-term Improvements5-46

Table 5-8a: Second Street Pike Proposed Immediate Improvements5-54

Table 5-8b: Second Street Pike Proposed Short-term Improvements.....5-54

Table 5-8c: Second Street Pike Proposed Long-term Improvements5-55

Table 5-9a: Bustleton Pike Proposed Immediate Improvements5-61

Table 5-9b: Bustleton Pike Proposed Short-term Improvements5-61

Table 5-9c: Bustleton Pike Proposed Long-term Improvements.....5-61

Table 5-10a: Wrightstown Road Proposed Immediate Improvements5-67

Table 5-10b: Wrightstown Road Proposed Short-term Improvements.....5-68

Table 5-11a: Mill Creek Road / Washington Avenue / Cherry Lane Proposed Immediate Improvements.5-71

Table 5-11b: Mill Creek Road / Washington Avenue / Cherry Lane Proposed Short-term Improvements 5-71

Table 5-12a: Township Line Road / Mill Creek Road Proposed Short-term Improvements.....5-75

Table 5-13a: Newtown Bypass / Durham Road / Washington Crossing Road Proposed Short-term Improvements5-80

Table 5-13b: Newtown Bypass / Durham Road / Washington Crossing Road Proposed Long-term Improvements5-81

Table 5-14a: Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road Proposed Immediate Improvements5-86

Table 5-14b: Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road Proposed Short-term Improvements5-86

Table 5-14c: Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road Proposed Long-term Improvements5-87

Table 5-15a: Yardley-Newtown Road / Yardley-Langhorne Road / Afton Avenue Proposed Short-term Improvements5-93

Table 5-16a: River Road / Delaware Avenue Proposed Short-term Improvements5-97

List of Figures

Figure 5-1: Key Roadways5-3

Figure 5-2: Swamp Road Corridor (S.R. 2079 / S.R. 2036) Corridor Improvements5-17

Figure 5-3: Stoopville Road & Washington Crossing Road Intersection Improvements5-27

Figure 5-4: Durham Road & Second Street Pike Intersection Improvements5-33

Figure 5-5: Newtown Bypass On-Ramp to I-95 Southbound Intersection Improvements5-40

Figure 5-6: Newtown-Richboro Road / Almshouse Road & Second Street Pike Intersection Improvements
.....5-48

Figure 5-7: Second Street Pike & Bristol Road Intersection Improvements5-56

Figure 5-8: Bustleton Pike & Elm Avenue Intersection Improvements5-62

Figure 5-9: Taylorsville Road / Main Street & Dolington Road / McKinley Avenue Intersection
Improvements5-88

Figure 5-10: Immediate Engineering Improvement Recommendations5-99

Figure 5-11: Short-Term Engineering Improvement Recommendations5-100

Figure 5-12: Long-Term Engineering Improvement Recommendations.....5-101

BACKGROUND

The Engineering and Traffic Studies Summary Report contains a summary of the evaluations of current traffic safety conditions and current and projected future traffic operating characteristics along the 16 Key Roadways, including the study's integration with ongoing state and municipal transportation improvement projects. A map of the 16 Key Roadways is shown in Figure 5-1. The engineering and traffic studies are consistent with PennDOT Publication 212, *Official Traffic Control Devices. An Engineering and Traffic Safety Elements Summary Matrix* was created to summarize the findings along the corridors, and can be found in Appendix C. Engineering recommendations and related improvement costs, to address immediate, short-term and long-term needs along the 16 Key Roadways are identified. The recommended transportation improvement plan incorporating engineering, education and enforcement elements is detailed in Chapter 7.

KEY ROADWAYS

Summaries of the 16 individual studies are below. The crash history statistics are confidential pursuant to 75 Pa. C.S. §3754 and 23 U.S.C. §409 and may not be disclosed or used in litigation without written permission from PennDOT.

I. Worthington Mill Road

Project Location

The study corridor begins at Second Street Pike (S.R. 0232) in Northampton Township and terminates at Durham Road (S.R. 0413) in Wrightstown Township, as shown in Figure 5-1. The study corridor is approximately 3.4 miles long with no signalized intersections and five (5) unsignalized intersections of consequence. The cross-section is that of a two-lane, undivided Urban Collector. The corridor is designated as S.R. 2081.

The Worthington Mill Road Corridor serves as a collector between the Second Street Pike, Swamp Road and Durham Road Corridors.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

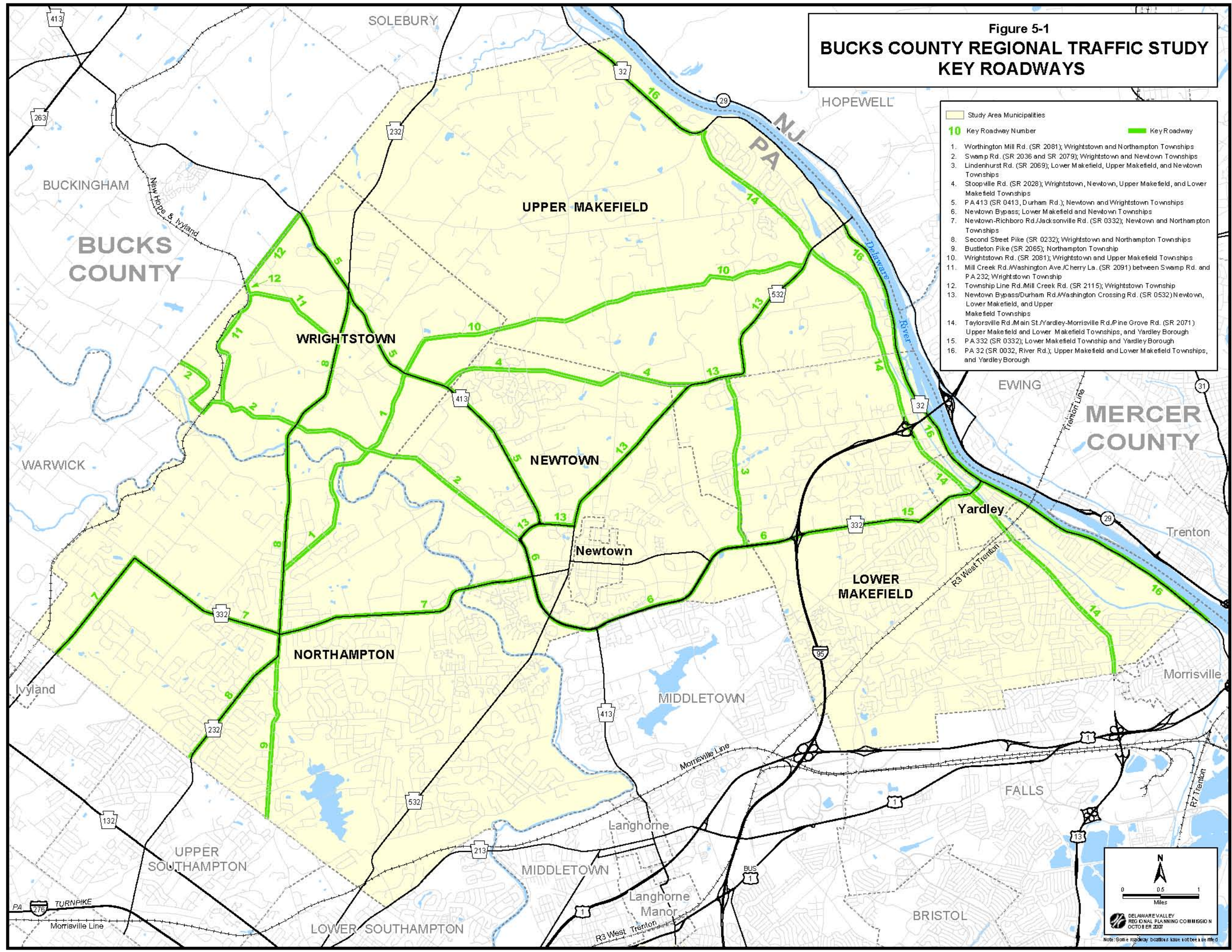
The Worthington Mill Road Corridor has several on-going transportation studies and engineering efforts on and adjacent to the corridor that are in different phases. A summary of the known engineering studies and design projects follows:

- *Swamp Road Corridor Improvement Project* - in Newtown and Wrightstown Townships is currently in the environmental clearance and preliminary engineering phase by PennDOT. Public outreach and community involvement activities are accompanying the project's development which may include: minor roadway widening, horizontal and vertical curve realignment, shoulder rehabilitation, associated drainage improvements, widening / replacement of some bridges and culverts along the corridor, and new signalization. The construction cost estimate for a full reconstruction project is approximately \$14 million and is scheduled for construction after Fiscal Year 2009.
- *Durham Road and Wrightstown / Worthington Mill Road Intersection Improvements* - in Wrightstown Township is currently in the engineering phase by the Township and includes widening of Durham Road for left turn lanes and new signalization.
- *PA 413 Access Management Plan* – in Newtown and Wrightstown Townships is currently in the planning stage by DVRPC. The case study spans Durham Road between the Newtown Bypass and Second Street Pike to illustrate tangible ways of introducing access management measures (e.g. sharing or restricting access, proper driveway placement and design, uniform signalized intersection spacing, etc.) within the corridor. The work is being performed with the participation of member governments, regional transportation providers and PennDOT.



*Typical Single-Family Residential Home along
Worthington Mill Road between Second Street Pike
and Swamp Road
Photo by: Jacobs Edwards and Kelcey*

**Figure 5-1
BUCKS COUNTY REGIONAL TRAFFIC STUDY
KEY ROADWAYS**



- Study Area Municipalities
- 10** Key Roadway Number
- Key Roadway
1. Worthington Mill Rd. (SR 2081); Wrightstown and Northampton Townships
 2. Swamp Rd. (SR 2036 and SR 2079); Wrightstown and Newtown Townships
 3. Lindenhurst Rd. (SR 2069); Lower Makefield, Upper Makefield, and Newtown Townships
 4. Stoopville Rd. (SR 2028); Wrightstown, Newtown, Upper Makefield, and Lower Makefield Townships
 5. PA 413 (SR 0413, Durham Rd.); Newtown and Wrightstown Townships
 6. Newtown Bypass; Lower Makefield and Newtown Townships
 7. Newtown-Richboro Rd./Jacksonville Rd. (SR 0332); Newtown and Northampton Townships
 8. Second Street Pike (SR 0232); Wrightstown and Northampton Townships
 9. Bustleton Pike (SR 2065); Northampton Township
 10. Wrightstown Rd. (SR 2081); Wrightstown and Upper Makefield Townships
 11. Mill Creek Rd./Washington Ave./Cherry La. (SR 2091) between Swamp Rd. and PA 232; Wrightstown Township
 12. Township Line Rd./Mill Creek Rd. (SR 2115); Wrightstown Township
 13. Newtown Bypass/Durham Rd./Washington Crossing Rd. (SR 0532) Newtown, Lower Makefield, and Upper Makefield Townships
 14. Taylorsville Rd./Main St./Yardley-Morrisville Rd./Pine Grove Rd. (SR 2071) Upper Makefield and Lower Makefield Townships, and Yardley Borough
 15. PA 332 (SR 0332); Lower Makefield Township and Yardley Borough
 16. PA 32 (SR 0032, River Rd.); Upper Makefield and Lower Makefield Townships, and Yardley Borough

0 0.5 1
Miles

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
OCTOBER 2010

Note: Some roadway locations have not been verified.

Existing Conditions

The study corridor generally runs in a north-south direction and is characterized by a varying degree of horizontal and vertical curvature with several steep grades. Worthington Mill Road generally provides two lanes from 10-feet to 12-feet each with little to no shoulders. There is a posted speed limit of 40 MPH on the entire length of Worthington Mill Road. However, there are multiple curves along Worthington Mill Road that have advisory speed signs at 25 MPH to 35 MPH.

The primary land use along Worthington Mill Road (S.R. 2081) in Wrightstown and Northampton townships is single-family residential (approximately 50%). Other land uses include wooded areas (approximately 20%), agriculture (approximately 17%) and vacant areas (approximately 10%). The area between Second Street Pike and Swamp Road consists of single-family residential subdivisions and houses with direct driveway access. There is a one-lane bridge just south of Swamp Road that extends for 530 feet. North of Swamp Road, there are additional single-family houses and woods. There is one community service use along this stretch of roadway: a church on the corner of Second Street Pike.



*One Lane Bridge on Worthington Mill Road over Neshaminy Creek just south of Swamp Road
Photo by: Jacobs Edwards and Kelcey*

The 3.4-mile long corridor presently contains five (5) intersections of consequence; all five (5) are unsignalized.

- Second Street Pike & Worthington Mill Road (unsignalized)
- Twining Road & Worthington Mill Road (unsignalized)
- Swamp Road & Worthington Mill Road (unsignalized)
- Mud Road & Worthington Mill Road (unsignalized)
- Durham Road & Worthington Mill Road (unsignalized)

Traffic Data

Automatic Traffic Recorder (ATR) counts were conducted by DVRPC at two (2) locations to determine the existing traffic volumes and vehicle classifications on Worthington Mill Road. The first ATR count was conducted between Second Street Pike and Swamp Road along Worthington Mill Road on Tuesday, April 26, 2005. The second ATR count was conducted between Swamp Road and PA Route 413 on Thursday, June 2, 2005. For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

*Peak Hour Traffic Volumes (All Vehicles)**Between Second Street Pike and Swamp Road*

Northbound: Worthington Mill Road – 260 vehicles, 3.5% trucks (7:00 – 8:00 A.M.)
Southbound: Worthington Mill Road – 205 vehicles, 2.4% trucks (5:00 – 6:00 P.M.)
Combined: Worthington Mill Road – 364 vehicles, 3.0% trucks (7:00 – 8:00 A.M.)

Between Swamp Road and PA Route 413

Northbound: Worthington Mill Road – 95 vehicles, 7.4% trucks (6:00 – 7:00 P.M.)
Southbound: Worthington Mill Road – 111 vehicles, 7.2% trucks (5:00 – 6:00 P.M.)
Combined: Worthington Mill Road – 198 vehicles, 6.6% trucks (5:00 – 6:00 P.M.)

*Average Daily Traffic (ADT) Volumes**Between Second Street Pike and Swamp Road*

Northbound: Worthington Mill Road – 1,925 vehicles, 2.5% trucks, 18 motorcycles, 8 buses
Southbound: Worthington Mill Road – 1,849 vehicles, 2.3% trucks, 11 motorcycles, 9 buses
Combined: Worthington Mill Road – 3,774 vehicles, 2.4% trucks, 29 motorcycles, 17 buses

Between Swamp Road and Durham Road

Northbound: Worthington Mill Road – 946 vehicles, 9.9% trucks, 8 motorcycles, 16 buses

Southbound: Worthington Mill Road – 946 vehicles, 9.5% trucks, 13 motorcycles, 17 buses

Combined: Worthington Mill Road – 1,892 vehicles, 9.7% trucks, 21 motorcycles, 33 buses

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory volume to capacity analysis to evaluate any operational and/or congestion concerns.

Crash Summary

Reportable crash data along the Worthington Mill Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 54 crashes occurred within the corridor limits. There were a total of 72 vehicles involved in the 54 crashes on Worthington Mill Road in the five year period. Of the 72 vehicles, three (3) large trucks were involved in three (3) separate crashes, constituting less than five (5) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 6 (11%)
- 2002 – 10 (19%)
- 2003 – 12 (22%)
- 2004 – 9 (17%)
- 2005 – 17 (31%)

There was one (1) fatality involved in the reportable crash data. The fatality occurred in the midblock between Lantern Way and Twining Road resulting from a hit fixed object crash. The majority of the crashes (51%) were Property Damage Only (PDO). Hit fixed object crashes were the most common type of crash accounting for 58 percent of the crashes. These types of crashes are normally caused by excessive speeds, slippery surface, fixed object in or too close to roadway, and/or inadequate traffic control devices/guiderail.

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Cursory capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks, roadway alignment and traffic congestion at Durham Road.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is immediate, occurring one year or less; the second is short term, occurring in one to three years; and the third is long term, occurring in three years or more



Worthington Mill Road between Swamp Road and Durham Road

Photo by: Jacobs Edwards and Kelcey

The majority of crashes are related to excessive speed (46% too fast for condition and 9% proceeding without clearance) and the crash rate during a minimum 12-month period (3.45) is greater than the applicable rate in the most recent high-crash rate table (1.85) in the appendix of Official Traffic-Control Devices (Department Publication 212); therefore, a reduced speed limit along Worthington Mill Road is warranted.

A sketch of the proposed Durham Road and Wrightstown / Worthington Mill Road Intersection Improvements (by others under a separate project) is included in Appendix D.

Table 5-1a: Worthington Mill Road Proposed Immediate Improvements

Signage Improvements		
ID	Description	Cost
SI-1-IM1	Lower the speed limit from 40 MPH to 35 MPH along the entire length of Worthington Mill Road in accordance with Department Publication 212. (<i>Northampton & Wrightstown Townships</i>) (14 signs @ \$150/sign)	\$2,100
Total Signage Improvements Cost		\$2,100
Total Immediate Improvements Cost		\$2,100

Table 5-1b: Worthington Mill Road Proposed Short-term Improvements

Highway Maintenance Improvements		
ID	Description	Cost
HM-1-ST1	Consider installing a stone base in areas along Worthington Mill Road that have a substantial drop-off immediately adjacent to the travel lanes, especially south of Durham Road. (<i>Wrightstown Township</i>) (75 CY @ \$60/CY)	\$4,500
HM-1-ST2	Repair inlet just south of Swamp Road. (<i>Wrightstown Township</i>) (Type C Inlet @ \$2,500)	\$2,500
HM-1-ST3	Install guiderail along the curve between Mud Road and Durham Road in accordance with Department Publication 13M (DM-2) – Culvert Headwall within Clear Zone. (<i>Wrightstown Township</i>) (500 LF Type 2-S Guiderail @ \$25/LF)	\$12,500
HM-1-ST4	Install guiderail delineation (reflectors) throughout Worthington Mill Road as new guiderail is added or reconstructed. (<i>Northampton & Wrightstown Townships</i>) (25 delineators for existing/proposed guiderail @ \$20/delineator)	\$500
Total Highway Maintenance Improvements Cost		\$20,000
Geometric Improvements		
ID	Description	Cost
GI-1-ST1	Move forward with Durham Road and Wrightstown / Worthington Mill Road Intersection Improvement Project. (<i>Wrightstown Township</i>)	\$1,000,000
Total Geometric Improvements Cost		\$1,000,000
Total Short-term Improvements Cost		\$1,020,000

Table 5-1c: Worthington Mill Road Proposed Long-term Improvements

Geometric Improvements		
ID	Description	Cost
GI-1-LT1	Widen the bridge over the Neshaminy Creek to two lanes. <i>(Northampton & Wrightstown Townships)</i>	\$3,000,000
GI-1-LT2	Move forward with the Swamp Road Corridor Improvement Project, as agreed on by PennDOT, the municipalities and the community.* <i>(Newtown & Wrightstown Townships)</i>	TBD*
Total Geometric Improvements Cost		\$3,000,000*
Total Long-term Improvements Cost		\$3,000,000*

2. Swamp Road

Project Location

The study corridor begins at the Wrightstown Township line and terminates at the Newtown Bypass, within Wrightstown and Newtown townships, as shown in Figure 5-1. The study corridor is approximately 6.2 miles long and includes three (3) signalized intersections and six (6) unsignalized intersections of consequence. The cross section is that of a two-lane, undivided Urban Minor Arterial. From the Buckingham-Wrightstown township line to Rushland Road, the corridor is State Route (S.R.) 2079 and from Rushland Road to the Newtown Bypass the corridor is S.R. 2036.

The Swamp Road Corridor serves as a link between Wrightstown and Newtown. For instance, it serves as a connection between Rushland and the Newtown Bypass and I-95 to the east. The Swamp Road Corridor is one of the primary east-west routes through Bucks County, considering many people use it to travel to and from the Doylestown area.

Original and Successor Projects

A summary of the known transportation studies and engineering/construction efforts follows:

- *Swamp Road Engineering Study* - was commissioned by and prepared for Newtown and Wrightstown townships (and completed in May 2002) to identify and evaluate the existing deficiencies of Swamp Road from the Buckingham Township line to the Newtown Bypass and recommend appropriate improvements. The study team worked closely with a Community Advisory Committee (CAC), whose membership was comprised of local citizens and major traffic generators, such as the Bucks County Community College and local quarries.
- *Swamp Road Culvert Replacement at Worthington Mill Road (S.R. 2036, Section BSB)* – consisted of a small stone arch culvert approximately 500 feet east of the intersection of Swamp and Worthington Mill roads, which was replaced by PennDOT in 2004; and the posted 15-ton weight limit removed. In the same year, this project also included an emergency bridge superstructure replacement just west of the Bucks County Community College between Liberty Drive and Penns Woods Drive.



Bucks County Community College along the southern section of Swamp Road
Photo by: Jacobs Edwards and Kelcey

Concurrent Projects

The Swamp Road Corridor has several ongoing transportation studies and engineering efforts on and adjacent to the corridor, which are currently in different phases. A summary of the known engineering studies and design projects follows:

- *Swamp Road Corridor Improvement Project* - in Newtown and Wrightstown Townships is currently in the environmental clearance and preliminary engineering phase by PennDOT. Public outreach and community involvement activities are accompanying the project's development which may include: minor roadway widening, horizontal and vertical curve realignment, shoulder rehabilitation, associated drainage improvements, widening / replacement of some bridges and culverts along the corridor, and new signalization. The construction cost estimate for a full reconstruction project is approximately \$14 million and is scheduled for construction after Fiscal Year 2009.
- *Second Street Pike (PA 232) Corridor and Intersection Improvements* - in Wrightstown Township is currently in the engineering phase by PennDOT and includes an upgrade to the Route 232 and Swamp Road intersection to provide a truck climbing lane and horizontal realignment of the roadway approaches to the intersection. The project will also include signalization improvements. The construction cost estimate for the project is currently at \$1.65 million and is scheduled for construction in Fiscal Years 2008 and 2009.
- *Newtown Bypass Traffic Signal Enhancement Initiative* - in Lower Makefield and Newtown townships is currently in the implementation phase by the involved municipalities and PennDOT, and includes traffic signal retiming, improved coordination, and phasing adjustments for 11 signalized intersections along the Newtown Bypass. The TSEI goal is to reduce corridor travel time and delay through low-cost immediate improvements. Signal timing modifications were initially implemented in summer 2007.

Existing Conditions

The study corridor generally runs in an east-west direction and is characterized by a varying degree of horizontal and vertical curvature with several steep grades. Swamp Road generally provides two 11-foot lanes of bituminous cartway throughout, with paved shoulders in some areas with recent development. The speed limit on Swamp Road ranges from 40 miles per hour (MPH) to 45 MPH. There is a posted speed limit of 40 MPH from the Wrightstown-Buckingham township line to Worthington Mill Road. From Worthington Mill Road to the Newtown Bypass, the posted speed limit is 45 MPH.

Much of the land along Swamp Road in Wrightstown and Newtown townships supports agricultural (approximately 30%), single-family residential (approximately 29%), wooded areas (approximately 17%) and mining (approximately 9%). There are several single-family houses with direct driveway access, as well as several single-family subdivisions. Bucks County Community College is located on the eastern portion of this roadway in Newtown Township. Four quarry sites are located near and west of Second Street Pike (PA 232) in Wrightstown Township, including the Hanson Penns Park Quarry at the intersection of Second Street Pike, the Eureka Stone Quarry across the street and the Rush Valley Quarry farther west. Also, Miller Quarry is located just north of Swamp Road on Mill Creek Road.

The 6.2-mile long corridor presently contains nine (9) intersections of consequence; three (3) are signalized and six (6) are unsignalized.

- Rushland Road & Swamp Road (unsignalized)
- Penns Park Road/Mill Creek Road & Swamp Road (unsignalized)
- Second Street Pike (PA 232) & Swamp Road
- Worthington Mill Road & Swamp Road (unsignalized)
- Twining Bridge Road & Swamp Road (unsignalized)
- BCCC Drive/Liberty Drive & Swamp Road (unsignalized)
- BCCC Drive/Helen Randle Park Entrance & Swamp Road
- Sawmill Lane/Short Lane & Swamp Road (unsignalized)
- Newtown Bypass (PA 413) & Swamp Road



*Hanson Penns Park Quarry at the intersection of Second Street Pike and Swamp Road
Photo by: Jacobs Edwards and Kelcey*

Traffic Data

Automatic Traffic Recorder (ATR) counts were conducted by DVRPC at four (4) locations to determine the existing traffic volumes and vehicle classifications on Swamp Road. The first ATR count was conducted in Wrightstown Township between Old Sackettsford Road and Mill Creek Road / Penns Park Road on Tuesday, April 26, 2005. The second ATR count was conducted in Wrightstown Township between Mill Creek Road / Penns Park Road and Second Street Pike on Thursday, June 2, 2005. The third ATR count was conducted also in Wrightstown Township between Second Street Pike and Worthington Mill Road / Wrightstown Road on Wednesday, April 27, 2005. The last ATR count was conducted in Newtown Township between Penns Woods and Liberty Drive on Wednesday, April 27, 2005. For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicles classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)

Between Old Sackettsford Road and Mill Creek Road / Penns Park Road

Eastbound: Swamp Road – 379 vehicles, 6.1% trucks (8:00 – 9:00 A.M.)
Westbound: Swamp Road – 322 vehicles, 4.7% trucks (5:00 – 6:00 P.M.)
Combined: Swamp Road – 607 vehicles, 9.6% trucks (7:00 – 8:00 A.M.)

Between Mill Creek Road / Penns Park Road and Second Street Pike

Eastbound: Swamp Road – 297 vehicles, 9.4% trucks (7:00 – 8:00 A.M.)
Westbound: Swamp Road – 282 vehicles, 5.7% trucks (4:00 – 5:00 P.M.)
Combined: Swamp Road – 508 vehicles, 4.5% trucks (5:00 – 6:00 P.M.)

Between Second Street Pike and Worthington Mill Road / Wrightstown Road

Eastbound: Swamp Road – 426 vehicles, 9.9% trucks (8:00 – 9:00 A.M.)
Westbound: Swamp Road – 280 vehicles, 3.6% trucks (5:00 – 6:00 P.M.)
Combined: Swamp Road – 650 vehicles, 12.8% trucks (8:00 – 9:00 A.M.)

Between Penns Woods and Liberty Drive

Eastbound: Swamp Road – 499 vehicles, 7.0% trucks (7:00 – 8:00 A.M.)

Westbound: Swamp Road – 524 vehicles, 3.1% trucks (5:00 – 6:00 P.M.)

Combined: Swamp Road – 932 vehicles, 8.2% trucks (8:00 – 9:00 A.M.)

*Average Daily Traffic (ADT) Volumes**Between Old Sackettsford Road and Mill Creek Road / Penns Park Road*

Eastbound: Swamp Road – 3,148 vehicles, 9.8% trucks, 21 bikes

Westbound: Swamp Road – 3,283 vehicles, 10.3% trucks, 21 bikes

Combined: Swamp Road – 6,431 vehicles, 10.0% trucks, 42 bikes

Between Mill Creek Road / Penns Park Road and Second Street Pike

Eastbound: Swamp Road – 2,628 vehicles, 10.6% trucks, 16 bikes

Westbound: Swamp Road – 2,720 vehicles, 10.3% trucks, 15 bikes

Combined: Swamp Road – 5,348 vehicles, 10.4% trucks, 31 bikes

Between Second Street Pike and Worthington Mill Road / Wrightstown Road

Eastbound: Swamp Road – 3,630 vehicles, 12.9% trucks, 1 bikes

Westbound: Swamp Road – 3,301 vehicles, 11.4% trucks, 10 bikes

Combined: Swamp Road – 6,931 vehicles, 12.2% trucks, 11 bikes

Between Penns Woods and Liberty Drive

Eastbound: Swamp Road – 5,664 vehicles, 8.2% trucks, 5 bikes

Westbound: Swamp Road – 5,351 vehicles, 8.1% trucks, 10 bikes

Combined: Swamp Road – 11,015 vehicles, 8.2% trucks, 15 bikes

Vehicle turning movement counts were reviewed for the nine (9) intersection locations within the Swamp Road Corridor. The counts were obtained from multiple sources including the Swamp Road Corridor Improvement and Newtown Bypass TSEI projects.

Origin-Destination data was reviewed for the truck traffic generated at the four quarries, either fronting or immediately adjacent to Swamp Road. The O-D data was collected through license plate surveys conducted on Wednesday, October 11, 2006 between 8:00 AM and 11:00 AM at 16 locations throughout the Bucks County Regional Traffic Study area. Without regard to the actual path followed (and it was noted that Stoopville Road was closed at the time of the survey), between 63 percent and 67 percent of the analyzed truck trips were oriented between the quarries and the vicinity of the I-95 interchange with the Newtown Bypass—implying the value of Swamp Road and the Newtown Bypass in serving these “desire lines.”

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory capacity analysis to evaluate any operational and/or congestion concerns. A cursory volume to capacity analysis was also performed on Swamp Road to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Crash Summary

Reportable crash data along the Swamp Road Corridor for the most current five years available (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle requires towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 223 reportable crashes occurred within the corridor limits. There were a total of 363 vehicles involved in the 223 crashes on Swamp Road in the five year period. Of the 363 vehicles, 16 large trucks were involved in 15 separate crashes, constituting less than five (5) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 57 (25%)
- 2002 – 59 (26%)
- 2003 – 58 (26%)
- 2004 – 26 (11%)
- 2005 – 23 (10%)

There was a significant reduction in crashes over the final two years of the study period, most likely attributed to the amount of work that has taken place (i.e., culvert replacement, milling and overlay, warning signs, pavement markings).

There were no fatalities involved in the reportable crash data. The majority of the crashes (47%) were Property Damage Only (PDO). Hit-fixed-object crashes were the most common type of crash accounting for 40 percent of the crashes. These types of crashes are normally caused by excessive speed, slippery surface, fixed object in or too close to roadway, and/or inadequate traffic control devices / guiderail.



*Eureka Stone Quarry located across Swamp Road from the Hanson Penns Park Quarry
Photo by: Jacobs Edwards and Kelcey*

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Cursory capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions. A cursory analysis was also performed on Swamp Road to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks, roadway alignment, drainage, traffic congestion, crashes, Bucks County Community College access, and unnecessary signage.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is immediate, occurring one year or less; the second is short-term, occurring in one to three years. Long-term (i.e., beyond three years) further improvement for Swamp Road will be addressed in the Swamp Road Corridor Improvement Project, and in the Second Street Pike Corridor and Intersection Improvement Project currently being developed by PennDOT.

A map overview of the improvement recommendations along Swamp Road is included in Figure 5-2.

Table 5-2a: Swamp Road Proposed Immediate Improvements

Signage Improvements		
	Description / Location	Cost
SI-2-IM1	Install Curve Warning Sign (W1-2) in the eastbound direction along Swamp Road at curve located west of the Rushland Road intersection (See Figure 5-2). <i>(Wrightstown Township)</i>	\$325
SI-2-IM2	Install Intersection Warning Sign (W2-5) and Advance Street Name Plaque (W16-8) for the eastbound Rushland Road approach at the intersection of Rushland Road and Swamp Road. Also, install Advance Street Name Signs (D3-2) for both eastbound and westbound Swamp Road approaches (See Figure 5-2). <i>(Wrightstown Township)</i>	\$600
SI-2-IM3	Install an Advance Curve Sign (W1-1) in the westbound direction along Swamp Road at the New Hope-Ivyland Railroad at-grade crossing (See Figure 5-2). <i>(Wrightstown Township)</i>	\$300
SI-2-IM4	Install a Combination Horizontal Alignment Intersection Sign (W1-10) and Advance Street Name Plaque (W16-8) along the eastbound Swamp Road at the intersection of Swamp Road, Penns Park Road, and Mill Creek Road (See Figure 5-2). <i>(Wrightstown Township)</i>	\$250
SI-2-IM5	Install Chevron Signs (W1-8), Large Arrow sign (W1-6), and Slippery When Wet Sign (W8-5) along the horizontal and vertical curves along Swamp Road near the quarries between Penns Park Road and Second Street Pike (See Figure 5-2). <i>(Wrightstown Township)</i>	\$1,200
SI-2-IM6	Install Chevron Signs (W1-8) along eastbound and westbound Swamp Road at the horizontal curve towards left, located east of Second Street Pike intersection (See Figure 5-2). <i>(Wrightstown Township)</i>	\$675
SI-2-IM7	Install Advance Stop Warning Sign (W3-1) and Advance Street Name Plaque (W16-8) along eastbound Swamp Road at the intersection of Swamp Road and Worthington Mill Road (See Figure 5-2). <i>(Wrightstown Township)</i>	\$350
SI-2-IM8	Replace the existing Curve Sign (W1-2) with a Combination Horizontal Alignment Intersection Sign (W1-10) and an Advance Street Name Plaque (W16-8) along eastbound Swamp Road at the intersection of Twining Bridge Road (See Figure 5-2). <i>(Newtown Township)</i>	\$250
SI-1-IM9	Install Advance Intersection Sign (W2-1) and Advance Street Name Plaque (W16-8a) along eastbound and westbound Swamp Road at the intersection of Swamp Road, Liberty Drive and BCCC Entrance/Exit (See Figure 5-2). <i>(Newtown Township)</i>	\$625
SI-2-IM10	Remove Green and Brown Detour Route Signs that are no longer necessary (on Swamp Road, Second Street Pike, PA 413, and Newtown Bypass) (See Figure 5-2). <i>(Newtown & Wrightstown Townships)</i>	\$500
Total Signage Improvements Cost		\$5,075

Pavement Marking Improvements		
ID	Description	Cost
PM-2-IM1	Install raised pavement markings, railroad crossing pavement marking, and 'SLOW' pavement marking for the eastbound Swamp Road at the New Hope-Ivyland Railroad at-grade crossing (See Figure 5-2). (<i>Wrightstown Township</i>)	\$3,000
PM-2-IM2	Install raised pavement markings at the horizontal curve location just east of Penns Park Road, Mill Creek Road (See Figure 5-2). (<i>Wrightstown Township</i>)	\$2,100
PM-2-IM3	Install raised pavement markings at the horizontal curve location east of the Second Street Pike intersection (See Figure 5-2). (<i>Wrightstown Township</i>)	\$2,100
Total Pavement Marking Improvements Cost		\$7,200

Highway Lighting Improvements		
ID	Description	Cost
HL-2-IM1	Install highway lighting at the horizontal curve location just east of Penns Park Road, Mill Creek Road. (See Figure 5-2). (<i>Wrightstown Township</i>) (5 Lights)	\$7,500
HL-2-IM2	Install highway lighting at the horizontal curve location east of Second Street Pike. (See Figure 5-2). (<i>Wrightstown Township</i>) (5 Lights)	\$7,500
Total Highway Lighting Improvements Cost		\$15,000

Highway Maintenance Improvements		
ID	Description	Cost
HM-2-IM1	Consider installing a stone base in areas along Swamp Road that have a substantial drop-off immediately adjacent to the travel lanes. (<i>Newtown & Wrightstown Townships</i>) (900 CY @ \$60/CY) (See Figure 5-2).	\$54,000
HM-2-IM2	Trim/cut down several trees between the Mill Creek Road and Penns Park Road. (5 Trees @ \$1,000/Tree) (See Figure 5-2). (<i>Wrightstown Township</i>)	\$5,000
HM-2-IM3	Install guiderail delineation (reflectors) throughout Swamp Road as new guiderail is added or reconstructed. (35 delineators for existing guiderail @ \$50/delineator) (See Figure 5-2). (<i>Newtown & Wrightstown Townships</i>)	\$1,750
Total Highway Maintenance Improvements Cost		\$60,750

Traffic Signal Improvements		
ID	Description	Cost
TS-2-IM1	Install a 6' X 6' Queue Pre-emption Loop Detector at a distance of 600 feet behind the stop bar at the westbound approach at the Swamp Road, Park Entrance and BCCC Entrance/Exit intersection (See Figure 5-2). (<i>Newtown Township</i>)	\$30,000
TS-2-IM2	Move forward with the Newtown Bypass Traffic Signal Enhancement Initiative Improvements (<i>Newtown and Lower Makefield Townships</i>)	\$27,000
Total Traffic Signal Improvements Cost		\$57,000

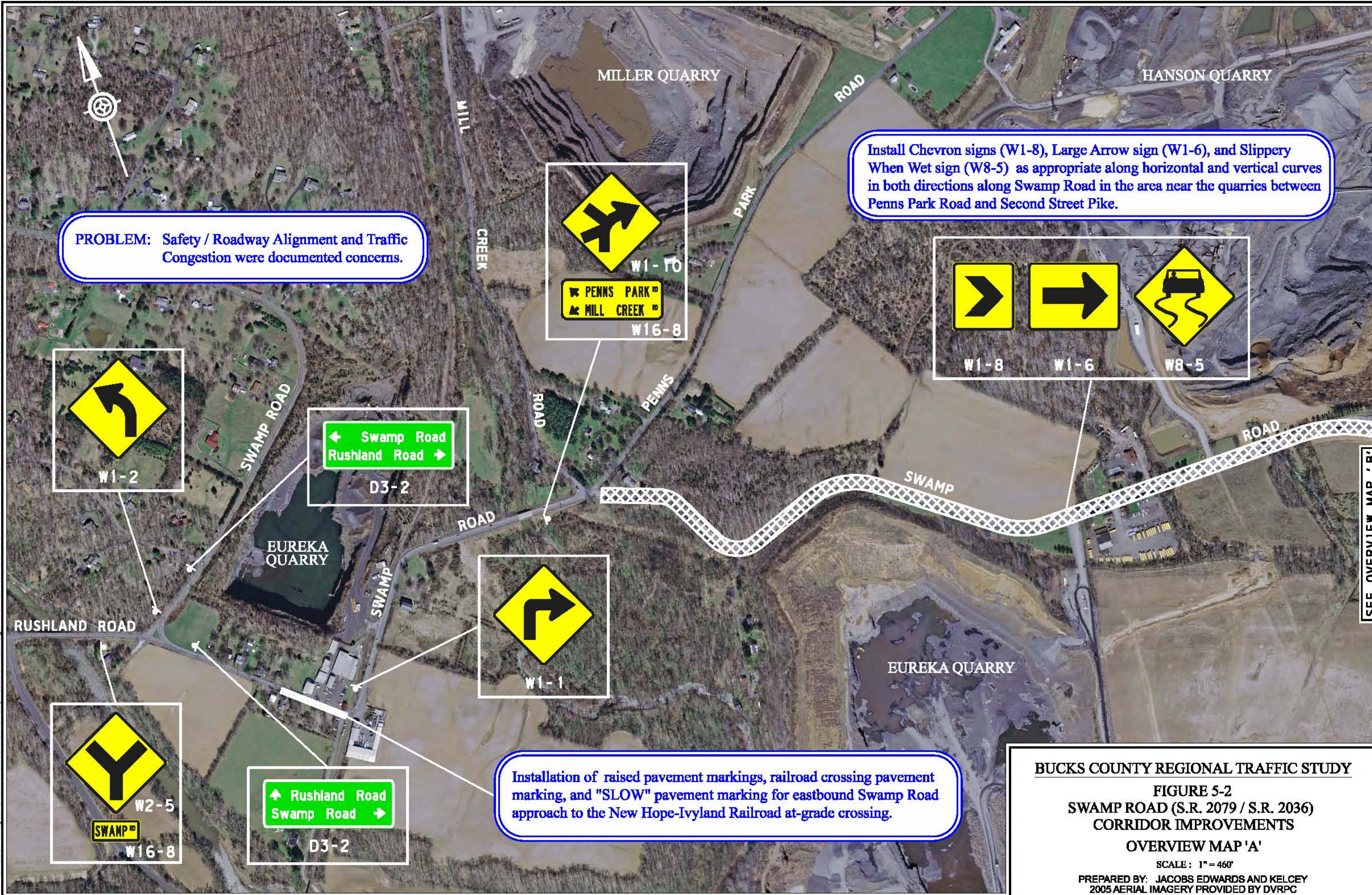
Total Immediate Improvements Cost		\$145,025
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Table 5-2b: Swamp Road Proposed Short-term Improvements

Geometric Improvements		
ID	Description	Cost
GI-2-ST1	Lengthen the culvert located immediately east of the BCCC signalized driveway allowing widening of Swamp Road. Lengthen the westbound left turn lane. Provide necessary traffic signal modifications (See Figure 5-2). <i>(Newtown Township)</i>	\$175,000
Total Geometric Improvements Cost		\$175,000
Total Short-term Improvements Cost		\$175,000

Table 5-2c: Swamp Road Proposed Long-term Improvements

Geometric Improvements		
ID	Description	Cost
GI-2-LT1	Move forward with the Swamp Road Corridor Improvement Project, as agreed on by PennDOT, the municipalities and the community.* <i>(Newtown & Wrightstown Townships)</i>	TBD*
GI-2-LT2	Move forward with the Second Street Pike Corridor and Intersection Improvements	\$1,650,000
Total Geometric Improvements Cost		\$1,650,000*
Total Long-term Improvements Cost		\$1,650,000*



PROBLEM: Safety / Roadway Alignment and Traffic Congestion were documented concerns.

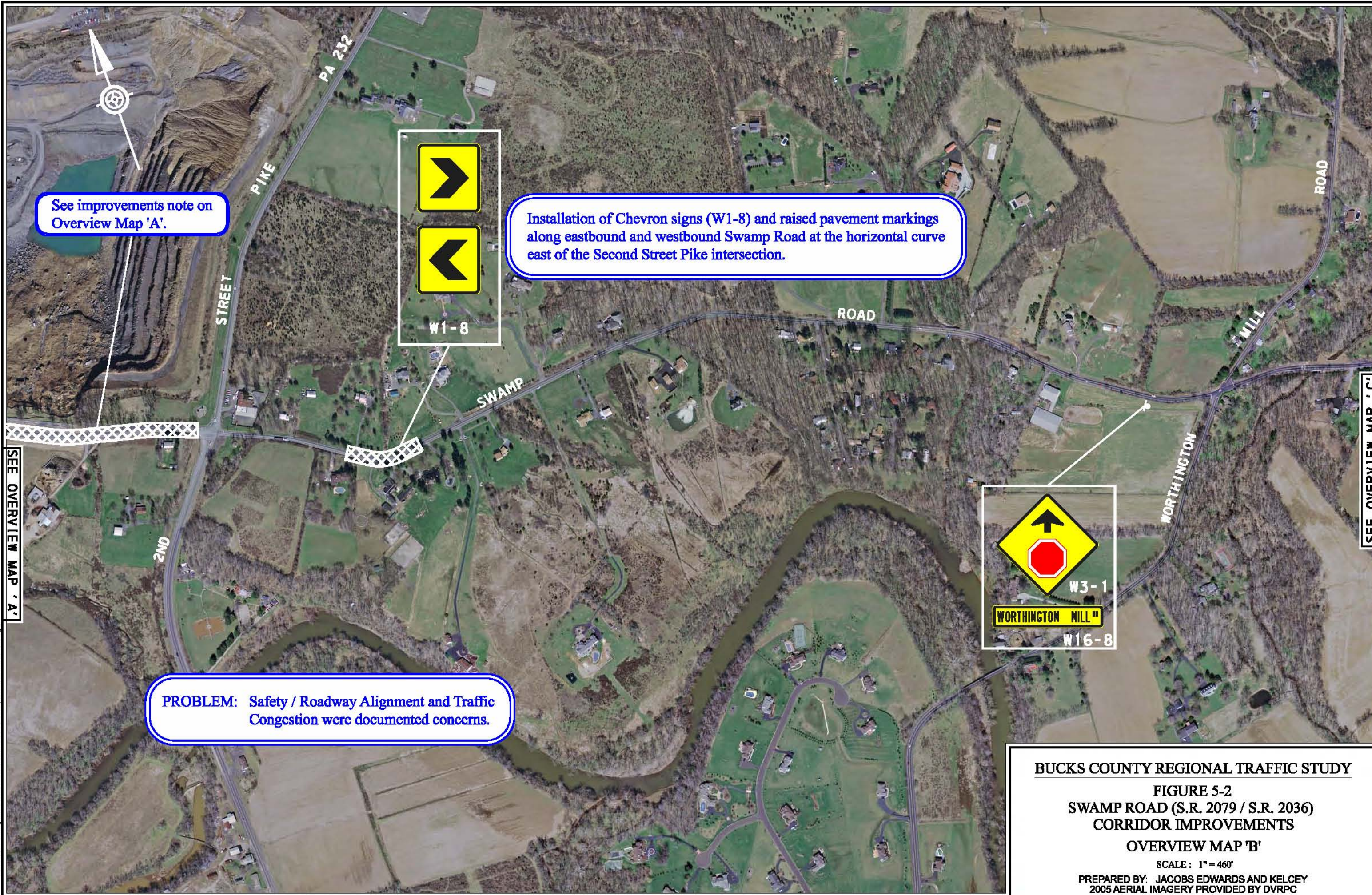
Install Chevron signs (W1-8), Large Arrow sign (W1-6), and Slippery When Wet sign (W8-5) as appropriate along horizontal and vertical curves in both directions along Swamp Road in the area near the quarries between Penns Park Road and Second Street Pike.



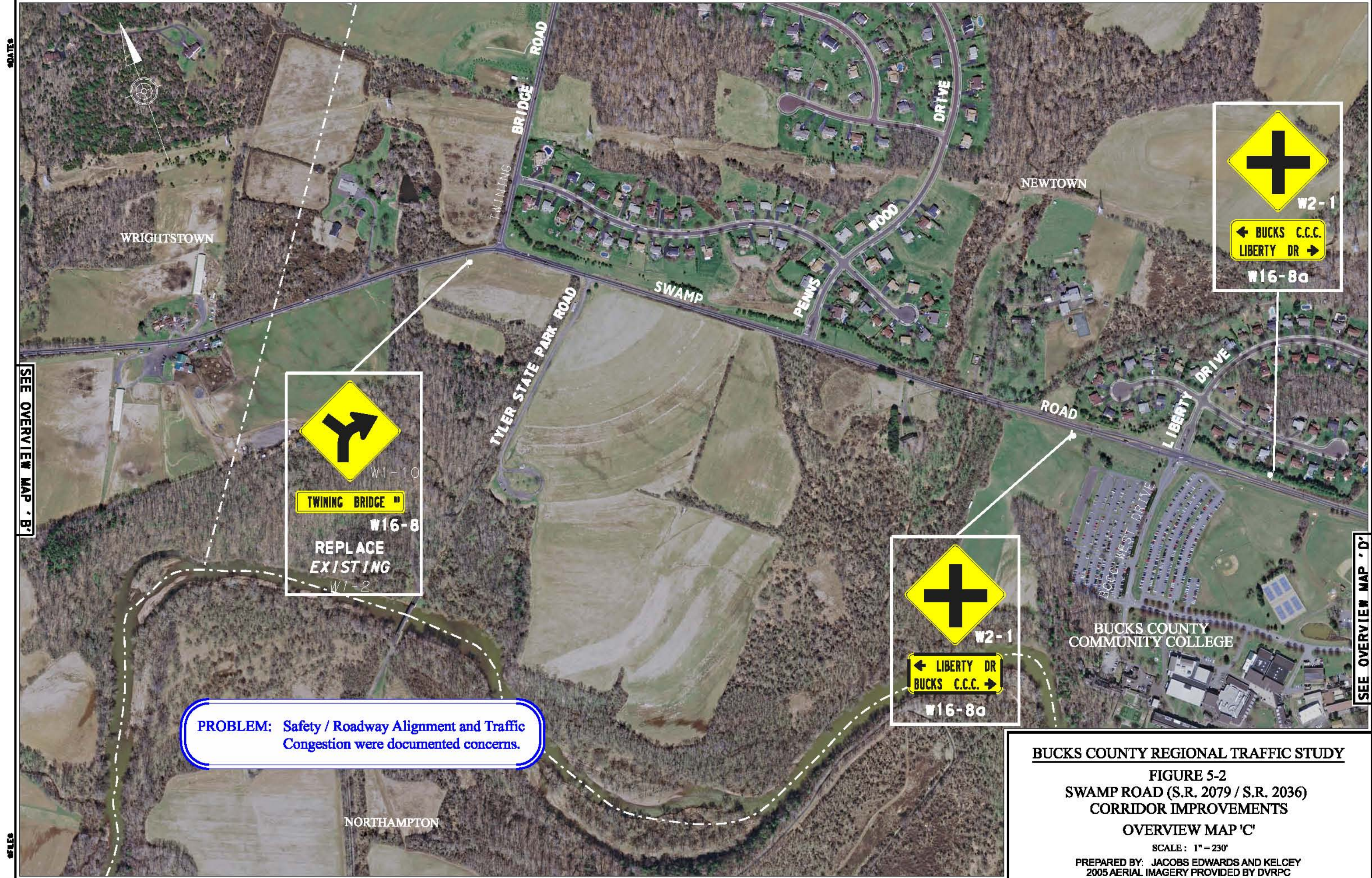
Installation of raised pavement markings, railroad crossing pavement marking, and "SLOW" pavement marking for eastbound Swamp Road approach to the New Hope-Ivyland Railroad at-grade crossing.

BUCKS COUNTY REGIONAL TRAFFIC STUDY
FIGURE 5-2
SWAMP ROAD (S.R. 2079 / S.R. 2036)
CORRIDOR IMPROVEMENTS
OVERVIEW MAP 'A'
SCALE: 1" = 460'
PREPARED BY: JACOBS EDWARDS AND KELCEY
2005 AERIAL IMAGERY PROVIDED BY DVRPC

SEE OVERVIEW MAP 'B'



BUCKS COUNTY REGIONAL TRAFFIC STUDY
FIGURE 5-2
SWAMP ROAD (S.R. 2079 / S.R. 2036)
CORRIDOR IMPROVEMENTS
OVERVIEW MAP 'B'
 SCALE: 1" = 460'
 PREPARED BY: JACOBS EDWARDS AND KELCEY
 2005 AERIAL IMAGERY PROVIDED BY DVRPC



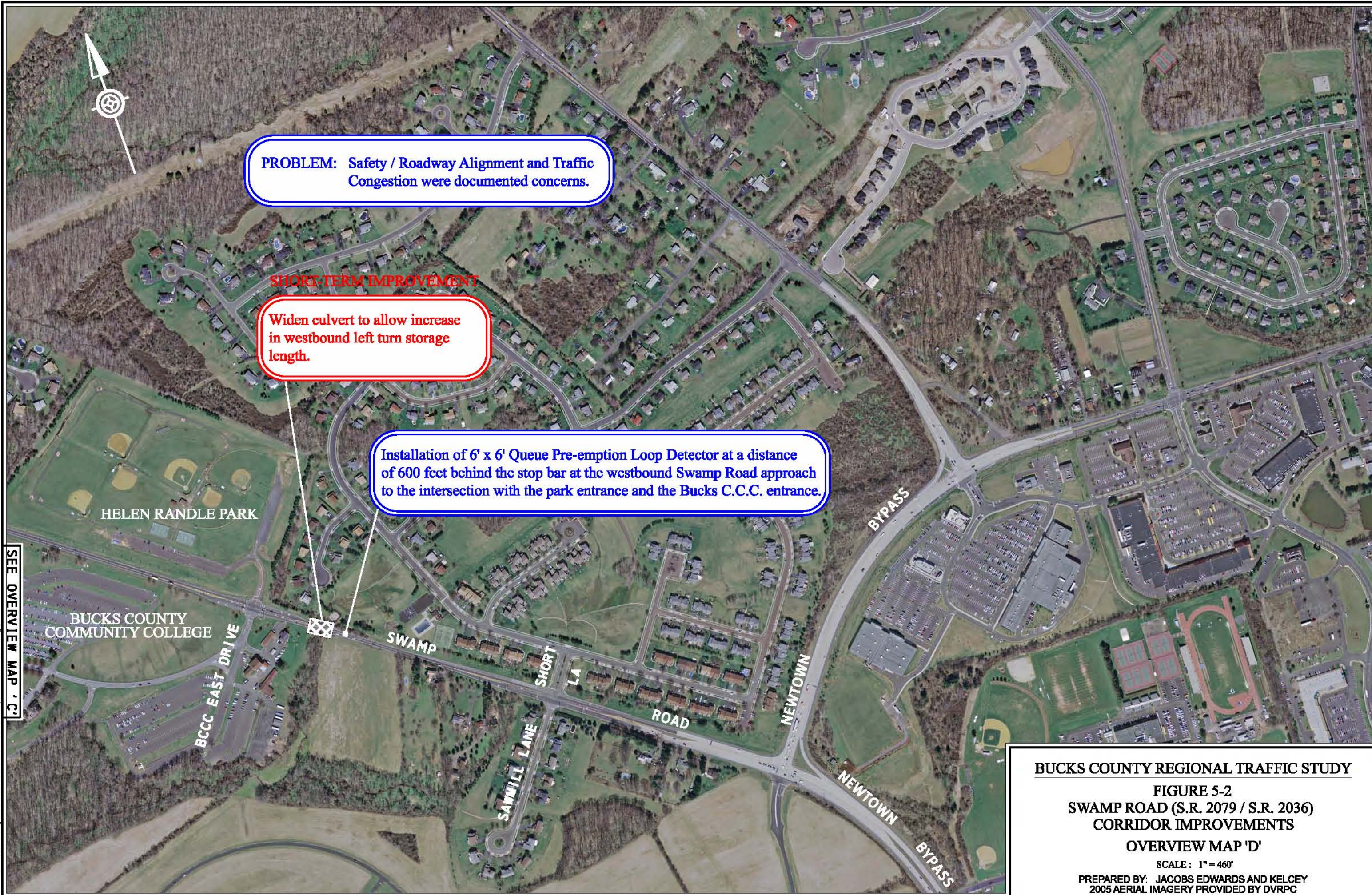
PROBLEM: Safety / Roadway Alignment and Traffic Congestion were documented concerns.

W1-10
TWINING BRIDGE "
 W16-8
REPLACE EXISTING
 W1-2

W2-1
 ← LIBERTY DR
 BUCKS C.C.C. →
 W16-8a

W2-1
 ← BUCKS C.C.C.
 LIBERTY DR →
 W16-8a

BUCKS COUNTY REGIONAL TRAFFIC STUDY
FIGURE 5-2
SWAMP ROAD (S.R. 2079 / S.R. 2036)
CORRIDOR IMPROVEMENTS
OVERVIEW MAP 'C'
 SCALE: 1" = 230'
 PREPARED BY: JACOBS EDWARDS AND KELCEY
 2005 AERIAL IMAGERY PROVIDED BY DVRPC



PROBLEM: Safety / Roadway Alignment and Traffic Congestion were documented concerns.

SHORT-TERM IMPROVEMENT
Widen culvert to allow increase in westbound left turn storage length.

Installation of 6' x 6' Queue Pre-emption Loop Detector at a distance of 600 feet behind the stop bar at the westbound Swamp Road approach to the intersection with the park entrance and the Bucks C.C.C. entrance.

BUCKS COUNTY REGIONAL TRAFFIC STUDY
FIGURE 5-2
SWAMP ROAD (S.R. 2079 / S.R. 2036)
CORRIDOR IMPROVEMENTS
OVERVIEW MAP 'D'
SCALE: 1" = 460'
PREPARED BY: JACOBS EDWARDS AND KELCEY
2005 AERIAL IMAGERY PROVIDED BY DVRPC

3. Lindenhurst Road

Project Location

The study corridor begins at the Newtown Bypass in Newtown Township, continues through Lower Makefield Township, and terminates at Washington Crossing Road in Upper Makefield Township, as shown in Figure 5-1. The study corridor is approximately 2.3 miles long and includes five (5) signalized intersections. The cross-section is that of a two-lane, undivided Urban Collector. The corridor is designated as S.R. 2069.

The Lindenhurst Road corridor serves as a collector between the Newtown Bypass and Washington Crossing Road. Although classified as a collector, the Lindenhurst Road Corridor, in conjunction with the Stoopville Road Corridor, has historically served as an alternate route to the Newtown Bypass for traffic traveling northwest of Newtown Borough.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

The Lindenhurst Road Corridor has several on-going transportation studies and engineering efforts on and adjacent to the corridor that are in different phases. A summary of the known engineering studies and design projects follows:

- *Newtown Bypass Traffic Signal Enhancement Initiative* - in Lower Makefield and Newtown townships is currently in the implementation phase by the involved municipalities and PennDOT, and includes traffic signal retiming, improved coordination, and phasing adjustments for 11 signalized intersections along the Newtown Bypass. The TSEI goal is to reduce corridor travel time and delay through low-cost immediate improvements. Signal timing modifications were initially implemented in summer 2007.
- *Lindenhurst Road Traffic Calming Improvements* – in Lower Makefield Township is currently in the construction phase by the Township and includes various traffic safety measures including raised median islands, textured crosswalks, striping, signing, and turn lanes.



*Residential subdivision along Lindenhurst Road in Lower Makefield Township
Photo by: Jacobs Edwards and Kelcey*

Existing Conditions

The study corridor generally runs in a north-south direction with little to no sharp curves or steep grades. Lindenhurst Road generally provides two lanes of traffic with a minimum of a 20-foot wide bituminous cartway with no shoulders to a 24-foot wide bituminous cartway with paved shoulders of varying width and areas of concrete barrier curb. There is a posted speed limit of 40 MPH the entire length of Lindenhurst Road.

The primary land use along Lindenhurst Road is single-family residential (approximately 50%). Additional land uses include agriculture (approximately 22%) and vacant areas (approximately 20%).

The 2.3-mile long corridor presently contains five (5) signalized intersections.

- Newtown Bypass & Lindenhurst Road
- Quarry Road & Lindenhurst Road
- Twining Road & Lindenhurst Road
- Woodside Road & Lindenhurst Road
- Washington Crossing Road & Lindenhurst Road

Traffic Data

Automated Traffic Recorder (ATR) counts were conducted by DVRPC at one (1) location to determine the existing traffic volumes and vehicle classifications on Lindenhurst Road. The ATR count was conducted between Twining Road and Heather Ridge along Lindenhurst Road on Tuesday, June 7, 2005. For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicles classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)*Between Twining Road and Heather Ridge*

Northbound: Lindenhurst Road – 586 vehicles, 2.9% trucks (5:00 – 6:00 P.M.)

Southbound: Lindenhurst Road – 497 vehicles, 5.2% trucks (8:00 – 9:00 A.M.)

Combined: Lindenhurst Road – 968 vehicles, 2.9% trucks (5:00 – 6:00 P.M.)

Average Daily Traffic (ADT) Volumes*Between Twining Road and Heather Ridge*

Northbound: Lindenhurst Road – 5,103 vehicles, 6.8% trucks, 34 bikes

Southbound: Lindenhurst Road – 5,003 vehicles, 6.8% trucks, 21 bikes

Combined: Lindenhurst Road – 10,106 vehicles, 6.8% trucks, 55 bikes

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory capacity analysis to evaluate any operational and/or congestion concerns. A cursory volume to capacity analysis was also performed on Lindenhurst Road to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Crash Summary

Reportable crash data along the Lindenhurst Road Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 41 crashes occurred within the corridor limits. There were a total of 75 vehicles involved in the 41 crashes on Lindenhurst Road in the five year period. Of the 75 vehicles, four (4) large trucks were involved in three (3) separate crashes, constituting less than three (3) percent of the total vehicles involved in large crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 11 (27%)
- 2002 – 5 (12%)
- 2003 – 8 (20%)
- 2004 – 10 (24%)
- 2005 – 7 (17%)

There were no fatalities involved in the reportable crash data. The majority of the crashes (51%) were Property Damage Only (PDO). Rear end crashes were the most common type of crash accounting for 40 percent, followed by angle crashes (29%) and hit fixed object crashes (27%).

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions. A cursory analysis was also performed on Lindenhurst Road to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks, roadway alignment, and traffic congestion at the Newtown Bypass.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is short term, occurring in one to three years; and the next is long term, occurring in three years or more

A sketch of the proposed Lindenhurst Road Traffic Calming Improvements (by others under a separate project) is included in Appendix D.

Table 5-3a: Lindenhurst Road Immediate Improvements

Traffic Signal Improvements		
ID	Description	Cost
TS-3-IM1	Move forward with the Newtown Bypass Traffic Signal Enhancement Initiative Improvements (<i>Newtown and Lower Makefield Townships</i>)	\$27,000
Total Traffic Signal Improvements Cost		\$27,000
Geometric Improvements		
ID	Description	Cost
GI-3-IM1	Move forward with Lindenhurst Road Traffic Calming Improvements. (<i>Lower Makefield Township</i>)	\$395,000
Total Geometric Improvements Cost		\$395,000
Total Immediate Improvements Cost		\$422,000

Table 5-3b: Lindenhurst Road Proposed Short-term Improvements

Highway Maintenance Improvements		
ID	Description	Cost
HM-3-ST1	Repair inlet at Twining Road. (<i>Lower Makefield Township</i>) (Type C Inlet @ \$2,500)	\$2,500
HM-3-ST2	Install guiderail delineation (reflectors) throughout Lindenhurst Road as new guiderail is added or reconstructed. (<i>Lower Makefield & Newtown Townships</i>) (11 delineators for existing guiderail @ \$20/delineator)	\$220
Total Highway Maintenance Improvements Cost		\$2,720
Geometric Improvements		
ID	Description	Cost
GI-3-ST1	Construct two-foot shoulders where there are currently no shoulders. (<i>Newtown Township</i>) (2,550 SY @ \$85/SY)	\$216,750
Total Geometric Improvements Cost		\$216,750
Total Short-term Improvements Cost		\$219,470

Table 5-3c: Lindenhurst Road Proposed Long-term Improvements

Geometric Improvements		
ID	Description	Cost
GI-3-LT1	Straighten curve along the southern section of Lindenhurst Road. (<i>Newtown Township</i>)	\$1,250,000
Total Geometric Improvements Cost		\$1,250,000
Total Long-term Improvements Cost		\$1,250,000

4. Stoopville Road

Project Location

The study corridor begins in the west at Durham Road in Wrightstown Township, continues through Newtown and Lower Makefield Townships, and terminates at Washington Crossing Road in Upper Makefield Township, as shown in Figure 5-1. The study corridor is approximately 3.4 miles long and includes four (4) unsignalized intersections of consequence. The cross-section is that of two-lane, undivided Urban Collector. The corridor is designated as S.R. 2028.

The Stoopville Road Corridor serves as a collector between Durham Road and Washington Crossing Road. Although classified as a collector, the Stoopville Road Corridor, in conjunction with the Lindenhurst Road Corridor, has historically served as an alternate route to the Newtown Bypass for traffic traveling northwest of Newtown Borough.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

The Stoopville Road Corridor has one (1) known on-going transportation study and engineering effort on the corridor. A summary of the known engineering study and design project follows:

- *Stoopville Road Traffic Calming Plan* – in Newtown Township is currently in the engineering phase by the Township and includes various traffic calming measures including gateways, roundabouts, landscaped medians, decorative crosswalks, chicanes, and a multi-use trail.



*Agriculture land use along Stoopville Road
Photo by: Jacobs Edwards and Kelcey*

Existing Conditions

The study corridor generally runs in an east-west direction and characterized by a varying degree of horizontal curvature. Stoopville Road generally provides two lanes of traffic with a minimum of a 20-foot wide paved bituminous cartway with little to no shoulder. Some widening has occurred with left-turn lanes and shoulders in areas of recent development. There is a posted speed limit of 40 MPH on Stoopville Road between Durham Road and the mid-block between Rosefield Drive and Eagleton Farms Road / Hemlock Drive. From the mid-block to Washington Crossing Road, the speed limit is 45 MPH. There are also multiple curves along Stoopville Road that have advisory speed signs at 25 MPH to 30 MPH.

The primary land use along Stoopville Road is agriculture (approximately 50%), as well as single-family residential (approximately 39%) and multi-family residential (approximately 6%). Some of the farms have been preserved through the Bucks County agricultural preservation program.

The 3.4-mile long corridor presently contains four (4) intersections of consequence; all four (4) are unsignalized.

- Durham Road & Stoopville Road (unsignalized)
- Eagle Road & Stoopville Road (unsignalized)
- Creamery Road / Linton Hill Road & Stoopville Road (unsignalized)
- Washington Crossing Road & Stoopville Road (unsignalized)

Traffic Data

Automated Traffic Recorder (ATR) counts were conducted by DVRPC at one (1) location to determine the existing traffic volumes and vehicle classifications on Stoopville Road. The ATR count was conducted between Milestone Drive and Linton Hill Road / Creamery Road along Stoopville Road on Tuesday, June 7, 2005. For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicles classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)*Between Milestone Drive and Linton Hill Road / Creamery Road*

Eastbound: Stoopville Road – 564 vehicles, 7.0% trucks (7:00 – 8:00 A.M.)

Westbound: Stoopville Road – 535 vehicles, 4.1% trucks (5:00 – 6:00 P.M.)

Combined: Stoopville Road – 735 vehicles, 4.6% trucks (5:00 – 6:00 P.M.)

Average Daily Traffic (ADT) Volumes*Between Milestone Drive and Linton Hill Road / Creamery Road*

Eastbound: Stoopville Road – 3,954 vehicles, 11.6% trucks, 11 bikes

Westbound: Stoopville Road – 4,148 vehicles, 11.0% trucks, 26 bikes

Combined: Stoopville Road – 8,102 vehicles, 11.3% trucks, 37 bikes

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory capacity analysis to evaluate any operational and/or congestion concerns. A cursory volume to capacity analysis was also performed on Stoopville Road to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Crash Summary

Reportable crash data along the Stoopville Road Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 34 crashes occurred within the corridor limits. There were a total of 60 vehicles involved in the 34 crashes on Stoopville Road in the five year period. Of the 60 vehicles, one (1) large truck was involved in one (1) separate crash, constituting less than two (2) percent of the total vehicles involved in large crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 9 (26%)
- 2002 – 7 (21%)
- 2003 – 8 (23%)
- 2004 – 6 (18%)
- 2005 – 4 (12%)

There was one (1) fatality involved in the reportable crash data. The fatality occurred at the intersection of Rosefield Drive resulting from an angle crash. The majority of the crashes were minor injuries (38%) and Property Damage Only (38%). Hit fixed object and angle crashes were the most common type of crash each accounting for 32 percent.

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions. A cursory analysis was also performed on Stoopville Road to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks; roadway alignment at Stoopville Road and Durham Road, Stoopville Road and Linton Hill Road / Creamery Road, and Stoopville Road and Washington Crossing Road; and traffic volumes.

Traffic speeds were observed to be above the posted speed limit on Stoopville Road through a radar speed study near Eagle Road, but there is insufficient crash data (including majority of crashes related to excessive speed and crash rate greater than recent high-crash rate table) to warrant a lower speed limit on Stoopville Road in accordance with Department Publication 212, especially from the mid-block between Rosefield Drive and Eagleton Farms Road / Hemlock Drive to Washington Crossing Road for consistency of 40 MPH across the entire roadway.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is short term, occurring in one to three years; and the next is long term, occurring in three years or more.

An alternative for the Stoopville Road and Washington Crossing Road Intersection is included in Figure 5-3. A sketch of the proposed Stoopville Road Traffic Calming Plan (by others under a separate project) is included in Appendix D.

Table 5-4a: Stoopville Road Proposed Short-term Improvements

Highway Maintenance Improvements		
ID	Description	Cost
HM-4-ST1	Consider installing a stone base in areas along Stoopville Road that have a substantial drop-off immediately adjacent to the travel lanes, especially east of Linton Hill Road. <i>(Lower Makefield, Newtown and Upper Makefield Townships)</i> (335 CY @ \$60/CY)	\$20,100
HM-4-ST2	Install guiderail in the section of Stoopville Road west of Linton Hill Road in accordance with Department Publication 13M (DM-2) – Culvert Headwall within Clear Zone. <i>(Newtown and Upper Makefield Townships)</i> (300 LF Type 2-S Guiderail @ \$25/LF)	\$7,500
HM-4-ST3	Install guiderail delineation (reflectors) throughout Stoopville Road as new guiderail is added or reconstructed. <i>(Lower Makefield, Newtown and Upper Makefield Townships)</i> (15 delineators for existing guiderail @ \$20/delineator)	\$300
Total Highway Maintenance Improvements Cost		\$27,900
Geometric Improvements		
ID	Description	Cost
GI-4-ST1	Move forward with traffic calming improvements on Stoopville Road. Improvements should be in accordance with PennDOT design criteria and reflect the level of traffic calming on Lindenhurst Road. Consider raised medians and converging chevrons or transverse pavement markings. <i>(Newtown and Upper Makefield Townships)</i>	\$395,000 (based on cost of Lindenhurst Traffic Calming Plan)
Total Geometric Improvements Cost		\$395,000
Total Short-term Improvements Cost		\$422,900

Table 5-4b: Stoopville Road Proposed Long-term Improvements

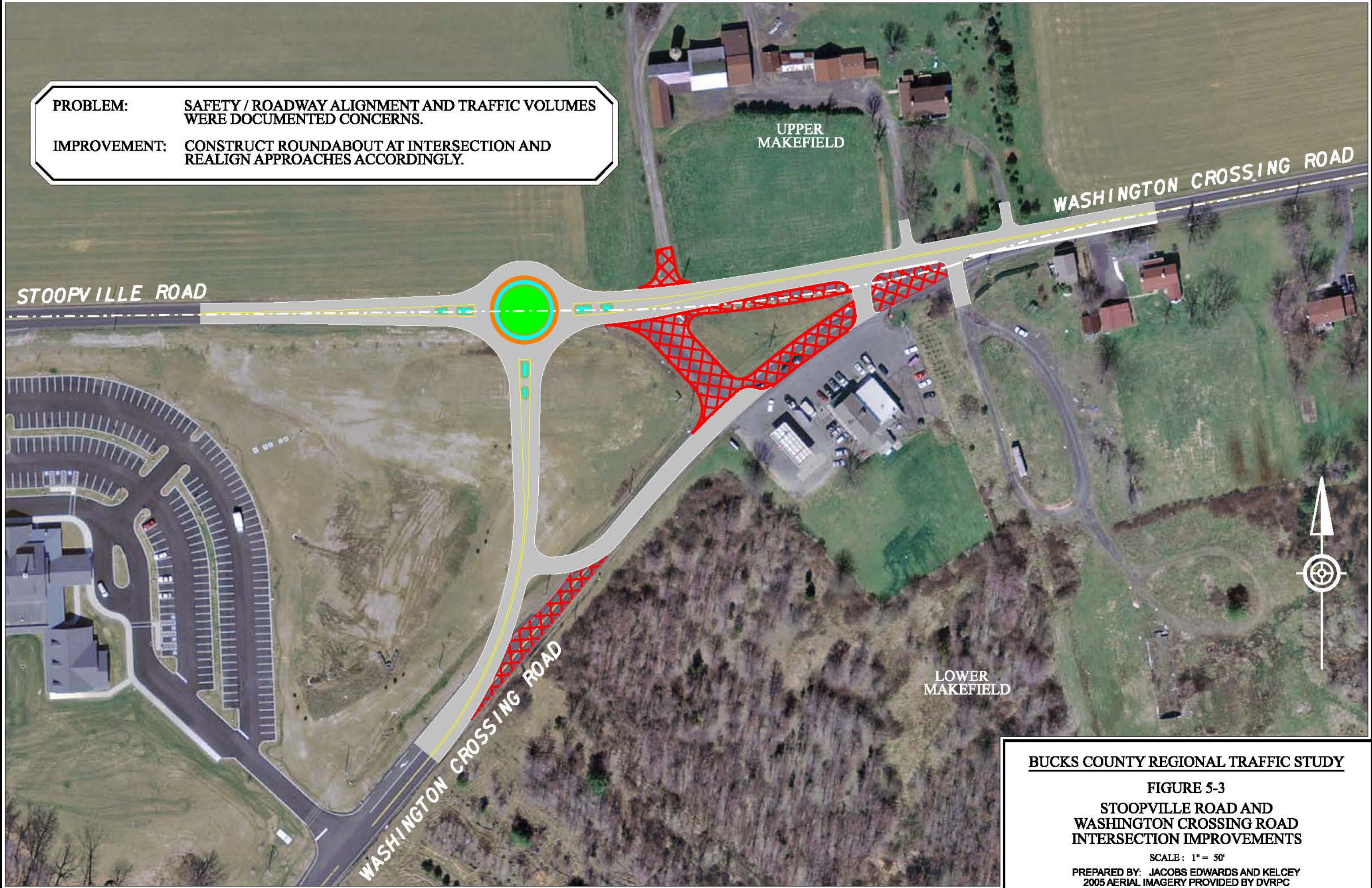
Geometric Improvements		
ID	Description	Cost
GI-3-LT1	Consider a roundabout at the intersection of Washington Crossing Road and Stoopville Road as future development warrants improvements (See Figure 5-3). <i>(Lower Makefield, Newtown and Upper Makefield Townships)</i>	\$1,000,000
Total Geometric Improvements Cost		\$1,000,000
Total Long-term Improvements Cost		\$1,000,000

00425

05125

PROBLEM: SAFETY / ROADWAY ALIGNMENT AND TRAFFIC VOLUMES WERE DOCUMENTED CONCERNS.

IMPROVEMENT: CONSTRUCT ROUNDABOUT AT INTERSECTION AND REALIGN APPROACHES ACCORDINGLY.



BUCKS COUNTY REGIONAL TRAFFIC STUDY

FIGURE 5-3

STOOPVILLE ROAD AND WASHINGTON CROSSING ROAD INTERSECTION IMPROVEMENTS

SCALE: 1" = 50'

PREPARED BY: JACOBS EDWARDS AND KELCEY
2005 AERIAL IMAGERY PROVIDED BY DVRPC

5. Durham Road

Project Location

The study corridor begins at the Newtown Bypass in Newtown Township and terminates at Township Line Road in Wrightstown Township, as shown in Figure 5-1. The study corridor is approximately 5.1 miles long and includes five (5) signalized intersections and five (5) unsignalized intersections of consequence. The cross-section is that of a two-lane, undivided Urban Principal Arterial. The corridor is designated as S.R. 0413.

The Durham Road Corridor is a link in the PA 413 Corridor that spans from the Burlington Bristol Bridge in southern Bucks County to PA 611 in Pipersville in northern Bucks County. The PA 413 Corridor is one of the primary north-south routes through Bucks County. The study corridor serves as a primary link from the Newtown area to US 202 for the Doylestown and New Hope-Lambertville areas.



*Durham Road (looking southbound) at the intersection of Second Street Pike
Photo by: Jacobs Edwards and Kelcey*

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

The Durham Road Corridor has several on-going transportation studies and engineering efforts on and adjacent to the corridor that are in different phases. A summary of the known engineering studies and design projects follows:

- *Durham Road and Wrightstown/Worthington Mill Road Intersection Improvements* - in Wrightstown Township is currently in the engineering phase by the Township and includes widening of Durham Road for left turn lanes and new signalization.
- *PA 413 Access Management Plan* – in Newtown and Wrightstown Townships is currently in the planning stage by DVRPC. The case study spans Durham Road between the Newtown Bypass and Second Street Pike to illustrate tangible ways of introducing access management measures (e.g. sharing or restricting access, proper driveway placement and design, uniform signalized intersection spacing, etc.) within the corridor. The work is being performed with the participation of member governments, regional transportation providers, and PennDOT.



*Anchor Crossing Shopping Center along Durham Road
Photo by: Jacobs Edwards and Kelcey*

Existing Conditions

The study corridor generally runs in a north-south direction. There are no sharp horizontal curves, although several steep grades exist toward the southern limits of the corridor. The roadway provides two 12-foot lanes of bituminous cartway with 4-foot paved shoulders. There is a posted speed limit of 45 MPH from the Newtown Bypass to just south of Township Line Road where the speed limit changes to 35 MPH to Township Line Road.

The primary land use along Durham Road is single-family residential (approximately 36%) and multi-family residential (approximately 2%), as well as agriculture (approximately 34%). Other land uses include wooded areas (approximately 9%), commercial (approximately 8%) and vacant areas (7%). Notable land uses in Newtown Township include the Newtown Municipal Complex and Emergency Services building, Rose Bank Winery and Clark Nature Center. The majority of residential development along this stretch is single-family, however there is one multi-family development located off of North Drive. At the intersection of Second Street Pike and PA 413 in Wrightstown Township, there are shops, medical offices and a post office located within the Anchor Crossing shopping center. Stand alone commercial buildings as well as single-family residences and agricultural land can be found along the remainder of Durham Road.

The 5.1-mile long corridor presently contains 10 intersections of consequence; 5 are signalized and 5 are unsignalized.

- Newtown Bypass & Durham Road
- Wrights Road & Durham Road
- South Drive & Durham Road (unsignalized)
- North Drive & Durham Road
- Twining Bridge Road & Durham Road (unsignalized)
- Stoopville Road & Durham Road (unsignalized)
- Worthington Mill Road / Wrightstown Road & Durham Road (unsignalized)
- Penns Park Road & Durham Road (unsignalized)
- Second Street Pike & Durham Road
- Township Line & Durham Road

Traffic Data

Automatic Traffic Recorder (ATR) counts were conducted by DVRPC at four (4) locations to determine the existing traffic volumes and vehicle classification on Durham Road as follows:

- between the Newtown Bypass and Stoopville Road on Tuesday, June 7, 2005;
- between Stoopville Road and Worthington Mill Road / Wrightstown Road on Tuesday, May 3, 2005;
- between Worthington Mill Road / Wrightstown Road and Second Street Pike on Tuesday, May 3, 2005; and
- between Second Street Pike and Township Line Road on Tuesday, May 17, 2005.

For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)

Between Newtown Bypass and Stoopville Road

Northbound: Durham Road – 629 vehicles, 2.9% trucks (4:00 – 5:00 P.M.)

Southbound: Durham Road – 634 vehicles, 5.4% trucks (7:00 – 8:00 A.M.)

Combined: Durham Road – 1,228 vehicles, 2.0% trucks (5:00 – 6:00 P.M.)

Between Stoopville Road and Worthington Mill Road / Wrightstown Road

Northbound: Durham Road – 946 vehicles, 2.2% trucks (5:00 – 6:00 P.M.)

Southbound: Durham Road – 859 vehicles, 5.8% trucks (7:00 – 8:00 A.M.)

Combined: Durham Road – 1,750 vehicles, 2.0% trucks (5:00 – 6:00 P.M.)

Between Worthington Mill Road / Wrightstown Road and Second Street Pike

Northbound: Durham Road – 676 vehicles, 2.7% trucks (5:00 – 6:00 P.M.)

Southbound: Durham Road – 720 vehicles, 6.4% trucks (7:00 – 8:00 A.M.)

Combined: Durham Road – 1,301 vehicles, 2.5% trucks (5:00 – 6:00 P.M.)

Between Second Street Pike and Township Line Road

Northbound: Durham Road – 598 vehicles, 5.4% trucks (5:00 – 6:00 P.M.)

Southbound: Durham Road – 593 vehicles, 12.3% trucks (7:00 – 8:00 A.M.)

Combined: Durham Road – 1,198 vehicles, 4.5% trucks (5:00 – 6:00 P.M.)

Average Daily Traffic (ADT) Volumes

Between Newtown Bypass and Stoopville Road

Northbound: Durham Road – 7,261 vehicles, 4.6% trucks, 27 motorcycles, 58 buses

Southbound: Durham Road – 7,681 vehicles, 4.6% trucks, 30 motorcycles, 58 buses

Combined: Durham Road – 14,942 vehicles, 4.6% trucks, 57 motorcycles, 116 buses

Between Stoopville Road and Worthington Mill Road / Wrightstown Road

Northbound: Durham Road – 9,687 vehicles, 5.4% trucks, 12 motorcycles, 54 buses

Southbound: Durham Road – 9,598 vehicles, 5.7% trucks, 11 motorcycles, 51 buses

Combined: Durham Road – 19,285 vehicles, 5.5% trucks, 23 motorcycles, 105 buses

Between Worthington Mill Road / Wrightstown Road and Second Street Pike

Northbound: Durham Road – 7,046 vehicles, 6.8% trucks, 14 motorcycles, 46 buses

Southbound: Durham Road – 7,404 vehicles, 6.5% trucks, 14 motorcycles, 55 buses

Combined: Durham Road – 14,450 vehicles, 6.6% trucks, 28 motorcycles, 101 buses

Between Second Street Pike and Township Line Road

Northbound: Durham Road – 7,646 vehicles, 8.7% trucks, 26 motorcycles, 38 buses

Southbound: Durham Road – 7,555 vehicles, 8.6% trucks, 22 motorcycles, 37 buses

Combined: Durham Road – 15,201 vehicles, 8.6% trucks, 48 motorcycles, 75 buses

Vehicle turning movement counts were reviewed for the 10 intersection locations within the Durham Road Corridor. The counts were obtained from multiple sources including the *PA 413 Access Management Plan*.

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory capacity analysis to evaluate any operational and/or congestion concerns. A cursory volume to capacity analysis was also performed on Durham Road to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Crash Summary

Reportable crash data along the Durham Road Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 192 crashes occurred within the corridor limits. There were a total of 357 vehicles involved in the 192 crashes on Durham Road in the five year period. Of the 357 vehicles, eight (8) large trucks were involved in eight (8) separate crashes, constituting less than three (3) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 41 (21%)
- 2002 – 49 (26%)
- 2003 – 31 (16%)
- 2004 – 36 (19%)
- 2005 – 35 (18%)

There were two (2) fatal crashes in the reportable crash data. One (1) fatal crash, killing two (2) people, occurred in the midblock between Worthington Mill Road / Wrightstown Road and Penns Park Road resulting from a hit fixed object crash. The other fatal crash occurred in the midblock between Fox Hill Drive and Pine Lane resulting from a head on collision. The majority of crashes (42%) were Property Damage Only (PDO). The leading crash types along Durham Road were rear end crashes (37%), angle crashes (26%) and hit fixed object crashes (23%).

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions. A cursory analysis was also performed on Durham Road to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks, traffic volumes from the Newtown Bypass to Stoopville Road, and traffic congestion from Penns Park Road to Township Line Road.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is immediate, occurring one year or less; the second is short term, occurring in one to three years; and the third is long term, occurring in three years or more.

An improvement alternative developed for the Durham Road and Second Street Pike Intersection is included in Figure 5-4. A sketch of the proposed Durham Road and Wrightstown / Worthington Mill Road Intersection Improvements (by others under a separate project) is included in Appendix D.

Table 5-5a: Durham Road Proposed Immediate Improvements

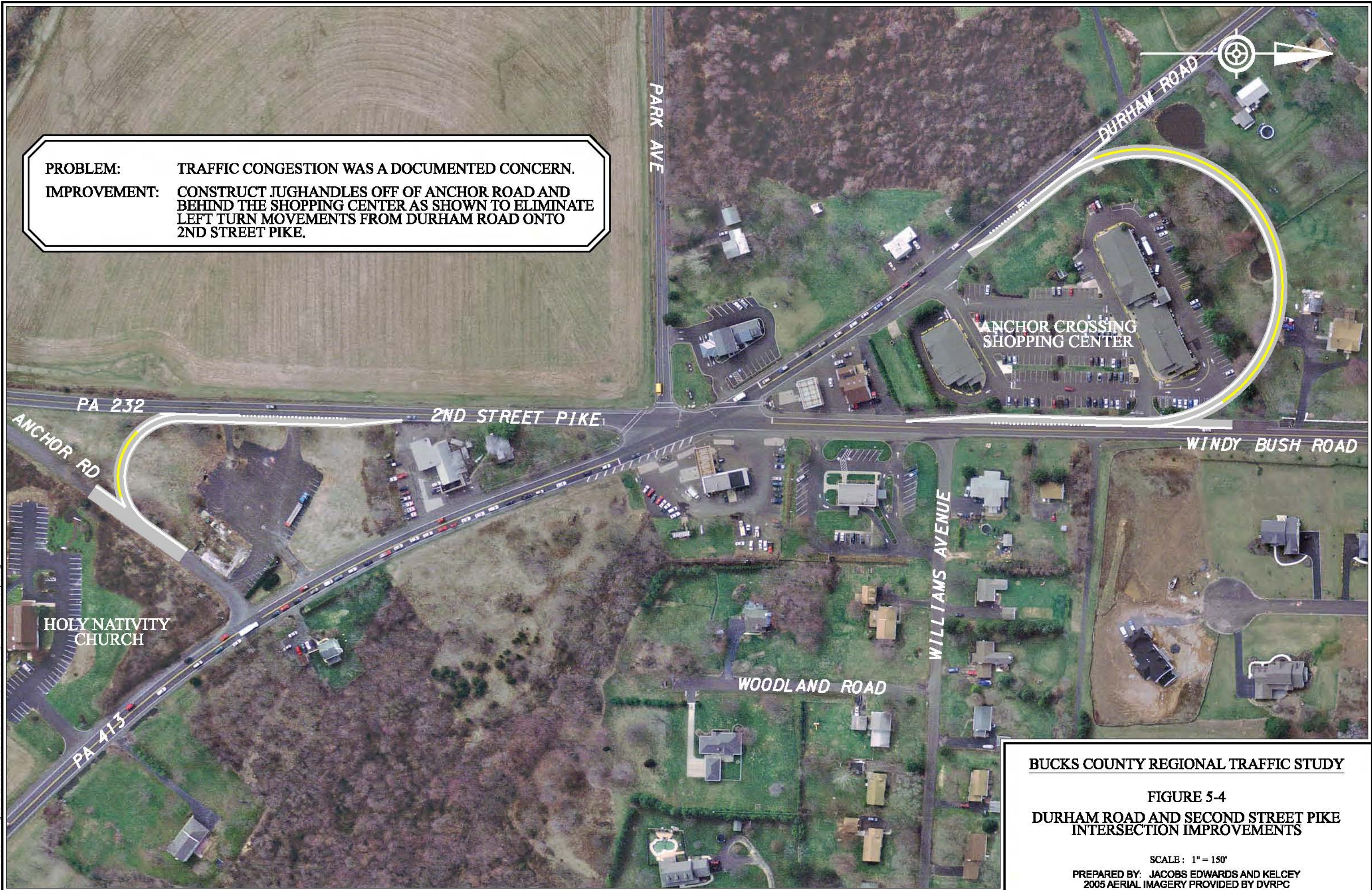
Traffic Signal Improvements		
ID	Description	Cost
TS-5-IM1	Re-time the traffic signal at the intersection of Durham Road, Second Street Pike, and Park Avenue. (<i>Wrightstown Township</i>)	\$3,000
Total Traffic Signal Improvements Cost		\$3,000
Total Immediate Improvements Cost		\$3,000

Table 5-5b: Durham Road Proposed Short-term Improvements

Geometric Improvements		
ID	Description	Cost
GI-5-ST1	Move forward with Durham Road and Wrightstown / Worthington Mill Road Intersection Improvement Project. (<i>Wrightstown Township</i>)	\$1,000,000
Total Geometric Improvements Cost		\$1,000,000
Total Short-term Improvements Cost		\$1,000,000

Table 5-5c: Durham Road Proposed Long-term Improvements

Geometric Improvements		
ID	Description	Cost
GI-5-LT1	Improve intersection of Durham Road, Second Street Pike, and Park Avenue (See Figure 5-4). (<i>Wrightstown Township</i>)	\$1,000,000
Total Geometric Improvements Cost		\$1,000,000
Total Long-term Improvements Cost		\$1,000,000



PROBLEM: TRAFFIC CONGESTION WAS A DOCUMENTED CONCERN.
IMPROVEMENT: CONSTRUCT JUGHANDLES OFF OF ANCHOR ROAD AND BEHIND THE SHOPPING CENTER AS SHOWN TO ELIMINATE LEFT TURN MOVEMENTS FROM DURHAM ROAD ONTO 2ND STREET PIKE.

BUCKS COUNTY REGIONAL TRAFFIC STUDY

FIGURE 5-4

DURHAM ROAD AND SECOND STREET PIKE INTERSECTION IMPROVEMENTS

SCALE: 1" = 150'

PREPARED BY: JACOBS EDWARDS AND KELCEY
 2005 AERIAL IMAGERY PROVIDED BY DVRPC

6. Newtown Bypass

Project Location

The study corridor begins at Swamp Road in Newtown Township and terminates at Interstate 95 in Lower Makefield Township, as shown in Figure 5-1. The study corridor is approximately 4.8 miles long and includes eleven (11) signalized intersections. The cross-section is that of a divided, four-lane Urban Principal Arterial. The corridor is designated as S.R. 0332.

The Newtown Bypass serves as a major access to I-95 for the Newtown area. The bypass runs just south of Newtown Borough and connects I-95 to some of the major arterials in Bucks County including PA 413, PA 532, PA 332, and Swamp Road.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

The Newtown Bypass Corridor has several on-going transportation studies and engineering efforts on and adjacent to the corridor that are in different phases. A summary of the known engineering studies and design projects follows:

- *Newtown Bypass Traffic Signal Enhancement Initiative* - in Lower Makefield and Newtown townships is currently in the implementation phase by the involved municipalities and PennDOT, and includes traffic signal retiming, improved coordination, and phasing adjustments for 11 signalized intersections along the Newtown Bypass. The TSEI goal is to reduce corridor travel time and delay through low-cost immediate improvements. Signal timing modifications were initially implemented in summer 2007.
- *Swamp Road Corridor Improvement Project* - in Newtown and Wrightstown Townships is currently in the environmental clearance and preliminary engineering phase by PennDOT. Public outreach and community involvement activities are accompanying the project's development which may include: minor roadway widening, horizontal and vertical curve realignment, shoulder rehabilitation, associated drainage improvements, widening / replacement of some bridges and culverts along the corridor, and new signalization. The construction cost estimate for a full reconstruction project is approximately \$14 million and is scheduled for construction after Fiscal Year 2009.
- *I-95 Interchange at PA 332* - in Lower Makefield Township includes a new ramp from PA 332 eastbound to I-95 northbound and relocating the existing I-95 northbound off-ramp to PA 332.

Existing Conditions

The study corridor generally runs in an east-west direction. There are no steep grades or horizontal curves along the highway. The Newtown Bypass within the study limits provides two 12-foot lanes with 10-foot right and left shoulders in each direction separated by a guiderail or mountable curb concrete median. Left-turn lanes are provided at the signalized intersections. There is a posted speed limit of 55 MPH.

The Newtown Bypass within the study limits is a limited access highway with much of the development buffered from the roadway. The land use is distributed among transport and parking (approximately 17%), agriculture (approximately 14%), multi-family residential (approximately 14%), single-family residential (approximately 12%), wooded areas (approximately 13%), vacant areas (approximately 10%) and commercial (approximately 9%). The Summit Square Shopping Center located near the intersection of PA 413 features a Giant grocery store, Eckerd drug store, and several other neighborhood-serving commercial uses. Across the street is a multifamily residential development.



*Typical Section along the Newtown Bypass near Buck Road / Sycamore Street
Photo by: Jacobs Edwards and Kelcey*



*Silver Lake Executive Campus on the Newtown Bypass
Photo by: Jacobs Edwards and Kelcey*

Both La Salle University and Holy Family University are located along this stretch, as well as an office campus for Lockheed Martin. Several commercial and office developments are located along this stretch in addition to agricultural land located near I-95. In addition to Tyler State Park near the intersection of Swamp Road, there are a variety of land uses west of PA 413 including schools, single-family and multifamily residential, commercial, and wooded areas.

The 4.8-mile long corridor contains 11 signalized intersections.

- Swamp Road & Newtown Bypass
- Newtown-Richboro Road & Newtown Bypass
- Buck Road / S Sycamore Street & Newtown Bypass
- Newtown-Langhorne Road / S State Street & Newtown Bypass
- Summit Trace Road & Newtown Bypass
- Woodburne Road / Penns Trail & Newtown Bypass
- Newtown-Yardley Road / Lower Silver Lake Road & Newtown Bypass
- Lindenhurst Road & Newtown Bypass
- Stony Hill Road & Newtown Bypass
- I-95 Southbound Ramps & Newtown Bypass
- I-95 Northbound Ramps & Newtown Bypass



*Newtown Bypass at Lindenhurst Road
Photo by: Jacobs Edwards and Kelcey*

Traffic Data

Automatic Traffic Recorder (ATR) counts were conducted by DVRPC at five (5) locations to determine the existing traffic volumes and vehicle classifications on the Newtown Bypass as follows:

- between Swamp Road and Newtown-Richboro Road on Tuesday, May 10, 2005;
- between Newtown-Richboro Road and Buck Road / S Sycamore Street on Tuesday, May 10, 2005;
- between Buck Road / S Sycamore Street and Newtown-Langhorne Road / S State Street on Tuesday, May 10, 2005;
- between Newtown-Langhorne Road / S State Street and Lindenhurst Road on Tuesday, May 10, 2005; and
- between Lindenhurst Road and I-95 Ramps on Tuesday, May 3, 2005.

For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)

Between Swamp Road and Newtown-Richboro Road

Northbound: Newtown Bypass – 1,579 vehicles, 2.5% trucks (5:00 – 6:00 P.M.)

Southbound: Newtown Bypass – 1,109 vehicles, 2.5% trucks (4:00 – 5:00 P.M.)

Combined: Newtown Bypass – 2,673 vehicles, 2.1% trucks (5:00 – 6:00 P.M.)

Between Newtown-Richboro Road and Buck Road / S Sycamore Street

Eastbound: Newtown Bypass – 1,474 vehicles, 4.3% trucks (7:00 – 8:00 A.M.)

Westbound: Newtown Bypass – 1,566 vehicles, 2.2% trucks (5:00 – 6:00 P.M.)

Combined: Newtown Bypass – 2,887 vehicles, 2.0% trucks (5:00 – 6:00 P.M.)

Between Buck Road / S Sycamore Street and Newtown-Langhorne Road / S State Street

Eastbound: Newtown Bypass – 1,867 vehicles, 2.2% trucks (7:00 – 8:00 A.M.)

Westbound: Newtown Bypass – 1,913 vehicles, 1.0% trucks (5:00 – 6:00 P.M.)

Combined: Newtown Bypass – 3,207 vehicles, 2.1% trucks (5:00 – 6:00 P.M.)

Between Newtown-Langhorne Road / S State Street and Lindenhurst Road

Eastbound: Newtown Bypass – 1,754 vehicles, 5.2% trucks (7:00 – 8:00 A.M.)

Westbound: Newtown Bypass – 2,074 vehicles, 2.1% trucks (5:00 – 6:00 P.M.)

Combined: Newtown Bypass – 3,707 vehicles, 2.6% trucks (5:00 – 6:00 P.M.)

Between Lindenhurst Road and I-95 Ramps

Eastbound: Newtown Bypass – 1,552 vehicles, 4.6% trucks (7:00 – 8:00 A.M.)

Westbound: Newtown Bypass – 2,164 vehicles, 2.3% trucks (5:00 – 6:00 P.M.)

Combined: Newtown Bypass – 3,645 vehicles, 2.8% trucks (5:00 – 6:00 P.M.)

*Average Daily Traffic (ADT) Volumes**Between Swamp Road and Newtown-Richboro Road*

Northbound: Newtown Bypass – 18,576 vehicles, 5.1% trucks, 106 motorcycles, 393 buses

Southbound: Newtown Bypass – 13,985 vehicles, 3.5% trucks, 30 motorcycles, 71 buses

Combined: Newtown Bypass – 32,561 vehicles, 4.4% trucks, 136 motorcycles, 464 buses

Between Newtown-Richboro Road and Buck Road / S Sycamore Street

Eastbound: Newtown Bypass – 18,992 vehicles, 4.0% trucks, 47 motorcycles, 64 buses

Westbound: Newtown Bypass – 17,239 vehicles, 4.4% trucks, 51 motorcycles, 74 buses

Combined: Newtown Bypass – 36,231 vehicles, 4.2% trucks, 98 motorcycles, 138 buses

Between Buck Road / S Sycamore Street and Newtown-Langhorne Road / S State Street

Eastbound: Newtown Bypass – 19,718 vehicles, 3.7% trucks, 43 motorcycles, 67 buses

Westbound: Newtown Bypass – 18,439 vehicles, 3.8% trucks, 50 motorcycles, 64 buses

Combined: Newtown Bypass – 38,157 vehicles, 3.7% trucks, 93 motorcycles, 131 buses

Between Newtown-Langhorne Road / S State Street and Lindenhurst Road

Eastbound: Newtown Bypass – 21,204 vehicles, 5.9% trucks, 27 motorcycles, 90 buses

Westbound: Newtown Bypass – 20,655 vehicles, 5.3% trucks, 16 motorcycles, 89 buses

Combined: Newtown Bypass – 41,859 vehicles, 5.6% trucks, 43 motorcycles, 179 buses

Between Lindenhurst Road and I-95 Ramps

Eastbound: Newtown Bypass – 18,364 vehicles, 6.3% trucks, 29 motorcycles, 76 buses

Westbound: Newtown Bypass – 20,765 vehicles, 6.0% trucks, 18 motorcycles, 103 buses

Combined: Newtown Bypass – 39,129 vehicles, 6.1% trucks, 47 motorcycles, 179 buses

Vehicle turning movement counts were reviewed for the eleven (11) intersection locations within the Newtown Bypass Corridor. The counts were obtained from the *Newtown Bypass Traffic Signal Enhancement Initiative*.

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory capacity analysis to evaluate any operational and/or congestion concerns. A cursory volume to capacity analysis was also performed on the Newtown Bypass to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Crash Summary

Reportable crash data along the Newtown Bypass Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 309 crashes occurred within the corridor limits. There were a total of 617 vehicles involved in the 309 crashes on the Newtown Bypass in the five year period. Of the 617 vehicles, 10 large trucks were involved in nine (9) separate crashes, constituting less than two (2) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 96 (31%)
- 2002 – 52 (17%)
- 2003 – 67 (22%)
- 2004 – 48 (15%)
- 2005 – 46 (15%)

There was one (1) fatal crash in the reportable crash. The fatality occurred at the intersection of the Newtown

Bypass and Woodburne Road resulting from an angle crash. The majority of the crashes (42%) were Property Damage Only (PDO), and minor injuries accounted for 37 percent of the crashes. Rear end crashes were the most common type of crash accounting for 54 percent of the crashes followed by angle crashes accounting for 31 percent.

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions. A cursory analysis was also performed on the Newtown Bypass to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks, traffic congestion, traffic volumes, and unnecessary signage.

Lower Makefield Township has indicated that crashes frequently occur at the southbound on-ramp due to the volume of vehicles merging into one lane shortly after entering the ramp. The township has indicated that widening the southbound on-ramp to two lanes should be considered.

Lower Makefield Township has also noted that with a 55 MPH speed limit and the reconfiguration of the ramp on the eastern side of I-95, vehicles are typically traveling at higher speeds on the Newtown Bypass bridge over I-95. Consideration should be given to installing a center divider to minimize the opportunity for crossover collisions.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is immediate, occurring one year or less; the second is short term, occurring in one to three years; and the third is long term, occurring in three years or more.

An alternative developed for the extension of the right-turn lane on the eastbound Newtown Bypass to southbound Interstate 95 is included in Figure 5-5.

Table 5-6a: Newtown Bypass Proposed Immediate Improvements

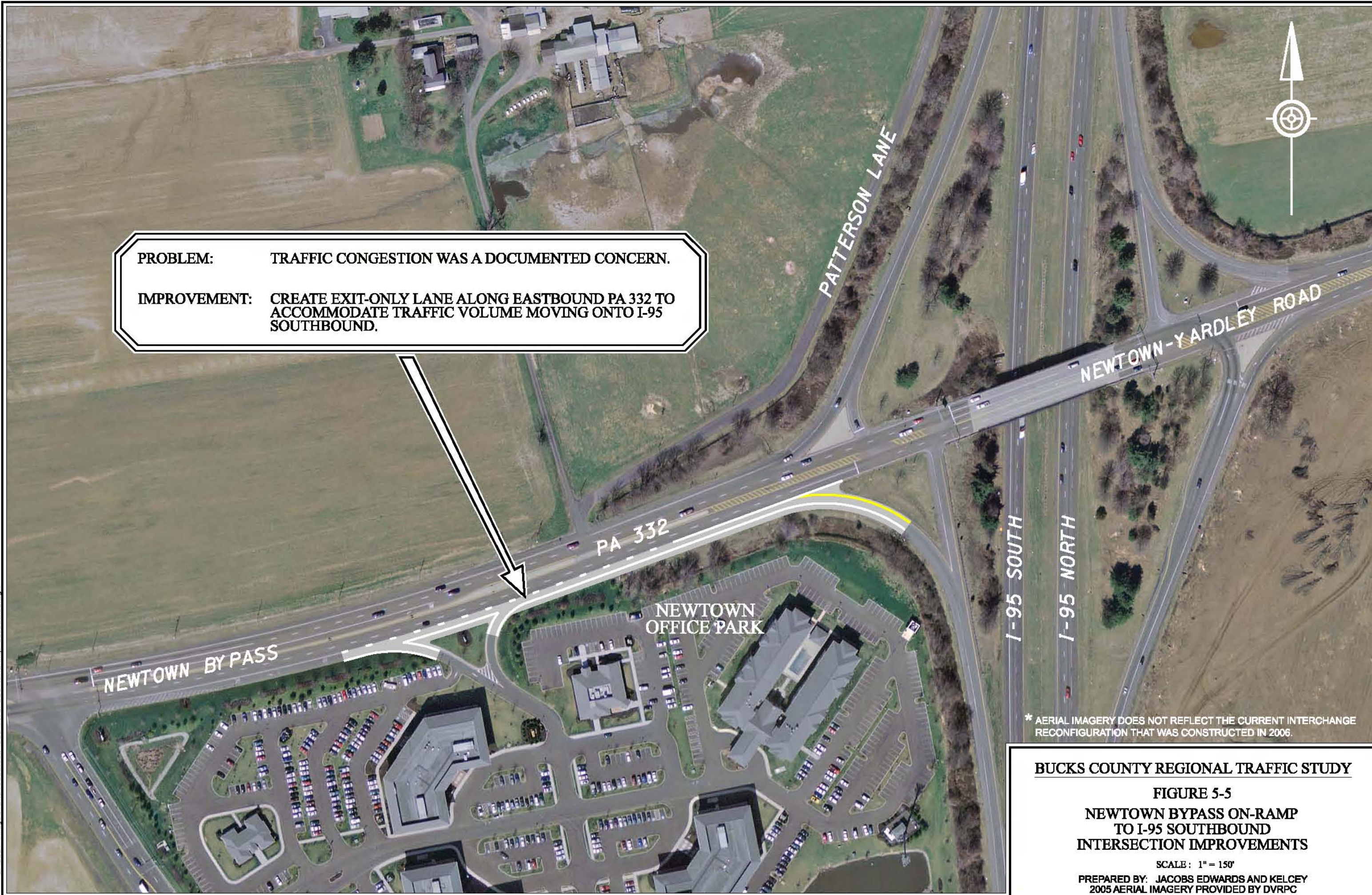
Signage Improvements		
ID	Description	Cost
SI-6-IM1	Install a Signal Ahead Sign (W3-3) with an Advanced Street Name Plaque (W16-8) on the Newtown Bypass on the westbound approach at Woodburne Road / Penns Trail Road. <i>(Newtown Township)</i>	\$250
Total Signage Improvements Cost		\$250
Traffic Signal Improvements		
ID	Description	Cost
TS-6-IM1	Move forward with the Newtown Bypass Traffic Signal Enhancement Initiative Improvements. <i>(Newtown and Lower Makefileld Townships)</i>	\$27,000
Total Traffic Signal Improvements Cost		\$27,000
Total Immediate Improvements Cost		\$27,250

Table 5-6b: Newtown Bypass Proposed Short-term Improvements

Pavement Marking Improvements		
ID	Description	Cost
PM-6-ST1	Install black striping along the Newtown Bypass from Newtown-Richboro Road to Swamp Road. <i>(Newtown Township)</i> (2 Miles)	\$10,000
PM-6-ST2	Install raised pavement markings along the entire length of the Newtown Bypass. <i>(Lower Makefield and Newtown Townships)</i>	\$50,000
Total Pavement Marking Improvements Cost		\$60,000
Total Short-term Improvements Cost		\$60,000

Table 5-6c: Newtown Bypass Proposed Long-term Improvements

Geometric Improvements		
ID	Description	Cost
GI-6-LT1	Extend right-turn lane on the eastbound Newtown Bypass to southbound Interstate 95 (See Figure 5-5). <i>(Lower Makefield Township)</i>	\$300,000
GI-6-LT2	Move forward with the Swamp Road Corridor Improvement Project, as agreed on by PennDOT, the municipalities and the community.* <i>(Newtown & Wrightstown Townships)</i>	TBD*
Total Geometric Improvements Cost		\$300,000*
Total Long-term Improvements Cost		\$300,000*



PROBLEM: TRAFFIC CONGESTION WAS A DOCUMENTED CONCERN.

IMPROVEMENT: CREATE EXIT-ONLY LANE ALONG EASTBOUND PA 332 TO ACCOMMODATE TRAFFIC VOLUME MOVING ONTO I-95 SOUTHBOUND.

* AERIAL IMAGERY DOES NOT REFLECT THE CURRENT INTERCHANGE RECONFIGURATION THAT WAS CONSTRUCTED IN 2006.

BUCKS COUNTY REGIONAL TRAFFIC STUDY

FIGURE 5-5

NEWTOWN BYPASS ON-RAMP TO I-95 SOUTHBOUND INTERSECTION IMPROVEMENTS

SCALE: 1" = 150'

PREPARED BY: JACOBS EDWARDS AND KELCEY
2005 AERIAL IMAGERY PROVIDED BY DVRPC

7. Newtown-Richboro Road / Almshouse Road / Jacksonville Road

Project Location

The study corridor begins at Bristol Road (S.R. 2025) in Northampton Township and terminates at the Newtown Bypass (S.R. 0332) in Newtown Township, as shown in Figure 5-1. The study corridor is approximately 7.6 miles long with 10 signalized intersections. The cross-section is that of a two-lane, undivided Urban Principal Arterial. The corridor is designated as S.R. 0332.

The Newtown-Richboro Road / Almshouse Road / Jacksonville Road Corridor serves as part of a key link from Bucks County at Yardley and Montgomery County at Hatboro.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

The Newtown-Richboro Road / Almshouse Road / Jacksonville Road has one (1) known on-going transportation study and engineering effort on the corridor. A summary of the known engineering study and design project follows:

- *Newtown-Richboro Road Bridge Replacement* - in Northampton and Newtown Township is currently in construction and includes replacement of the bridge over the Neshaminy Creek.

Existing Conditions

The study corridor generally runs in an east-west direction. There are no steep grades or horizontal curves along the highway. Newtown-Richboro Road / Almshouse Road / Jacksonville Road generally provides two lanes of traffic with a 22-foot wide minimum paved bituminous cartway with paved shoulders ranging from one to ten feet wide. Some widening has occurred with left-turn lanes and wide shoulders provided in areas of recent development. The posted speed limit varies from 35 MPH to 45 MPH. Jacksonville Road / Almshouse Road has a speed limit of 45 MPH from Bristol Road to Winding Way. At Winding Way, the speed limit changes to 40 MPH until Temperance Lane. From Temperance Lane to Harmony Drive, the speed limit is 35 MPH and the road changes names to Newtown-Richboro Road. After Harmony Drive, the speed limit is 45 MPH until the Newtown Bypass.



*Newtown-Richboro Road near Pickering Bend Road
Photo by: Jacobs Edwards and Kelcey*

The primary land use along Newtown-Richboro Road / Almshouse Road / Jacksonville Road in Northampton and Newtown Townships is single-family residential (approximately 39 percent) and multi-family residential (approximately one (1) percent). Other land uses are fairly distributed among agriculture, wooded areas, recreation, vacant areas, commercial, community services, transport and parking, and manufacturing. Newtown-Richboro Road in Newtown Township consists of Newtown Middle School, single-family residential houses, and Tyler State Park. Where Newtown-Richboro Road crosses into Northampton Township, land uses include a multi-family 55+ residential community at Rock Way, single-family residential developments, and the Northampton Recreation Complex. The intersection of Second Street Pike and Almshouse Road is home to the Richboro Shopping Plaza, the Northampton Township Complex and Fire Station. West of this intersection, much of the land along Almshouse Road is single-family residential subdivisions and houses with direct driveway access with some agriculture and a church. There are three industrial parks on Jacksonville Road along with a church, a swim club, a golf course and single-family residential subdivisions and houses with direct driveway access.

The 7.6-mile long corridor presently contains 10 signalized intersections.

- Bristol Road & Jacksonville Road
- Pulinski Road & Jacksonville Road
- Jacksonville Road & Almshouse Road
- Hatboro Road & Almshouse Road

- Second Street Pike & Almshouse Road / Newtown-Richboro Road
- Township Road & Newtown-Richboro Road
- Holland Road & Newtown-Richboro Road
- Spring Garden Road / Rock Way & Newtown-Richboro Road
- Mill Pond Road & Newtown-Richboro Road
- Newtown Bypass & Newtown-Richboro Road

Traffic Data

Automatic Traffic Recorder (ATR) counts were conducted by DVRPC at three (3) locations to determine the existing traffic volumes and vehicle classifications on Newtown-Richboro Road / Almshouse Road / Jacksonville Road as follows:

- between Bristol Road and Almshouse Road along Jacksonville Road on Tuesday, April 26, 2005;
- between Jacksonville Road and Second Street Pike along Almshouse Road on Tuesday, April 26, 2005; and
- between Second Street Pike and the Newtown Bypass along Newtown-Richboro Road on Tuesday, April 26, 2005.

For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)

Between Bristol Road and Almshouse Road

Eastbound: Jacksonville Road – 676 vehicles, 4.9% trucks (4:00 – 5:00 P.M.)
 Westbound: Jacksonville Road – 580 vehicles, 7.8% trucks (8:00 – 9:00 A.M.)
 Combined: Jacksonville Road – 1,119 vehicles, 7.1% trucks (7:00 – 8:00 A.M.)

Between Jacksonville Road and Second Street Pike

Eastbound: Almshouse Road – 763 vehicles, 1.6% trucks (6:00 – 7:00 P.M.)
 Westbound: Almshouse Road – 758 vehicles, 4.1% trucks (7:00 – 8:00 A.M.)
 Combined: Almshouse Road – 1,380 vehicles, 4.7% trucks (7:00 – 8:00 P.M.)

Between Second Street Pike and Newtown Bypass

Eastbound: Newtown-Richboro Road – 898 vehicles, 2.3% trucks (5:00 – 6:00 P.M.)
 Westbound: Newtown-Richboro Road – 896 vehicles, 1.6% trucks (5:00 – 6:00 P.M.)
 Combined: Newtown-Richboro Road – 1,794 vehicles, 2.0% trucks (5:00 – 6:00 P.M.)

Average Daily Traffic (ADT) Volumes

Between Bristol Road and Almshouse Road

Eastbound: Jacksonville Road – 7,340 vehicles, 5.7% trucks, 21 motorcycles, 49 buses
 Westbound: Jacksonville Road – 7,037 vehicles, 5.4% trucks, 21 motorcycles, 53 buses
 Combined: Jacksonville Road – 14,377 vehicles, 5.5% trucks, 42 motorcycles, 102 buses

Between Jacksonville Road and Second Street Pike

Eastbound: Almshouse Road – 9,084 vehicles, 4.1% trucks, 31 motorcycles, 32 buses
 Westbound: Almshouse Road – 9,335 vehicles, 3.9% trucks, 23 motorcycles, 47 buses
 Combined: Almshouse Road – 18,419 vehicles, 4.0% trucks, 54 motorcycles, 79 buses

Between Second Street Pike and Newtown Bypass

Eastbound: Newtown-Richboro Road – 10,450 vehicles, 3.3% trucks, 35 motorcycles, 45 buses
 Westbound: Newtown-Richboro Road – 10,624 vehicles, 3.6% trucks, 25 motorcycles, 45 buses
 Combined: Newtown-Richboro Road – 21,074 vehicles, 3.4% trucks, 60 motorcycles, 90 buses



*Jacksonville Road approaching Almshouse Road
 Photo by: Jacobs Edwards and Kelcey*

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory volume to capacity analysis to evaluate any operational and/or congestion concerns.

Crash Summary

Reportable crash data along the Newtown-Richboro Road / Almshouse Road / Jacksonville Road Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 321 crashes occurred within the corridor limits. There were a total of 611 vehicles involved in the 321 crashes on the Newtown Bypass in the five year period. Of the 611 vehicles, 14 large trucks were involved in 13 separate crashes, constituting less than three (3) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 60 (18%)
- 2002 – 63 (20%)
- 2003 – 65 (20%)
- 2004 – 70 (22%)
- 2005 – 63 (20%)

There was one (1) fatal crash in the reportable crash. The fatality occurred at the mid-block between St. Leonards Road and West Hanover Street resulting from a hit pedestrian. The majority of the crashes (46%) were Property Damage Only (PDO), and minor injuries accounted for 27 percent. Rear end crashes were the most common type of crash accounting for 34 percent of the crashes, followed by angle crashes accounting for 32 percent.

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks and traffic congestion.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is immediate, occurring one year or less; and the second is short term, occurring in one to three years.

An alternative developed for the improvement of the Newtown-Richboro Road / Almshouse Road and Second Street Pike intersection is included in Figure 5-6.

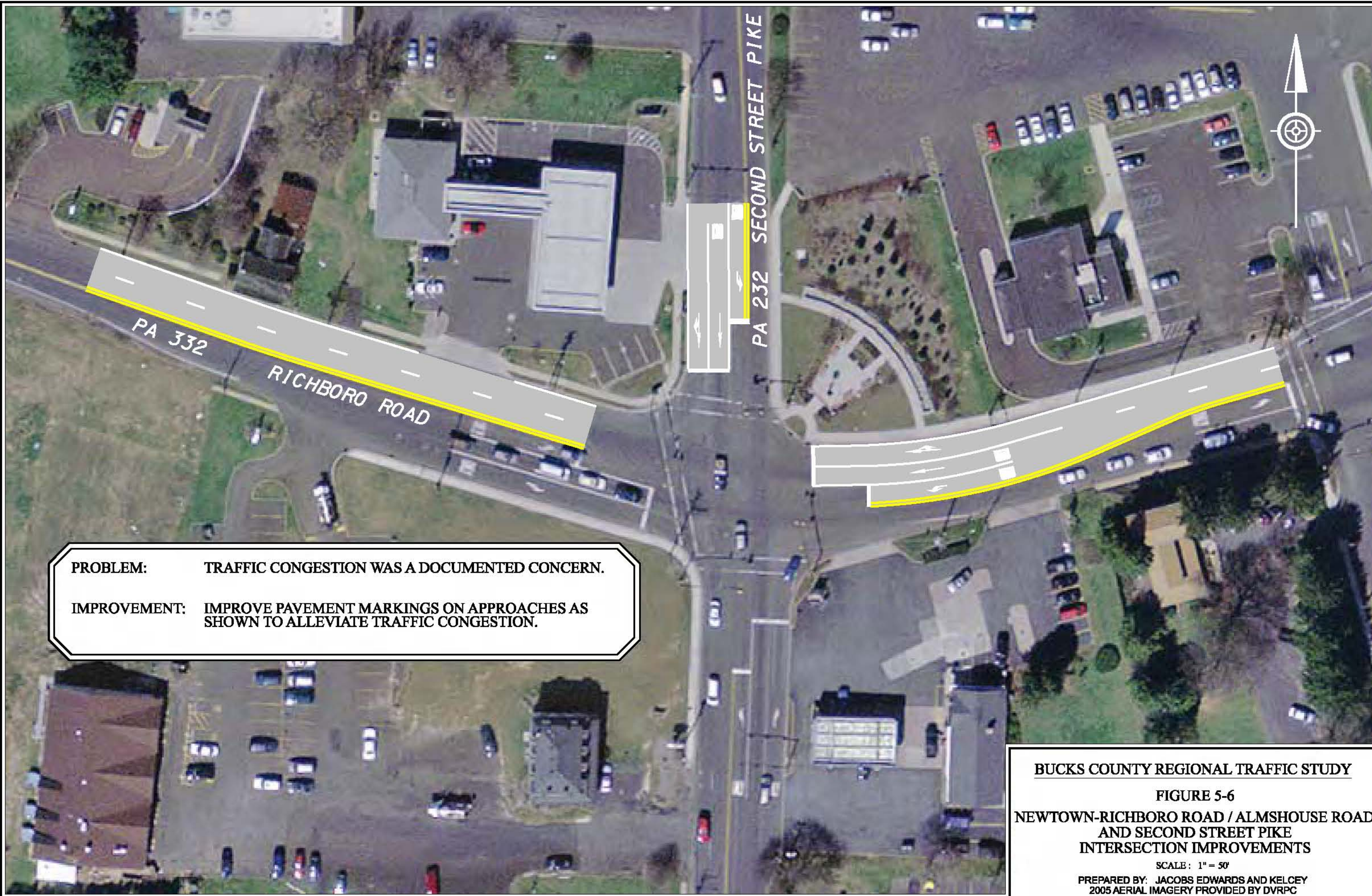
Table 5-7a: Newtown-Richboro Road / Almshouse Road / Jacksonville Road Proposed Immediate Improvements

Signage Improvements		
ID	Description	Cost
SI-2-IM1	Install a Pedestrian Crossing Sign (W11-2) in advance of the crosswalk on Newtown-Richboro Road at Hanover Road. There is a crosswalk across Newtown-Richboro Road from a residential development on Hanover Road to Tyler State Park with an existing flashing overhead pedestrian crossing sign. (<i>Newtown Township</i>)	\$400
Total Signage Improvements Cost		\$400
Traffic Signal Improvements		
ID	Description	Cost
TS-7-IM1	Optimize the traffic signal timings at Jacksonville Road and Almshouse Road. (<i>Northampton Township</i>)	\$3,000
TS-7-IM2	Optimize the traffic signal timings at Almshouse Road, Newtown-Richboro Road and Second Street Pike. (<i>Northampton Township</i>)	\$3,000
Total Traffic Signal Improvements Cost		\$6,000
Total Immediate Improvements Cost		\$6,400

Table 5-7b: Newtown-Richboro Road / Almshouse Road / Jacksonville Road Proposed Short-term Improvements

Pavement Marking Improvements		
ID	Description	Cost
PM-7-ST1	Remove the passing zone between Fir Drive and Holland Road in accordance with Department Publication 212 – Many driveways and intersections create frequent potential conflicts. (<i>Northampton Township</i>) (1,800 LF)	\$1,000
Total Pavement Marking Improvements Cost		\$1,000
Highway Maintenance Improvements		
ID	Description	Cost
HM-7-ST1	Install guiderail at the culvert on Jacksonville Road north of Spring Mill Country Club on both sides of the roadway in accordance with Department Publication 13M (DM-2) – Culvert Headwall within Clear Zone. (<i>Northampton Township</i>) (200 LF Type 2-S Guiderail @ \$25/LF)	\$5,000
HM-7-ST2	Install end treatments on guiderail at the intersection of Jacksonville Road and Almshouse Road. (<i>Northampton Township</i>) (2 Type 2 Strong Post End Treatments @ \$900/Treatment)	\$1,800
HM-7-ST3	Consider installing a stone base at the drop-off on Newtown-Richboro Road between Hanover Road and the Newtown Bypass. (<i>Newtown Township</i>) (675 CY @ \$60/CY)	\$40,500
Total Highway Maintenance Improvements Cost		\$47,300

Geometric Improvements		
ID	Description	Cost
GI-7-ST1	Improve the lane configuration at the intersection of Newtown-Richboro Road / Almshouse Road and Second Street Pike to have two through lanes on Newtown-Richboro Road westbound (See Figure 5-6). <i>(Northampton Township)</i>	\$10,000
Total Geometric Improvements Cost		\$10,000
Total Short-term Improvements Cost		\$58,300



PROBLEM: TRAFFIC CONGESTION WAS A DOCUMENTED CONCERN.

IMPROVEMENT: IMPROVE PAVEMENT MARKINGS ON APPROACHES AS SHOWN TO ALLEVIATE TRAFFIC CONGESTION.

BUCKS COUNTY REGIONAL TRAFFIC STUDY

FIGURE 5-6

NEWTOWN-RICHBORO ROAD / ALMHOUSE ROAD AND SECOND STREET PIKE INTERSECTION IMPROVEMENTS

SCALE: 1" = 50'

PREPARED BY: JACOBS EDWARDS AND KELCEY
2005 AERIAL IMAGERY PROVIDED BY DVRPC

8. Second Street Pike

Project Location

The study corridor begins at Bristol Road (S.R. 2025) in Northampton Township and terminates at Durham Road (S.R. 0413) in Wrightstown Township, as shown in Figure 5-1. The study corridor is approximately 6.8 miles long with eight (8) signalized intersections and six (6) unsignalized intersections of consequence. The cross-section is that of a two-lane, undivided Urban Principal Arterial from Bristol Road to Newtown-Richboro Road / Almshouse Road and an Urban Minor Arterial from Newtown-Richboro Road / Almshouse Road to Durham Road. The corridor is designated as S.R. 0232.

The Second Street Pike Corridor serves as part of a key link from Bucks County at New Hope, Montgomery County at Bryn Athyn, and the City of Philadelphia.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

The Second Street Pike Corridor has several on-going transportation studies and engineering efforts on and adjacent to the corridor that are in different phases. A summary of the known engineering studies and design projects follows:

- *Second Street Pike (PA 232) Corridor and Intersection Improvements* - in Wrightstown Township is currently in the engineering phase by PennDOT and includes an upgrade to the Route 232 and Swamp Road intersection to provide a truck climbing lane and horizontal realignment of the roadway approaches to the intersection. The project will also include signalization improvements. The construction cost estimate for the project is currently at \$1.65 million and is scheduled for construction in Fiscal Years 2008 and 2009.
- *Swamp Road Corridor Improvement Project* - in Newtown and Wrightstown Townships is currently in the environmental clearance and preliminary engineering phase by PennDOT. Public outreach and community involvement activities are accompanying the project's development which may include: minor roadway widening, horizontal and vertical curve realignment, shoulder rehabilitation, associated drainage improvements, widening / replacement of some bridges and culverts along the corridor, and new signalization. The construction cost estimate for a full reconstruction project is approximately \$14 million and is scheduled for construction after Fiscal Year 2009.
- *PA 413 Access Management Plan* – in Newtown and Wrightstown townships is currently in the planning stage by DVRPC. The case study spans Durham Road between the Newtown Bypass and Second Street Pike to illustrate tangible ways of introducing access management measures (e.g. sharing or restricting access, proper driveway placement and design, uniform signalized intersection spacing, etc.) within the corridor. The work is being performed with the participation of member governments, regional transportation providers, and PennDOT.

Existing Conditions

The study corridor generally runs in a north-south direction. There are no sharp horizontal curves, but some steep grades exist throughout the study limits. Second Street Pike generally provides two 12-foot bituminous lanes with paved shoulders in each direction. The posted speed limit varies from 35 MPH to 45 MPH. From Bristol Road to Tanyard Road, the posted speed limit is 45 MPH. From Tanyard Road to Worthington Mill Road, the posted speed limit is 35 MPH. From Worthington Mill Road to Penns Park Road, the posted speed limit is 45 MPH. From Penns Park Road to Cherry Lane, the posted speed limit is 35 MPH. From Cherry Lane to Durham Road, the posted speed limit is 45 MPH.

The primary land use along Second Street Pike is single-family residential (approximately 50 percent). Other land uses include agriculture (approximately 21 percent), commercial (approximately 10 percent), wooded areas (approximately 7



Single-family residential with direct driveway access to Second Street Pike
Photo by: Jacobs Edwards and Kelcey

percent), transport and parking (approximately 6 percent) and mining (approximately 3 percent). South of Swamp Road in Northampton Township there are single-family residential subdivisions and agricultural land. The intersection of Second Street Pike and Almshouse Road consists of commercial uses including the Richboro Shopping Plaza. The southernmost portion of Second Street Pike in Northampton Township is primarily single-family residential subdivisions and houses with direct driveway access.

The 6.8-mile long corridor presently contains eight (8) signalized intersections and six (6) unsignalized intersections of consequence.

- Bristol Road & Second Street Pike
- New Road & Second Street Pike
- Tanyard Road & Second Street Pike
- Crossroads Plaza Entrance & Second Street Pike
- Bustleton Pike & Second Street Pike
- Newtown-Richboro Road / Almshouse Road & Second Street Pike
- Twining Ford Road & Second Street Pike (unsignalized)
- Worthington Mill Road & Second Street Pike (unsignalized)
- Sackettsford Road & Second Street Pike (unsignalized)
- Twining Road & Second Street Pike (unsignalized)
- Swamp Road & Second Street Pike
- Penns Park Road & Second Street Pike (unsignalized)
- Cherry Lane & Second Street Pike (unsignalized)
- Durham Road & Second Street Pike

Traffic Data

Automated Traffic Recorder (ATR) counts were conducted by DVRPC at four (4) locations to determine the existing traffic volumes and vehicle classification on Second Street Pike as follows:

- between Bristol Road and Bustleton Pike on Thursday June 9, 2005;
- between Bustleton Pike and Worthington Mill Road on Thursday June 9, 2005;
- between Worthington Mill Road and Swamp Road on Thursday June 9, 2005; and
- between Swamp Road and Durham Road on Tuesday, April 26, 2005.

For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)

Between Bristol Road and Bustleton Pike

Northbound: Second Street Pike – 834 vehicles, 2.2% trucks (5:00 – 6:00 P.M.)

Southbound: Second Street Pike – 672 vehicles, 2.5% trucks (5:00 – 6:00 P.M.)

Combined: Second Street Pike – 1,506 vehicles, 2.3% trucks (5:00 – 6:00 P.M.)

Between Bustleton Pike and Worthington Mill Road

Northbound: Second Street Pike – 563 vehicles, 2.8% trucks (5:00 – 6:00 P.M.)

Southbound: Second Street Pike – 558 vehicles, 2.2% trucks (5:00 – 6:00 P.M.)

Combined: Second Street Pike – 1,121 vehicles, 2.5% trucks (5:00 – 6:00 P.M.)

Between Worthington Mill Road and Swamp Road

Northbound: Second Street Pike – 356 vehicles, 10.1% trucks (8:00 – 9:00 A.M.)

Southbound: Second Street Pike – 378 vehicles, 6.1% trucks (4:00 – 5:00 P.M.)

Combined: Second Street Pike – 702 vehicles, 4.0% trucks (5:00 – 6:00 P.M.)

Between Swamp Road and Durham Road

Northbound: Second Street Pike – 315 vehicles, 9.5% trucks (7:00 – 8:00 A.M.)

Southbound: Second Street Pike – 316 vehicles, 5.1% trucks (4:00 – 5:00 P.M.)

Combined: Second Street Pike – 570 vehicles, 6.1% trucks (4:00 – 5:00 P.M.)

Average Daily Traffic (ADT) Volumes*Between Bristol Road and Bustleton Pike*

Northbound: Second Street Pike – 9,056 vehicles, 4.0% trucks, 27 motorcycles, 33 buses
 Southbound: Second Street Pike – 8,891 vehicles, 3.9% trucks, 26 motorcycles, 33 buses
 Combined: Second Street Pike – 17,947 vehicles, 3.9% trucks, 53 motorcycles, 66 buses

Between Bustleton Pike and Worthington Mill Road

Northbound: Second Street Pike – 7,687 vehicles, 5.8% trucks, 26 motorcycles, 46 buses
 Southbound: Second Street Pike – 6,801 vehicles, 6.3% trucks, 23 motorcycles, 47 buses
 Combined: Second Street Pike – 14,488 vehicles, 6.0% trucks, 49 motorcycles, 93 buses

Between Worthington Mill Road and Swamp Road

Northbound: Second Street Pike – 4,337 vehicles, 8.6% trucks, 7 motorcycles, 38 buses
 Southbound: Second Street Pike – 4,388 vehicles, 9.2% trucks, 13 motorcycles, 37 buses
 Combined: Second Street Pike – 8,725 vehicles, 8.9% trucks, 20 motorcycles, 75 buses

Between Swamp Road and Durham Road

Northbound: Second Street Pike – 3,548 vehicles, 9.4% trucks, 20 motorcycles, 26 buses
 Southbound: Second Street Pike – 3,317 vehicles, 6.2% trucks, 22 motorcycles, 21 buses
 Combined: Second Street Pike – 6,865 vehicles, 7.8% trucks, 42 motorcycles, 47 buses

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory volume to capacity analysis to evaluate any operational and/or congestion concerns.

Crash Summary

Reportable crash data along the Second Street Pike Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 282 crashes occurred within the corridor limits. There were a total of 527 vehicles involved in the 282 crashes on Second Street Pike in the five year period. Of the 527 vehicles, 16 large trucks were involved in 15 separate crashes, constituting less than four (4) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 62 (22%)
- 2002 – 53 (18%)
- 2003 – 61 (21%)
- 2004 – 61 (21%)
- 2005 – 45 (16%)

There was one (1) fatal crash in the reportable crash. The fatality occurred at the mid-block between Cherry Lane and Old Anchor Road resulting from a hit fixed object crash. The majority of the crashes (45%) were Property Damage Only (PDO), and minor injuries accounted for 28 percent. Angle crashes were the most common type of crash accounting for 58 percent of the crashes.

There were three (3) crash cluster locations on Second Street Pike. The crash cluster location with the highest number of crashes in the whole study area (60 crashes) occurred at the intersection of Second Street Pike and Newtown-Richboro Road / Almshouse Road.

- 60 crashes at Newtown-Richboro Road / Almshouse Road (44 angle, 5 rear end, 2 head on, 2 hit fixed object, 1 sideswipe);
- 34 crashes at Swamp Road (27 angle, 4 hit fixed object, 2 rear end, 1 non collision); and
- 23 crashes at Bristol Road (14 angle, 6 rear end, 2 hit fixed object, 1 sideswipe).

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks, roadway alignment, traffic congestion, and unnecessary signage.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is immediate, occurring one year or less; the second is short term, occurring in one to three years; and the third is long term, occurring in three years or more.

An improvement alternative developed for the Durham Road and Second Street Pike Intersection is presented in Figure 5-4, within the discussion of Key Roadway 5 (Durham Road). An alternative developed for the improvement of the Second Street Pike and Bristol Road intersection is included in Figure 5-7.

Table 5-8a: Second Street Pike Proposed Immediate Improvements

Traffic Signal Improvements		
ID	Description	Cost
TS-8-IM1	Optimize the traffic signal timings at Second Street Pike and Bristol Road. <i>(Northampton Township)</i>	\$3,000
Total Traffic Signal Improvements Cost		\$3,000
Total Immediate Improvements Cost		\$3,000

Table 5-8b: Second Street Pike Proposed Short-term Improvements

Highway Maintenance Improvements		
ID	Description	Cost
HM-8-ST1	Consider fixing the drop-off on Second Street Pike southbound, south of Sackettsford Road by filling with stone. <i>(Northampton Township)</i> (100 CY @ \$60/CY)	\$6,000
HM-8-ST2	Consider filling in the swales north of Penns Park Road where houses are spaced too closely for guiderail. <i>(Wrightstown Township)</i> (170 CY @ \$60/CY)	\$10,200
HM-8-ST3	Install proper end treatments on guiderail near Tanyard Road. <i>(Northampton Township)</i> (2 Type 2 Strong Post End Treatments @ \$900/Treatment)	\$1,800
HM-8-ST4	Install guiderail delineation (reflectors) throughout Second Street Pike as new guiderail is added or reconstructed. <i>(Northampton and Wrightstown Townships)</i> (40 delineators for existing guiderail @ \$20/delineator)	\$800
Total Highway Maintenance Improvements Cost		\$18,800
Total Short-term Improvements Cost		\$18,800

Table 5-8c: Second Street Pike Proposed Long-term Improvements

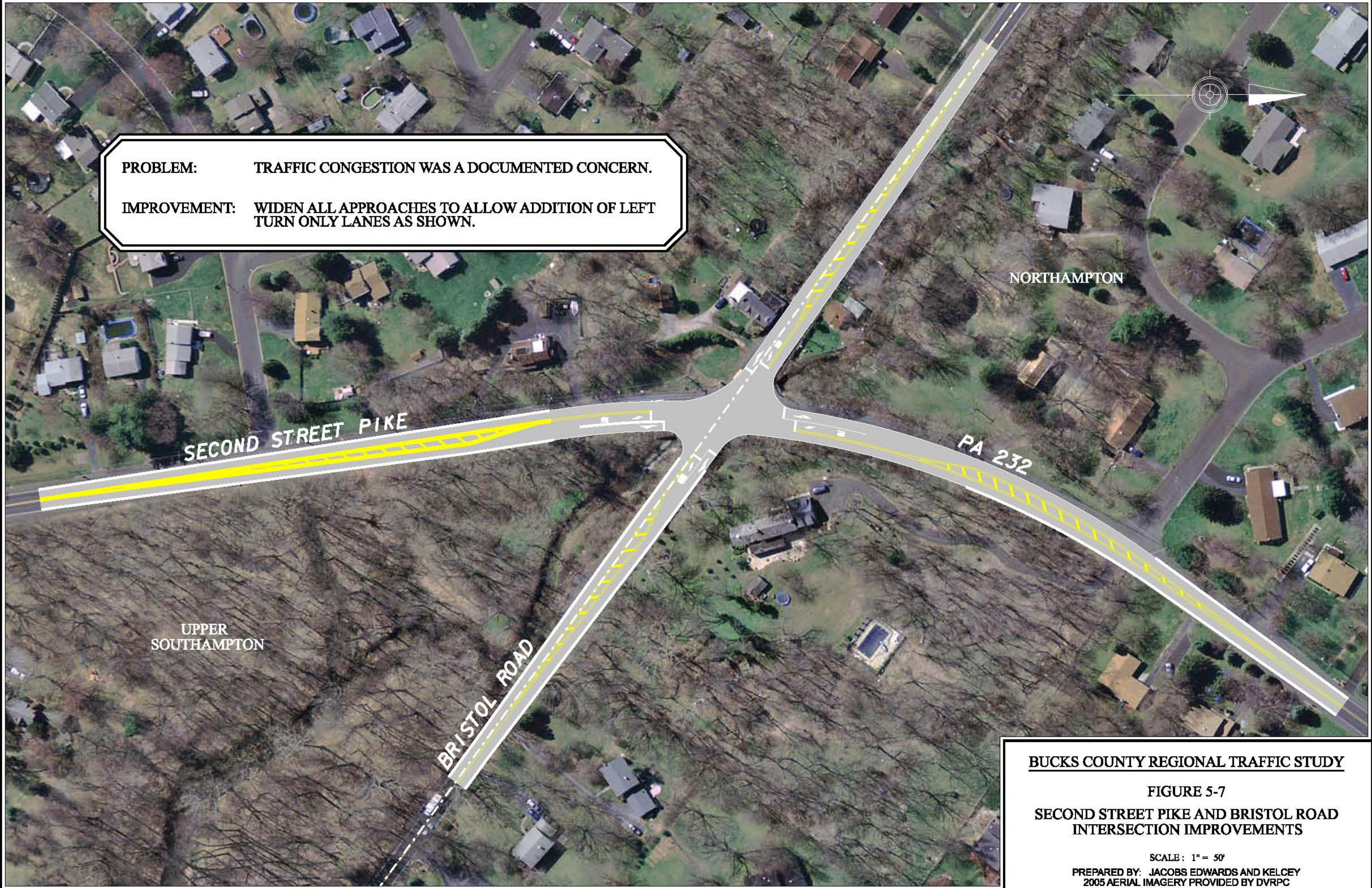
Geometric Improvements		
ID	Description	Cost
GI-8-LT1	Improve intersection of Second Street Pike and Bristol Road (See Figure 5-7). (<i>Northampton Township</i>)	\$2,000,000
Total Geometric Improvements Cost		\$2,000,000
Total Long-term Improvements Cost		\$2,000,000

STATES

STATES

PROBLEM: TRAFFIC CONGESTION WAS A DOCUMENTED CONCERN.

IMPROVEMENT: WIDEN ALL APPROACHES TO ALLOW ADDITION OF LEFT TURN ONLY LANES AS SHOWN.



BUCKS COUNTY REGIONAL TRAFFIC STUDY

FIGURE 5-7

SECOND STREET PIKE AND BRISTOL ROAD INTERSECTION IMPROVEMENTS

SCALE: 1" = 50'

PREPARED BY: JACOBS EDWARDS AND KELCEY
2005 AERIAL IMAGERY PROVIDED BY DVRPC

9. Bustleton Pike

Project Location

The study corridor begins at Bristol Road (S.R. 2025) and terminates at Second Street Pike (S.R. 0232) entirely in Northampton Township, as shown in Figure 5-1. The study corridor is approximately 2.0 miles long with three (3) signalized intersections and three (3) unsignalized intersections of consequence. The cross-section is that of a two-lane, undivided Urban Minor Arterial. The corridor is designated as S.R. 2065.

The Bustleton Pike Corridor serves as part of a key link from Bucks County at Richboro and the City of Philadelphia.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

There are no known on-going transportation studies and/or engineering efforts on and/or adjacent to the corridor.

Existing Conditions

The study corridor generally runs in a north-south direction. There is a sharp horizontal curve north of Lower Holland Road. Bustleton Pike generally provides two lanes of traffic with a 22-foot wide bituminous cartway with paved shoulders ranging from one (1) to eight (8) feet. Some widening has occurred with bituminous curb and wider shoulders in areas of residential development. There is a posted speed limit of 35 MPH the entire length of Bustleton Pike.

The primary land use along Bustleton Pike is single-family residential (approximately 71 percent). Other land uses include commercial (approximately 11 percent), transport and parking (approximately 6 percent), wooded areas (approximately 5 percent), vacant areas (approximately 4 percent) and agriculture (approximately 3 percent). A small amount of commercial buildings are located near the intersection of Upper Holland Drive.

The 2.0-mile long corridor presently contains three (3) signalized intersections and three (3) unsignalized intersections of consequence.

- Bristol Road & Bustleton Pike
- Elm Avenue & Bustleton Pike (unsignalized)
- Lower Holland Road & Bustleton Pike (unsignalized)
- Tanyard Road & Bustleton Pike (unsignalized)
- Upper Holland Road & Bustleton Pike
- Second Street Pike & Bustleton Pike



*Quarry Truck traveling along Bustleton Pike
Photo by: Jacobs Edwards and Kelcey*

Traffic Data

Automated Traffic Recorder (ATR) counts were conducted by DVRPC at one (1) location to determine the existing traffic volumes and vehicle classifications on Bustleton Pike. The ATR count was conducted between Bristol and Second Street Pike along Bustleton Pike on Tuesday, May 3, 2005. For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)

Between Bristol Road and Second Street Pike

Northbound: Bustleton Pike – 471 vehicles, 6.8% trucks (5:00 – 6:00 P.M.)
 Southbound: Bustleton Pike – 427 vehicles, 6.8% trucks (7:00 – 8:00 A.M.)
 Combined: Bustleton Pike – 875 vehicles, 7.0% trucks (5:00 – 6:00 P.M.)

Average Daily Traffic (ADT) Volumes*Between Bristol Road and Second Street Pike*

Northbound: Bustleton Pike – 5,141 vehicles, 7.0% trucks, 17 motorcycles, 23 buses

Southbound: Bustleton Pike – 5,320 vehicles, 6.4% trucks, 18 motorcycles, 20 buses

Combined: Bustleton Pike – 10,461 vehicles, 6.7% trucks, 35 motorcycles, 40 buses

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory volume to capacity analysis to evaluate any operational and/or congestion concerns.

Crash Summary

Reportable crash data along the Bustleton Pike Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 100 crashes occurred within the corridor limits. There were a total of 193 vehicles involved in the 100 crashes on Bustleton Pike in the five year period. Of the 193 vehicles, four (4) large trucks were involved in four (4) separate crashes, constituting less than three (3) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 18 (18%)
- 2002 – 29 (29%)
- 2003 – 23 (23%)
- 2004 – 16 (16%)
- 2005 – 14 (14%)

There were no fatalities involved in the reportable crash data. The majority of the crashes (42%) were Property Damage Only (PDO), and minor injuries accounted for 30 percent. Rear end crashes were the most common type accounting for 42 percent of the crashes, followed by angle crashes accounting for 31 percent and hit fixed object crashes accounting for 19 percent.



*Bustleton Pike at Bristol Road
Photo by: Jacobs Edwards and Kelcey*

There were two (2) crash cluster locations on Bustleton Pike. The first one was at Elm Ave and had 26 crashes (17 rear end, 6 angle, 3 hit fixed object). The second crash cluster location was at Bristol Road had 17 crashes (12 angle, 2 rear end, 2 hit fixed object, 1 sideswipe).

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks, roadway alignment, and traffic congestion.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is immediate, occurring one year or less; the second is short term, occurring in one to three years; and the third is long term, occurring in three years or more.

An alternative developed for the re-alignment of Elm Avenue at Bustleton Pike is included in Figure 5-8.

Table 5-9a: Bustleton Pike Proposed Immediate Improvements

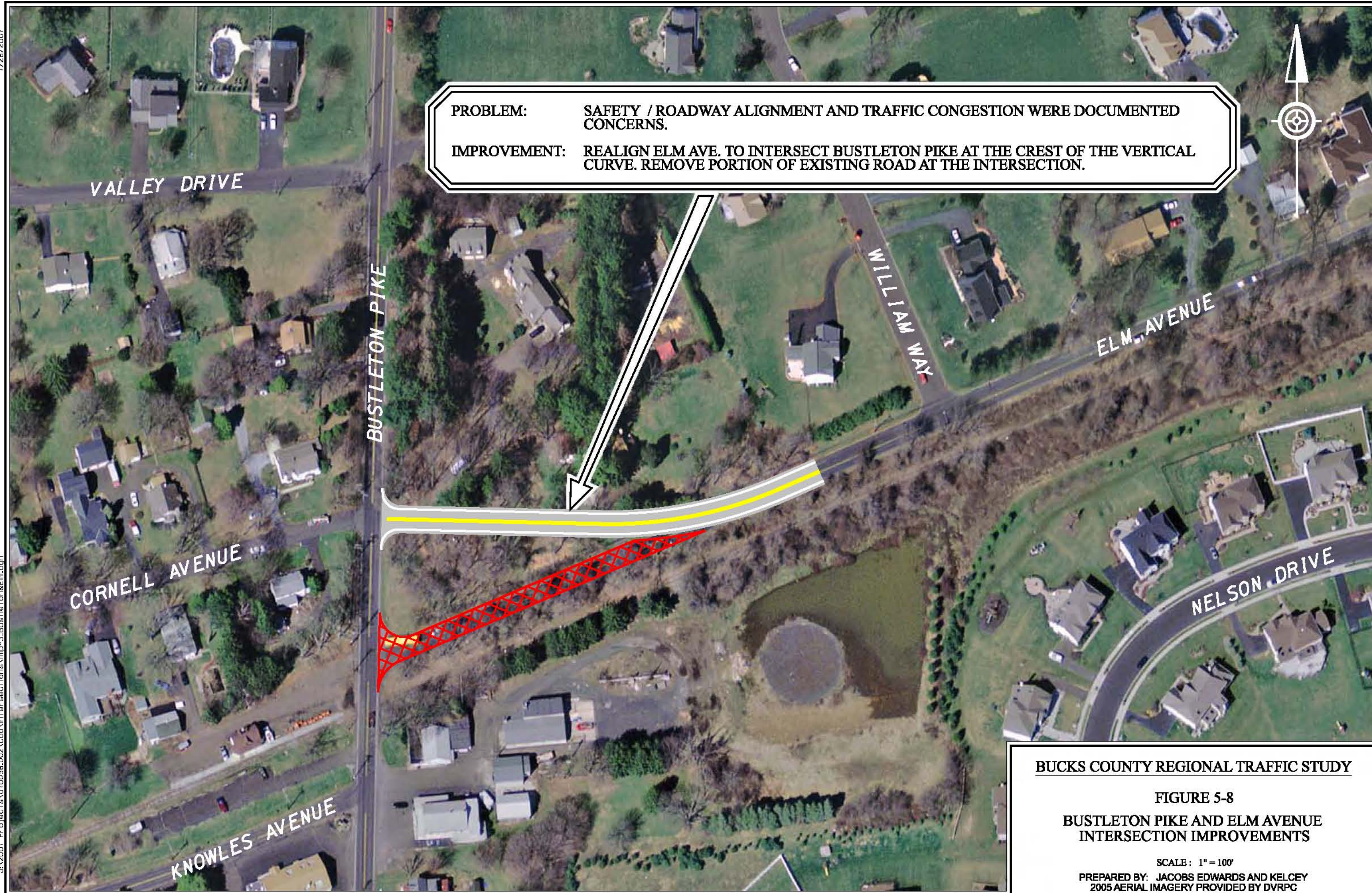
Signage Improvements		
ID	Description	Cost
SI-9-IM1	Install Chevron Signs (W1-8) along the sharp curve on Bustleton Pike near Lower Holland Road. (<i>Northampton Township</i>)	\$725
Total Signage Improvements Cost		\$725
Total Immediate Improvements Cost		\$725

Table 5-9b: Bustleton Pike Proposed Short-term Improvements

Pavement Marking Improvements		
ID	Description	Cost
PM-9-ST1	Install raised pavement markings on the sharp curve on Bustleton Pike near Lower Holland Road. (<i>Northampton Township</i>)	\$400
Total Pavement Marking Improvements Cost		\$400
Highway Maintenance Improvements		
ID	Description	Cost
HM-9-ST1	Install proper end treatments on guiderail near Tanyard Road. (<i>Northampton Township</i>) (2 Type 2 Strong Post End Treatments @ \$900/Treatment)	\$1,800
HM-9-ST2	Install guiderail delineation (reflectors) throughout Bustleton Pike as new guiderail is added or reconstructed. (<i>Northampton Township</i>) (15 delineators for existing guiderail @ \$20/delineator)	\$300
Total Highway Maintenance Improvements Cost		\$2,100
Total Short-term Improvements Cost		\$2,500

Table 5-9c: Bustleton Pike Proposed Long-term Improvements

Geometric Improvements		
ID	Description	Cost
GI-9-LT1	Re-align intersection of Elm Avenue and Bustleton Pike (See Figure 5-8). (<i>Northampton Township</i>)	\$750,000
Total Geometric Improvements Cost		\$750,000
Total Long-term Improvements Cost		\$750,000



PROBLEM: SAFETY / ROADWAY ALIGNMENT AND TRAFFIC CONGESTION WERE DOCUMENTED CONCERNS.

IMPROVEMENT: REALIGN ELM AVE. TO INTERSECT BUSTLETON PIKE AT THE CREST OF THE VERTICAL CURVE. REMOVE PORTION OF EXISTING ROAD AT THE INTERSECTION.



BUCKS COUNTY REGIONAL TRAFFIC STUDY

FIGURE 5-8

BUSTLETON PIKE AND ELM AVENUE INTERSECTION IMPROVEMENTS

SCALE: 1" = 100'

PREPARED BY: JACOBS EDWARDS AND KELCEY
2005 AERIAL IMAGERY PROVIDED BY DVRPC

10. Wrightstown Road

Project Location

The study corridor begins at Durham Road (S.R. 0413) in Wrightstown Township and terminates at Washington Crossing Road (S.R. 0532) in Upper Makefield Township, as shown in Figure 5-1. The study corridor is approximately 5.7 miles long with six (6) unsignalized intersections of consequence. The cross-section is that of a two-lane, undivided Rural Minor Collector. The corridor is designated as S.R. 2081.

The Wrightstown Road Corridor serves as a collector between the Durham Road and Washington Crossing Road Corridors.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

The Wrightstown Road Corridor has several on-going transportation studies and engineering efforts on and adjacent to the corridor that are in different phases. A summary of the known engineering studies and design projects follows:

- *Durham Road and Wrightstown / Worthington Mill Road Intersection Improvements* - in Wrightstown Township is currently in the engineering phase by the Township and includes widening of Durham Road for left turn lanes and new signalization.
- *PA 413 Access Management Plan* – in Newtown and Wrightstown Townships is currently in the planning stage by DVRPC. The case study spans Durham Road between the Newtown Bypass and Second Street Pike to illustrate tangible ways of introducing access management measures (e.g. sharing or restricting access, proper driveway placement and design, uniform signalized intersection spacing, etc.) within the corridor. The work is being performed with the participation of member governments, regional transportation providers, and PennDOT.

Existing Conditions

The study corridor generally runs in an east-west direction. There are no steep grades along the corridor. There are two sharp horizontal curves in an S-curve configuration located just west of the intersection with Old Dolington Road. Wrightstown Road generally provides two lanes of traffic with a 22-foot wide bituminous cartway with little to no shoulders. There is a posted speed limit of 40 MPH the entire length of Wrightstown Road. There are multiple curves along Wrightstown Road that have advisory speed signs ranging from 20 MPH to 40 MPH.

The primary land use along Wrightstown Road are single-family residential (approximately 40 percent) and agriculture (approximately 40 percent). Other land uses included wooded areas (approximately 15 percent) and vacant areas (5 percent). The Crossings Vineyard and Winery is located near the eastern end of this roadway.

The 5.7-mile long corridor presently contains six (6) intersections of consequence; all are unsignalized.

- Durham Road & Wrightstown Road (unsignalized)
- Eagle Road & Wrightstown Road (unsignalized)
- Creamery Road / Linton Hill Road & Wrightstown Road (unsignalized)
- Highland Road & Wrightstown Road (unsignalized)
- Old Dolington Road & Wrightstown Road (unsignalized)
- Washington Crossing Road & Wrightstown Road (unsignalized)



*Wrightstown Road (looking eastbound) near Creamery Road
Photo by: Jacobs Edwards and Kelcey*



*Typical single-family residential property along Wrightstown Road
Photo by: Jacobs Edwards and Kelcey*

Traffic Data

Automated Traffic Recorder (ATR) counts were conducted by DVRPC at one (1) location to determine the existing traffic volumes and vehicle classifications on Wrightstown Road. The ATR count was conducted between Durham Road and Washington Crossing Road along Wrightstown Road on Tuesday, April 26, 2005. For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.



*Advisory signs along Wrightstown Road (looking eastbound) near Old Dolington Road
Photo by: Jacobs Edwards and Kelcey*

Peak Hour Traffic Volumes (All Vehicles)

Between Durham Road and Washington Crossing Road

Eastbound: Wrightstown Road – 166 vehicles, 13.3% trucks (7:00 – 8:00 A.M.)

Westbound: Wrightstown Road – 101 vehicles, 4.0% trucks (5:00 – 6:00 P.M.)

Combined: Wrightstown Road – 229 vehicles, 12.7% trucks (7:00 – 8:00 A.M.)

Average Daily Traffic (ADT) Volumes

Between Durham Road and Washington Crossing Road

Eastbound: Wrightstown Road – 1,118 vehicles, 13.3% trucks, 5 motorcycles, 13 buses

Westbound: Wrightstown Road – 1,044 vehicles, 9.5% trucks, 5 motorcycles, 21 buses

Combined: Wrightstown Road – 2,162 vehicles, 11.5% trucks, 10 motorcycles, 34 buses

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory volume to capacity analysis to evaluate any operational and/or congestion concerns.

Crash Summary

Reportable crash data along the Wrightstown Road Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 72 crashes occurred within the corridor limits. There were a total of 124 vehicles involved in the 72 crashes on Wrightstown Road in the five year period. Of the 124 vehicles, four (4) large trucks were involved in four (4) separate crashes, constituting less than four (4) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 19 (26%)
- 2002 – 11 (15%)
- 2003 – 18 (25%)
- 2004 – 12 (17%)
- 2005 – 12 (17%)

There were no fatalities involved in the reportable crash data. The majority of the crashes (50%) were Property Damage Only (PDO), and minor injuries accounted for 33 percent. Angle crashes were the most common type accounting for 55 percent, followed by hit fixed object accounting for 29 percent.

There were two (2) crash cluster locations on Wrightstown Road. The cluster at Durham Road had 17 crashes (14 angle, 3 rear end) and the cluster at Eagle Road had 15 crashes (all angle).

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks and traffic volumes.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is immediate, occurring one year or less; the second is short term, occurring in one to three years; and the third is long term, occurring in three years or more.

A sketch of the proposed Durham Road and Wrightstown / Worthington Mill Road Intersection Improvements (by others under a separate project) is included in Appendix D.

Table 5-10a: Wrightstown Road Proposed Immediate Improvements

Signage Improvements		
ID	Description	Cost
SI-10-IM1	Remove 40 MPH speed plaques on curve warning signs. The posted speed limit on Wrightstown Road used to be 45 MPH and was recently changed to 40 MPH. <i>(Upper Makefield and Wrightstown Townships)</i>	\$200
SI-10-IM2	Install Advanced Street Name Plaque (W16-8) at the following locations: <ul style="list-style-type: none"> • Wrightstown Road before the intersection at Eagle Road. There are existing Stop Ahead Warning Signs in each direction that these name plaques can be attached to. • Wrightstown Road before the intersection at Highland Road. There are existing Intersection Ahead Warning Signs in each direction that these name plaques can be attached to. <i>(Upper Makefield Township)</i>	\$300
SI-10-IM3	Install Chevron Signs (W1-8) at the following locations: <ul style="list-style-type: none"> • Wrightstown Road on the two curves between Verduci Drive and Old Dolington Road, in both directions. There are some existing chevron signs, but the curves are so sharp that more should be installed to help the drivers navigate the curve. • Wrightstown Road on the curve at Hampton Court, in both directions. There is an existing large arrow sign, but chevrons will delineate the curve and help drivers navigate the roadway. • Wrightstown Road on the left curve, going eastbound, between Cooper Road and McConkey Drive. <i>(Upper Makefield and Wrightstown Townships)</i>	\$1,500
Total Signage Improvements Cost		\$2,000
Total Immediate Improvements Cost		\$2,000

Table 5-10b: Wrightstown Road Proposed Short-term Improvements

Highway Maintenance Improvements		
ID	Description	Cost
HM-10-ST1	Consider filling in the swales with stone in the following locations: <ul style="list-style-type: none"> • Wrightstown Road in both directions, west of Penn Oak Trail; • Wrightstown Road in both directions, at Woodland Drive; • Wrightstown Road in both directions, east of Highland Road; and • Wrightstown Road eastbound on the right curve between Verduci Drive and Old Dolington Road. (<i>Upper Makefield and Wrightstown Townships</i>) (635 CY @ \$60/CY)	\$38,100
HM-10-ST2	Install guiderail delineation (reflectors) throughout Wrightstown Road as new guiderail is added or reconstructed. (<i>Upper Makefield and Wrightstown Townships</i>) (45 delineators for existing guiderail @ \$20/delineator)	\$900
Total Highway Maintenance Improvements Cost		\$39,000
Geometric Improvements		
ID	Description	Cost
GI-10-ST1	Move forward with Durham Road and Wrightstown / Worthington Mill Road Intersection Improvement Project. (<i>Wrightstown Township</i>)	\$1,000,000
Total Geometric Improvements Cost		\$1,000,000
Total Short-term Improvements Cost		\$1,039,000

11. Mill Creek Road / Washington Avenue / Cherry Lane

Project Location

The study corridor begins at Swamp Road (S.R. 2036) and terminates at Second Street Pike (S.R. 0232) entirely in Wrightstown Township, as shown in Figure 5-1. The study corridor is approximately 3.1 miles long with five (5) unsignalized intersections of consequence. The cross-section is that of a two-lane, undivided Urban Collector. The corridor is designated as S.R. 2091.

The Mill Creek Road / Washington Avenue / Cherry Lane Corridor serves as a collector between the Swamp Road, Township Line Road, and Second Street Pike Corridors.



*Typical section of Mill Creek Road just north of Swamp Road
Photo by: Jacobs Edwards and Kelcey*

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

The Mill Creek Road / Washington Avenue / Cherry Lane Corridor has one on-going transportation study and engineering effort adjacent to the corridor. A summary of the known engineering study and design project follows:

- *Swamp Road Corridor Improvement Project* - in Newtown and Wrightstown Townships is currently in the environmental clearance and preliminary engineering phase by PennDOT. Public outreach and community involvement activities are accompanying the project’s development which may include: minor roadway widening, horizontal and vertical curve realignment, shoulder rehabilitation, associated drainage improvements, widening / replacement of some bridges and culverts along the corridor, and new signalization. The construction cost estimate for a full reconstruction project is approximately \$14 million and is scheduled for construction after Fiscal Year 2009.



*One-lane bridge on Mill Creek Road just north of the Miller Quarry Entrance
Photo by: Jacobs Edwards and Kelcey*

Existing Conditions

The study corridor generally runs in an north-south direction. There are two (2) narrow bridge structures along Mill Creek Road. There are several sharp horizontal curves and steep grades along the Mill Creek Road segment of the corridor between Swamp Road and Washington Avenue. The lack of site distance just north of the Miller Quarry may pose a hazardous condition to vehicles traversing this stretch of the corridor. There is also a sharp horizontal curve at the intersection of Washington Avenue and Cherry Lane. Mill Creek Road / Washington Avenue / Cherry Lane generally provides two lanes of traffic with a 22-foot wide bituminous cartway with little to no shoulders. The posted speed limit varies from 35 MPH to 45 MPH. From Swamp Road to Cherry Lane, the posted speed limit is 35 MPH. From Cherry Lane to Second Street Pike, the posted speed limit is 45 MPH. There is a speed advisory sign of 25 MPH for a curve along Washington Avenue.

The primary land use along Mill Creek Road / Washington Avenue / Cherry Lane are single-family residential (approximately 46 percent). Other land uses include wooded areas (approximately 27 percent), agriculture (approximately 16 percent), commercial (approximately 4 percent), and mining (approximately 3 percent). The entrance to Miller Quarry is located along Mill Creek Road. The Lingohocken Fire Company is located at the corner of Mill Creek Road and Washington Road. Cherry Lane features single-family residences and an equestrian center.

The 3.1-mile long corridor presently contains five (5) intersections of consequence; all are unsignalized.

- Swamp Road & Mill Creek Road (unsignalized)
- Cedar Lane & Mill Creek Road (unsignalized)
- Mill Creek Road & Washington Avenue (unsignalized)
- Washington Avenue & Cherry Lane (unsignalized)
- Second Street Pike & Cherry Lane (unsignalized)

Traffic Data

Automated Traffic Recorder (ATR) counts were conducted by DVRPC at two (2) locations to determine the existing traffic volumes and vehicle classifications on Mill Creek Road / Washington Avenue / Cherry Lane. The first ATR count was conducted between Swamp Road and Washington Avenue along Mill Creek Road on Tuesday, October 4, 2005. The second ATR count was conducted between Mill Creek Road and Second Street Pike along Cherry Lane on Tuesday, April 26, 2005. For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)

Between Swamp Road and Washington Avenue

Northbound: Mill Creek Road – 29 vehicles, 48.3% trucks (7:00 – 8:00 A.M.)

Southbound: Mill Creek Road – 40 vehicles, 65.0% trucks (6:00 – 7:00 A.M.)

Combined: Mill Creek Road – 60 vehicles, 56.7% trucks (6:00 – 7:00 A.M.)

Between Mill Creek Road and Second Street Pike

Eastbound: Cherry Lane – 46 vehicles, 8.7% trucks (8:00 – 9:00 A.M.)

Westbound: Cherry Lane – 62 vehicles, 9.7% trucks (4:00 – 5:00 P.M.)

Combined: Cherry Lane – 102 vehicles, 9.8% trucks (4:00 – 5:00 P.M.)



*Typical Section along Washington Avenue
Photo by: Jacobs Edwards and Kelcey*

Average Daily Traffic (ADT) Volumes

Between Swamp Road and Washington Avenue

Northbound: Mill Creek Road – 276 vehicles, 19.2% trucks, 4 motorcycles, 3 buses

Southbound: Mill Creek Road – 346 vehicles, 22.8% trucks, 5 motorcycles, 5 buses

Combined: Mill Creek Road – 622 vehicles, 21.2% trucks, 9 motorcycles, 8 buses

Between Mill Creek Road and Second Street Pike

Eastbound: Cherry Lane – 422 vehicles, 8.1% trucks, 10 motorcycles, 9 buses

Westbound: Cherry Lane – 459 vehicles, 5.2% trucks, 5 motorcycles, 7 buses

Combined: Cherry Lane – 901 vehicles, 6.7% trucks, 15 motorcycles, 16 buses

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory volume to capacity analysis to evaluate any operational and/or congestion concerns.

Crash Summary

Reportable crash data along the Mill Creek Road / Washington Avenue / Cherry Lane Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 11 crashes occurred within the corridor limits. There were a total of 15 vehicles involved in the 11 crashes on Mill Creek Road / Washington Avenue / Cherry Lane in the five year period. Of the 15 vehicles, two (2) large trucks were involved in two (2) separate crashes, constituting less than 14 percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 6 (55%)
- 2002 – 4 (36%)
- 2003 – 0 (0%)
- 2004 – 1 (9%)
- 2005 – 0 (0%)

There were no fatalities involved in the reportable crash data. The majority of the crashes (36%) were minor injuries, and moderate injuries and Property Damage Only (PDO) each accounted for 27 percent. Hit fixed object crashes were the most common type accounting for 45 percent, followed by rear end crashes accounting for 36 percent.

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks and roadway alignment.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is immediate, occurring one year or less; the second is short term, occurring in one to three years; and the third is long term, occurring in three years or more.

Table 5-11a: Mill Creek Road / Washington Avenue / Cherry Lane Proposed Immediate Improvements

Signage Improvements		
ID	Description	Cost
SI-11-IM1	Install Chevron Signs (W1-8) on curves along Mill Creek Road. (<i>Wrightstown Township</i>) (15 signs @ \$100/sign)	\$1,500
Total Signage Improvements Cost		\$1,500
Total Immediate Improvements Cost		\$1,500

Table 5-11b: Mill Creek Road / Washington Avenue / Cherry Lane Proposed Short-term Improvements

Pavement Marking Improvements		
ID	Description	Cost
PM-11-ST1	Install raised pavement markings on curves along Mill Creek Road. (<i>Wrightstown Township</i>)	\$3,600
Total Pavement Marking Improvements Cost		\$3,600

Highway Maintenance Improvements		
ID	Description	Cost
HM-11-ST1	Install guiderail at culvert across from Miller Quarry Entrance in accordance with Department Publication 13M (DM-2) – Embankment Height and Culvert Headwall within Clear Zone. <i>(Wrightstown Township)</i> (150 LF Type 2-S Guiderail @ \$25/LF)	\$3,750
HM-11-ST2	Install guiderail delineators (reflectors) along Mill Creek Road / Washington Avenue / Cherry Lane as new guiderail is added or reconstructed. <i>(Wrightstown Township)</i> (120 delineators for existing guiderail @ \$20/delineator)	\$2,400
HM-11-ST3	Consider install stone base in the areas that the soil significantly drops off on the west side of the road surface along Mill Creek Road. Also, consider install stone in the swales along Washington Avenue and Cherry Avenue. <i>(Wrightstown Township)</i> (970 CY @ \$60/CY)	\$58,200
HM-11-ST4	Install proper end treatments on guiderail near Cedar Lane. <i>(Wrightstown Township)</i> (2 Type 2 Strong Post End Treatments @ \$900/Treatment)	\$1,800
HM-11-ST5	Install a headwall at the pipe south of Miller Quarry and the pipe between Miller Quarry and Cedar Lane. <i>(Wrightstown Township)</i> (4 Type D Endwalls @ \$2,500/Endwall)	\$10,000
HM-11-ST6	Fix the pavement along the edge of the road on Mill Creek Road at the intersection with Swamp Road. There are potholes and part of the pavement has rutted away. <i>(Wrightstown Township)</i> (275 SY @ \$50/SY)	\$13,750
Total Highway Maintenance Improvements Cost		\$89,900

Geometric Improvements		
ID	Description	Cost
GI-11-ST1	Construct one to two-foot shoulders where there are currently no shoulders along Washington Avenue and Cherry Lane. <i>(Wrightstown Township)</i> (1,800 SY @ \$85/SY)	\$153,000
Total Geometric Improvements Cost		\$153,000

Total Short-term Improvements Cost		\$246,500
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12. Township Line Road / Mill Creek Road

Project Location

The study corridor begins at Washington Avenue (S.R. 2091) and terminates at Durham Road (S.R. 0413) entirely in Wrightstown Township, as shown in Figure 5-1. The study corridor is approximately 1.4 miles long with one (1) signalized intersection and four (4) unsignalized intersections of consequence. The cross-section is that of a two-lane, undivided Urban Collector. The corridor is designated as S.R. 2115.

The Township Line Road / Mill Creek Road Corridor serves as a collector between the Durham Road, Cherry Lane, and Washington Avenue Corridors.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

There are no known on-going transportation studies and/or engineering efforts on and/or adjacent to the corridor.

Existing Conditions

The study corridor generally runs in a north-south direction. There are no steep grades or sharp horizontal curves. Township Line Road / Mill Creek Road generally provides two lanes of traffic with a 22-foot wide bituminous cartway with little to no shoulders. The posted speed limit varies from 35 MPH to 45 MPH. From Washington Avenue to Brian Lane, the posted speed limit is 35 MPH. From Brian Lane to Durham Road, the posted speed limit is 45 MPH.

The primary land use along Township Line Road / Mill Creek Road are single-family residential (approximately 79 percent). Other land uses include agriculture (approximately 14 percent) and commercial (approximately 7 percent). There are some neighborhood services near the intersection of Mill Creek Road and Township Line Road. The Wycombe Inn is also located along Mill Creek Road.



*Post Office and single-family residences along Township Line Road
Photo by: Jacobs Edwards and Kelcey*

The 1.4-mile long corridor presently contains one (1) signalized intersection and four (4) unsignalized intersections of consequence.

- Washington Avenue & Mill Creek Road (unsignalized)
- Mill Creek Road & Township Line Road (unsignalized)
- Park Avenue & Township Line Road (unsignalized)
- Cherry Lane & Township Line Road (unsignalized)
- Durham Road & Township Line Road

Traffic Data

Automated Traffic Recorder (ATR) counts were conducted by DVRPC at two (2) locations to determine the existing traffic volumes and vehicle classifications on Township Line Road / Mill Creek Road. The first ATR count was conducted between Washington Avenue and Township Line Road / Forest Grove Road along Mill Creek Road on Tuesday, October 4, 2005. The second ATR count was conducted between Mill Creek Road and Durham Road along Township Line Road on Tuesday, April 26, 2005. For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)*Between Washington Avenue and Township Line Road / Forest Grove Road*

Northbound: Mill Creek Road – 60 vehicles, 10.0% trucks (6:00 – 7:00 P.M.)
 Southbound: Mill Creek Road – 55 vehicles, 30.9% trucks (7:00 – 8:00 A.M.)
 Combined: Mill Creek Road – 106 vehicles, 9.4% trucks (5:00 – 6:00 P.M.)

Between Mill Creek Road and Durham Road

Eastbound: Township Line Road – 118 vehicles, 7.6% trucks (7:00 – 8:00 A.M.)
 Westbound: Township Line Road – 114 vehicles, 1.8% trucks (5:00 – 6:00 P.M.)
 Combined: Township Line Road – 216 vehicles, 2.8% trucks (5:00 – 6:00 P.M.)

Average Daily Traffic (ADT) Volumes*Between Washington Avenue and Township Line Road / Forest Grove Road*

Northbound: Mill Creek Road – 705 vehicles, 16.0% trucks, 4 motorcycles, 7 buses
 Southbound: Mill Creek Road – 587 vehicles, 15.5% trucks, 7 motorcycles, 5 buses
 Combined: Mill Creek Road – 1,292 vehicles, 15.8% trucks, 11 motorcycles, 12 buses

Between Mill Creek Road and Durham Road

Eastbound: Township Line Road – 1,301 vehicles, 7.6% trucks, 24 motorcycles, 6 buses
 Westbound: Township Line Road – 1,100 vehicles, 7.4% trucks, 11 motorcycles, 5 buses
 Combined: Township Line Road – 2,401 vehicles, 7.5% trucks, 35 motorcycles, 11 buses

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory volume to capacity analysis to evaluate any operational and/or congestion concerns.

Crash Summary

Reportable crash data along the Township Line Road / Mill Creek Road Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 10 crashes occurred within the corridor limits. There were a total of 20 vehicles involved in the 10 crashes on Township Line Road / Mill Creek Road in the five year period. Of the 20 vehicles, none were large trucks.



*Township Line Road (looking southbound) near
 Cherry Lane
 Photo by: Jacobs Edwards and Kelcey*

The record of reportable crashes per year is shown below:

- 2001 – 2 (20%)
- 2002 – 2 (20%)
- 2003 – 0 (0%)
- 2004 – 3 (30%)
- 2005 – 3 (30%)

There were no fatalities involved in the reportable crash data. The majority of the crashes (60%) were Property Damage Only (PDO), and minor injuries accounted for 30 percent. Rear end crashes were the most common type accounting for 40 percent, followed by angle crashes accounting for 30 percent and hit fixed object crashes accounting for 20 percent.

There were no crash cluster locations along Township Line Road / Mill Creek Road.

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks and roadway alignment.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were all considered short term, occurring in one to three years.

Table 5-12a: Township Line Road / Mill Creek Road Proposed Short-term Improvements

Highway Maintenance Improvements		
ID	Description	Cost
HM-12-IM1	Install guiderail on southbound Mill Creek Road between Washington Avenue & Township Line Road in accordance with Department Publication 13M (DM-2) – Headwall within Clear Zone. <i>(Wrightstown Township)</i> (200 LF Type 2-S Guiderail @ \$25/LF)	\$5,000
HM-12-IM2	Consider installing stone base in the areas that the soil significantly drops off on the west side of the road surface along Township Line Road near Cherry Lane. <i>(Wrightstown Township)</i> (100 CY @ \$60/CY)	\$6,000
HM-12-IM3	Remove guiderail on northbound Township Line Road just north of Cherry Lane. <i>(Wrightstown Township)</i> (200 LF @ \$10/LF)	\$2,000
Total Highway Maintenance Improvements Cost		\$13,000
Total Short-term Improvements Cost		\$13,000

13. Newtown Bypass / Durham Road / Washington Crossing Road

Project Location

The study corridor begins at Swamp Road (S.R. 2036) in Newtown Township, continues through Lower Makefield Township, and terminates at Taylorsville Road (S.R. 2071) in Upper Makefield Township, as shown in Figure 5-1. The study corridor is approximately 6.0 miles long with seven (7) signalized intersections and five (5) unsignalized intersections of consequence. The cross-section is that of a four-lane, undivided Urban Principal Arterial from Swamp Road to Durham Road, and a two-lane, undivided Urban Minor Arterial from Durham Road to Taylorsville Road. The corridor is designated as S.R. 0532.

The Newtown Bypass / Durham Road / Washington Crossing Road Corridor serves as part of a key link into New Jersey from Bucks County at Washington Crossing and Newtown.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

The Newtown Bypass / Durham Road / Washington Crossing Road Corridor has several on-going transportation studies and engineering efforts on and adjacent to the corridor that are in different phases. A summary of the known engineering studies and design projects follows:

- Swamp Road Corridor Improvement Project* - in Newtown and Wrightstown Townships is currently in the environmental clearance and preliminary engineering phase by PennDOT. Public outreach and community involvement activities are accompanying the project's development which may include: minor roadway widening, horizontal and vertical curve realignment, shoulder rehabilitation, associated drainage improvements, widening / replacement of some bridges and culverts along the corridor, and new signalization. The construction cost estimate for a full reconstruction project is approximately \$14 million and is scheduled for construction after Fiscal Year 2009.
- Newtown Bypass Traffic Signal Enhancement Initiative* - in Lower Makefield and Newtown townships is currently in the implementation phase by the involved municipalities and PennDOT, and includes traffic signal retiming, improved coordination, and phasing adjustments for 11 signalized intersections along the Newtown Bypass. The TSEI goal is to reduce corridor travel time and delay through low-cost immediate improvements. Signal timing modifications were initially implemented in summer 2007.
- PA 413 Access Management Plan* - in Newtown and Wrightstown townships is currently in the planning stage by DVRPC. The case study spans Durham Road between the Newtown Bypass and Second Street Pike to illustrate tangible ways of introducing access management measures (e.g. sharing or restricting access, proper driveway placement and design, uniform signalized intersection spacing, etc.) within the corridor. The work is being performed with the participation of member governments, regional transportation providers, and PennDOT.
- Stoopville Road Traffic Calming Plan* - in Newtown Township is currently in the engineering phase by the Township and includes various traffic calming measures including gateways, roundabouts, landscaped medians, decorative crosswalks, chicanes, and a multi-use trail.
- Washington Crossing Gateway Park* - in Upper Makefield Township includes a linear pedestrian / bike system and is designed within the rights-of-way of General Washington Memorial Boulevard, River Road, and Taylorsville Road as a municipal park in the village of Washington Crossing. It will link several detached state-owned recreation and historic sites with ADA ramps, sidewalks, crosswalks, and streetscape improvements.



Newtown Shopping Center
Photo by: Jacobs Edwards and Kelcey

Existing Conditions

The study corridor generally runs in an east-west direction along the Newtown Bypass / Durham Road segment and north-south direction along the Washington Crossing Road segment. There are no sharp curves or steep grades throughout the study limits. The Newtown Bypass segment of the corridor generally provides four 12-foot

bituminous lanes with full paved shoulders and left turn lanes in each direction. The Durham Road / Washington Crossing Road segment of the corridor generally provides two lanes of traffic with a 22-foot wide bituminous cartway with paved shoulders of varying width. The posted speed limit varies from 35 MPH to 45 MPH. From Swamp Road to Durham Road, the posted speed limit is 55 MPH. From Durham Road to Balderston Drive, the posted speed limit is 45 MPH. From Balderston Drive to Old Dolington Road, the posted speed limit is 35 MPH. From Old Dolington Road to Taylorsville Road, the posted speed limit is 45 MPH.

The primary land use along Newtown Bypass / Durham Road / Washington Crossing Road is single-family residential (approximately 36 percent) and multi-family residential (approximately 2 percent). Other land uses include wooded areas (approximately 25 percent) and agriculture (approximately 21 percent). The Newtown Bypass / Durham Road Segment includes the Newtown Shopping Center, which is a regional shopping center. The Washington Crossing Road segment is primarily single-family residential, agricultural and wooded lands.

The 6.0-mile long corridor presently contains seven (7) signalized intersections and five (5) unsignalized intersections of consequence.

- Swamp Road & Newtown Bypass
- Durham Road & Newtown Bypass
- Eagle Road & Durham Road
- Durham Road & Washington Crossing Road
- Linton Hill Road & Washington Crossing Road
- Stoopville Road & Washington Crossing Road (unsignalized)
- Highland Road & Washington Crossing Road (unsignalized)
- Lindenhurst Road & Washington Crossing Road
- Dolington Road & Washington Crossing Road (unsignalized)
- Old Dolington Road & Washington Crossing Road (unsignalized)
- Wrightstown Road & Washington Crossing Road (unsignalized)
- Taylorsville Road & Washington Crossing Road



*Washington Crossing Road (looking southbound)
between Wrightstown Road and Meadowview Drive
Photo by: Jacobs Edwards and Kelcey*

Traffic Data

Automatic Traffic Recorder (ATR) counts were conducted by DVRPC at six (6) locations to determine the existing traffic volumes and vehicle classification on the Newtown Bypass / Durham Road / Washington Crossing Road as follows:

- between Swamp Road and Durham Road along the Newtown Bypass on Tuesday, May 3, 2005.
- between Durham Road and Sycamore Street along Durham Road on Tuesday, June 7, 2005.
- between Sycamore Street and Stoopville Road along Washington Crossing Road on Tuesday, June 7, 2005.
- between Stoopville Road and Lindenhurst Road on Thursday, June 9, 2005.
- between Dolington Road and Wrightstown Road on Tuesday, April 26, 2005.
- between Wrightstown Road and Taylorsville Road on Tuesday, April 26, 2005.

For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)

Between Swamp Road and Durham Road

Northbound: Newtown Bypass – 945 vehicles, 1.9% trucks (5:00 – 6:00 P.M.)
Southbound: Newtown Bypass – 1,088 vehicles, 1.4% trucks (5:00 – 6:00 P.M.)
Combined: Newtown Bypass – 2,033 vehicles, 1.6% trucks (5:00 – 6:00 P.M.)

Between Durham Road and Sycamore Street

Eastbound: Durham Road – 483 vehicles, 5.6% trucks (7:00 – 8:00 A.M.)
Westbound: Durham Road – 599 vehicles, 7.0% trucks (5:00 – 6:00 P.M.)
Combined: Durham Road – 966 vehicles, 6.3% trucks (5:00 – 6:00 P.M.)

Between Sycamore Street and Stoopville Road

Northbound: Washington Crossing Road – 384 vehicles, 5.7% trucks (7:00 – 8:00 A.M.)

Southbound: Washington Crossing Road – 418 vehicles, 8.4% trucks (5:00 – 6:00 P.M.)

Combined: Washington Crossing Road – 717 vehicles, 5.7% trucks (5:00 – 6:00 P.M.)

Between Stoopville Road and Lindenhurst Road

Eastbound: Washington Crossing Road – 719 vehicles, 4.7% trucks (7:00 – 8:00 A.M.)

Westbound: Washington Crossing Road – 715 vehicles, 2.1% trucks (5:00 – 6:00 P.M.)

Combined: Washington Crossing Road – 1,098 vehicles, 2.5% trucks (5:00 – 6:00 P.M.)

Between Dolington Road and Wrightstown Road

Northbound: Washington Crossing Road – 183 vehicles, 9.8% trucks (8:00 – 9:00 A.M.)

Southbound: Washington Crossing Road – 161 vehicles, 8.7% trucks (8:00 – 9:00 A.M.)

Combined: Washington Crossing Road – 344 vehicles, 9.3% trucks (8:00 – 9:00 A.M.)

Between Wrightstown Road and Taylorsville Road

Northbound: Washington Crossing Road – 272 vehicles, 9.6% trucks (7:00 – 8:00 A.M.)

Southbound: Washington Crossing Road – 251 vehicles, 6.8% trucks (3:00 – 4:00 P.M.)

Combined: Washington Crossing Road – 492 vehicles, 7.9% trucks (8:00 – 9:00 A.M.)

Average Daily Traffic (ADT) Volumes*Between Swamp Road and Durham Road*

Northbound: Newtown Bypass – 10,192 vehicles, 5.1% trucks, 22 motorcycles, 75 buses

Southbound: Newtown Bypass – 13,289 vehicles, 3.1% trucks, 45 motorcycles, 62 buses

Combined: Newtown Bypass – 23,481 vehicles, 4.0% trucks, 67 motorcycles, 137 buses

Between Durham Road and Sycamore Street

Eastbound: Durham Road – 5,488 vehicles, 5.9% trucks, 25 motorcycles, 19 buses

Westbound: Durham Road – 5,417 vehicles, 5.6% trucks, 15 motorcycles, 29 buses

Combined: Durham Road – 10,905 vehicles, 5.8% trucks, 40 motorcycles, 48 buses

Between Sycamore Street and Stoopville Road

Northbound: Washington Crossing Road – 4,078 vehicles, 3.6% trucks, 5 motorcycles, 39 buses

Southbound: Washington Crossing Road – 3,846 vehicles, 8.2% trucks, 9 motorcycles, 36 buses

Combined: Washington Crossing Road – 7,943 vehicles, 5.8% trucks, 14 motorcycles, 75 buses

Between Stoopville Road and Lindenhurst Road

Eastbound: Washington Crossing Road – 5,516 vehicles, 6.5% trucks, 33 motorcycles, 31 buses

Westbound: Washington Crossing Road – 5,391 vehicles, 6.9% trucks, 36 motorcycles, 31 buses

Combined: Washington Crossing Road – 10,907 vehicles, 6.7% trucks, 69 motorcycles, 62 buses

Between Dolington Road and Wrightstown Road

Northbound: Washington Crossing Road – 2,057 vehicles, 6.4% trucks, 17 motorcycles, 19 buses

Southbound: Washington Crossing Road – 1,844 vehicles, 6.3% trucks, 10 motorcycles, 18 buses

Combined: Washington Crossing Road – 3,901 vehicles, 6.4% trucks, 27 motorcycles, 37 buses

Between Wrightstown Road and Taylorsville Road

Northbound: Washington Crossing Road – 3,205 vehicles, 6.2% trucks, 10 motorcycles, 27 buses

Southbound: Washington Crossing Road – 2,959 vehicles, 5.8% trucks, 6 motorcycles, 25 buses

Combined: Washington Crossing Road – 6,164 vehicles, 6.0% trucks, 16 motorcycles, 52 buses

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory capacity analysis to evaluate any operational and/or congestion concerns. A cursory volume to capacity analysis was also performed on Newtown Bypass / Durham Road / Washington Crossing Road to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Crash Summary

Reportable crash data along the Newtown Bypass / Durham Road / Washington Crossing Road Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 174 crashes occurred within the corridor limits. There were a total of 314 vehicles involved in the 174 crashes on Newtown Bypass / Durham Road / Washington Crossing Road in the five year period. Of the 314 vehicles, seven (7) large trucks were involved in six (6) separate crashes, constituting less than three (3) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 33 (19%)
- 2002 – 51 (29%)
- 2003 – 32 (18%)
- 2004 – 38 (22%)
- 2005 – 20 (12%)

There was one (1) fatality involved in the reportable crash data. The fatality occurred at the intersection of Linton Hill Road and Washington Crossing Road resulting from an angle crash. The majority of the crashes (47%) were Property Damage Only (PDO), and minor injuries accounted for 33 percent. Angle crashes were the most common type of crash accounting for 39 percent of the crashes, followed by hit fixed object crashes accounting for 24 percent of the crashes and rear end crashes accounting for 22 percent of the crashes.

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions. A cursory analysis was also performed on Newtown Bypass / Durham Road / Washington Crossing Road to evaluate the impacts of potentially diverted traffic volumes from operational changes in other area roadways.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry trucks, roadway alignment, traffic congestion and traffic volumes.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were all considered short term, occurring in one to three years.

An alternative for the Stoopville Road and Washington Crossing Road Intersection is included in Section 4 in Figure 5-3.

Table 5-13a: Newtown Bypass / Durham Road / Washington Crossing Road Proposed Short-term Improvements

Highway Maintenance Improvements		
ID	Description	Cost
HM-13-ST1	Fix and lengthen existing guiderail on Durham Road eastbound between Durham Road and Eagle Road in accordance with Department Publication 13M (DM-2) – Headwall within Clear Zone. (<i>Newtown Township</i>) (100 LF Type 2-S Guiderail @ \$25/LF; (2 Type 2 Strong Post End Treatments @ \$900/Treatment)	\$4,300
HM-13-ST2	Replace railing on bridge on Washington Crossing Road before Taylorsville Road. (<i>Upper Makefield Township</i>) (300 LF Aluminum Bridge Railing @ \$200/LF)	\$60,000
HM-13-ST3	Install guiderail in the following locations: <ul style="list-style-type: none"> Washington Crossing Road northbound, just south of Linton Hill Road; Washington Crossing Road northbound, north of Gauks Lane; and in accordance with Department Publication 13M (DM-2) – Headwall within Clear Zone. (<i>Newtown Township</i>) (800 LF Type 2-S Guiderail @ \$25/LF)	\$20,000
HM-13-ST4	Consider filling in the swales with stone in the following locations: <ul style="list-style-type: none"> Washington Crossing Road southbound, at Durham Road; Washington Crossing Road southbound, just north of Pickering Drive; Washington Crossing Road in both directions, south of Stoopville Road; Washington Crossing Road in both directions, north of Stoopville Road; and Washington Crossing Road in both directions, south of Aqueduct Road. (<i>Lower Makefield, Newtown and Upper Makefield Townships</i>) (470 CY @ \$60/CY)	\$28,200
HM-13-ST5	Fix the headwalls in the following locations: <ul style="list-style-type: none"> Washington Crossing Road northbound, north of Gauks Lane; and Washington Crossing Road northbound, north of Dolington Road. (<i>Lower Makefield, Newtown and Upper Makefield Townships</i>) (4 Type D Endwalls @ \$2,500/Endwall)	\$10,000
HM-13-ST6	Install delineators on existing guiderail at the following locations as new guiderail is added or reconstructed: <ul style="list-style-type: none"> Washington Crossing Road at Dolington Road. Washington Crossing Road, north of Aqueduct Road. (<i>Lower Makefield and Upper Makefield Townships</i>) (25 delineators for existing guiderail @ \$20/delineator)	\$500
Total Highway Maintenance Improvements Cost		\$123,000
Total Short-term Improvements Cost		\$123,000

Table 5-13b: Newtown Bypass / Durham Road / Washington Crossing Road Proposed Long-term Improvements

Geometric Improvements		
ID	Description	Cost
GI-13-LT1	Consider a roundabout at the intersection of Washington Crossing Road and Stoopville Road as future development warrants improvements (See Figure 5-3). <i>(Lower Makefield, Newtown and Upper Makefield Townships)</i>	\$1,000,000
Total Geometric Improvements Cost		\$1,000,000
Total Long-term Improvements Cost		\$1,000,000

14. Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road

Project Location

The study corridor begins at West Trenton Avenue (S.R. 2018) in Lower Makefield Township, through Yardley Borough, and terminates at River Road (S.R. 0032) in Upper Makefield Township, as shown in Figure 5-1. The study corridor is approximately 9.2 miles long with seven (7) signalized intersections and seven (7) unsignalized intersections of consequence. The cross-section is that of a two-lane, undivided Urban Minor Arterial. The corridor is designated as S.R. 2071.

The Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road Corridor serves as part of a key link from Upper Bucks County, just above Washington Crossing, through Yardley, and Morrisville. The corridor connects River Road, Interstate 95, US Route 1 and US Route 13.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering / construction efforts along this corridor.

Concurrent Projects

The Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road Corridor has several on-going transportation studies and engineering efforts on and adjacent to the corridor that are in different phases. A summary of the known engineering studies and design projects follows

- *Yardley Borough Drainage Improvements* - in Yardley Borough on Main Street from PA 332 to Silver Creek Bridge is currently in the engineering phase by PennDOT and includes installation of storm sewer inlets and piping to correct extremely poor drainage facilities which cause the roadway to flood during rainfalls. The construction cost estimate for the project is \$500,000, and is scheduled for construction in Fiscal Year 2008.
- *Washington Crossing Gateway Park* - in Upper Makefield Township includes a linear pedestrian / bike system and is designed within the rights-of-way of General Washington Memorial Boulevard, River Road, and Taylorsville Road as a municipal park in the village of Washington Crossing. It will link several detached state-owned recreation and historic sites with ADA ramps, sidewalks, crosswalks, and streetscape improvements.
- *River Road Bridge Replacement over the Pennsylvania Canal* – in Upper Makefield Township includes a bridge replacement over the Pennsylvania Canal to provide for seven feet of underclearance under the new bridge for the Delaware Canal Towpath. The bridge is currently closed to traffic and is diverting volume to Taylorsville Road. Construction is slated for fall 2007.
- *I-95 / Scudder Falls Bridge Improvement Project* – in Lower Makefield Township includes preparing an Environmental Assessment to evaluate potential alternatives and select a Preferred Alternative that will improve safety and relieve congestion on the Scudder Falls Bridge and along I-95 from PA Route 332 in Bucks Co., PA to Bear Tavern Road in Mercer Co., NJ. Alternatives are being developed for the Scudder Falls Bridge and I-95 and design options for the interchanges at Taylorsville Road and NJ Route 29.

Existing Conditions

The study corridor generally runs in a north-south direction. There are no sharp curves or steep grades throughout the study limits. Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road generally provides two lanes of traffic with a 22-foot wide bituminous cartway with paved shoulders of varying width. On-street parking exists on northbound Main Street in Yardley Borough. The posted speed limit varies from 25 MPH to 45 MPH. From West Trenton Avenue to Yardley-Morrisville Road, the posted speed limit is 40 MPH. From Yardley-Morrisville Road to Iron Horse Drive, the posted speed limit is 35 MPH. From Iron Horse Drive to Bleachery Lane, the posted speed limit is 25 MPH. From Bleachery Lane to Highland Drive, the posted speed limit is 35 MPH. From Highland Drive to just south of Little Road, the posted speed limit is 45 MPH. From just south of Little Road to Kings Grant Drive, the posted speed limit is 35 MPH. From Kings Grant Drive to River Road, the posted speed limit is 45 MPH.



Main Street in Yardley Borough
Photo by: Jacobs Edwards and Kelcey

The primary land use along Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove is single-family residential (approximately 50 percent) and multi-family residential

(approximately 1 percent). Other land uses include wooded areas (approximately 32 percent) and commercial (approximately 7 percent). The commercial land use is located in Yardley Borough and around the intersection of Washington Crossing Road. Directly north of Interstate 95, the area is mostly wooded with an occasional single-family residence. There are some small-scale commercial and office free-standing buildings around the intersection of Washington Crossing Road. North of that intersection, there are single-family residential subdivisions, single-family residences with direct driveway access, and woods. Slightly south of Interstate 95, the corridor serves as a true main street – with neighborhood-scale uses and a walkable streetscape. Most of the commercial and residential buildings are situated close to the street and community services such as the Yardley post office and borough hall can be found along this stretch. The Yardley SEPTA station including a park-and-ride facility is located near the border of Yardley Borough and Lower Makefield Townships. There is some multi-family residential development near the SEPTA station, however the remainder of residential development in Lower Makefield Township along this roadway is single-family.

The 9.2-mile long corridor presently contains seven (7) signalized intersections and seven (7) unsignalized intersections of consequence.

- W Trenton Avenue & Pine Grove Road
- Big Oak Road & Pine Grove Road
- Yardley-Morrisville Road & Pine Grove Road / Yardley-Morrisville Road
- Edgewood Road / Black Rock Road & Yardley-Morrisville Road
- W Afton Avenue & S Main Street / N Main Street
- Yardley-Dolington Road / Quarry Road & N Main Street / Taylorsville Road (unsignalized)
- I-95 North Ramps & Taylorsville Road (unsignalized)
- I-95 South Ramps & Taylorsville Road (unsignalized)
- Woodside Road & Taylorsville Road
- Mt Eyre Road & Taylorsville Road (unsignalized)
- Aqueduct Road & Taylorsville Road (unsignalized)
- Washington Crossing Road & Taylorsville Road
- Woodhill Road & Taylorsville Road (unsignalized)
- River Road & Taylorsville Road (unsignalized)



Taylorsville Road (looking southbound) approaching Interstate 95
Photo by: Jacobs Edwards and Kelcey

Traffic Data

Automatic Traffic Recorder (ATR) counts were conducted by DVRPC at seven (7) locations to determine the existing traffic volumes and vehicle classifications on Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road as follows:

- between W Trenton Avenue and Big Oak Road along Pine Grove Road on Tuesday, September 27, 2005.
- between Sutphin Road and Edgewood Road / Black Rock Road along Yardley-Morrisville Road on Tuesday, September 27, 2005.
- between Oxford Valley Road and Afton Avenue along South Main Street on Monday, May 2, 2005.
- between Afton Avenue and Dolington Road along North Main Street on Monday, May 2, 2005.
- between Yardley-Dolington Road / McKinley Avenue and I-95 Ramps along Taylorsville Road on Tuesday, June 7, 2005.
- between I-95 Ramps and Washington Crossing Road along Taylorsville Road on Tuesday, June 7, 2005.
- between Washington Crossing Road and Woodhill Road along Taylorsville Road on Tuesday, September 27, 2005.

For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)

Between W Trenton Avenue and Big Oak Road

Northbound: Pine Grove Road – 474 vehicles, 2.3% trucks (5:00 – 6:00 P.M.)

Southbound: Pine Grove Road – 434 vehicles, 4.1% trucks (5:00 – 6:00 P.M.)

Combined: Pine Grove Road – 908 vehicles, 3.2% trucks (5:00 – 6:00 P.M.)

Between Sutphin Road and Edgewood Road / Black Rock Road

Northbound: Yardley-Morrisville Road – 450 vehicles, 6.4% trucks (8:00 – 9:00 A.M.)

Southbound: Yardley-Morrisville Road – 471 vehicles, 3.6% trucks (5:00 – 6:00 P.M.)

Combined: Yardley-Morrisville Road – 899 vehicles, 3.1% trucks (5:00 – 6:00 P.M.)

Between Oxford Valley Road and Afton Avenue

Northbound: S Main Street – 551 vehicles, 4.4% trucks (4:00 – 5:00 P.M.)

Southbound: S Main Street – 535 vehicles, 4.7% trucks (8:00 – 9:00 A.M.)

Combined: S Main Street – 973 vehicles, 3.1% trucks (5:00 – 6:00 P.M.)

Between Afton Avenue and Dolington Road

Northbound: N Main Street – 482 vehicles, 3.5% trucks (7:00 – 8:00 A.M.)

Southbound: N Main Street – 523 vehicles, 3.4% trucks (4:00 – 5:00 P.M.)

Combined: N Main Street – 875 vehicles, 1.8% trucks (5:00 – 6:00 P.M.)

Between Yardley-Dolington Road / McKinley Avenue and I-95 Ramps

Northbound: Taylorsville Road – 920 vehicles, 4.7% trucks (7:00 – 8:00 A.M.)

Southbound: Taylorsville Road – 752 vehicles, 3.1% trucks (5:00 – 6:00 P.M.)

Combined: Taylorsville Road – 1,209 vehicles, 6.3% trucks (7:00 – 8:00 A.M.)

Between I-95 Ramps and Washington Crossing Road

Northbound: Taylorsville Road – 714 vehicles, 2.5% trucks (5:00 – 6:00 P.M.)

Southbound: Taylorsville Road – 658 vehicles, 3.2% trucks (7:00 – 8:00 A.M.)

Combined: Taylorsville Road – 1,143 vehicles, 2.5% trucks (5:00 – 6:00 P.M.)

Between Washington Crossing Road and Woodhill Road

Northbound: Taylorsville Road – 874 vehicles, 2.3% trucks (5:00 – 6:00 P.M.)

Southbound: Taylorsville Road – 779 vehicles, 3.6% trucks (8:00 – 9:00 A.M.)

Combined: Taylorsville Road – 1,372 vehicles, 2.3% trucks (5:00 – 6:00 P.M.)

Average Daily Traffic (ADT) Volumes*Between W Trenton Avenue and Big Oak Road*

Northbound: Pine Grove Road – 4,600 vehicles, 5.5% trucks, 17 motorcycles, 16 buses

Southbound: Pine Grove Road – 4,725 vehicles, 6.4% trucks, 22 motorcycles, 20 buses

Combined: Pine Grove Road – 9,325 vehicles, 6.0% trucks, 39 motorcycles, 36 buses

Between Sutphin Road and Edgewood Road / Black Rock Road

Northbound: Yardley-Morrisville Road – 4,905 vehicles, 4.8% trucks, 23 motorcycles, 16 buses

Southbound: Yardley-Morrisville Road – 5,219 vehicles, 5.4% trucks, 21 motorcycles, 14 buses

Combined: Yardley-Morrisville Road – 10,124 vehicles, 5.1% trucks, 44 motorcycles, 30 buses

Between Oxford Valley Road and Afton Avenue

Northbound: S Main Street – 5,621 vehicles, 5.4% trucks, 24 motorcycles, 23 buses

Southbound: S Main Street – 5,818 vehicles, 4.6% trucks, 20 motorcycles, 29 buses

Combined: S Main Street – 11,439 vehicles, 5.0% trucks, 44 motorcycles, 52 buses

Between Afton Avenue and Dolington Road

Northbound: N Main Street – 5,667 vehicles, 2.9% trucks, 23 motorcycles, 28 buses

Southbound: N Main Street – 5,711 vehicles, 3.8% trucks, 23 motorcycles, 27 buses

Combined: N Main Street – 11,378 vehicles, 3.3% trucks, 46 motorcycles, 55 buses

Between Yardley-Dolington Road / McKinley Avenue and I-95 Ramps

Northbound: Taylorsville Road – 6,570 vehicles, 4.0% trucks, 16 motorcycles, 12 buses

Southbound: Taylorsville Road – 6,542 vehicles, 5.5% trucks, 27 motorcycles, 21 buses

Combined: Taylorsville Road – 13,112 vehicles, 4.8% trucks, 43 motorcycles, 33 buses

Between I-95 Ramps and Washington Crossing Road

Northbound: Taylorsville Road – 6,663 vehicles, 5.6% trucks, 30 motorcycles, 59 buses

Southbound: Taylorsville Road – 6,639 vehicles, 5.0% trucks, 25 motorcycles, 45 buses

Combined: Taylorsville Road – 13,302 vehicles, 5.3% trucks, 55 motorcycles, 104 buses

Between Washington Crossing Road and Woodhill Road

Northbound: Taylorsville Road – 7,531 vehicles, 4.3% trucks, 37 motorcycles, 38 buses

Southbound: Taylorsville Road – 7,183 vehicles, 4.3% trucks, 42 motorcycles, 34 buses

Combined: Taylorsville Road – 14,714 vehicles, 4.3% trucks, 79 motorcycles, 72 buses

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory volume to capacity analysis to evaluate any operational and/or congestion concerns.

Crash Summary

Reportable crash data along the Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 222 crashes occurred within the corridor limits. There were a total of 380 vehicles involved in the 222 crashes on Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road in the five year period. Of the 380 vehicles, 10 large trucks were involved in 10 separate crashes, constituting less than three (3) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 49 (22%)
- 2002 – 57 (26%)
- 2003 – 38 (17%)
- 2004 – 43 (19%)
- 2005 – 35 (16%)

There was one (1) fatality involved in the reportable crash data. The fatality occurred at the mid-block between Crossing Farm Lane and Little Road resulting from a hit fixed object crash. The majority of the crashes (45%) were Property Damage Only (PDO), and minor injuries accounted for 28 percent. Angle and hit fixed object crashes were the most common type of crash each accounting for 31 percent of the crashes, followed by rear end crashes accounting for 23 percent of the crashes.

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: heavy trucks (home construction, landfill, etc.), roadway alignment, traffic congestion and traffic volumes.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is immediate, occurring one year or less; the second is short term, occurring in one to three years; and the third is long term, occurring in three years or more.

An alternative developed for the improvement of the Taylorsville Road / Main Street & Dolington Road / McKinley Avenue intersection is included in Figure 5-9.

Table 5-14a: Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road Proposed Immediate Improvements

Signage Improvements		
ID	Description	Cost
SI-14-IM1	Restore the fallen Curve Ahead Warning Sign and 35 MPH Advisory Sign on Pine Grove Road northbound, just north of Big Oak Road. (<i>Lower Makefield Township</i>)	\$300
SI-14-IM2	Install Advanced Street Name Plaque (W16-8) on existing Intersection Warning Sign at River Road in both directions. (<i>Upper Makefield Township</i>)	\$150
Total Signage Improvements Cost		\$450
Traffic Signal Improvements		
ID	Description	Cost
TS-14-IM1	Replace existing traffic signal lights with LEDs at the intersection of Pine Grove Road and Big Oak Road. (<i>Lower Makefield Township</i>) (8 LEDs @ \$250/LED)	\$2,000
TS-14-IM2	Optimize the traffic signal timings at Pine Grove Road and Big Oak Road. (<i>Lower Makefield Township</i>)	\$3,000
TS-14-IM3	Optimize the traffic signal timings at Yardley-Morrisville Road and Edgewood Road. (<i>Lower Makefield Township</i>)	\$3000
Total Traffic Signal Improvements Cost		\$8,000
Total Immediate Improvements Cost		\$8,450

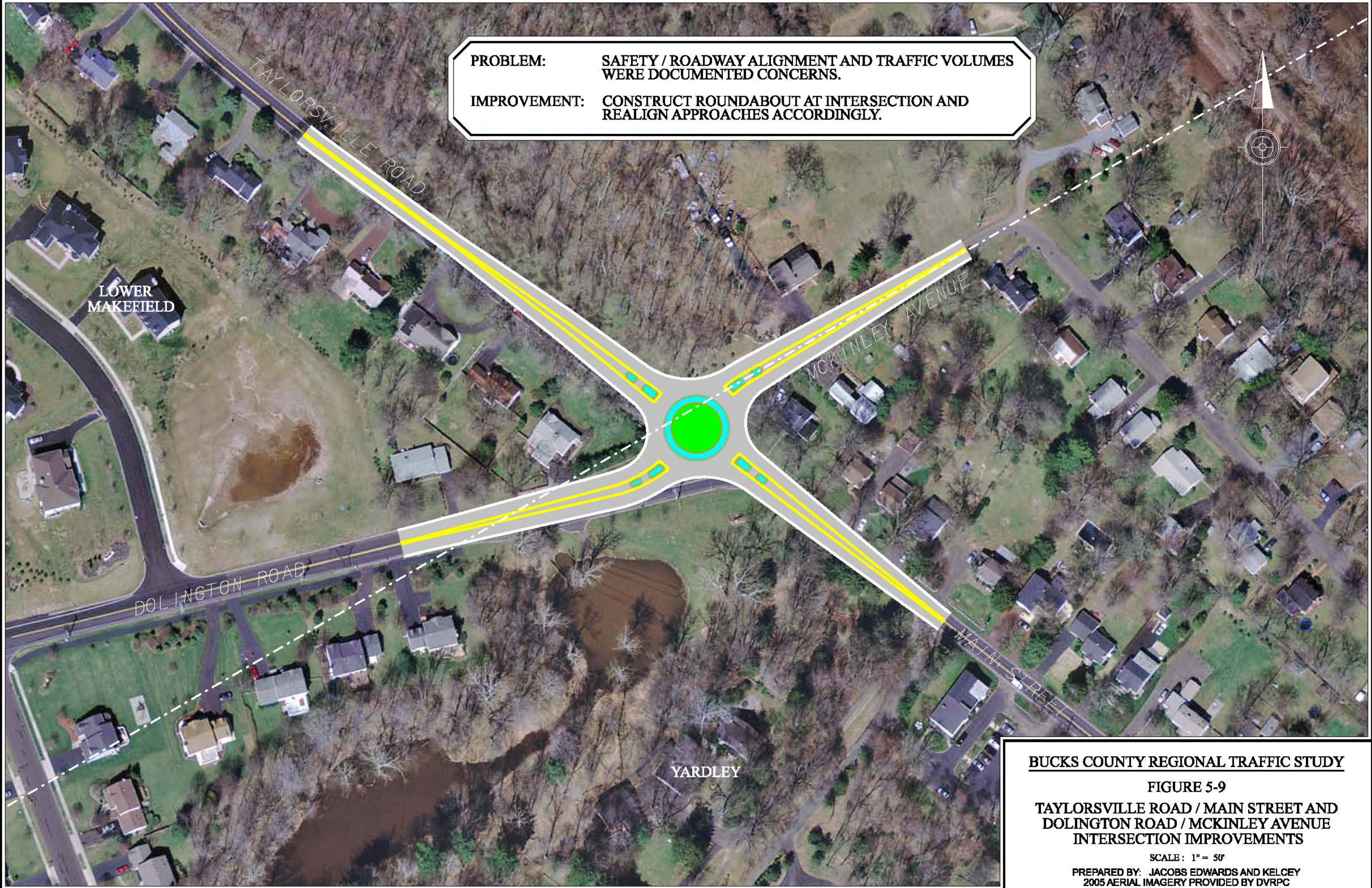
Table 5-14b: Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road Proposed Short-term Improvements

Pavement Marking Improvements		
ID	Description	Cost
PM-14-ST1	Install "SLOW" and arrow pavement markings on Pine Grove Road northbound and southbound on the curve just north of Big Oak Road. (<i>Lower Makefield Township</i>)	\$1,250
Total Pavement Marking Improvements Cost		\$1,250
Highway Maintenance Improvements		
ID	Description	Cost
HM-14-ST1	Install delineators on guiderail on Taylorsville Road just north of Mt Eyre Road as new guiderail is added or reconstructed. (<i>Lower Makefield Township</i>) (15 delineators for existing guiderail @ \$20/delineator)	\$300
HM-14-ST2	Consider filling in the swales with stone on Taylorsville Road northbound, just south of Mt Eyre Road. (<i>Lower Makefield Township</i>) (140 CY @ \$60/CY)	\$8,400
Total Highway Maintenance Improvements Cost		\$8,700
Total Short-term Improvements Cost		\$9,950

Table 5-14c: Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road Proposed Long-term Improvements

Geometric Improvements		
ID	Description	Cost
GI-14-LT1	Improve the intersection of Taylorsville Road / Main Street & Dolington Road / McKinley Avenue with consideration of a roundabout (See Figure 5-9). <i>(Lower Makefield Township and Yardley Borough)</i>	\$1,000,000
GI-14-LT2	Construct gateway-type improvement along Main Street at the railroad track overpass just north of Yardley Drive in Yardley Borough. <i>(Lower Makefield Township and Yardley Borough)</i>	\$50,000
Total Geometric Improvements Cost		\$1,050,000
Total Long-term Improvements Cost		\$1,050,000

PROBLEM: SAFETY / ROADWAY ALIGNMENT AND TRAFFIC VOLUMES WERE DOCUMENTED CONCERNS.
IMPROVEMENT: CONSTRUCT ROUNDABOUT AT INTERSECTION AND REALIGN APPROACHES ACCORDINGLY.



BUCKS COUNTY REGIONAL TRAFFIC STUDY

FIGURE 5-9

**TAYLORSVILLE ROAD / MAIN STREET AND
DOLINGTON ROAD / MCKINLEY AVENUE
INTERSECTION IMPROVEMENTS**

SCALE: 1" = 50'

PREPARED BY: JACOBS EDWARDS AND KELCEY
2005 AERIAL IMAGERY PROVIDED BY DVRPC

15. Yardley-Newtown Road / Yardley-Langhorne Road / Afton Avenue

Project Location

The study corridor begins at Interstate 95 (S.R. 0095) in Lower Makefield Township and terminates at Delaware Avenue (S.R. 0032) in Yardley Borough, as shown in Figure 5-1. The study corridor is approximately 2.7 miles long with four (4) signalized intersections and one (1) unsignalized intersection of consequence. The cross-section is that of a two-lane, undivided Urban Minor Arterial. The corridor is designated as S.R. 0332.

The Yardley-Newtown Road / Yardley-Langhorne Road / Afton Road Corridor serves as part of a key link from Bucks County at Yardley and Montgomery County at Hatboro. The corridor connects Interstate 95, Yardley-Langhorne Road, Main Street, and Delaware Avenue.



*Yardley-Newtown Road (looking eastbound) at
Mirror Lake Road
Photo by: Jacobs Edwards and Kelcey*

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

The Newtown Bypass Corridor has several on-going transportation studies and engineering efforts on and adjacent to the corridor that are in different phases. A summary of the known engineering studies and design projects follows:

- *I-95 Interchange at PA 332* – in Lower Makefield Township includes a new ramp from PA 332 eastbound to I-95 northbound and relocating the existing I-95 northbound off-ramp to PA 332.
- *Yardley Borough Drainage Improvements* - in Yardley Borough on Main Street from PA 332 to Silver Creek Bridge is currently in the engineering phase by PennDOT and includes installation of storm sewer inlets and piping to

correct extremely poor drainage facilities which cause the roadway to flood during rainfalls. The construction cost estimate for the project is \$500,000, and is scheduled for construction in Fiscal Year 2008.

Existing Conditions

The study corridor generally runs in an east-west direction. There are no sharp curves or steep grades throughout the study limits. Yardley-Newtown Road / Yardley-Langhorne Road / Afton Road generally provides two lanes of traffic with a 22-foot wide bituminous cartway with paved shoulders of varying width. The posted speed limit varies from 25 MPH to 45 MPH. From the Interstate 95 ramps to Scammel Drive, the posted speed limit is 45 MPH. From Scammel Drive to Breece Drive, the posted speed limit is 40 MPH. From Breece Drive to Delaware Avenue, the posted speed limit is 25 MPH.

The primary land use along Yardley-Newtown Road / Yardley-Langhorne Road / Afton Road is single-family residential (approximately 56 percent). Other land uses include agriculture (approximately 20 percent), wooded areas (approximately 7 percent), and commercial (approximately 7 percent). Single-family residential and preserved open space dominates Yardley-Newtown Road and Yardley-Langhorne Road in Lower Makefield Township. In Yardley Borough, the landscape becomes more commercial in nature. Around the intersection of Main Street and Afton Avenue, the buildings are located close to the street and sidewalks are provided, making for a pedestrian-friendly environment.

The 2.7-mile long corridor presently contains four (4) signalized intersections and one (1) unsignalized intersection of consequence.

- I-95 Ramps & Yardley-Newtown Road
- Mirror Lake Road & Yardley-Newtown Road
- Yardley-Langhorne Road & Yardley-Newtown Road
- Main Street & Afton Avenue
- Delaware Avenue & Afton Avenue (unsignalized)

Traffic Data

Automatic Traffic Recorder (ATR) counts were conducted by DVRPC at two (2) locations to determine the existing traffic volumes and vehicle classifications on Yardley-Newtown Road. The first ATR count was conducted between I-95 Ramps and Langhorne-Yardley Road / Afton Avenue along Yardley-Newtown Road on Tuesday, May 17, 2005. The second ATR count was conducted between Langhorne-Yardley Road / Afton Avenue and Delaware Avenue along West Afton Avenue on Monday, May 2, 2005. For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)*Between I-95 Ramps and Langhorne-Yardley Road / Afton Avenue*

Eastbound: Yardley-Newtown Road – 422 vehicles, 2.6% trucks (5:00 – 6:00 P.M.)

Westbound: Yardley-Newtown Road – 326 vehicles, 5.5% trucks (11:00 A.M. – 12:00 P.M.)

Combined: Yardley-Newtown Road – 753 vehicles, 2.1% trucks (5:00 – 6:00 P.M.)

Between Langhorne-Yardley Road / Afton Avenue and Delaware Avenue

Eastbound: W Afton Avenue – 329 vehicles, 5.8% trucks (7:00 – 8:00 A.M.)

Westbound: W Afton Avenue – 338 vehicles, 6.8% trucks (8:00 – 9:00 A.M.)

Combined: W Afton Avenue – 649 vehicles, 7.2% trucks (8:00 – 9:00 A.M.)

Average Daily Traffic (ADT) Volumes*Between I-95 Ramps and Langhorne-Yardley Road / Afton Avenue*

Eastbound: Yardley-Newtown Road – 3,954 vehicles, 3.9% trucks, 11 motorcycles, 14 buses

Westbound: Yardley-Newtown Road – 3,736 vehicles, 4.2% trucks, 14 motorcycles, 12 buses

Combined: Yardley-Newtown Road – 7,690 vehicles, 4.1% trucks, 25 motorcycles, 26 buses

Between Langhorne-Yardley Road / Afton Avenue and Delaware Avenue

Eastbound: W Afton Avenue – 3,599 vehicles, 5.3% trucks, 11 motorcycles, 18 buses

Westbound: W Afton Avenue – 3,531 vehicles, 4.9% trucks, 6 motorcycles, 29 buses

Combined: W Afton Avenue – 7,130 vehicles, 5.1% trucks, 17 motorcycles, 47 buses

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory volume to capacity analysis to evaluate any operational and/or congestion concerns.

Crash Summary

Reportable crash data along the Yardley-Newtown Road / Yardley-Langhorne Road / Afton Road Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 64 crashes occurred within the corridor limits. There were a total of 124 vehicles involved in the 64 crashes on Yardley-Newtown Road / Yardley-Langhorne Road / Afton Road Road in the five year period. Of the 124 vehicles, three (3) large trucks were involved in three (3) separate crashes, constituting less than three (3) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 10 (16%)
- 2002 – 15 (23%)
- 2003 – 10 (16%)
- 2004 – 19 (29%)
- 2005 – 10 (16%)

There were no fatalities involved in the reportable crash data. The majority of the crashes (46%) were Property Damage Only (PDO), and minor injuries accounted for 29 percent. Angle crashes were the most common type accounting for 42 percent, followed by hit fixed object and rear end crashes each accounting for 21 percent.

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: quarry and other heavy trucks, roadway alignment, traffic congestion and traffic volumes.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were all considered to be short term, occurring in one to three years.

Table 5-15a: Yardley-Newtown Road / Yardley-Langhorne Road / Afton Avenue Proposed Short-term Improvements

Highway Maintenance Improvements		
ID	Description	Cost
HM-15-ST1	Replace existing wood fence with guiderail on East Afton Avenue westbound at Main Street. (<i>Yardley Borough</i>) (200 LF Type 2-S Guiderail @ \$25/LF)	\$5,000
HM-15-ST2	Consider filling in the swales with stone on Yardley-Newtown Road westbound at and west of Mirror Lake Road. (<i>Lower Makefield Township</i>) (100 CY @ \$60/CY)	\$6,000
Total Highway Maintenance Improvements Cost		\$11,000
Total Short-term Improvements Cost		\$11,000

16. River Road / Delaware Avenue

Project Location

The study corridor begins at the Lower Makefield Township / Morrisville Borough Line, extends through Yardley Borough, and terminates at Lurgan Road (S.R. 2101) in Upper Makefield Township, as shown in Figure 5-1. The study corridor is approximately 11.8 miles long with 11 unsignalized intersections of consequence. The cross-section is that of a two-lane, undivided Urban Principal Arterial from the Lower Makefield Township / Morrisville Borough Line to General Washington Memorial Boulevard (PA 532), and a two-lane, undivided Urban Minor Arterial from Taylorsville Road to Lurgan Road. The corridor is designated as S.R. 0032.

The River Road / Delaware Avenue Corridor serves as part of a key link from Bucks County at Morrisville to Northampton County at Easton. The corridor is a scenic roadway that runs along the Delaware River through almost the entire eastern border of Bucks County.

Original and Successor Projects

There are no known original and successor transportation studies and/or engineering/construction efforts along this corridor.

Concurrent Projects

The River Road / Delaware Corridor has several on-going transportation studies and engineering efforts on and adjacent to the corridor that are in different phases. A summary of the known engineering studies and design projects follows:

- *River Road Bridge Replacement* – in Upper Makefield Township includes a bridge replacement over the Pennsylvania Canal to provide for seven feet of underclearance under the new bridge for the Delaware Canal Towpath. The bridge is currently closed to traffic and is diverting volume to Taylorsville Road. Construction is slated for fall 2007.
- *Washington Crossing Gateway Park* - in Upper Makefield Township includes a linear pedestrian / bike system and is designed within the rights-of-way of General Washington Memorial Boulevard, River Road, and Taylorsville Road as a municipal park in the village of Washington Crossing. It will link several detached state-owned recreation and historic sites with ADA ramps, sidewalks, crosswalks, and streetscape improvements.

Existing Conditions

The study corridor generally runs in a north-south direction. There are no sharp curves or steep grades throughout the study limits. River Road / Delaware Avenue generally provides two lanes of traffic with a 22-foot wide bituminous cartway with little to no shoulders. The posted speed limit varies from 35 MPH to 45 MPH. From the Lower Makefield Township / Morrisville Borough Line to Letchworth Avenue, the posted speed limit is 40 MPH. From Letchworth Avenue to Florence Avenue, the posted speed limit is 35 MPH. From Florence Avenue to Lafayette Drive, the posted speed limit is 45 MPH. From Lafayette Drive to Cedar Glenn Drive, the posted speed limit is 35 MPH. From Cedar Glenn Drive to Lurgan Road, the posted speed limit is 45 MPH.

The primary land use along River Road / Delaware Avenue is single-family residential (approximately 65 percent) and multi-family residential (approximately 2 percent). The other primary land use consists of wooded areas (approximately 16 percent).

The corridor south of George Washington Memorial Boulevard consists of mostly single-family residential, with some multifamily, office and commercial development along the western side of the roadway in Yardley Borough. The corridor north of George Washington Memorial Boulevard is primarily residential in nature, with both single-family subdivisions and homes with direct driveway access. The Delaware River runs along the eastern side of the entire corridor. The Morrisville Water Filtration Plant is located in Lower Makefield Township at the intersection of East Ferry Road.



*Delaware Avenue (looking northbound) in Yardley Borough
Photo by: Jacobs Edwards and Kelcey*

The 11.8-mile long corridor presently contains 11 unsignalized intersections of consequence.

- Trenton Ave & River Road (unsignalized)
- Black Rock Road & River Road (unsignalized)
- Letchworth Ave & River Road (unsignalized)
- College Ave & Delaware Avenue (unsignalized)
- Afton Avenue & Delaware Avenue (unsignalized)
- Woodside Road & River Road (unsignalized)
- Mt Eyre Road & River Road (unsignalized)
- General Washington Memorial Boulevard & River Road (unsignalized)
- Taylorsville Road & River Road (unsignalized)
- Brownsburg Road East & River Road (unsignalized)
- Lurgan Road & River Road (unsignalized)

Traffic Data

Automatic Traffic Recorder (ATR) counts were conducted by DVRPC at five (5) locations to determine the existing traffic volumes and vehicle classifications on River Road as follows:

- between Ferry Road and Richard Road along River Road on Tuesday, September 27, 2005.
- between Letchworth Avenue and Afton Avenue along South Delaware Avenue on Tuesday, June 7, 2005.
- between Afton Avenue and Florence Avenue along North Delaware Avenue on Tuesday, June 7, 2005.
- between Yardley Borough line and Washington Crossing Road on Tuesday, April 26, 2005.
- between Stoneybrook Road and Lurgan Road along River Road on Tuesday, April 26, 2005.

For the purpose of this study, trucks with a minimum of two axles and six tires (FHWA vehicle classification type 5) were considered.

Peak Hour Traffic Volumes (All Vehicles)

Between Ferry Road and Richard Road

Northbound: River Road – 357 vehicles, 0.8% trucks (5:00 – 6:00 P.M.)

Southbound: River Road – 419 vehicles, 1.4% trucks (7:00 – 8:00 A.M.)

Combined: River Road – 529 vehicles, 1.3% trucks (7:00 – 8:00 A.M.)

Between Letchworth Avenue and Afton Avenue

Northbound: S Delaware Avenue – 202 vehicles, 8.4% trucks (8:00 – 9:00 A.M.)

Southbound: S Delaware Avenue – 279 vehicles, 3.6% trucks (5:00 – 6:00 P.M.)

Combined: S Delaware Avenue – 466 vehicles, 4.9% trucks (5:00 – 6:00 P.M.)

Between Afton Avenue and Florence Avenue

Northbound: N Delaware Avenue – 155 vehicles, 11.6% trucks (8:00 – 9:00 A.M.)

Southbound: N Delaware Avenue – 209 vehicles, 2.9% trucks (5:00 – 6:00 P.M.)

Combined: N Delaware Avenue – 340 vehicles, 3.2% trucks (5:00 – 6:00 P.M.)

Between Yardley Borough line and Washington Crossing Road

Northbound: River Road – 38 vehicles, 2.6% trucks (9:00 – 10:00 A.M.)

Southbound: River Road – 49 vehicles, 0.0% trucks (3:00 – 4:00 P.M.)

Combined: River Road – 80 vehicles, 0.0% trucks (3:00 – 4:00 P.M.)

Between Stoneybrook Road and Lurgan Road

Northbound: River Road – 361 vehicles, 9.1% trucks (8:00 – 9:00 A.M.)

Southbound: River Road – 338 vehicles, 3.3% trucks (5:00 – 6:00 P.M.)

Combined: River Road – 694 vehicles, 4.2% trucks (5:00 – 6:00 P.M.)

Average Daily Traffic (ADT) Volumes

Between Ferry Road and Richard Road

Northbound: River Road – 2,772 vehicles, 2.3% trucks, 27 motorcycles, 2 buses

Southbound: River Road – 2,839 vehicles, 2.4% trucks, 23 motorcycles, 0 buses

Combined: River Road – 5,611 vehicles, 2.4% trucks, 50 motorcycles, 2 buses

Between Letchworth Avenue and Afton Avenue

Northbound: S Delaware Avenue – 2,601 vehicles, 6.3% trucks, 2 motorcycles, 12 buses
 Southbound: S Delaware Avenue – 2,789 vehicles, 4.6% trucks, 21 motorcycles, 13 buses
 Combined: S Delaware Avenue – 5,390 vehicles, 5.4% trucks, 23 motorcycles, 25 buses

Between Afton Avenue and Florence Avenue

Northbound: N Delaware Avenue – 1,816 vehicles, 6.8% trucks, 30 motorcycles, 10 buses
 Southbound: N Delaware Avenue – 1,916 vehicles, 5.3% trucks, 29 motorcycles, 8 buses
 Combined: N Delaware Avenue – 3,732 vehicles, 6.0% trucks, 59 motorcycles, 18 buses

Between Yardley Borough line and Washington Crossing Road

Northbound: River Road – 451 vehicles, 6.0% trucks, 9 motorcycles, 4 buses
 Southbound: River Road – 471 vehicles, 4.5% trucks, 10 motorcycles, 6 buses
 Combined: River Road – 922 vehicles, 5.2% trucks, 19 motorcycles, 10 buses



*River Road (looking northbound) with Single-family Residential to the west and the Delaware River to the east
 Photo by: Jacobs Edwards and Kelcey*

Between Stoneybrook Road and Lurgan Road

Northbound: River Road – 4,434 vehicles, 6.9% trucks, 38 motorcycles, 2 buses
 Southbound: River Road – 4,112 vehicles, 6.2% trucks, 33 motorcycles, 24 buses
 Combined: River Road – 8,546 vehicles, 6.6% trucks, 71 motorcycles, 26 buses

Capacity Analysis and Methodology

Peak hour operations were evaluated along the corridor and at the key intersections for existing conditions in a cursory volume to capacity analysis to evaluate any operational and/or congestion concerns.

Crash Summary

Reportable crash data along the River Road / Delaware Avenue Corridor for the most current five years (January 2001 to December 2005) was reviewed. Reportable crashes are crashes involving fatalities, injuries, or where a vehicle required towing. The crash data was reviewed to identify where the crashes occurred and what was the most common type of crash. Based on the data provided, a total of 116 crashes occurred within the corridor limits. There were a total of 174 vehicles involved in the 116 crashes on River Road / Delaware Avenue in the five year period. Of the 174 vehicles, two (2) large trucks were involved in two (2) separate crashes, constituting less than two (2) percent of the total vehicles involved in crashes along the corridor.

The record of reportable crashes per year is shown below:

- 2001 – 25 (22%)
- 2002 – 29 (25%)
- 2003 – 25 (22%)
- 2004 – 24 (20%)
- 2005 – 13 (11%)

There were two (2) fatalities involved in the reportable crash data. Both fatalities occurred as a result of hit fixed object crashes at the mid-block between Ferry Road and Richard Road and the mid-block between Mt Eyre Road and Spring Court. The majority of the crashes (46%) were Property Damage Only (PDO), and minor injuries accounted for 27 percent. Hit fixed object crashes were the most common type accounting for 50 percent, followed by angle crashes accounting for 22 percent and rear end crashes each accounting for 18 percent.

Future “No Build” Conditions

Existing traffic volumes were projected to the year 2030 using growth factors provided by DVRPC. Capacity analyses were completed for future 2030 no-build conditions using the same methodology that was used under existing conditions.

Summary of Adverse Conditions

Based on field views, meeting discussions, and existing and future analyses, adverse conditions include: heavy trucks (home construction, landfill, etc.) and traffic volumes.

Recommendations

Improvement recommendations were formed to address safety and mobility problems. The recommendations were separated into time frames in which they could be implemented. The first time frame is immediate, occurring one year or less; the second is short term, occurring in one to three years; and the third is long term, occurring in three years or more.

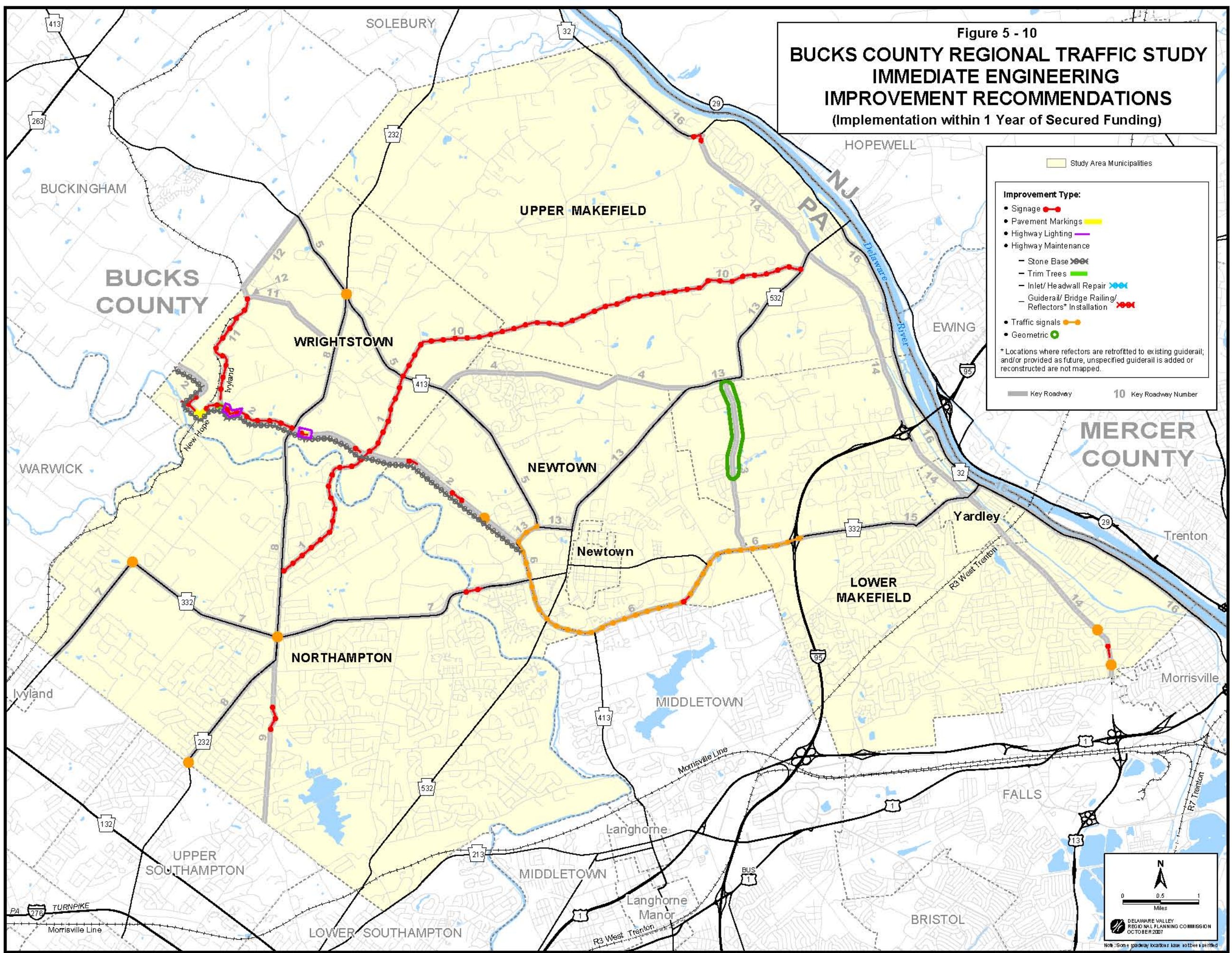
Table 5-16a: River Road / Delaware Avenue Proposed Short-term Improvements

Highway Maintenance Improvements		
ID	Description	Cost
HM-16-ST1	Extend guiderail and install end treatments on existing guiderail on southbound River Road just north of Woodside Road in accordance with Department Publication 13M (DM-2) – Headwall within Clear Zone. (Lower Makefield Township) (100 LF Type 2-S Guiderail @ \$25/LF; (2 Type 2 Strong Post End Treatments @ \$900/Treatment)	\$4,300
HM-16-ST2	Install delineators along the length of River Road / Delaware Avenue as new guiderail is added or reconstructed. (Lower Makefield and Upper Makefield Townships and Yardley Borough) (135 delineators for existing guiderail @ \$20/delineator)	\$2,700
HM-16-ST3	Consider fill in the swales with stone on northbound River Road just south of Lurgan Road. (Upper Makefield Township) (100 CY @ \$60/CY)	\$6,000
Total Highway Maintenance Improvements Cost		\$13,000
Total Short-term Improvements Cost		\$13,000

OVERVIEW OF ENGINEERING RECOMMENDATIONS

Figures 5-10, 5-11 and 5-12, respectively, illustrate the geographic distribution of the study’s immediate, short-term and long-term engineering recommendations. Funded projects (Lindenhurst Road Traffic Calming Improvements and the TSEI projects—both in implementation), highway maintenance treatments for Swamp Road, and relatively low cost signage and traffic signal timing adjustments predominate in the immediate-term improvement program. In the short-term future, geometric improvements gain more prominence along side highway maintenance improvements aimed at adding stone base along roadway edges, installing guiderail at warranted locations, repairing drainage structures, and implementing extensive pavement marking activities. PennDOT District 6-0 management staff have committed to advance the implementation of some of these maintenance projects using their forces and funds. In the long-term, the recommended improvement set is comprised exclusively of capital intensive geometric improvements at intersections or along segments of the Key Roadway network. Typically, improvements of this sort require strong local support and are pursued with capital assistance provided through federal-aid highway funding programs administered through the DVRPC.

Figure 5 - 10
BUCKS COUNTY REGIONAL TRAFFIC STUDY
IMMEDIATE ENGINEERING
IMPROVEMENT RECOMMENDATIONS
 (Implementation within 1 Year of Secured Funding)



Study Area Municipalities

Improvement Type:

- Signage
- Pavement Markings
- Highway Lighting
- Highway Maintenance
- Stone Base
- Trim Trees
- Inlet/ Headwall Repair
- Guiderail/ Bridge Railing/ Reflectors* Installation
- Traffic signals
- Geometric

* Locations where reflectors are retrofitted to existing guiderail, and/or provided as future, unspecified guiderail is added or reconstructed are not mapped.

Key Roadway 10 Key Roadway Number

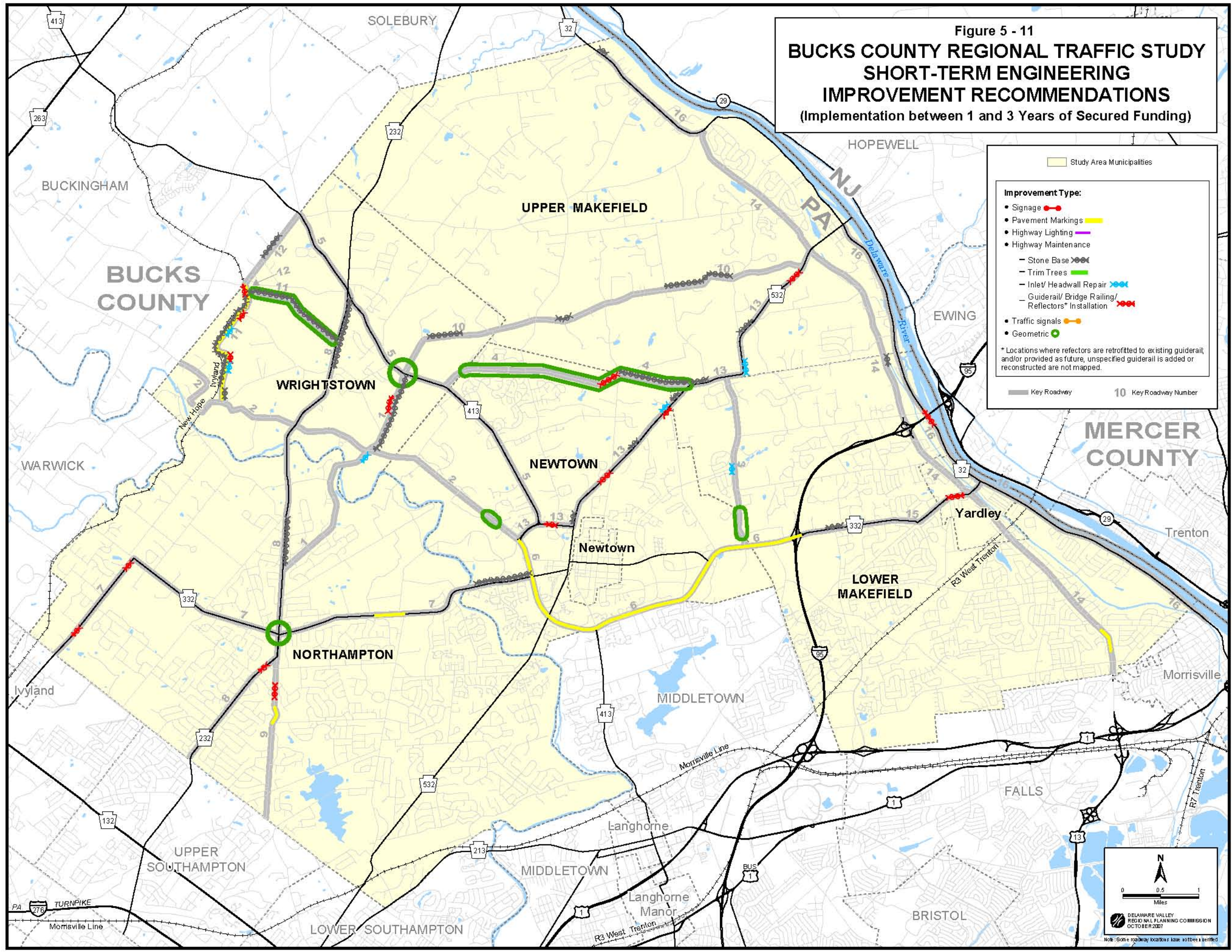
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0 0.5 1 Miles

DELAWARE VALLEY REGIONAL PLANNING COMMISSION
 OCTOBER 2007

NOT: Some roadway locations have not been verified

Figure 5 - 11
BUCKS COUNTY REGIONAL TRAFFIC STUDY
SHORT-TERM ENGINEERING
IMPROVEMENT RECOMMENDATIONS
 (Implementation between 1 and 3 Years of Secured Funding)



Study Area Municipalities

Improvement Type:

- Signage
- Pavement Markings
- Highway Lighting
- Highway Maintenance
- Stone Base
- Trim Trees
- Inlet/ Headwall Repair
- Guiderail/ Bridge Railing/ Reflectors* Installation
- Traffic signals
- Geometric

* Locations where reflectors are retrofitted to existing guiderail, and/or provided as future, unspecified guiderail is added or reconstructed are not mapped.

Key Roadway 10 Key Roadway Number

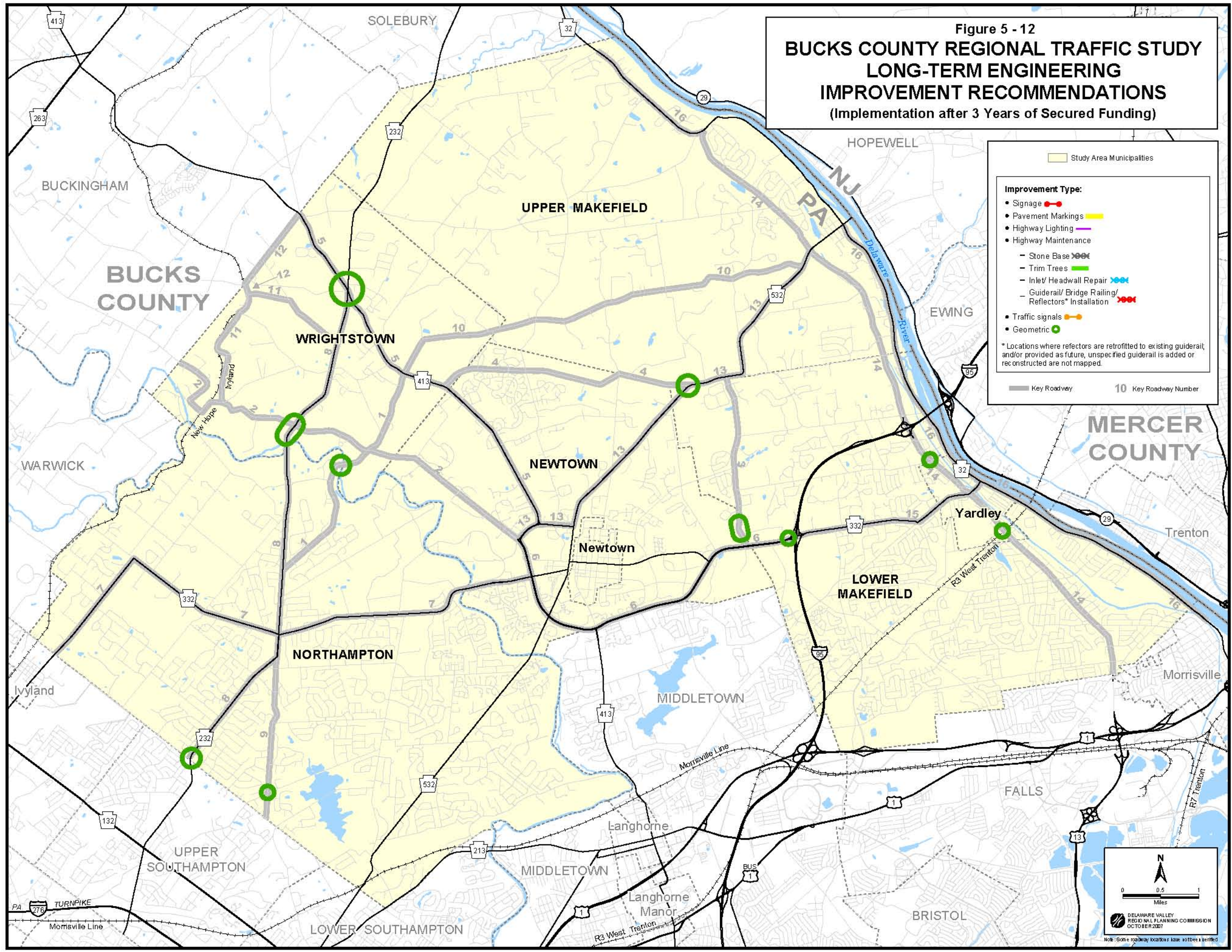
N

0 0.5 1
Miles

DELAWARE VALLEY
 REGIONAL PLANNING COMMISSION
 OCTOBER 2007

NOT: Some roadway locations have not been verified

Figure 5 - 12
BUCKS COUNTY REGIONAL TRAFFIC STUDY
LONG-TERM ENGINEERING
IMPROVEMENT RECOMMENDATIONS
 (Implementation after 3 Years of Secured Funding)



N

0 0.5 1
Miles

DELAWARE VALLEY
 REGIONAL PLANNING COMMISSION
 OCTOBER 2007

NOT: Some roadway locations have not been verified



Bucks County

Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township / Yardley Borough

6.



Traffic Calming Feasibility Studies Summary

Prepared by:

JACOBS
Edwards and Kelcey

in Association with:
KMJ Consulting, Inc

For:

 DELAWARE VALLEY REGIONAL PLANNING COMMISSION

October 2007

Table of Contents

BACKGROUND..... 6-1

OVERVIEW OF OTHER PLANS TO CALM TRAFFIC IN THE STUDY AREA 6-2

EXISTING CONDITIONS..... 6-2
Study Methodology..... 6-2

INITIAL ELIGIBILITY REVIEW 6-4
Measures To Calm Traffic 6-8

CONCLUSIONS 6-9

BIBLIOGRAPHY 6-10

List of Tables

Table 6-1: Traffic Calming Feasibility Matrix 6-5

Table 6-2: Summary of Traffic Calming Options 6-11

List of Figures

Figure 6-1: Initial Traffic Calming Eligibility Analysis Process 6-3

BACKGROUND

Pennsylvania's Traffic Calming Handbook, Pennsylvania Department of Transportation, Publication 383, was used as the principle resource in developing the traffic calming feasibility study component of the *Bucks County Regional Traffic Study (BCRTS)*. Other state and federal traffic calming publications were also reviewed and used in the development of the study including *Traffic Calming: State of the Practice*, an informational report of the Institute of Transportation Engineers (ITE), the Federal Highway Administration (FHWA) Guide to Roundabouts, and Pennsylvania Department of Transportation's Publication 414.

According to an Institute of Transportation Engineers (ITE) subcommittee, "Traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior and improve conditions for non-motorized street users." As stated in Pennsylvania's Traffic Calming Handbook, "Traffic calming measures are mainly used to address speeding and high cut-through traffic volumes on neighborhood streets." Speeding vehicles may present a safety issue to other motorists, and non-motorists, and make non-motorists feel less welcome and more frightened in a neighborhood. Cut-through traffic increases volumes on roadways and may increase speeds on these roadways, which decreases desirability for non-motorists. Traffic calming measures are usually intended to be self-enforcing as opposed to using regulatory devices such as speed limit signs that require enforcement.

Traffic calming measures are predominantly used on local streets and some collector roads with mostly residential land uses. They may be used on arterial roadways, typically within downtown districts or commercial areas where speed limits are reduced. The basic types of traffic calming measures are listed below. A more detailed list of measures, compiled from the references cited above, is contained in Appendix E of this document.

Horizontal Deflection – mainly used to reduce vehicle speeds

- Curb extension/bulb-out
- Chicane
- Gateway treatment
- On-street parking
- Raised median island/pedestrian refuge
- Traffic circle – including roundabouts

Vertical Deflection – mainly used to reduce vehicle speeds

- Textured crosswalk
- Speed hump – Watts
- Speed hump (table) – Seminole County
- Raised crosswalk
- Raised intersection

Physical Obstruction – mainly used to reduce cut-through traffic

- Semi-diverter
- Diagonal diverter
- Right-in/right-out island
- Raised median through intersection

As part of the *BCRTS*, the following tasks were completed:

- Review of ongoing efforts and plans to calm traffic on study area roadways
- Establishing eligibility requirements for State highways per Pennsylvania Department of Transportation (PennDOT)'s traffic calming guidelines
- Review of key roadway and traffic data for each of the 16 study area roadways including: functional classification, daily traffic volume, adjacent land use, posted speed limit, and spot speed study data to determine if the study area roadways meet initial eligibility requirements.
- Identifying possible traffic calming measures for each of the study area roadways shown to meet initial eligibility requirements.
- Assessing secondary impacts of traffic calming strategies
- Preparing a report detailing the results of the traffic calming analyses.

This document summarizes the findings of these analyses.

OVERVIEW OF OTHER PLANS TO CALM TRAFFIC IN THE STUDY AREA

Stoopville Road: A traffic calming plan for Stoopville Road has been developed by Gilmore & Associates to reduce vehicle speeds, traffic volume and vehicle crashes on the roadway. The project goals include development of a traffic calming implementation process; identification of funding sources for design and construction; and acquisition of volume, speed and vehicle classification along the roadway. Stoopville Road is an urban collector connecting an urban principal arterial (Durham Road) and an urban minor arterial (Washington Crossing Road). The plan, prepared for Newtown Township by Gilmore & Associates, dated January 2007 and presented in April 2007, includes: gateway treatments, roundabouts, landscaped medians, decorative crosswalks, chicanes, and a multiuse trail.¹ It is currently being reviewed by PennDOT.

Lindenhurst Road: A plan was developed for Lower Makefield Township by Schoor DePalma to construct traffic safety measures “to improve the quality of life within the adjoining neighborhoods by reducing vehicle speeds and increasing both the real and perceived safety of pedestrians and motorists.” Lindenhurst Road is an urban collector roadway connecting an urban principal arterial (Newtown Bypass) and an urban minor arterial (Washington Crossing Road). The plan prepared by Schoor DePalma, and shown in a conceptual drawing dated April 2007, includes raised medians, textured crosswalks, and re-striping to narrow the width of the travelway.² It is currently being reviewed by PennDOT.

PennDOT guidelines recommend that municipalities determine the funding source for installation and maintenance of traffic calming measures prior to beginning the traffic calming study since these projects will compete with other capital projects for state funding. All projects within a study area that meet the traffic calming criteria, established in the traffic calming and approval process, should be ranked based on an established project ranking system. Finally, a local traffic advisory committee should be established to coordinate all requests for traffic calming measures made within the study area.

EXISTING CONDITIONS

Sixteen Key Roadways identified by the Bucks County Regional Traffic Planning Task Force (RTPTF), each a state highway and totaling approximately 70 miles, have been subject to the traffic calming feasibility analyses.

Study Methodology

The study methodology employed for traffic calming analysis was based on the process set forth in the Pennsylvania Traffic Calming Handbook for the study, approval and implementation of traffic calming measures. The process is multi-stepped and begins at the submittal of a request for study and concludes with the installation and evaluation of traffic calming measures. The steps outlined in the Handbook are as follows:

- Step 1 – Submittal of Request for Study,
- Step 2 – Traffic Calming Plan Development,
- Step 3 – Approval Process, and
- Step 4 – Installation and Evaluation.

In the *BCRTS*, the task was to identify the Key Roadways that meet the criteria for traffic calming and identify a range of potential measures that would apply to the roadways identified. Therefore, efforts were limited mostly to Step 1 in the PennDOT process described above. Based upon the results of this analysis, further development of improvements for roadways meeting the traffic calming criteria may be pursued.

Figure 6-1 presents the process used to determine whether study area roadways meet the traffic calming criteria and would benefit from traffic calming measures.

¹ A graphic representation of the Stoopville Road Traffic Calming Plan is contained in Appendix D of this document.

² A graphic representation of the Lindenhurst Road Traffic Calming Improvement Project is contained in Appendix D of this document.

Determining the project area is the first item in studying a roadway for traffic calming. This includes the surrounding roadway network that would be affected by the installation of traffic calming devices. This area is also utilized in a later step when local community support must be demonstrated for this project. For this study, all of the 16 Key Roadways within the study area were included. If any were found to warrant traffic calming, their immediately surrounding network was considered at the end of the initial eligibility process.

Figure 6-1: Initial Traffic Calming Eligibility Analysis Process

According to the Pennsylvania Traffic Calming Handbook, functional classification and land use should be primary criteria to determine where traffic calming measures may be applied. Based on information in the Handbook, traffic calming may be applicable on roadways with the following functional classifications and characteristics:

- local residential streets,
- collector streets with predominantly residential land uses, and
- arterial roads within downtown districts or commercial areas (with posted speed limits of 40 mph or less).

If these preliminary requirements are satisfied, the evaluation process continues. If they are not, the study goes no further.

Collecting data—including average daily traffic (ADT) volumes, speed study data, and cut-through traffic data—to prove that a traffic calming problem exists is the next step after establishing the functional classification and land use.

Regarding the minimum requirement for traffic volumes, the ADT should exceed 1,000 vehicles/day or the peak hour volume should exceed 100 vehicles for the roadway to be considered for traffic calming.

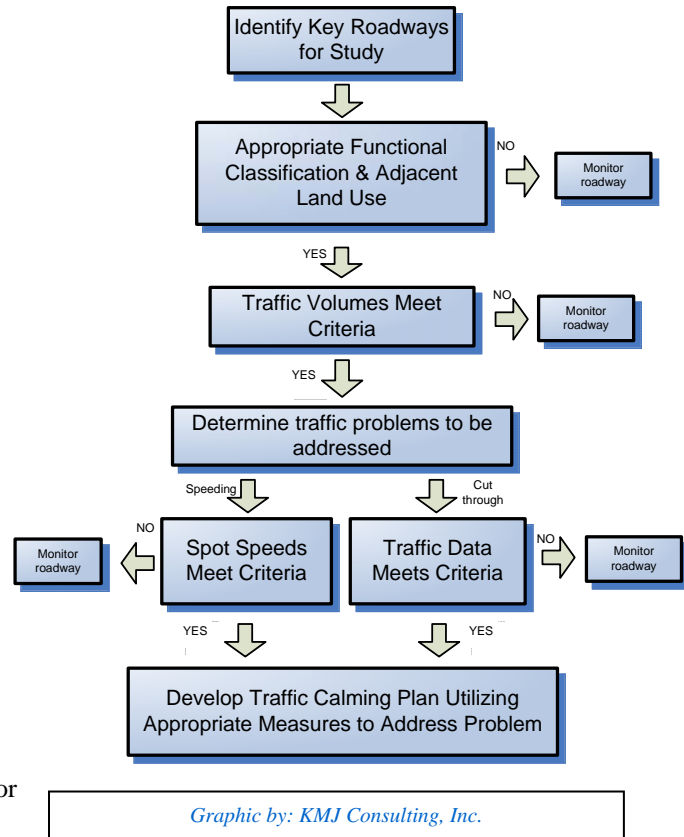
The traffic problems that exist should dictate the type of data collected at this point. If speeding is an issue, then spot speed data should be collected to determine the 85th percentile speed of the vehicles traveling on the Key Roadway. The Pennsylvania Traffic Calming Handbook states, “The 85th percentile speed should exceed the posted speed limit by 10 mph before traffic calming is considered.”

If cut-through traffic is the issue, then a survey should be conducted to determine the percentage of vehicles cutting through a local street. The Pennsylvania Traffic Calming Handbook states, “The cut-through traffic on the local residential street should be 40 percent or more of the total one hour, single direction volume. In addition, a minimum of 100 cut-through trips in one hour, in one direction, should be set as a minimum requirement.”

In addition, a Neighborhood Traffic Calming Survey should be conducted based on the Pennsylvania Traffic Calming Handbook. The survey should include all residents and businesses in the project area. It can be conducted door-to-door or via the mail. Results of the survey should indicate a 70 percent approval for interest in traffic calming by all residents and businesses in the project area.

If each of these initial criteria elements is satisfied, the study moves into the project ranking phase where it is reviewed against other traffic calming projects using the PennDOT Project Ranking System to determine the order in which projects should be advanced.

The final phase of this step is for the local government to show its support for the traffic calming projects on state roads or roads with a significant effect on a state road. This is completed by passing a resolution approving further study.



It should be noted that if traffic calming is requested for a state road, or if state, federal, or liquid fuels funds are used, approval from the local PennDOT engineering district is required.

As previously stated, the project task was to identify study area roadways that meet the criteria for traffic calming and identify a range of potential measures that would apply to the roadways identified. More detailed study can be undertaken for the roadways meeting the traffic calming criteria as a subsequent project.

INITIAL ELIGIBILITY REVIEW

A review to determine the initial eligibility was conducted for each of the Key Roadways. Data collected as part of other study tasks were used for this effort and supplemented with field observations and as needed. A matrix was developed to compare the physical roadway and traffic characteristics for each Key Roadway with the criteria stated in the Pennsylvania Traffic Calming Handbook. The matrix is presented in Table 6-1.

The PennDOT guidelines suggest that a study area should be defined for each roadway. In this case, the *BCRTS* area is so extensive that this task was neither feasible nor necessary at this stage of the project.

As presented in Figure 6-1, functional classification and land use are the first two criteria to establish eligibility for traffic calming measures. The next attribute to evaluate for arterial roadways is speed. There were no local residential streets among the key study area roadways; however, there were four collector roadways with residential land use as the predominant adjacent land use and a fifth collector road that had a section of the roadway with mostly residential adjacent land uses. They are as follows:

- Worthington Mill Road (Key Roadway #1),
- Lindenhurst Road (Key Roadway #3),
- Stoopville Road (Key Roadway #4),
- Mill Creek Road / Washington Avenue / Cherry Lane (Key Roadway #11), and
- Township Line Road / Mill Creek Road (a portion of Key Roadway #12).

In addition, the following two minor arterial roadways had a section(s) running through a downtown commercial district and a posted speed of 40 mph or less:

- Taylorsville Road / Main Street / Yardley Morrisville Road / Pine Grove Road (Key Roadway #14), and
- PA 332 (Key Roadway #15).

The remaining roadways did not meet the functional classification or land use eligibility criteria.

The ADT was reviewed to determine if the minimum volume requirement was satisfied. Mill Creek Road / Washington Avenue / Cherry Lane (Key Roadway #11) had an ADT less than 1,000 vehicles per day at the two locations studied and therefore it was no longer eligible for consideration.

Since travel speed is generally the issue driving the request for traffic calming devices, speed data was reviewed for each of the study area roadways that passed the functional classification and land use criteria discussed above. Spot speed data were collected using standard methodology to determine the 85th percentile speed of vehicles traveling on each of the study area roadways. The 85th percentile speed is the speed below which 85 percent of the vehicles are traveling. This speed is generally considered safe and reasonable under ideal conditions.

Traffic calming measures may be considered when the 85th percentile speed exceeds the speed limit by 10 mph. Stoopville Road (Key Roadway #4) between Durham Road and Rosefield Drive had an 85th percentile speed that exceeded the posted speed (40 mph) by 10mph thus making it eligible for traffic calming. (Data were provided in the Traffic Calming Plan for Stoopville Road prepared by Gilmore and Associates, Inc. in November 2005.) The remaining sections of Stoopville Road have a posted speed limit of 45 mph.

Worthington Mill Road (Key Roadway #1) and Lindenhurst Road (Key Roadway #3) each had speed data for two locations. The 85th percentile speed was greater than the posted speed limit by nearly 10 mph at each location. Since the functional classification and land use criteria were satisfied and the speed was close to the threshold for traffic calming eligibility, it is recommended that these roadways remain candidates but that speeds be monitored prior to concluding that traffic calming measures are warranted.

Table 6-1: Traffic Calming Feasibility Matrix

General Information		Volume		Speed			Traffic Calming		
Roadway	Functional Classification*	Adjacent Land Use (approximate)	Roadway Segment	ADT**	Speed Limit boundary	Posted Speed Limit (mph)	Measured 85th % Speed*** (mph)	Speed in excess of the posted speed (mph)	Meets Initial Eligibility
Traffic Calming Criteria based on PennDOT									
Local residential streets, collector streets with predominantly residential land uses, arterial roads within downtown districts or commercial areas (with posted speed limits of 40 mph or less)									
1	Worthington Mill Road (SR 2081)	Approximately half residential	Second Street Pk - Swamp Rd / Swamp Rd - Durham Rd	3,774 1,892	40 40	49 47	9 7	Potentially - monitor speed	
2	Swamp Road (SR 2036 / SR 2079)	Agricultural, wooded, residential, industrial	Buckingham Twp line - Mill Creek Rd / Penns Park Rd	6,431	40	-	-	-	
		Industrial	Mill Creek Rd / Penns Park Rd - Second Street Pk	5,348	40	44	4	N	
3	Lindenhurst Road (SR 2069)	Agricultural, wooded, residential, institutional and parkland	Second Street Pk - Worthington Mill Rd / Wrightstown Rd	6,931	40	-	-	-	
		Approximately half residential	Worthington Mill Rd / Wrightstown Rd - Newtown Byp	11,015	45	48	3	Potentially - monitor speed	
4	Stoopville Road (SR 2028)	More than half residential	Newtown Byp - Washington Crossing Rd	10,106	40	48	8	Potentially - monitor speed	
		Collector	Durham Rd - Washington Crossing Rd	8,102	40	47	7	-	
5	Durham Road (PA 413)								
6	Newtown Bypass (SR 0332)								
7	Newtown Richboro Road / Jacksonville Road (SR 0332)								
8	Second Street Pike (SR 0232)	Shopping center access by Newtown-Richboro Rd, residential by Worthington Mill Rd	Bustleton Pk - Worthington Mill Rd	14,488	35	-	-	Potentially - conduct speed study	
		Residential, agricultural, mining at Swamp Rd, commercial at Penns Park Rd	Worthington Mill Rd - Swamp Rd	8,725	45	54	9	N	
9	Bustleton Pike (SR 2065)	Commercial at SR 413, agricultural and residential	Swamp Rd - Durham Rd	6,865	45	-	-	Potentially - monitor development of properties and conduct speed studies	
		Mostly residential with limited commercial	Cherry Ln - Durham Rd		45	-	-	N	
10	Wrightstown Road (SR 2081)	Agricultural and residential with some wooded	Miller Quarry Ent - Cedar Ln	622	35	38	3	N	
		Minor / Major Collector	Mill Creek Rd - Second Street Pk	901	35	36	3	N	
11	Mill Creek Road / Washington Avenue / Cherry Lane (SR 2081)	Mostly wooded, some residential	Washington Ave - mostly residential, Cherry Ln - mostly residential		40	50	10	Potentially - monitor development of properties	
		Collector	Durham Rd - Washington Crossing Rd	2,162	40	40	-	-	
12	Township Line Road / Mill Creek Road (SR 2115)	Residential, commercial	Miller Quarry Ent - Cedar Ln	622	35	38	3	N	
		More than half residential	Mill Creek Rd - Durham Rd	1,292	35	37	2	Potentially - monitor speed	
13	Newtown Bypass / Durham Road / Washington Crossing Road (SR 0332)	Residential, agricultural	Mill Creek Rd - Durham Rd	2,401	45	-	-	N	
		Other Principal Arterial	Durham Rd - Sycamore St	10,905	45	-	-	-	
14	Taylorsville Road / Main Street / Yardley Morrisville Road / Pine Grove Road (SR 2071)	Commercial in the vicinity of Durham Road & Stoopville Rd, mostly residential, wooded and agricultural	Sycamore St - Stoopville Rd	7,924	45	50	5	N	
		Minor Arterial	Stoopville Rd - Lindenhurst Rd	10,907	45	-	-	-	
15	Newtown-Yardley Road / Atton Avenue (SR 0332)	Residential	Balderton Dr - Old Dolington Rd	3,901	45	53	8	N	
		Minor Arterial	Delaware Ave - Breese Dr	7,130	40	-	-	-	
16	River Road / Delaware Avenue (SR 0032)	Residential, wooded and agricultural	Dollington Rd - Wrightstown Rd	5,164	45	-	-	-	
		Other Principal Arterial	Wrightstown Rd - Taylorsville Rd	9,325	40	-	-	-	
Legend	does not pass initial eligibility test	Residential	W Trenton Ave - Big Oak Rd	10,124	35	39	4	N	
		Commercial	Yardley-Morrisville Rd - Edgewood Rd/Black Rock Rd	11,439	25	21	-4	Potentially - monitor speed	
17	Newtown-Yardley Road / Atton Avenue (SR 0332)	Residential, wooded, commercial	Oxford Valley Ave - Atton Ave	11,378	35	46	1	N	
		Residential, wooded	Atton Ave - Yardley Dollington Rd / McKinley Ave	13,112	35	-	-	-	
18	Newtown-Yardley Road / Atton Avenue (SR 0332)	Residential, wooded	Yardley Dollington Rd / McKinley Ave - I-95 Ramps	13,302	45	46	1	N	
		Commercial	Delaware Ave	7,130	25	25	0	Potentially - monitor speed	
19	River Road / Delaware Avenue (SR 0032)	Residential, wooded	I-95 Ramps - Washington Crossing Rd	14,714	45	-	-	-	
		Other Principal Arterial	Washington Crossing Rd - Woodhill Rd	7,680	45	49	4	N	
20	River Road / Delaware Avenue (SR 0032)	Residential, wooded	I-95 Ramps - Langhorne Yardley Rd / W Atton Ave	7,680	40	-	-	-	
		Minor Arterial	Langhorne Yardley Rd / W Atton Ave - Delaware Ave	7,130	40	-	-	-	
21	River Road / Delaware Avenue (SR 0032)	Residential, wooded	Delaware Ave	7,130	25	-	-	-	
		Other Principal Arterial	Delaware Ave	7,130	25	25	0	Potentially - monitor speed	
22	River Road / Delaware Avenue (SR 0032)	Residential, wooded	Breese Dr - just west of Main Street	8,546	35	-	-	-	
		Minor Arterial	Stoneybrook Rd - Lurgan Rd	8,546	45	-	-	-	

* Functional Classification - the grouping of highways by the character of service they provide
 ** ADT - Average Daily Traffic - total volume of traffic during a number of whole days - more than 1 day and less than 1 year - divided by the number of days in that period
 *** 85th Percentile Speed - the speed on a roadway at or below which 85% of the motor vehicles travel

Speed data were collected at one location along Township Line Road/Mill Creek Road (#12) where the initial functional classification and land use criteria were satisfied. The 85th percentile speed did not exceed the posted speed limit at the study location by 10 mph. However, since the functional classification and land use criteria were satisfied, it is recommended that these roadways remain candidates but that speeds be monitored prior to concluding that traffic calming measures are warranted.

Speed studies conducted at two locations along Main Street (Key Roadway #14) through Yardley from just north of Afton Avenue to Iron Horse Drive showed that the 85th percentile speed did not exceed the posted speed limit at either study location by 10 mph. However, since the functional classification and land use criteria were satisfied, it is recommended that this segment of Main Street through Yardley remains a candidate but that speeds be monitored prior to concluding that traffic calming measures are warranted.

A speed study conducted along Afton Avenue (Key Roadway #15) in Yardley just east of Main Street showed that the 85th percentile speed did not exceed the posted speed limit at the study location by 10 mph. However, since the functional classification and land use criteria were satisfied, it is recommended that this roadway remain a candidate but that speeds be monitored prior to concluding that traffic calming measures are warranted.

Second Street Pike (Key Roadway #8), north of Bustleton Pike, is a minor arterial highway with a varied land use pattern. Posted speed limits vary with the degree and nature of adjacent development. Two segments have posted speed limits of 35 miles per hour, each with some component of commercial development (Bustleton to Worthington Mill – the established commercial district of Richboro; and Penns Park to Cherry Lane – a developing commercial district). A speed study conducted in an adjacent segment indicated that the 85th percentile speed was very nearly 10 miles per hour greater than the posted speed limit in that segment (45 mph). Because of the existing and developing commercial nature, posted speed limits in the segments, and travel speeds adjacent to them it is suggested that speed studies be performed in each, and development trends be monitored between Penns Park Road and Cherry Lane in further consideration / warranting for traffic calming measures.

The functional classification for Wrightstown Road (Key Roadway #10) is collector; however the current land use is largely agricultural and wooded. Therefore it does not currently meet the initial criteria. The speed limit is currently posted for 40 miles per hour along the roadway. The one speed study conducted for this roadway confirmed that the 85th percentile speed was 10 mph greater than the posted speed limit. Since the speed criteria is satisfied, it is suggested that the land use continue to be monitored for possible reconsideration of traffic calming measures at a later time.

In summary, as shown in the matrix, Stoopville Road (Key Roadway #4) was found to meet the initial traffic calming criteria. The following roadways met the functional classification and land use criteria, but should be monitored for increases in the 85th percentile speed:

- Worthington Mill Road (Key Roadway #1),
- Lindenhurst Road (Key Roadway #3),
- Township Line Road / Mill Creek Road (Key Roadway #12),
- Main Street (Key Roadway #14), and
- Afton Avenue (Key Roadway #15).

The matrix also illustrates that Second Street Pike (#8) should be assessed for 85th percentile travel speeds in the established commercial district between Bustleton Pike and Worthington Mill Road; and for 85th percentile speeds and increases in commercial development in the segment between Penns Park Road and Cherry Lane. Wrightstown Road (#10) should be monitored for increases in residential development as this collector roadway was currently observed to have an 85th percentile speed exceeding the posted speed limit by at least 10 mph.

Measures to Calm Traffic

Specific measures were identified for these study area roadways based upon the data analyzed. These options include both traffic calming and traffic safety measures as applicable, and are presented in Table 6-2. Raised crosswalks, raised medians and gateway treatments are included as traffic calming measures intended to reduce speeds by either drawing the motorists’ attention to crossing pedestrians or reducing the lateral clearance to slow traffic. Traffic safety measures are intended to increase drivers’ awareness of upcoming conditions and changes to the roadway’s physical attributes. It is expected that these measures would also change driver behavior.



*An example of a raised crosswalk is pictured. At this time, PennDOT only considers textured crosswalks on state highways.
Photo by: John Carpita, Public Works Consultant, Municipal Research and Services Center of Washington, Spring 2005 Issue*

Textured or raised crosswalks with the appropriate advanced pavement markings could be applied in areas with pedestrian movements as applicable. One type of traffic safety measure used is “On Pavement Speed Limit Markings,” which are often part of a gateway treatment used to signify the approach into a traffic calmed area. These pavement markings have a distinctive change in the road surface color. For example, they can be red bands across the roadway surface with the speed limit painted in white. These treatments are often combined with additional signing and/or traffic calming measures.



*A trailer-mounted Driver Feedback Sign
Photo by:
http://www.ci.bellevue.wa.us/traffic_calming_overview.htm
City of Bellevue, WA*

Another type of traffic safety measure is the Driver Feedback signs, which give motorists passing through an area of high pedestrian traffic or speed limit changes real-time feedback as to the speed of their vehicles. These signs can be programmed to flash Slow Now if a motorist exceeds the posted speed limit.

“Converging Chevrons or Transverse Pavement Markings” are another traffic safety measure option. These markings are placed across the road and are used to alter speeds by modifying a driver’s perception. The spacing of the markings is such that it creates the illusion of acceleration thus slowing the driver’s speed. These types of markings have been found to be most effective with drivers unfamiliar with the area and where roadway geometry requires a reduction in speed.

A ball bank indicator study is used to determine the maximum negotiable speed on curves, and if the posted speed limit is appropriate for the curve or if a curve speed warning sign should be installed.

These traffic calming and traffic safety measures were applied to the eight Key Roadways that satisfied criteria or remain candidates for traffic calming measures.

- Worthington Mill Road (Key Roadway #1) – A ball bank indicator study is recommended for the curvature along the roadway. In addition, converging chevrons or transverse pavement markings are recommended approaching the curves. On-pavement, speed limit markings are recommended at gateway locations to reinforce the speed limit and Driver Feedback signs at appropriate locations to advise drivers of their travel speed and warn speeding motorists accordingly.
- Lindenhurst Road (Key Roadway #3) – Pursue the Lindenhurst Road Traffic Calming Project (see Chapter 5, and Appendix D proposed by Lower Makefield Township, including raised medians as proposed on the Schoor-DePalma plans. As a complement to those plans, on-pavement speed limit markings are recommended at gateway locations to reinforce the speed limit, and Driver Feedback signs at appropriate locations to advise drivers of their travel speed and warn speeding motorists accordingly.

- Stoopville Road (Key Roadway #4) – This study’s suggested elements include raised medians along Stoopville Road at appropriate locations. In addition, converging chevrons or transverse pavement markings are recommended at approaches to the curves at gateway locations. Treatments to highlight the transition area as well as on-pavement speed limit markings are recommended to reinforce the speed limit. In addition, Driver Feedback signs are recommended at appropriate locations to advise drivers of their travel speed and warn speeding motorists accordingly.
- Second Street Pike (Key Roadway #8) – Treatments to highlight speed limit zone transition areas as well as on-pavement speed limit markings are recommended to introduce / reinforce the speed limit. Driver Feedback signs are recommended at appropriate locations to advise drivers of their travel speed and warn speeding motorists accordingly. Textured or raised pedestrian crosswalks are recommended for the established commercial area and should be designed to include appropriate pavement markings as well as advance warning pavement markings.
- Wrightstown Road (Key Roadway #10) – Converging chevrons or transverse pavement markings are recommended on Wrightstown Road approaching the curves. In addition, on-pavement speed limit markings are recommended at gateway locations to reinforce the speed limit and Driver Feedback signs at appropriate locations to advise drivers of their travel speed and warn speeding motorists accordingly.
- Township Line Road/Mill Creek Road (Key Roadway #12) – Textured or raised pedestrian crosswalks are recommended for the commercial area and should be designed to include appropriate pavement markings as well as advance warning pavement markings. Converging chevrons or transverse pavement markings are recommended at approach points to changes in speed limits. In addition, on-pavement speed limit markings are recommended at gateway locations to reinforce the speed limit and Driver Feedback signs at appropriate locations to advise drivers of their travel speed and warn speeding motorists accordingly.
- Main Street in Yardley (Key Roadway #14) – Textured or raised pedestrian crosswalks are recommended for the mid-block and/or high pedestrian areas. They should be designed to include appropriate pavement markings as well as advance warning pavement markings.
- Afton Avenue in Yardley (Key Roadway #15) – Textured or raised pedestrian crosswalks are recommended for the high pedestrian areas. They should be designed to include appropriate pavement markings as well as advance warning pavement markings.

CONCLUSIONS

The following conclusions are drawn based upon the analyses documented herein.

- Use of Driver Feedback signs in conjunction with increased enforcement in locations where the 85th percentile speed exceeded the posted speed limit is recommended.
- A traffic calming plan should be advanced for Stoopville Road, between Durham Road and Rosefield Drive.
- The current plan to calm traffic on Lindenhurst, by Schoor DePalma, may be beneficial as traffic has been found to clearly exceed the speed limit and motorists are traveling such that the 85th percentile speeds on the roadway were found to exceed the speed limit by nearly 10 miles per hour.
- Two identified segments within the Second Street Pike corridor should be assessed for traffic speeds (Bustleton to Worthington Mill, and Penns Park to Cherry Lane) and increases in commercial development (Penns Park to Cherry Lane) for further / future consideration of traffic calming measures.
- The Worthington Mill Road corridor should be monitored as vehicles travel above the posted speed limit and measures to calm traffic may be warranted at a future date.
- Traffic volumes should be monitored on each of the following study area roadways as they are potential candidates for traffic calming: Township Line Road/Mill Creek Road, Main Street in Yardley and Afton Avenue in Yardley.
- Residential development should be monitored along Wrightstown Road as traffic is currently exceeding the speed limit and the 85th percentile speeds on the roadway.

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Roadway		Traffic Calming Measures					Traffic Safety Measures			
		Raised Crosswalk[1]	Raised Median Island	Gateway Treatment	On Pavement Speed Limit Markings	Driver Feedback Sign[2]	Converging Chevrons or Transverse Pavement Markings [3]	Ball Bank Indicator Study[4]		
1	Worthington Mill Road				At gateway locations	At appropriate locations	Approaching curves	On Curves		
3	Lindenhurst Road		As proposed[5]		At gateway locations	At appropriate locations				
4	Stoopville Road		At appropriate locations	At gateway locations	At gateway locations	At appropriate locations	Approaching curves			
8	Second Street Pike[6]	At appropriate pedestrian crossing locations			At gateway locations	At appropriate locations	Approaching reduction in speed limit			
10	Wrightstown Road				At gateway locations	At appropriate locations	Approaching curves			
12	Township Line Road/Millcreek Road	At pedestrian crossing location in commercial area			At gateway locations	At appropriate locations	Approaching reduction in speed limit			
14	Main Street in Yardley	At appropriate pedestrian crossing locations								
15	Afton Avenue in Yardley (PA 332)	At appropriate pedestrian crossing locations			At gateway locations	At appropriate locations	Approaching reduction in speed limit			

[1] Raised Crosswalks are not presently practiced by PennDOT. Pending their approval, textured sidewalks are recommended. Crosswalks should be planned to include appropriate pavement markings as well as advance warning pavement markings.

[2] The use of permanent mounted Driver Feedback signs are pending PennDOT approval, until then trailer-mounted Driver Feedback signs are recommended.

[3] Converging Chevrons or Transverse Pavement Markings are placed across the road and are used to alter speeds by modifying drivers' perception.

[4] A Ball Bank Indicator Study determines a maximum negotiable speed on curves.

[5] As proposed in the plan by Schoor DePalma, currently under review by the Pennsylvania Department of Transportation.

[6] Assumes speed studies and future land use confirm criteria for traffic calming.



Bucks County Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township / Yardley Borough



7

Recommendations & Implementation Schedule

Prepared by:

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And:

 DELAWARE VALLEY REGIONAL PLANNING COMMISSION

October 2007

Table of Contents

INTRODUCTION.....7 - 1
Education and Outreach.....7 - 1
Increased Enforcement.....7 - 3
Engineering Improvements.....7 - 4
CONCLUSION7 - 5

List of Tables

Table 7-1: Engineering Improvements Summary.....7 - 7

INTRODUCTION

The *Bucks County Regional Traffic Study* was initiated to allow municipalities, stakeholders and the public-at-large the opportunity to examine and openly discuss truck and traffic safety and mobility conditions, and its affects upon daily life in the Newtown-Yardley region of Bucks County. This effort included substantial public outreach, analyses of recorded concerns and engineering evaluations of the integrity and operations along a Key Roadway network of 16 stated owned and maintained highways. Stakeholders in the process have included the public-at-large, elected officials and representatives from business, civic and industrial contingencies. Staff representatives from PennDOT and the Bucks County Planning Commission actively supported all aspects of the study.

This chapter summarizes the programmatic recommendations that resulted from the study to improve the safety and efficiency of roadways throughout the entire study area. The recommendations fall into three broad categories:

- Education and Outreach
- Increased Enforcement
- Engineering Improvements

Education and Outreach

Over the course of this study, analytical data was gathered from a number of sources; including: historical agency data, transportation network improvement plans, previous studies, stakeholder interviews and public open house proceedings and displays. When it comes to traffic and traffic engineering, a wide range of perceptions and opinions (and emotions) come into play—some fact, some not. In fact, the impetus for this study and the multi-municipal effort behind it was to measure actual conditions in relation to the perceptions, and craft a viable and supported transportation improvement program for the region.

Early discussions focused on quarry trucks; however the discussion soon broadened to all modes of transportation as related to mobility and safety. While the perception was that trucks were disproportionately hazardous, detailed analyses of traffic and accident data, as well as roadway geometry, revealed: that, in general, truck volumes are evenly distributed in proportion to overall traffic volumes; that truck speeds and accident histories are not appreciably different than the rest of the vehicles traveling the roadway network; and that restrictions are not warranted on any of the 16 Key Roadways.

Some participants perceived that residents from other parts of the study area (e.g., from other municipalities, or other parts of the same municipality) were interested in shifting traffic out of their township, or off of their nearest roadways, without regard to where it disperses. Through discourse, residents became aware that their neighbors in other parts of the region felt the same way that they did, and rather than solving the problem, traffic restrictions just shift the problem; and may place the sponsoring entity at risk for legal action.

Practical solutions needed to be identified where the problems were encountered. Some opinions indicated that the study area roadways were problematic along their entire lengths. Analyses (summarized in Chapter 5) indicated that the majority of the Key Roadway mileage provides for relatively safe and efficient travel. More likely, it is isolated intersections or selected highway segments that negatively affect overall vehicular progression and mobility. Many felt that taming traffic, rather than accommodating and encouraging its free movement, was the proper approach for the Key Roadways. Analyses (summarized in Chapter 6) pointed to a subset of the study highway network that is feasible now, or foreseeable for future traffic calming improvements. The recommended measures address vehicle operating conditions in-place, rather than divert vehicles and relocate the problem. A problem focus produces solutions.

As the study drew to a close, most participants agreed that the joint effort of the municipalities to openly meet, share ideas and discuss solutions, supported by the leadership of the state elected officials, was an encouraging sign that validated their concerns. The study and its processes were a genuine attempt to fairly determine solutions to regional traffic problems, and influence operations on the state highway network.

In that regard, there are a number of programmatic initiatives that should be mutually considered, and pursued or continued by the Regional Traffic Planning Task Force to keep the dialogue open and information flowing as the Newtown-Yardley region continues to face its traffic challenges.

- The task force, either in its present form or made up of municipal representatives who report to the respective township boards, should stay convened and meet on a regular basis—with the continued support of the state representatives.
- The task force should work with one another, the community-at-large and their municipalities to:
 1. further develop or refine the study’s engineering recommendations for implementation,
 2. investigate establishing Highway Safety Corridors within selected Key Roadway segments (see Appendix F), and
 3. investigate the safe development of brake retarder prohibition ordinances and signage along the Key Roadways (see Appendix G) where engine brake noise is problematic with the community.
- The task force may wish to establish and maintain its own website for the purpose of communicating regional traffic matters. [Note: the project website developed for the *BCRTS*, and its domain name “www.BucksCountyRegionalTrafficStudy.org,” are secured until October 25, 2008, so that the complete project record will be preserved for about one year following the completion of the final report document.]
- Membership to the task force could be broadened to include Council Rock and Pennsbury school district representatives. At least, school district transportation matters should be incorporated into the regular task force meeting proceedings.
- Task force members could also meet individually in their municipalities, or through the municipal governance meetings, with residents and business owners to formally record, discuss and assess new or ongoing local transportation issues; and then bring these matters back to the Regional Traffic Planning Task Force meetings.
- The task force could meet annually for a “Transportation Summit” to assess and update its overall improvement program. Collectively determined and recommended transportation projects or programs would be submitted to the county for consideration and inclusion in the Region’s (e.g., DVRPC’s) long-range transportation plan and transportation improvement program. Local match programs¹ could be developed and pursued to accelerate individual, smaller-scale projects.
- Study area municipalities should use the methodology presented in Chapter 6 to independently evaluate and introduce traffic calming measures to the wider roadway network. Municipal leadership is required to initiate the traffic calming process for PennDOT’s review and approval. The Lindenhurst Road Traffic Calming Improvements project (item #2, below) serves an excellent example of municipal initiative(s) taken to plan, design and fund traffic calming measures along a state highway.
- The task force should regularly monitor traffic and land use conditions along the Key Roadways that remain candidates for traffic calming measures. When and where warranted and desirable, consider the following traffic calming recommendations for implementation.
 1. Worthington Mill Road (Key Roadway #1) – A ball bank indicator study is recommended for the curvature along the roadway. In addition, converging chevrons or transverse pavement markings are recommended approaching the curves. On-pavement, speed limit markings are recommended at gateway locations to reinforce the speed limit and Driver Feedback signs² at appropriate locations to advise drivers of their travel speed and warn speeding motorists accordingly.
 2. Lindenhurst Road (Key Roadway #3) – Pursue the Lindenhurst Road Traffic Calming Project (see Chapter 5) proposed by Lower Makefield Township, including raised medians as proposed on the Schoor-DePalma plans. As a complement to that project, on-pavement speed limit markings are recommended at gateway locations to reinforce the speed limit, and Driver Feedback signs at appropriate locations to advise drivers of their travel speed and warn speeding motorists accordingly.
 3. Stoopville Road (Key Roadway #4) – This study’s suggested elements (see Chapter 5) reflect the level of traffic calming on Lindenhurst, including providing raised medians along Stoopville Road at appropriate locations. In addition, converging chevrons or transverse pavement markings are recommended at approaches to the curves at gateway locations. Treatments to highlight the transition area as well as on-pavement speed limit markings are recommended to reinforce the speed limit. In addition, Driver Feedback signs are recommended at appropriate locations to advise drivers of their travel speed and warn speeding motorists accordingly.
 4. Wrightstown Road (Key Roadway #10) – Converging chevrons or transverse pavement markings are recommended on Wrightstown Road approaching the curves. In addition, on-pavement speed limit markings are recommended at gateway locations to reinforce the speed limit and Driver Feedback signs at appropriate locations to advise drivers of their travel speed and warn speeding motorists accordingly.

¹ “Local match” are programs where municipal funds are used in place of state monies to secure federal-aid highway funds. Regional review and consideration may be necessary. State department of transportation oversight will be required.

² Trailer-mounted speed feedback signs are available for use immediately. The use of permanent mounted Driver Feedback signs are pending PennDOT approval.

5. Township Line Road/Mill Creek Road (Key Roadway #12) – Textured or raised pedestrian crosswalks³ are recommended for the commercial area and should be designed to include appropriate pavement markings as well as advance warning pavement markings. Converging chevrons or transverse pavement markings are recommended at approach points to changes in speed limits. In addition, on-pavement speed limit markings are recommended at gateway locations to reinforce the speed limit and Driver Feedback signs at appropriate locations to advise drivers of their travel speed and warn speeding motorists accordingly.
6. Main Street in Yardley (Key Roadway #14) – Textured or raised pedestrian crosswalks are recommended for the mid-block and/or high pedestrian areas. They should be designed to include appropriate pavement markings as well as advance warning pavement markings.
7. Afton Avenue in Yardley (Key Roadway #15) – Textured or raised pedestrian crosswalks are recommended for the high pedestrian areas. They should be designed to include appropriate pavement markings as well as advance warning pavement markings.

The suggested measures will mollify speeds, but will not create diversions to nearby streets or roads.

- The municipalities and operating agencies should advertise success. Where regional improvements have been implemented, traffic benefits should be announced. Quicker, more efficient travel routes and supporting traffic data should be shared with motorists and residents to optimize vehicle distribution; decrease vehicle miles traveled and fuel consumption; and reduce emissions. Whether through a dedicated website (and/or existing municipal websites), press releases, etc., inform study area motorists that the Newtown Bypass traffic signal timing plans have been updated and will decrease travel time along the corridor.
- Incorporate traffic and school bus stop safety education programs into the curriculum of study area elementary schools.

Comments received on the draft report also suggested some directions that the task force might pursue as it continues its activities into the future. They included:

- Integrating land use planning into the RTPTF's mission, including: visioning future land use as a body with the participation of the community, considering developing multi-municipal comprehensive plans, managing growth, monitoring land development and traffic (by assembling traffic counts, conditions and recommendations from applicant's traffic impact studies), regionally.
- Continuing the coordination between Lower Makefield and Newtown townships for periodic study and maintenance of the Newtown Bypass.
- Conducting roundabout education.
- Preserving system mobility and safety along regional and local roadways by incorporating highway access management procedures and practices into corridor planning and land development reviews. [PennDOT's: *Access Management Model Ordinances for Pennsylvania Municipalities Handbook* is a valuable resource supporting these activities.]
- Pursuing development of continuous trails, bikeways and/or sidewalks to serve as options for motorized travel within the study area. The opportunities that highway improvement projects and land development applications can play in implementing these facilities, even on an incremental basis, should always be considered. [Appendix H contains a map of the study area's multi-use trail network as identified in DVRPC's interactive trail clearinghouse mapping inventory. The information can be helpful for planning, designing and implementing local, interconnected, off-road trail networks that also make sense on a regional basis. Implementation of the regional network is an ongoing activity of staff at the Bucks County Planning Commission and DVRPC. Further planning support is available through these agencies; and missing or newly constructed local links in the network, not illustrated on the map, should be brought to their attention.]

Problems can only begin to be assessed when perceptions are openly vented through constructive dialogue. Data collection and analyses should follow to assess the problems and focus on solutions. Regional collaboration, collective decisions and mutual support for remedial action improves the viability for implementation and enhances the meaningfulness to funding agencies. The Regional Traffic Planning Task Force provides a unique forum and conduit for the information and education necessary to spur this process.

Increased Enforcement

The speed of vehicles on study area roadways was cited as a common concern to be addressed in this traffic study. Experiences shared through the study's process pointed at aggressive drivers of passenger vehicles, and quarry truck drivers racing to make the next run. All involved agreed, and data confirms, that traffic enforcement leads to a

³ Raised crosswalks are not presently practiced by PennDOT. Pending their approval, textured crosswalks are recommended.

suppression of unsafe driving behaviors. However, when questioned, law enforcement representatives cited two obstacles to performing enforcement more effectively: cost and safe vehicle pull-over areas.

The state elected officials acknowledged that most of the grant funding available for municipal enforcement efforts is in the form of equipment. While this assistance is important and appreciated, it does not offset the much larger cost of labor (i.e., added police to patrol). Limited supplemental support through State Police forces is available, but can't be guaranteed with many miles of busy interstates requiring coverage in the area. Pulling-over an errant driver or a suspected unsafe vehicle along an unsafe stretch of roadway may compound the original suspected infraction. Similarly, safe school bus stop operations may be compromised by roadway environment and passing motorist's behavior.

The following actions should be considered to provide more efficient and effective traffic enforcement and/or promote safer driver behavior throughout the study area.

- Establish and encourage a means for surveillance, monitoring, and regular reporting / communicating of events and situations involving errant or aggressive unsafe driving along all roadways and within all municipalities comprising the Council Rock School District and the Pennsbury School District (including Falls Township and Tullytown Borough). This could be a very simple process, and should be performed on a routine basis; but would require the involvement and support of the school bus drivers (including their employer if the services are contracted), the school district transportation supervisors and municipal police department personnel.
- Deploy trailer-mounted driver feedback signs (i.e., mobile speed boards) on a regular and rotating basis to effectively reinforce behavior. PennDOT District 6-0 has two (2) trailers for loan, and TMA Bucks has one (1) that can be loaned to member municipalities. Consider multi-municipal procurement to obtain more for the region's needs.
- Investigate / lobby for statewide legislation allowing the use of radar and laser technologies for traffic enforcement by municipal police department personnel.
- Provide additional municipal funding for the region's traffic enforcement patrols.
- Investigate and develop a protocol for consistent communication and coordination between the various agencies that conduct vehicle safety and weight inspections at the Welcome Center on I-95 southbound—PennDOT, the Pennsylvania Public Utility Commission, the State Police (particularly, since various barracks are involved), the Motor Carrier Task Force (i.e., the various municipal police departments in the study area that collectively, but not formally, support one another's departments' manpower and equipment needs)—to contact municipal police in Yardley Borough and Lower Makefield Township as a matter of practice when the vehicle inspections are taking place. Municipal surveillance (at the Taylorsville Road interchange), interception, and pull-over (at the Park-and-Ride lot on Taylorsville Road, a DRJTBC facility); with a call for support from the certified personnel conducting the weighing and citation at the Welcome Center, will contribute to deterring illegal vehicles "shortcutting the weigh station" via Taylorsville, Main and Afton.
- Consider roadway improvements and land development proposals as opportunities to provide pull-off areas for school bus stops and occasional traffic enforcement activities.

Very often operational improvements decrease the need for enforcement. Some of the operational improvements discussed in the following section will improve mobility and reliability of travel along the Key Roadways, in turn decreasing instances of aggressive driving (including controlled intersection violations, speeding and/or using residential streets for short-cuts).

Engineering Improvements

Engineering improvements were developed to address safety and mobility problems along the Key Roadways. These are detailed in Chapter 5. General improvement categories were established, and the recommended improvements were preliminarily stratified into time frames in which they could be implemented.

- The first time frame is immediate, able for implementation in one year or less—once funding is available. These improvements include signage, pavement markings, highway lighting, various highway maintenance and traffic signal initiatives. Identified maintenance improvements to improve traffic safety conditions along Swamp Road are included in this time frame. Immediate improvements are a combined effort of both PennDOT District 6-0 and the involved municipalities for construction and maintenance. Lindenhurst Road's traffic calming improvements and the traffic signal optimization improvements for the Newtown Bypass are currently in implementation.
- The second time frame is short-term; occurring in one to three years after funding is secured. These improvements involve engineering and/or a procurement contract for implementation. New initiatives will

require the efforts of PennDOT District 6-0 and the involved municipalities for engineering, construction and maintenance.

- The third time frame is long-term, and includes more complex and costly geometric-type improvements likely to require development over three or more years. New initiatives will require efforts by PennDOT, DVRPC, Bucks County and the involved municipalities for planning, programming, engineering, construction and maintenance.

Table 7-1 provides a broad overview of the recommended engineering improvements.

CONCLUSION

Many accomplishments have been achieved through and during the performance of the *Bucks County Regional Traffic Study*.

The *BCRTS*'s process has identified and involved an active set of interested stakeholders, community representatives and individual citizens, and elicited their concerns. Comments received through the study's outreach have been considered and integrated into its processes and deliverables—establishing a current and strong foundation upon which to carry on the Regional Traffic Planning Task Force's work.

In July 2007, PennDOT implemented the Traffic Signal Enhancement Initiative (TSEI) along the Newtown Bypass, to provide a coordinated and traffic responsive traffic signal operation through Newtown and Lower Makefield townships. Lower Makefield Township has also advanced their vision for Lindenhurst Road. Lower Makefield's effort represented a model in municipal initiative to plan and implement traffic calming measures along a state highway. Construction funding assistance for the Lindenhurst Road Traffic Calming Improvements Project was secured through the Pennsylvania Department of Community and Economic Development, and project construction began in September 2007.

The *BCRTS*'s technical work documented traffic and truck safety and mobility conditions along a 70 mile Key Roadway study highway network, and identified many traffic improvement recommendations—with an eye toward implementation. Practical solutions were identified which can deliver safer and more reliable traffic conditions over the Key Roadway network within three years of securing funding. Other recommendations from the study are creative and new approaches applied to well known problem areas, and will need more time to develop. All are valid, and are offered for the RTPTF member's consideration.

Through the work, an improvement program for Swamp Road, through Wrightstown and Newtown townships, was identified to deliver an independent and timelier set of safety and mobility improvements that would be complementary with any further improvements for the corridor. PennDOT project management personnel have acknowledged the value of the identified *BCRTS* short-term engineering recommendations: to extend a culvert under Swamp Road just east of the Bucks County Community College / Helen Randle Park signalized intersection, and lengthen the westbound left-turn storage lane for vehicles entering the college (in Newtown Township). District 6-0 management staff have also agreed to implement some of this study's immediate- or short-term improvement recommendations using PennDOT maintenance forces and funds. In addition, the study identified seven other Key Roadways, or segments thereof, which offer the potential for implementing traffic calming measures along a broader highway network in the future, without diverting traffic to alternate locations. Still, many of the *Bucks County Regional Traffic Study* recommendations remain unfunded, and some "untested."

As the formal study drew to a close, with the release and public review and comment of the draft report, it became clear that support or consensus on some of the report's recommendations, within the participating municipalities or the wider community, was unknown or would not be reached without a protracted additional effort. The *BCRTS*'s technical work was prepared soundly, with professional judgment and in agreement with the scope of the services. Practicality and value suggested that a final report be prepared, with consideration of the comments received (citizens, stakeholders and municipal), and submitted to the RTPTF to serve the task force's continuing planning work. The final report's presentation in a ring binder allows the document to be used in continual reference, and be added to—to stay current with the ongoing activities of the task force.

This report and its recommendations represents a first step, and foundation for further discussions, and future development of the study's identified traffic related improvements, and the continued activities of the Regional Traffic Planning Task Force—with the involvement of the community-at-large and the governing boards of the participating municipalities. The continued demonstration of education, cooperation, collaboration, and

partnerships, evidenced by the RTPTF activities to-date, will be necessary to further develop this report's recommendations, and fund and implement traffic improvements in the region. Multi-municipal coalitions make sense for procurement contracts of equipment and services. They also can aid petitions for state and federal transportation funding assistance (e.g., through the Bucks County Planning Commission and DVRPC Transportation Improvement Program process).

Mutually supported improvement projects emanating from a regional plan such as the *Bucks County Regional Traffic Study* improve, but do not guarantee, success in obtaining implementation funding for capital intensive improvements. Given the keenly competitive atmosphere existent for a very limited pool of transportation assistance funds, vigilance and flexibility, with regard to funding and implementation opportunities, will also be required. The roles that multi-municipal comprehensive planning; the land development application, review and approval process; and individual initiative can play in delivering traffic and transportation improvements should not be overlooked.

Table 7-1: Engineering Improvements Summary									
Key Roadway #	Name	Immediate Improvements			Short-term Improvements				Long-term Improvements
		Signage Improvements	Traffic Signals	Geometric Improvements	Pavement Markings	Highway Lighting	Highway Maintenance	Geometric Improvements	Geometric Improvements
1	Worthington Mill Road	Northampton & Wrightstown Twps					Wrightstown Twp	Wrightstown Twp	Wrightstown Twp
2	Swamp Road	Newtown & Wrightstown Twps	Newtown Twp		Wrightstown Twp	Wrightstown Twp	Newtown & Wrightstown Twps	Newtown Twp	Newtown Twp
3	Lindenhurst Road		Newtown Twp	Lower Makefield Twp			Lower Makefield & Newtown Twps	Newtown Twp	Newtown Twp
4	Stoopville Road						Lower Makefield, Newtown & Upper Makefield Twps	Newtown & Upper Makefield Twps	Lower Makefield, Newtown & Upper Makefield Twps
5	Durham Road		Wrightstown Twp					Wrightstown Twp	Wrightstown Twp
6	Newtown Bypass	Newtown Twp	Newtown Twp		Lower Makefield & Newtown Twps				Newtown & Wrightstown Twps
7	Newtown-Richboro Road / Almshouse Road / Jacksonville Road	Newtown Twp	Northampton Twp		Northampton Twp		Newtown & Northampton Twps	Northampton Twp	
8	Second Street Pike		Northampton Twp				Northampton & Wrightstown Twps		Northampton Twp
9	Bustleton Pike	Northampton Twp			Northampton Twp		Northampton Twp		Northampton Twp
10	Wrightstown Road	Upper Makefield & Wrightstown Twps					Upper Makefield & Wrightstown Twps	Wrightstown Twp	
11	Mill Creek Road / Washington Avenue / Cherry Lane	Wrightstown Twp			Wrightstown Twp		Wrightstown Twp	Wrightstown Twp	
12	Township Line Road / Mill Creek Road						Wrightstown Twp		
13	Newtown Bypass / Durham Road / Washington Crossing Road						Lower Makefield, Newtown & Upper Makefield Twps		Lower Makefield, Newtown & Upper Makefield Twps
14	Taylorsville Road / Main Street / Yardley-Morrisville Road / Pine Grove Road	Lower Makefield & Upper Makefield Twps	Lower Makefield Twp		Lower Makefield Twp		Lower Makefield Twp		Lower Makefield Twp & Yardley Borough
15	Yardley-Newtown Road / Yardley-Langhorne Road / Afton Avenue						Lower Makefield Twp & Yardley Borough		
16	River Road / Delaware Avenue						Lower Makefield & Upper Makefield Twps and Yardley Borough		

Notes:
Municipalities noted are the locations of the projects
More detailed information for the projects can be found in Chapter 5

Source: Bucks County Regional Traffic Study – Final Report (DVRPC, October 2007)



Bucks County

Regional Traffic Study

Lower Makefield Township / Newtown Borough
 Newtown Township / Northampton Township
 Upper Makefield Township / Wrightstown Township / Yardley Borough

Appendices:

Regional Traffic Planning Task Force & Project Team MembersAppendix A

Summary Notes of the Public Open House Meetings (3)Appendix B

Engineering and Traffic Study Elements Summary Matrix.....Appendix C

Illustrations of the Concurrent Transportation Improvement Projects Being Developed by Others Within the Study AreaAppendix D

Inventory of Traffic Calming Measures & ApplicationsAppendix E

Criteria for Highway Safety Corridor Designation & Assessment of the Key Roadway NetworkAppendix F

Criteria for Brake Retarder Prohibition Signage & Assessment of the Key Roadway Network.....Appendix G

Multi-use Trail NetworkAppendix H

Prepared by:



in Association with:
KMJ Consulting, Inc

And:



October 2007

Appendix A

Regional Traffic Planning Task Force & Project Team Members

Regional Traffic Planning Task Force Membership

Greg Caiola, Supervisor – *Lower Makefield Township*
Ronald Smith, Supervisor – *Lower Makefield Township*

Mark Craig, Council Member – *Newtown Borough*

Anne Goren, Supervisor – *Newtown Township*
Jerry Schenkman, Supervisor – *Newtown Township*

Vince Deon, Supervisor – *Northampton Township*
Peter Palestina, Supervisor – *Northampton Township*

Daniel Rattigan, Supervisor – *Upper Makefield Township*
Robert West, Supervisor – *Upper Makefield Township*

Jane Magne, Supervisor – *Wrightstown Township*

Chris Harding, Council Member – *Yardley Borough*
Joe Hunter, Council Member – *Yardley Borough*

David Steil, Member – *PA House of Representatives (31st District)*

Scott Petri, Member – *PA House of Representatives (178th District)*

Project Management / Technical Team

Donald Shanis, Deputy Executive Director – **DVRPC**
Jerry Coyne, Manager, Office of Transportation Studies – **DVRPC**

Louis Belmonte, District Traffic Engineer – **PennDOT District 6-0 Office**
Francis Hanney, Assistant District Traffic Engineer – **PennDOT District 6-0 Office**

William Laubach, Manager, Bureau of Highway Safety and Traffic Engineering – **PennDOT Central Office**

Richard Brahler, Senior Transportation Planner – **Bucks County Planning Commission**

Joseph (Jay) Roth, Principal-in-Charge – **Jacobs Edwards and Kelcey**
Stanley Niemczak, Project Manager – **Jacobs Edwards and Kelcey**
Rachel Smith, Traffic / ITS Specialist – **Jacobs Edwards and Kelcey**

Karen Jehanian, President – **KMJ Consulting, Inc.**

Appendix B

Summary Notes of the Public Open House Meetings (3)

- 1. Wednesday - January 17, 2007 in Newtown Township**
- 2. Thursday - April 26, 2007 in Lower Makefield Township**
- 3. Thursday - September 20, 2007 in Northampton Township**



Bucks County

Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township / Yardley Borough

1/17/07

Public Open House Meeting Notes

The Public Open House was held between 6pm and 9pm, on Wednesday January 17, 2007 in the Gallagher Room, of the Rollins Center Building, on the Newtown campus of the Bucks County Community College.

Approximately 20 professional staff were on-hand to explain and receive input on four project displays addressing: the Bucks County Regional Traffic Study (BCRTS) project (2 displays) and two important projects being developed by PennDOT on two of the BCRTS' Key Roadways.

1. Planning background to the BCRTS (DVRPC)
2. Engineering elements of the BCRTS (Edwards and Kelcey)
3. Newtown Bypass Traffic Signal Enhancement Initiative (TSEI) Project, to improve traffic signal coordination along the Newtown Bypass (PennDOT, and Gannett Fleming Inc.)
4. Swamp Road Reconstruction Project (PennDOT, and KCI)

BCRTS project team members from PennDOT and the Bucks County Planning Commission were on-hand throughout the evening to monitor and support the needs of each project.

[PLEASE NOTE: Electronic copies for most of the evening's exhibits, and all of the meeting's project handouts, including a tabulated summary packet of the submitted comments, are included in the Products tab for [this](#) meeting.]

A project overview handout and a public comment form for the BCRTS were available to inform attendees and elicit their observations and opinions on transportation and quality-of-life issues for the study. A project specific comment form was also distributed by the Swamp Road Reconstruction Project staff as an initiative toward its forthcoming public involvement / information campaign (to begin in Spring 2007).

DVRPC's display gave attendees the opportunity to examine a variety of poster-size thematic maps which summarized the data collection and research activities that have been performed to-date—as background for the study. Copies of these graphics are viewable in the project website's Background Materials page.

Edwards and Kelcey's display highlighted the project's current Engineering and Traffic Study Elements Summary Matrix. The matrix provides a high-level summary of the progress and findings of the



engineering and traffic study elements (e.g., Weight, Size, and Load Restriction Studies, and Traffic Engineering and Safety Studies) for the BCRTS's 16 Key Roadways. The 16 Key Roadways are listed in the left-most column. Characteristics / attributes of Key Roadway traffic and roadway conditions are identified across the top of the remaining columns. The cells in the body of the table are shaded to represent an average or typical condition with respect to existing traffic and/or roadway elements within the entire roadway segment. A reference scale providing ranges for evaluating each parameter is shown on the right side of the graphic. (More information will be added to the matrix as the project advances.)

In the matrix, "Traffic Volumes" are annual average daily traffic volumes (AADTs)—or the average number of all vehicles that travel on the road per day. "Traffic Composition" represents the percentage of large trucks that travel the roadway per day. Some roads may have a relatively high percentage of trucks if the AADT is low. "Reportable Crash History" is based on all reportable crashes along the entire roadway from the years 2001 to 2005. "Reportable Crash History Composition (Trucks)" reflects the involvement of large trucks in the crashes reported along the key roadway (as a percent of all involved vehicles). "Prevailing Traffic Speed" is a comparison between the 85th percentile speed (i.e., that speed at or below which 85% of the vehicles are moving) and posted speed limits along the road. "Horizontal and Vertical Alignment" is a reference to the amount and degree of sharp horizontal curves and steep grades encountered along the entire roadway segment—in comparison with alignment conditions along the other key roadways. Copies of the matrix were provided to the guests.

Gannett Fleming's display offered a poster and hand-out which explained the goals of PennDOT's TSEI program, and the benefits associated with modernizing traffic signal operations. The handout also contained graphical information on existing peak hour travel conditions (e.g., speeds and delays) along the Newtown Bypass. The TSEI project display was enhanced with a computer-driven, animated simulation of existing peak hour conditions along the Bypass. The "Synchro / Simtraffic" program produced the performance measures described in the display / hand-out. The Synchro / Simtraffic program will also serve as the tool for calculating the optimized timing plans to be implemented on the Bypass, and computing the performance measures (speeds and delays, etc.), and animating traffic simulations for optimized conditions. Gannett Fleming and PennDOT's project staff will return to the next Open House to present the TSEI's recommended plan for the Newtown Bypass. The recommended timing plans will be implemented within the traffic signal system regulating the Bypass by Newtown Township during the Spring / early Summer 2007. **[NOTE: The BCRTS project will use and expand the Synchro program developed for the Bypass to undertake other traffic engineering exercises within the broader area of the regional traffic study.]**

KCI Technologies presented a very preliminary conceptual plan for the Swamp Road Reconstruction Project, which is in the environmental study and preliminary engineering stage. The displayed plan was based on current PennDOT design criteria. A project fact sheet was also prepared and distributed. At this stage, project staff will seek to identify and evaluate alternatives which address: the width of the roadway and its shoulders, the alignment of its curves and hills—to improve sight distances, etc., drainage problems, and culvert and intersection conditions. The work will be performed in coordination with Wrightstown and Newtown townships, regulatory agencies, and with a direct outreach campaign to the community-at-large. **[NOTE: BCRTS staff must coordinate our efforts with the Swamp Road project**

staff in order assure that the Swamp Road Traffic Engineering and Safety Study component of the regional traffic study is consistent with the longer-term reconstruction project. Additionally, the BCRTS will establish a link to the Swamp Road project's website, once established, to provide an easy way to stay current with the Reconstruction Project while visiting our site.]

Seventy three (73) guests signed in during the course of the 1/17/07 Public Open House, including:

- 4 of 14 RTPTF members, although two more were recognized as present—who did not sign in (representing: Newtown, Northampton, and Wrightstown townships; and the State Representatives' offices)
- 5 of 13 Regional Stakeholders (SEPTA, RRTS, BCCC, Council Rock School District, Swamp Road Residents Group)
- 11 of 29 Municipal Stakeholders (6/15 from Newtown Township, 2/3 from Northampton, 3/9 from Upper Makefield)
- 53 members of the general public

A total of 40 completed comment forms have been received. Thirty seven were completed and submitted on the night of the meeting. Three more comment forms were submitted to the DVRPC office by email or fax by January 22, 2007. A tabulation of the residence pattern of the guests (according to the sign-in sheet) and of those submitting comments (according to the submitted forms) is shown below.

Geographic Distribution of Attendees and Submitted Comment Forms

Attendees (73 signed in)		Residing in:	Submitted Comments (40 as of 01/22/07)	
#	% (in study area)		#	% (in study area)
11	16%	Lower Makefield	7	18%
1	1%	Newtown Borough	0	---
33	47%	Newtown Township	14	36%
5	7%	Northampton	2	5%
5	7%	Upper Makefield	5	13%
15	21%	Wrightstown	11	28%
0	---	Yardley Borough	0	---
3		elsewhere / not identified	1	



Bucks County

Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township / Yardley Borough

Public Open House
1/17/07 Meeting: Public Comment Form
And
Tabulated Comments
Packet



**Bucks County Regional Traffic Study
Public Comment Form**

A critical part of the Planning process is gathering concerns from the local community who live or work in region surrounding Newtown in Central Bucks County and have an interest in transportation improvements. Please complete and return this comment form and we will be sure to include your concerns in the planning process.

Please circle the municipality where you reside:

**Northampton Twp Newtown Boro Newtown Twp Yardley Boro
Lower Makefield Twp Upper Makefield Twp Wrightstown Twp**

1. What are the three greatest transportation challenges facing the region surrounding Newtown in Central Bucks County?

2. Please list any specific transportation concerns that you have *in your community*:

3. Please list three geographic areas in the region surrounding Newtown in Central Bucks County that are in the greatest need of improvement?

4. What are the most important transportation goals to be addressed?

5. What mode of transportation (car, bus, foot, etc.) presents the greatest barriers?

The following questions refer to "Potential Improvements and Solutions"

6. What specific roadway congestion improvements do you feel are needed?

7. What specific roadway safety improvements do you feel are needed?

8. What public transportation enhancements do you feel are needed?

9. What bicycle and pedestrian enhancements do you feel are needed?

10. What freight / truck traffic enhancements do you feel are needed?

11. Overall, what are the TOP THREE transportation improvements that you feel should be included in the study?

12. Overall, what are the TOP THREE quality-of-life issues to consider in addressing the region's transportation needs?

Please Drop Completed Comment Forms in the Comment Box Before Leaving. If you do not have time to complete the form tonight, please fax it to Jerry Coyne, DVRPC at 215-592-9125 or post them on the project website – BucksCountyRegionalTrafficStudy.org. Thank you for your participation.

1. What are the three greatest transportation challenges facing the region surrounding Newtown in Central Bucks County?

Lower Makefield Twp

- 1. Speeding
- 2. Truck traffic
- 1. Stoopville and Lindenhurst Road being used as a cut-through
- 2. High speeds - unfit for pedestrians/bicyclists
- 3. Newtown bypass doesn't function efficiently - lights need to be timed and stay times.
- 1. Stoopville and Lindenhurst being used by quarry trucks to go to 95.
- 1. Not enough public transportation which leads to congestion
- 2. Congestion
- 3. Truck traffic on inappropriate/unsafe roads
- RRTS January 17, 2007 Request for Information Packet .

Newtown Twp

- 1. Must improve roads - too congested
- 2. Must improve roads
- 3. Must improve roads
- Roads are too small and narrow to handle all of the people that now live and travel in Newtown Township.
- 1. Traffic patterns
- 2. Trucks
- 3. Traffic volume
- 1. Congestion on Newtown Bypass
- 2. Continued development residential and business
- 3. Rt. 413 congestion
- Keeping trucks on the Bypass
- 1. Truck traffic
- 2. Student traffic
- 3. Poor Roads
- 1. Better managing volume during "rush hour"
- 2. Reducing quarry truck traffic on Swamp Road
- 3. Creating a better traffic light system on the 413 bypass
- 1. Stoopville and Lindenhurst - truck cut-thru
- 2. Newtown bypass - lights need to be timed.
- 3. Traffic calming on Stoopville
- 1. Timing of Newtown bypass lights.
- 2. Quarry trucks using residential back roads.
- 3. Making roads more bike and pedestrian friendly.
- 1. Too much development, causing more traffic.
- 2. Bad drivers! - (Of all variety)
- 3. Road work seems to be going on somewhere in this area at all times.
- 1. Gridlock on the bypass during rush hours.
- 2. Flow of heavy truck traffic on Swamp Road.
- 3. Traffic calming on Stoopville and Lindenhurst will move more traffic to 413 bypass. Already flow concern there!
- 1. Efficient transition from major highways to local streets.
- 2. Easy access to all commercial zones.
- 3. Minimize the number of traffic lights/stops from Newtown to Langhorne, Richboro, Washington Crossing, Pineville.

Northampton Twp

- Time delays, signage, lane assignments
- Traffic congestion along 332 to 95

Upper Makefield Twp

- 1. High density traffic on single-lane urban roads.
- 2. Truck traffic on high-speed single lane roads.
- Safety
 - 1. Roads with no shoulders (bicycle safety)
 - 2. Trucks (Quarry Trucks) too many traveling too fast
 - 3. Speed limits not enforced or obeyed

1. What are the three greatest transportation challenges facing the region surrounding Newtown in Central Bucks County (continued)?

Upper Makefield Twp

- 1. Increased population
- 2. Country roads
- 3. Infrastructure repairs
- Uncontrolled speed of vehicles.

Wrightstown Twp

- Particle pollution!!! Dust created by the quarry trucks.
- 1. Volume of quarry trucks on the road.
- 2. Poor drainage all along Swamp Road.
- 3. Lack of traffic lights and dangerous intersections.
- Improvements being discussed here this evening are band-aids against the long-term changes that development and growth will bring to the region. Secondary Roadways are already developed and overly congested.
- 1. Volume of traffic
- 2. Quarry truck traffic
- 3. Safety concerns due to road quality
- Quarry trucks from South Jersey. The RRTS' incessant attempts to badger public officials into re-routing all truck traffic onto Swamp Road.
- 1. Trucks and college traffic
- 2. Speed limit reduced to 35
- 3. More traffic lights.
- 1. Excess of Trucks using Swamp Road after 232 on up.
- 2. Speed should be reduced.
- 3. Trucks kept away from BCCC!!! And kids driving.
- 1. Truck traffic - nuisance issues and safety.
- 2. Traffic congestion during rush hours.
- 3. Traffic safety due to congestion.
- 1. New developments allowed to drop in anywhere without regard to impact.
- 2. Lack of enforcement tools for speeding, tail-gating, etc.
- 3. Drivers' behavior - lack of traffic/driving awareness.
- 1. High volume on unsafe roads especially quarry trucks mixed with cars and buses.

2. Please list any specific transportation concerns that you have in your community:

Unidentified

- Lindenhurst Road - cars drive too fast!! Too many quarry trucks

Lower Makefield Twp

- Lindenhurst roads - cars travel more than 40 mph, trucks are dangerous, our children can't cross to other side.
- Politicians/agencies do not adhere to PennDOT guidelines consistently. They have failed to keep the Newtown bypass and arterial highways leading to it operating efficiently and encouraged commercial traffic to use collector roads. Stoopville and Lindenhurst Roads should NOT be upgraded to arterial highways.
- I want traffic calming on Lindenhurst
- I would like the trucks on Lindenhurst Road to take another route.
- I reside close to Lindenhurst Road
Truck traffic making road unsafe for cars, bikes, walking, etc.
Engine braking from large trucks
- RRTS January 17, 2007 Request for Information Packet .

Newtown Twp

- With so much building in area, roads are too small
- *Must remove keep off of shoulder at bypass and Buck Road. People turn from both lanes and there will be a deadly accident due to both of the lanes moving!!
- Quarry trucks racing up and down Stoopville Road/Lindenhurst.
- No turn lane onto south Buck Road from the Bypass.

2. Please list any specific transportation concerns that you have in your community (continued):

Newtown Twp

- Trucks on Stoopville/Lindenhurst Roads. Bicycle lanes on major roads.
- Travel past the college
- Placing speed limit signs in the Colonial Commons Development.
- Traffic calming
- 1. Speed of cars and trucks through zoned residential areas.
2. Little or no paths for cyclists or pedestrians.
- Too many people on the roads, especially during the "rush hour" and when school buses run.
- Truck traffic dangers when pulling out of my neighborhood.
- Heavy truck traffic on Stoopville Road and Jake-Break Use. Excessive Speeds on Stoopville Road. Turning left toward Newtown at Stoopville and 413.
- Rt. 413 traffic flow south into Newtown
Safety on Swamp Road
- Safety at major intersections.

Northampton Twp

- Rte 532 from Upper Southampton into Holland
- Traffic congestion along Richboro Road to Newtown bypass and then extreme congestion along bypass to 95.

Upper Makefield Twp

- Intersection Taylorsville road and Rt. 532 intersection Rt. 532 and Lindenhurst,
- Taylorsville Road and River Road - No shoulder, speed limits too high, poor condition.
- Speed control. Congestion at peak hours.
- Traffic speed is not controlled or enforced.
- Speeds on 532 between Old Dolington and Dolington regularly exceed 50 mph. The posted speed limit is 35 mph.

Wrightstown Twp

- 1. Speed of traffic
2. Traffic noise
- Volume of traffic and quarry truck traffic.
- The RRTS' selfish plans to force all quarry truck traffic onto Swamp Road.
- Lack of enough public transportation
Turning lanes
- Lack of public transportation
Need more turning lanes
Traffic lights needed.
- Truck traffic along Swamp Road - trucks operate at all hours of day (pre-dawn to 4:00 p.m.). Truck nuisance issues and safety issues.
- 1. Noise of trucks using Jack Brakes to go downhill.
2. Danger from vehicles crossing double-stripe lanes on curves
3. Speeding cars.
- Too much Traffic
Too Fast Traffic
- I live on Swamp Road and witness the above issues and accidents and close calls.

3. Please list the three geographic areas surrounding Newtown in Central Bucks County that are in the greatest need of improvement:

Lower Makefield Twp

- 1. Swamp Road
- 2. 332
- 3. 413
- Newtown bypass needs to be more efficient
- All - They all need access to better public transit. Trains to Philadelphia or to new Jersey to connect with New York.
- RRTS January 17, 2007 Request for Information Packet

Newtown Twp

- 1. Stoopville Road
- 2. Rt. 413 North
- 3. Newtown Bypass
- 1. Stoopville Road
- 2. Swamp Road
- 3. Durham (413)
- Lindenhurst Road.
- 1. Vertical and horizontal curves on Swamp between bypass and Rushland.
- 1. Buck Rd. in Holland Boro Swamp Rd
- 2. BCCC traffic during "rush hours"
- 3. Timing the 413 bypass traffic lights better
- 1. Swamp Road
- 2. Newtown bypass.
- 1. The stop signs along Swamp Road - just replace them all with lights. Many people don't obey the signs.
- 2. 413 - Very bad road.
- 3. Second Street Pike - a horror.
- 1. Stoopville/Lindenhurst Road Realignment.
- 2. 413/Stoopville Intersection Dangerous.
- 1. Eagle Road North of Newtown
- 2. Richboro - Newtown Road, to Richboro
- 3. Rt. 532 in Holland - intersection of Holland Rd. Bristol Rd. and 532.

Northampton Twp

- 1. Rte 532 as described above
- 2. Bridgetown Pike from 413 West to Maple Avenue.
- 1. 413 corridor
- 2. 332 corridor

Upper Makefield Twp

- Washington's Crossing

Wrightstown Twp

- Improve 413
- 1. Rt. 413
- 2. Swamp Road
- Swamp and Second Street Pike.
- 1. Improve sycamore Road
- 2. Need more turning lanes.
- Bypass - flow issues - that's it!
- 1. Stoopville Road
- 2. Worthington Mill
- 3. River Road
- 1. 413
- 2. Stoopville Road
- 3. Newtown bypass
- 1. Swamp Road, 232 to 413
- 2. Parts of Worthington Mill between Swamp and 413.
- 3. Stoopville Road

4. What are the most important transportation goals? (Summation)

- Truck traffic (neighborhoods, Lindenhurst, and Stoopville)
- Rail should be used in lieu of trucks
- Congestion, efficiency, and **safety** (children, bicyclist, and pedestrians)
- Optimize traffic light sequencing on the Newtown Bypass
- Balance traffic (including trucks) to all roadways including Stoopville
- Roadway Improvements (Swamp Road and PA 413)

5. What mode of transportation (car, bus, foot, etc.) presents the greatest barriers? (Summation)

- Trucks (Quarry, volume, frequency, and affect on pavement integrity)
- Cars
- Bus (Public Transportation and not enough public transportation)
- Foot (walking on Swamp Road is crazy)
- Bike

6. What specific roadway congestion improvements do you feel are needed? (Summation)

- Improvements to I-95 Ramps
- Intersections of: Lindenhurst and PA 532, B.C.C.C. entrances, Twin Bridge and Swamp Road curve, Eagle and Durham, Taylorsville Road and PA 532, PA 232 and PA 413, and Worthington Road and PA 413.
- Widen \ improve: Newtown Richboro Road, Newtown Bypass, Buck Road Corridor, Swamp Road, and PA 413
- Newtown Bypass operations \ signal sequencing and no development access from \ to Newtown Bypass
- Remove trucks from back roads, Stoopville, and Wrightstown
- Realign Stoopville \ Lindenhurst
- Kill traffic calming to prevent overburden of PA 413 and Newtown Bypass
- Consolidate school district transport into the county transit authority

7. What specific roadway safety improvements do you feel are needed? (Summation)

- Improvements to I-95 Ramps
- Speed Limits: review of posted (specifically noted: Swamp, Stoopville, Lindenhurst, PA 532, and PA 413) and increased police enforcement.
- Traffic calming (specifically noted: Stoopville, Lindenhurst, Wrightstown, and Woodside)
- Intersections of: Highland and PA 532, and Stony Ford Road and PA 532.
- Roadway improvements: improve horizontal and vertical curves, add turning lanes, add shoulders, improve site distances, and add traffic lights.
- Make developers mitigate their traffic impact
- Widen PA 413
- Remove trucks from back and residential roads
- Add more walking and bike paths
- Pa 32 add "cat" eyes

8. What public transportation enhancements do you feel are needed? (Summation)

- Increased Public Transit (expansion of regional rail lines, and increased bus service to and from Philadelphia, B.C.C.C., and commuter rail stations)
- Public Transportation not needed
- Better advertise public transportation
- Optimize traffic light sequencing on the Newtown Bypass
- Tax breaks for carpoolers

9. What bicycle and pedestrian enhancements do you feel are needed? (Summation)

- Collector roads needed traffic calming, bike paths, raised crosswalks, and speed bumps
- Need more sidewalks in the area
- They (bikes and pedestrians) should not be allowed until the roads are improved
- More bike lanes, walking paths, and cross walks (bike paths along Bypass and pedestrian crossing on bypass, pedestrian crossing on Swamp Road and college along with bike lane, crosswalks and brightly colored signs (like on Eagle and Jonquil Drive), bike \ pedestrian trails similar to Newtown-Yardley Road, River Road along the scenic Delaware, PA 532 and PA 43 in Washington Crossing, pedestrian and bike path connecting both Dolington Estates, extension of Lindenhurst bike path (to keep joggers off the road) bike and pedestrian routes along Lindenhurst, and bicycle along PA 232)
- Improve shoulders (specifically noted: Swamp Road)
- Bike and pedestrian paths are unrealistic based on the nature of the community
- None – especially along Swamp Road – where there are nice parks

10. What freight \ truck traffic enhancements do you feel are needed? (Summation)

- Remove trucks from back and residential roads and Lindenhurst
- Truck traffic should be allowed on multiple routes
- Restrictions on noise, more safety checks, and more traffic enforcement (limit engine breaking on non-bypass roads, prohibit air-brake usage on Swamp Road, restrict use of “Jake Brakes”, and restrict hours of operation)
- Encourage use of bypass
- Widen PA 413 to accommodate all modes of traffic
- Less truck traffic – PA 13 and college
- Force trucks to take PA 232 and PA 413

11. Overall, what are the TOP THREE transportation improvements that you feel should be included in the study?

Unidentified

- 95 on ramp.

Lower Makefield Twp

- 1. Safety crossing of Lindenhurst
2. Better bus safety.
- 1. Traffic calming on all collector roads
2. Timing of Newtown bypass lights
3. Bike and pedestrian trails
- 1. Lights timed on bypass
2. Traffic calming on Lindenhurst and Stoopville
- RRTS January 17, 2007 Request for Information Packet .

Newtown Twp

- 1. Stoopville Road
2. Rt. 413 North
3. Newtown Bypass
- FIX BYPASS AND BUCK ROAD...IT'S DANGEROUS.
- Stop development and then study related transportation concerns when the dust settles.

11. Overall, what are the TOP THREE transportation improvements that you feel should be included in the study (continued)?

Newtown Twp

- Light timing
 2. New speed limits on Bypass
- 1. Safety
 2. Gravel trucks are too load for residential areas.
- 1. Transit between bypass and Second Street Pike
- 1. Help limit commercial and residential overdevelopment of Swamp Road and 413 area.
 2. Swamp Road volume - LESSON.
- Traffic calming, timed lights.
- 1. Traffic calming on all collector roads.
 2. Timing of the Newtown Bypass lights
 3. Bike and pedestrian trails.
- 1. Widening roads.
 2. Police enforcement of bad drivers.
 3. Less stop signs, more lights.
- 1. Congestion on the bypass.
 2. Congestion on Swamp Road near 332/college
- 1. Evaluate the amount of traffic passing through major intersections.
 2. Find alternate routes that are less utilized for certain size trucks.
 3. Identify the 5 sites with the highest incidents of traffic accidents.

Northampton Twp

- 1. Time spent waiting at bottleneck intersections
 2. Egress for commercial establishments
- Reducing congestion and delay time.

Upper Makefield Twp

- Easement measurers at important intersections.
- Safety/Improvements on Taylorsville Road and Rover Road.
- 1. Enforcement along 532 between Old Dolington and Dolington.
 2. Speed limit reduction (to 25 mph) on 532 between Old Dolington and Dolington.
 3. Install speed humps on 532 between Old Dolington and Dolington.

Wrightstown Twp

- Define new big corridor solutions within open spaces to relieve volume and congestion throughout the region.
- 1. Improve and widen 413
 2. Improve ALL routes for heavy traffic (quarry)
- 1. Removing quarry trucks from Swamp Road.
 2. Having the Regional Traffic Stud listen to all citizens, not just RRTS.
 3. Enforcing posted speed limits.
- 1. Speed limits
 2. Lights
- Plans where changed after Wrightstown did them.
- 1. Bypass flow sequencing.
 2. Fix safety problems at the sources (intersections).
 3. Address truck traffic by allocating flow across multiple routes; not just one.
- 1. Provide fair balance of load on all State roads.
 2. Improve signalization and signage.
 3. Create spots for police enforcement. Where it's now unsafe for police to monitor.
- 1. Safety (lack of shoulders/curves, hills)
 2. Sharing the burdens amongst all so one or two roads aren't overloaded.
 3. Lowered speed limits in some areas.

12. Overall, what are the TOP THREE quality-of-life issues to consider in addressing the region's transportation needs?

Unidentified

- Lower speed on back roads.

Lower Makefield Twp

- School Buses stop and idle on busy roads (Lindenhurst). They pollute the air while idling and present a safety hazard, particularly to pedestrians.
- *Trucks (noise)
 - 1. Safety of residents. Residents along collector roads should be able to safely cross to neighboring developments.
 - 2. Children are almost being hit when boarding their school buses. Near misses between school buses and trucks!
- 1. Island with trees would slow traffic down and give a more "neighborhood" feeling.
- RRTS January 17, 2007 Request for Information Packet .

Newtown Twp

- Improve roads
- FIX BYPASS AND BUCK ROAD...IT'S DANGEROUS.
- Don't continue to bow down to developers.
- - 1. Public safety
 - 2. Reducing traffic noise
 - 3. Relieving congestion
- - 1. Safety for our children
 - 2. Quiet in residential areas (sound issues)
 - 3. More lights/better light sequencing
- - 1. Close quarries
- - 1. Swamp Road volume and noise pollution from trucks.
 - 2. More efficient 413 bypass lights.
 - 3. Limit overdevelopment on Swamp Road.
- - 1. Pollution
 - 2. Traffic congestion
 - 3. Safety guardrails
- - 1. Safety of the public.
- - 1. That this region has the money to do the improvements, so let's do it right and widen these roads!
 - 2. If you widen these roads NOW it will cost less than if you wait 20 years too.
 - 3. "Outside Traffic" shouldn't be driving through our neighborhoods.
- - 1. Truck noise/environmental pollution
 - 2. Traffic Safety
 - 3. Truck Route distribution
- - 1. Pollution
 - 2. Noise in residential areas
 - 3. Areas of high traffic use and/or congestion

Northampton Twp

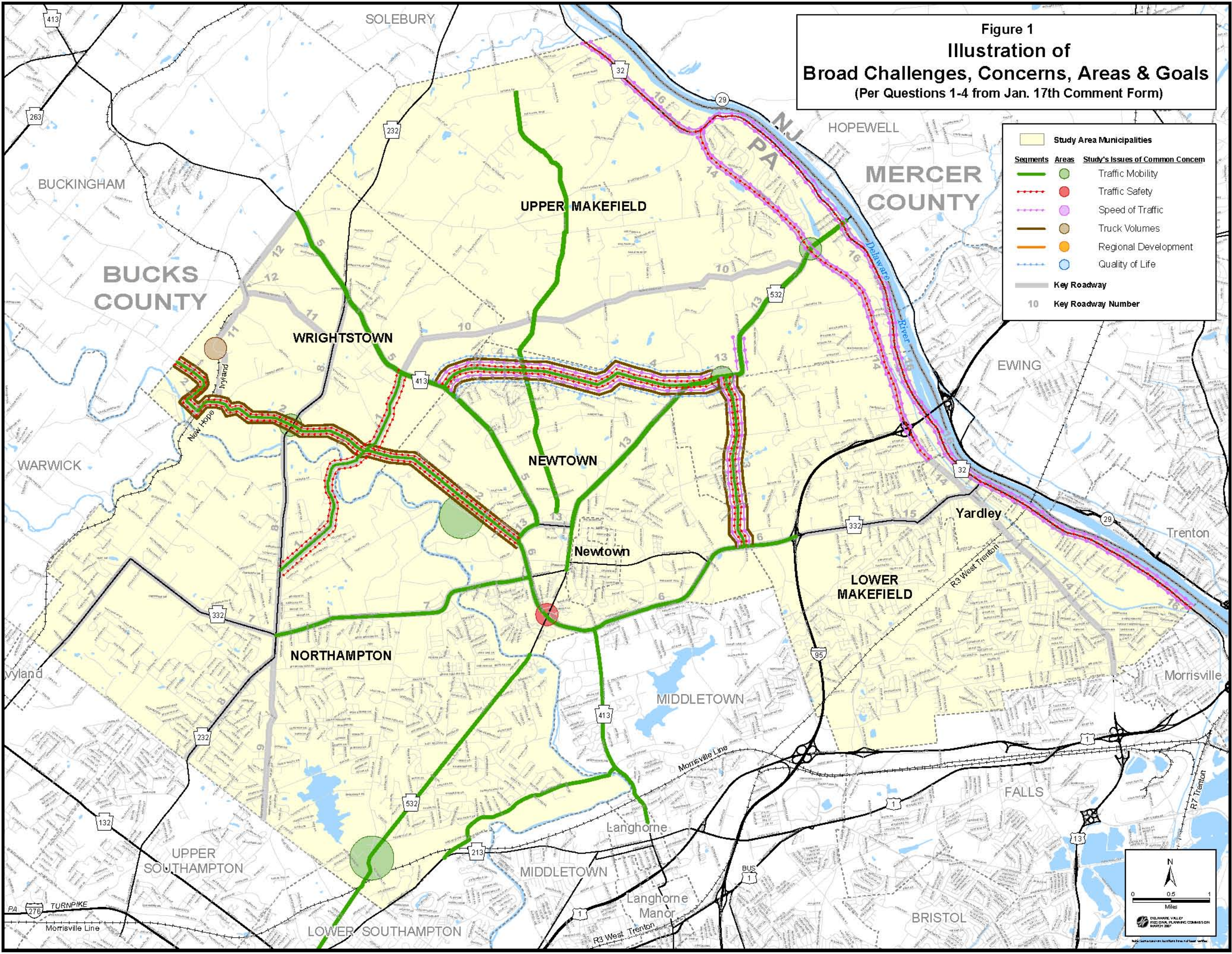
- - 1. Keep traffic moving
 - 2. Stop allowing parents to avoid school transportation.
 - 3. Consider people's time vs. safety, etc.
- - 1. Pollution
 - 2. Noise
 - 3. Congestion

12. Overall, what are the TOP THREE quality-of-life issues to consider in addressing the region's transportation needs?

Wrightstown Twp

- Traffic noise.
- 1. Safety of major highways
 2. Safe and multiple routes for quarry traffic.
- *Please be aware that the residents of Swamp Road have been very polite and considerate throughout the many years that the RRTS has been dumping on us. NO MORE! It is time that the Regional Planning Commission and public officials take ALL of Bucks County into their deliberations.
- 1. Safety
 2. Environmental impact
 3. Plans keep changing
- 1. Environmental impact
 2. Hazard to families
 3. Safety
- 1. Truck traffic is a nuisance
 2. Pre-dawn operation, noise, safety, congestion.
- 1. Don't bow down to people on Lindenhurst because they outnumber people on Swamp – Swamp Road's residents' quality of life is just as important.
 2. Noise - trucks going on flat roads generate less than trucks going on hilly roads.
 3. Don't overbuild roads to attract more development.
- 1. Early A.M. noisy truck traffic in residential areas
 2. Safety of residents and drivers.
 3. Fairness and equal consideration for all.

Figure 1
Illustration of
Broad Challenges, Concerns, Areas & Goals
 (Per Questions 1-4 from Jan. 17th Comment Form)

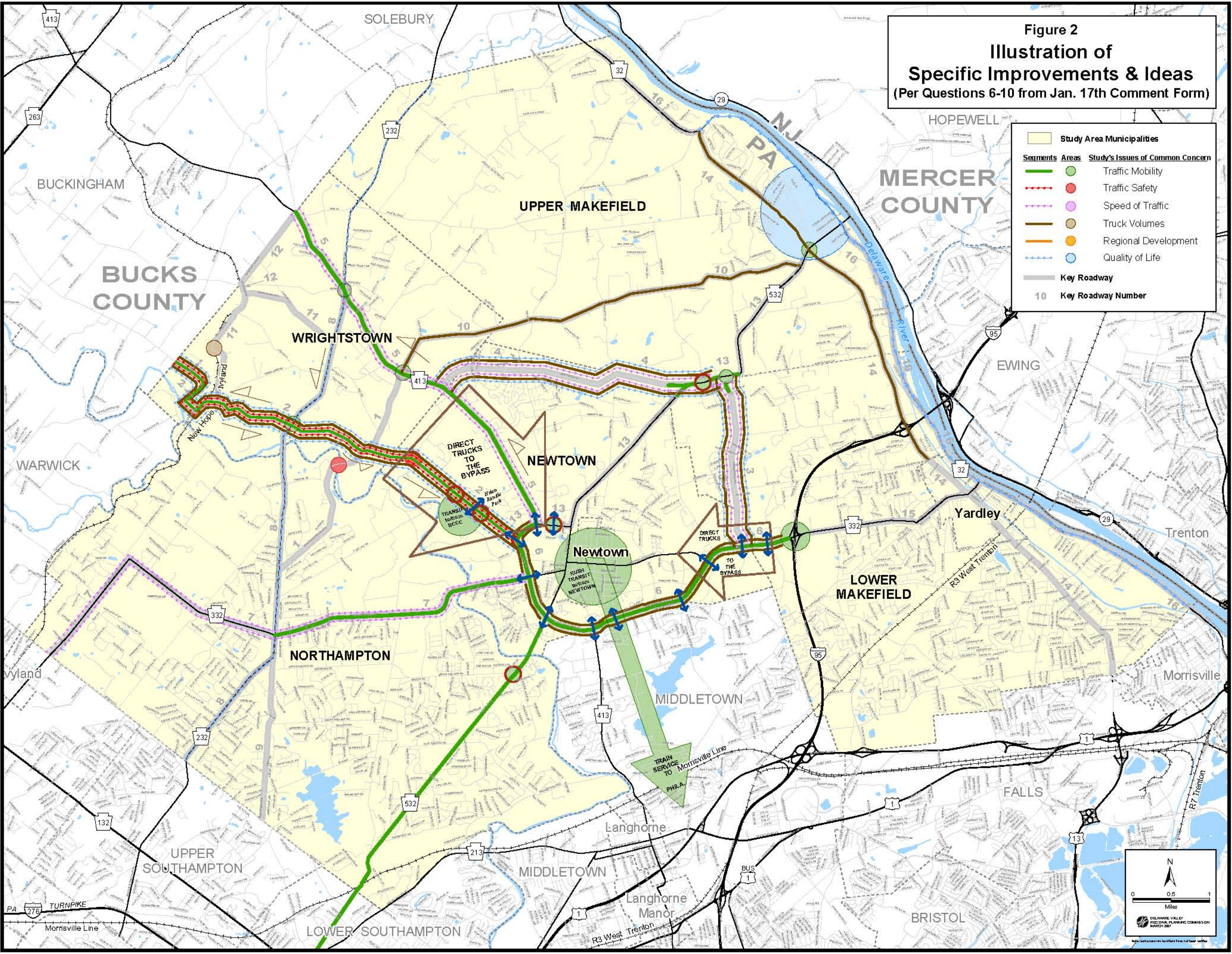


Segments	Areas	Study's Issues of Common Concern
		Traffic Mobility
		Traffic Safety
		Speed of Traffic
		Truck Volumes
		Regional Development
		Quality of Life
		Key Roadway
		Key Roadway Number

0 0.5 1
 Miles

DELAWARE VALLEY
 REGIONAL PLANNING COMMISSION
 MARCH 2017

Figure 2
Illustration of
Specific Improvements & Ideas
 (Per Questions 6-10 from Jan. 17th Comment Form)



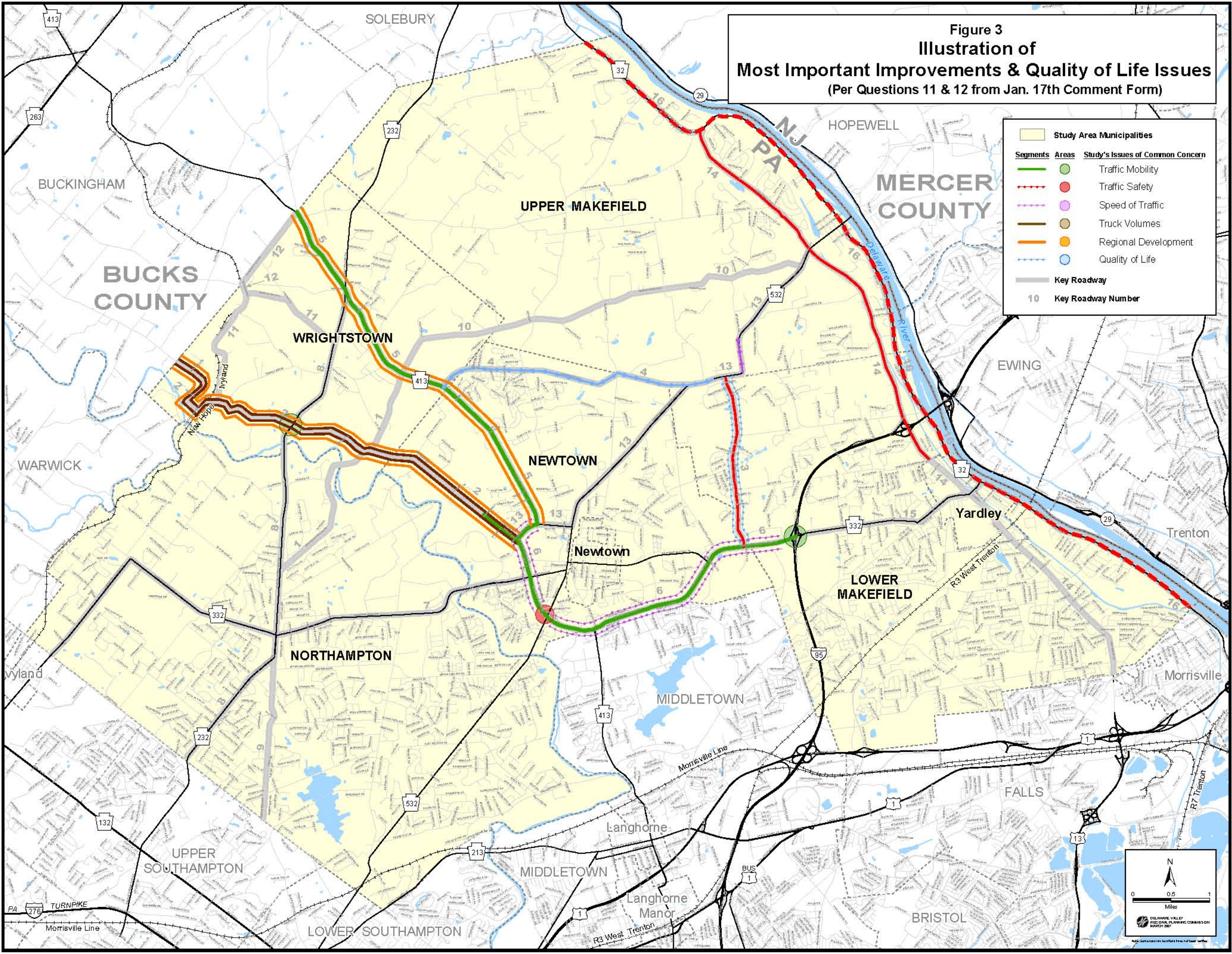
Segments	Areas	Study's Issues of Common Concern
		Traffic Mobility
		Traffic Safety
		Speed of Traffic
		Truck Volumes
		Regional Development
		Quality of Life
		Key Roadway
		Key Roadway Number

N

0 0.5 1
Miles

DELAWARE VALLEY
 REGIONAL PLANNING COMMISSION
 MARCH 2017

Figure 3
Illustration of
Most Important Improvements & Quality of Life Issues
 (Per Questions 11 & 12 from Jan. 17th Comment Form)



Study Area Municipalities		Study's Issues of Common Concern	
Segments	Areas		
			Traffic Mobility
			Traffic Safety
			Speed of Traffic
			Truck Volumes
			Regional Development
			Quality of Life
			Key Roadway
		10	Key Roadway Number

0 0.5 1
 Miles

DELAWARE VALLEY
 REGIONAL PLANNING COMMISSION
 MARCH 2017



Bucks County

Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township / Yardley Borough

4/26/07

Public Open House #2 Meeting Notes

The project's second Public Open House was held between 6pm and 9pm, on Thursday, April 26, 2007 in the cafeteria of the Charles H. Boehm Middle School, located in Lower Makefield Township.

Seventeen (17) professional staff were on-hand to explain and receive input on five project display stations addressing: the Bucks County Regional Traffic Study (BCRTS) project (2 displays) and three important projects being developed by PennDOT, Newtown Township and Lower Makefield Township along three of the BCRTS' Key Roadways.

1. Planning background to the BCRTS: Illustrated findings of the public comments received at the January 17, 2007 Public Open House #1 (DVRPC).
2. Engineering elements of the BCRTS: Key Road traffic data matrix, and suggested improvements from the *Swamp Road Traffic Engineering and Safety Study* (Jacobs Edwards and Kelcey); Traffic Calming and Key Roadway Eligibility Analyses (KMJ Consulting, Inc).
3. Newtown Bypass Traffic Signal Enhancement Initiative (TSEI) Project: To improve traffic signal coordination along the Newtown Bypass (PennDOT, and Gannett Fleming Inc.).
4. Lindenhurst Road Traffic Calming Project for Lower Makefield Township (Schoor DePalma).
5. Stoopville Road Traffic Calming Plan for Newtown Township (Gilmore & Associates, Inc.).

BCRTS project team members from PennDOT and the Bucks County Planning Commission were on-hand throughout the evening to monitor and support the needs of each project.

[PLEASE NOTE: Electronic copies for most of the evening's exhibits, and all of the meeting's project handouts are included on the project website's Meetings page in the Products tab for [this](#) meeting. A summary of the public comments submitted as a result of the meeting are attached to the notes.]

A hand-out entitled "Evening Program," which described the events taking place in the room, and a BCRTS public comment form seeking input to the evening's subject matters were available.

DVRPC's display summarized the responses to 12 questions on the public comments form distributed at the first Public Open House (held January 17, 2007). [Copies of these graphics are viewable in the Products tab for this meeting.] Three displays, which summarized the responses that emanated from the comment form, were arranged in order from: Broad concerns (Figure 1) to Specific improvement ideas (Figure 2) to Most Important improvements and Quality-of-life issues (Figure 3).

Varying interpretation of the questions, multiple levels of descriptive information provided, ranges in opinions and degree of conflicting responses suggested that the particular transportation facility or geographic area cited in the response be mapped in relation to the issues of concern defined by the RTPTF. The exercise culminated in



directly pointing to the set of Key Roadways which are of overarching concern to the public and the crux of the Bucks County Regional Traffic Study (Figure 3).

Jacobs Edwards and Kelcey's display highlighted the project's current Engineering and Traffic Study Elements Summary Matrix (dated 3/12/07, and viewable in the Products of the 03/29/07 RTPTF meeting). The matrix provides a high-level summary of the traffic data collected for the study and the findings of the *Weight, Size, and Load Restrictions Studies*. The Weight, Size, and Load Restrictions studies indicated that—through analyses of crash data, highway geometry, truck and traffic speeds and volumes conditions, and based upon criteria established by PennDOT—restrictions of trucks along the Key Roadway network are not warranted at this time. Other displays by the firm showed the set of immediate and short-term improvements suggested for the Swamp Road corridor—to complement the long-term Swamp Road Reconstruction Project being developed by PennDOT. (Copies of the summary reports for the: *Weight, Size, and Load Restrictions Studies*, and the *Swamp Road Traffic Engineering and Safety Study* can be viewed on the project website in the Products tab of the 03/29/07 RTPTF meeting.)

KMJ's display included a fact sheet which summarized PennDOT's procedures for determining initial eligibility for considering traffic calming along its highways. That process was applied to the 16 Key Roadways by KMJ staff for this study. The findings were summarized on the Traffic Calming – Initial Eligibility Analysis Matrix display board. Of the 16 Key Roadways, Stoopville Road clearly passes the initial feasibility test. Six other roadways, or portions thereof, remain candidates, but require more information before a definitive judgment can be made versus PennDOT's criteria. (KMJ's products are viewable on the website under Products | BCRTS in the proceedings of the 04/26/07 Public Open House.)

Gannett Fleming's display offered a rolling PowerPoint presentation regarding PennDOT's TSEI program and the firm's work conducting the TSEI along the Newtown Bypass. A hand-out was supplied which explained the general study steps, and benefits associated with retiming and improving coordination between traffic signals. The hand-out contained a comparison of expected benefits between existing conditions and proposed optimized conditions along the Bypass (e.g., travel time savings, fuel savings, etc. vs. engineering and implementation costs). The proposed timing plans will be implemented in the Newtown Township computer operating the Newtown Bypass traffic signal system within one month. (Gannett's hand-out is viewable on the project website under Products | TSEI in the proceedings of the 04/26/07 Public Open House # 2 meeting.)

Schoor DePalma (Engineers and Consultants) provided a fact sheet and aerial depiction of the Lindenhurst Road Traffic Calming Project (designed by Pickering, Corts & Summerson, Inc.) proposed by Lower Makefield Township. Raised medians, textured cross-walks and restriped travel lanes are components of the traffic safety project to be constructed by the end of this summer. The project scope also included a new traffic signal for the Woodside Road intersection, which has been installed. (Schoor DePalma's hand-outs are viewable on the website under Products | Lindenhurst Road... from the 04/26/07 Public Open House.)

Gilmore & Associates, Inc. displayed an aerial depiction of the Stoopville Road Traffic Calming Plan the firm prepared for Newtown Township. The preliminary concept contains five roundabouts, raised-landscaped medians, chicanes, decorative cross-walks, gateway treatments, and a multi-use trail. The displayed plan is preliminary—awaiting public review (the plans are also available for inspection at the Township Building) and comments from PennDOT. When the comments are entered, project design can begin. There are no funds committed for the project's construction at this time. Gilmore representatives also prepared a hand-out which summarized the project goals and described the advantages of each component of the traffic calming plan. (Gilmore's products

are available to view or download from the project website under the Products | Stoopville Road... from the 04/26/07 Public Open House.)

Eighty six (86) guests signed in during the course of the 4/26/07 Public Open House #2 meeting, including:

- 5 of 14 RTPTF members (including: Wrightstown, Lower Makefield and Upper Makefield townships, and State Representative Steil)
- 1 of 13 Regional Stakeholders (Pennsbury School District). Mrs. Herman, RRTS, was present, but did not sign in.
- 2 of 29 Municipal Stakeholders (2/15 from Newtown Township)
- 78 members of the general public

A total of 56 comment forms were submitted that evening, and two more arrived by fax on April 30th. A tabulation of the residence pattern of the guests (according to the sign-in sheet) and of those submitting comments (according to the municipality circled on the submitted forms) is shown below.

Geographic Distribution of Attendees and Submitted Comment Forms

Attendees (86 signed in)		Residing in:	Submitted Comments (58 as of 04/30/07)	
#	% (in study area)		#	% (in study area)
30	36%	Lower Makefield	26	48%
0	---	Newtown Borough	0	---
36	44%	Newtown Township	22	41%
0	---	Northampton	0	---
4	5%	Upper Makefield	2	4%
9	11%	Wrightstown	4	7%
3	4%	Yardley Borough	0	---
4		elsewhere / not identified	4	

From conversations encountered at the meeting: It was apparent that many of the attendees were following-up from the Swamp Road Reconstruction Project’s Public Open House held on April 18, 2007 in expectation of another chance to review and/or comment on the SRRP design. Based on a review of the addresses on the sign-in form, 21 (58%) of the Newtown Township residents signed-in at the meeting had Swamp Road or near-by addresses (e.g., Colonial Drive, Justice Drive, etc.).

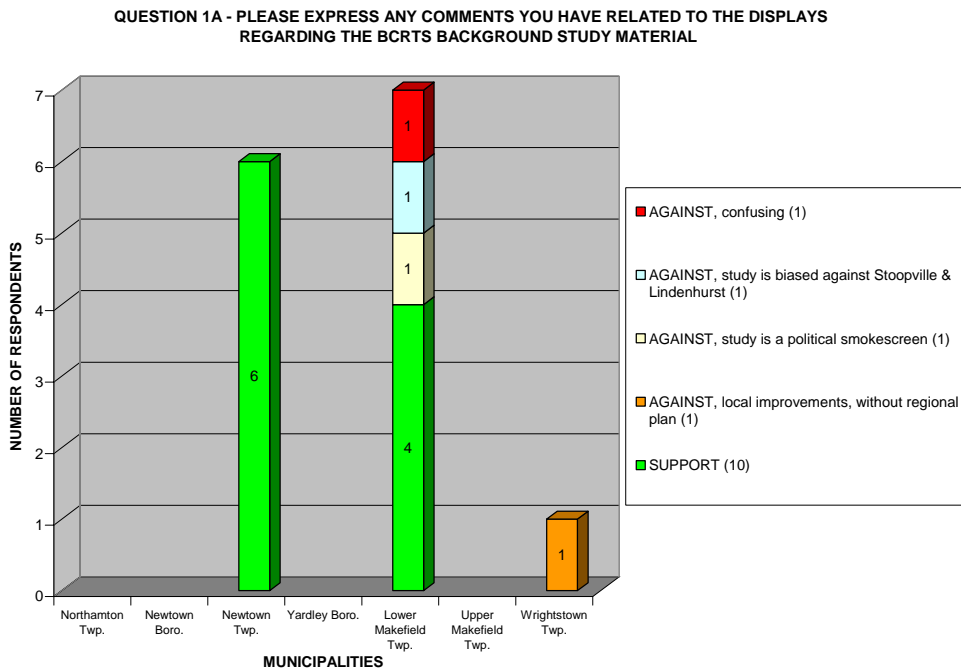
Mr. John Selitto, President of the Nob Hill Home Owners Association (Newtown Township) signed-on as a named municipal Stakeholder to the study.

[NOTE: A tabulated summary of the submitted comments is attached, along with a copy of the comment form.]

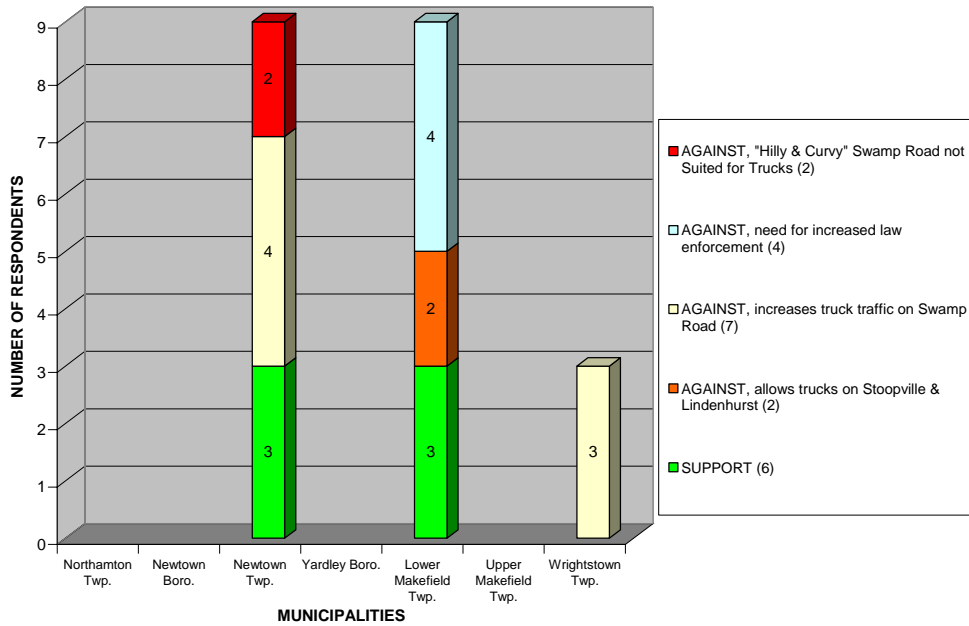
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- Attachment -
Tabulated Summary of the
Comments Received from the April 26, 2007 Public Open House #2
(note: a copy of the comment form follows)

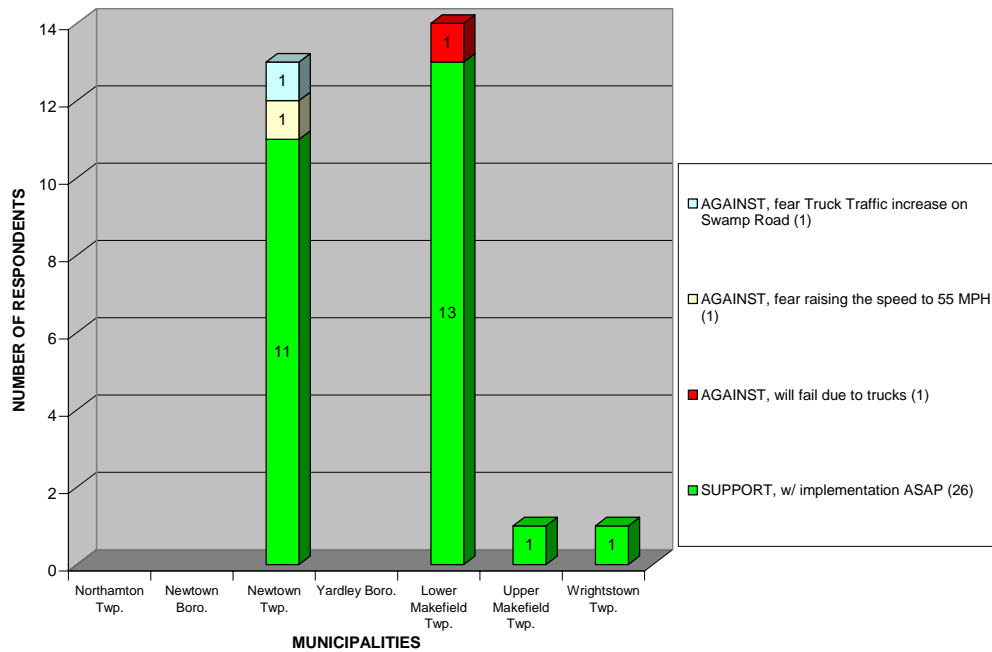
The responses to the “Public Comment Form” received from the 58 respondents are depicted in the following figures:



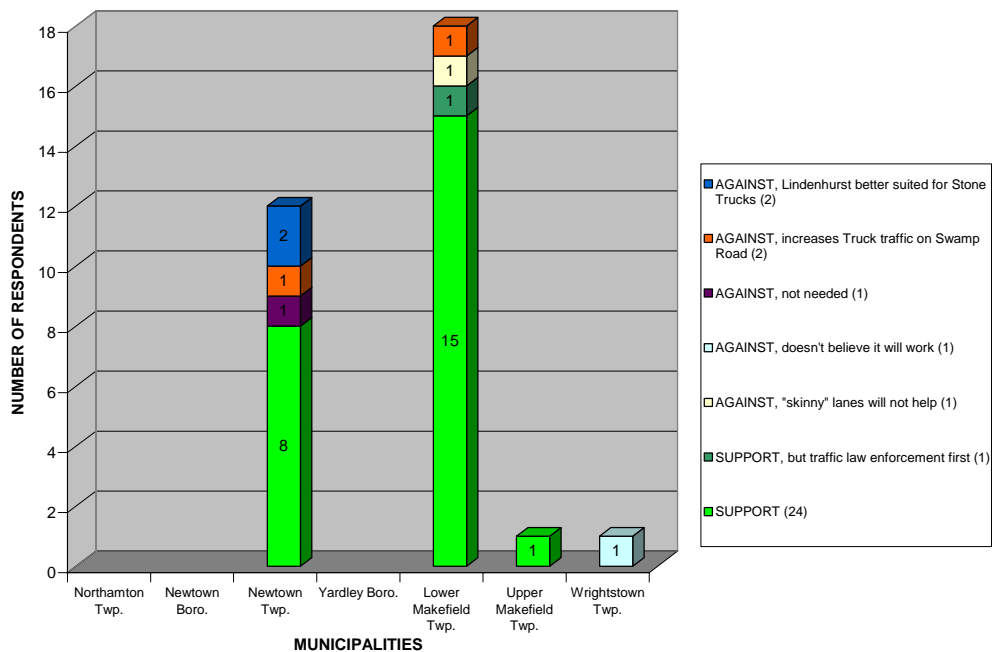
QUESTION 1B - PLEASE EXPRESS ANY COMMENTS YOU HAVE RELATED TO THE DISPLAYS REGARDING THE: WEIGHT, SIZE, & LOAD RESTRICTION STUDIES; SWAMP ROAD TRAFFIC ENGINEERING & SAFETY STUDY; AND THE TRAFFIC CALMING FEASIBILITY



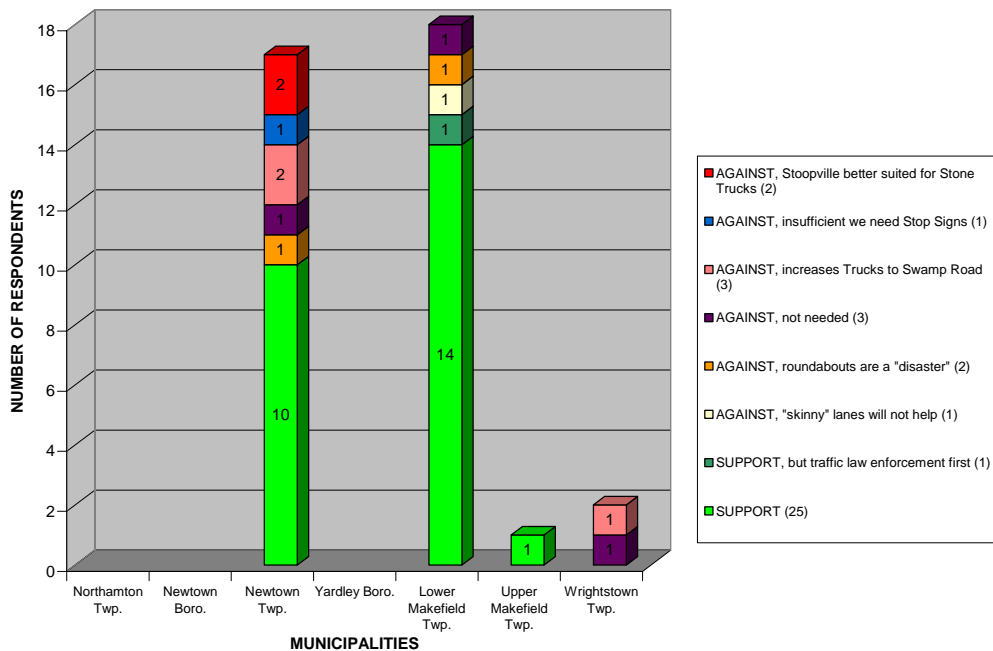
QUESTION 1C - PLEASE EXPRESS ANY COMMENTS YOU HAVE RELATED TO THE DISPLAYS REGARDING THE NEWTOWN BYPASS TRAFFIC SIGNAL ENHANCEMENT INITIATIVE



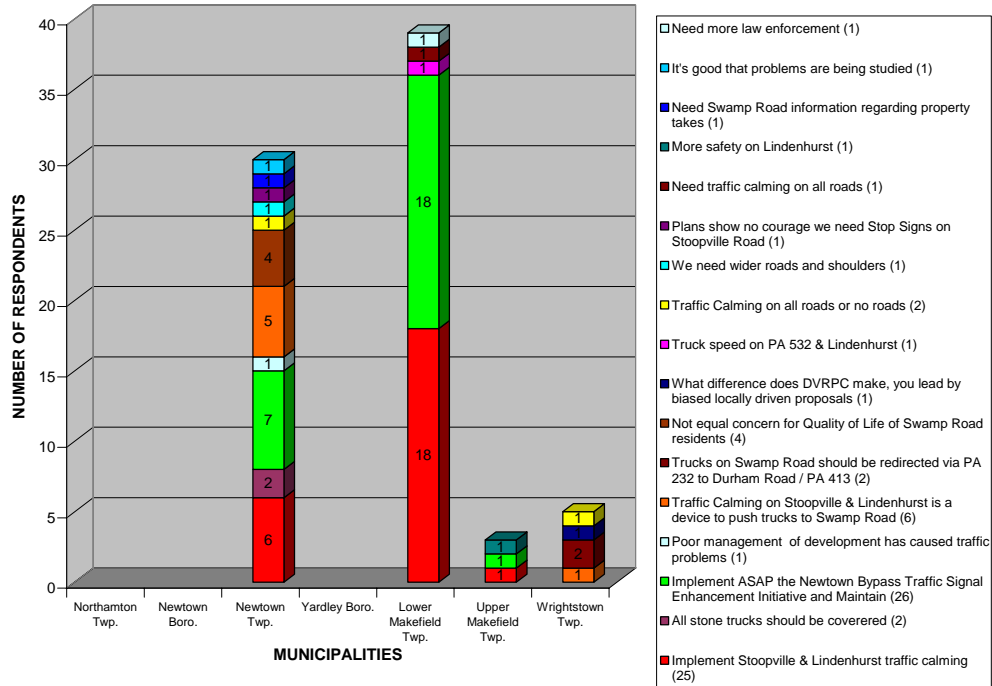
QUESTION 1D - PLEASE EXPRESS ANY COMMENTS YOU HAVE RELATED TO THE DISPLAYS REGARDING THE LINDENHURST TRAFFIC CALMING PLAN



QUESTION 1E - PLEASE EXPRESS ANY COMMENTS YOU HAVE RELATED TO THE DISPLAYS REGARDING THE STOOPVILLE TRAFFIC CALMING PLAN



QUESTION 2 - ANY ADDITIONAL QUESTIONS, COMMENTS, OR CONCERNS ABOUT THE TRANSPORTATION ISSUES IN THE REGION SURROUNDING NEWTOWN



**Bucks County Regional Traffic Study
Public Comment Form**

A critical part of the planning process is gathering concerns from the local community who live or work in the region surrounding Newtown in Central Bucks County and have an interest in transportation improvements. Please complete and return this comment form and we will be sure to include your concerns in the planning process.

Please circle the municipality where you reside:

Northampton Twp Newtown Boro Newtown Twp Yardley Boro

Lower Makefield Twp Upper Makefield Twp Wrightstown Twp

1. Please express any comments you have related to the following displays here tonight:

A. Bucks County Regional Traffic Study: Background Study Material

B. Bucks County Regional Traffic Study: Weight, Size, & Load Restriction Studies, Swamp Road Traffic Engineering & Safety Study, Traffic Calming Feasibility

C. Newtown Bypass Traffic Signal Enhancement Initiative

D. Lindenhurst Traffic Calming Plan

E. Stoopville Traffic Calming Plan

2. Any additional questions, comments, or concerns about the transportation issues in the region surrounding Newtown.

Please Drop Completed Comment Forms in the Comment Box Before Leaving. If you do not have time to complete the form tonight, please fax it to Jerry Coyne, DVRPC at 215-592-9125 or post them on the project website – BucksCountyRegionalTrafficStudy.org. Thank you for your participation.



Public Open House #3 *Summary of 9/20/07 Meeting*

CONTENT

The project's third Public Open House was held between 6pm and 9pm, on Thursday, September 20, 2007 in the cafeteria of the Richboro Elementary School in Northampton Township. The purpose of the meeting was to elicit comments and feedback about the draft Bucks County Regional Traffic Study report (June 2007).

Eight (8) professional staff were on-hand to explain and receive input on three project display stations addressing related sections of the draft report: project planning and outreach, traffic engineering and traffic calming, and programmatic improvements and implementation schedule. BCRTS project team members from PennDOT, the Bucks County Planning Commission, Jacobs Edwards & Kelcey, and the Delaware Valley Regional Planning Commission were on-hand throughout the evening to monitor and support the needs of the meeting.

Three poster size figures from the draft report were displayed to highlight the planning work conducted in the project. Figure 2-3 showed the Key Roadways with Traffic Classification Counts, Figure 2-10 illustrated summarized Truck Concerns, Figure 2-11 illustrated Municipal Concerns regarding traffic and roadway conditions, and Figure 2-12 depicted a subset of the Key Roadway Network determined to be of heightened interest to the public.

Transportation engineering and traffic calming subject matters were addressed with poster-size versions of the engineering improvement concepts drawn on aerial photos contained in Chapter 5, and Table 6-1 from the draft report.

The draft report's recommendations and implementation schedule information was displayed on a poster size version of Table 7-1, of the draft report which provided, a broad overview of the type and location of the recommended engineering improvements along each Key Roadway.

ATTENDANCE AND PUBLIC COMMENTS

Thirty four (34) guests signed in during the course of the September 20, 2007 Public Open House #3 meeting, including:

- 5 of 14 RTPTF members (including: Newtown, Northampton, Wrightstown Townships, State Representative Steil, and State Representative Petri; Mr. Schenkman from Newtown Township was in attendance by did not sign in)
- 1 of 13 Regional Stakeholders (Mrs. Herman, RRTS)
- 1 of 29 Municipal Stakeholders (1/15 from Newtown Township)
- 27 members of the general public



Public Open House #3
Summary of 9/20/07 Meeting
- continued -

A total of twenty-two (22) comment forms were submitted that evening. An additional nineteen (19) comments via email from the general public have been received through September 26, 2007. A tabulation of the residence pattern of the guests (according to the sign-in sheet) and of those submitting comments (according to the municipality circled on the submitted comment forms or indicated in their emails) follows.

Geographic Distribution of Attendees and Submitted Public Comment Forms & Emails

Attendees (34 signed in)		Residing in:	Submitted Comments (41 as of 09/26/07)	
#	% (in study area)		#	% (in study area)
8	23%	Lower Makefield	16	39%
0	0%	Newtown Borough	0	0%
12	35%	Newtown Township	18	44%
5	15%	Northampton	2	5%
0	0%	Upper Makefield	0	0%
7	21%	Wrightstown	2	5%
0	0%	Yardley Borough	0	0%
2	6%	elsewhere / not identified	3	7%

Encounters with the attendees, and review of the completed public comment forms, the emails and letters submitted by stakeholder / citizen groups yielded the following key concerns:

1. The identified location of the roundabout at the intersection of Stoopville & Washington Crossing Roads in the draft report, and/or its alignment facilitating the “Northern Bypass;”
2. Concerns over the effectiveness of the TSEI Project for the Newtown Bypass; and
3. The desire for traffic calming on Swamp Road, and/or concerns about the scope / scale of the full Swamp Road Reconstruction Project.

A sample Public Comment Form is attached, and a tabulation of submitted written comments (received from attendees, emails and stakeholder / citizen groups) follows.



**Bucks County Regional Traffic Study
Public Comment Form
Open House #3 – Thursday, September 20, 2007**

A critical part of the planning process is gathering concerns from the local community who live or work in the region surrounding Newtown in Central Bucks County and have an interest in transportation improvements. Please complete and return this comment form and we will be sure to include your concerns in the planning process.

Please circle the municipality where you reside:

**Northampton Twp Newtown Boro Newtown Twp Yardley Boro
Lower Makefield Twp Upper Makefield Twp Wrightstown Twp**

1. Have you had a chance to review the Draft Bucks County Regional Traffic Study Final Report, found on the project website? (The report is directly accessible at [http://www.dvrpc.org/BCRTS/meeting/2007-07_products/Draft_BCRTS_Report\(6+\).pdf](http://www.dvrpc.org/BCRTS/meeting/2007-07_products/Draft_BCRTS_Report(6+).pdf))

Yes

No

2. If so, do you have any specific comments related to the report?

3. Please provide any specific comments related to the materials presented here this evening.

4. Please express any comments you have related to moving forward. What initiatives do you think should be a top priority and how do you think they should be implemented?

5. Please express any comments you have related to the process and format of this study.

Please Drop Completed Comment Forms in the Comment Box Before Leaving. If you do not have time to complete the form tonight, please mail or fax it to Jerry Coyne, DVRPC at 190 N Independence Mall West, 8th Floor, Phila., PA 19106, 215-592-9125 or post them on the project website – BucksCountyRegionalTrafficStudy.org. Thank you for your participation.

Please note: If you have not read the report, it will be available online and comments will be accepted until Wednesday, September 26, 2007.

**Summary of the Comments Received from the BCRTS
September 20, 2007 Public Open House #3**

TABULATED RESPONSES from the PUBLIC COMMENT FORM

Municipality where they reside:	Total
Northampton Township	2
Newtown Borough	0
Newtown Township	8
Yardley Borough	0
Lower Makefield Township	11
Upper Makefield Township	0
Wrightstown Township	1

Question 1: Have you had a chance to review the Draft Bucks County Regional Traffic Study found on the project website?	Total
Yes	20
No	2

Question 2: Do you have any specific comments related to the report?*	Total
No Response	5
Swamp Rd needs traffic calming	2
Link area bike paths	1
Swamp Rd should carry trucks	1
Improve functionality of Newtown Bypass	3
Oppose fixing curve at south end of Lindenhurst	1
Issues with roundabout at Stoopville Rd & Washington Crossing	4
Oppose roundabouts in general	1
Safety on Mill Creek Rd	1
Signal at Taylorsville / Main & Dolington Rd vs. roundabout	1
Double left lanes at WB Bypass & Stoney Hill Rd	1
Comprehensive / easy to understand	2
Show more suggestions / alternatives	1
Traffic numbers on Swamp Rd outdated	1
Roundabout at Stoopville Rd & Washington Crossing facilitates Northern Bypass	2
Concerns over growth / preserve open space	1

*Respondents may have given more than one answer



**Summary of the Comments Received at the BCRTS
September 20, 2007 Public Open House #3**

TABULATED RESPONSES from the PUBLIC COMMENT FORM, cont.

Question 3: Please provide any specific comments related to the materials presented here this evening.*	Total
No Response	7
Supportive of traffic calming on Lindenhurst Rd	1
Improve functionality of Newtown Bypass	1
Figure 2-11: 'traffic speeds' are ambiguous	1
More copies of draft report should be available	1
Issues with roundabout at Stoopville Rd & Washington Crossing	4
Disappointing	1
Good variety	1
Roundabouts speed up traffic / cause fatalities	2
Need 3D maps (i.e., topo)	1
Good study	2
Stop PennDot from widening	1
Roundabout at Stoopville Rd & Washington Crossing facilitates Northern Bypass	1
Holland Rd & Buck Rd & Old Bristol Rd not addressed	1

Question 4 - What initiatives do you think should be a top priority and how do you think they should be implemented?*	Total
No Response	3
Need traffic calming / improvements on Swamp Rd	4
Make Bypass more accessible to PA 413	2
Improve functionality of Newtown Bypass	8
Balance traffic & truck traffic around Newtown	1
Area-wide focus on calming / safety / signage	2
2nd Street Pike & Durham Rd jughandle issue	1
Swamp Road improvements	1
More studying needed to make decisions	1
Truck restrictions at all one lane bridges	1
Jake Brakes restrictions	1
Issues with roundabout at Stoopville Rd & Washington Crossing	1

*Respondents may have given more than one answer



**Summary of the Comments Received at the BCRTS
September 20, 2007 Public Open House #3**

TABULATED RESPONSES from the PUBLIC COMMENT FORM, cont.

Question 5: Please express any comments you have related to the process and format of the study.*	Total
No Response	6
More time needed for Swamp Rd input	1
Issues with roundabout at Stoopville Rd & Washington Crossing	3
Truck noise nuisance / sound walls	1
Better indication of existing priorities needed	1
Keep public engaged	1
More public participation: suggested Q & A	1
Study aimed at roadway expansion	1
Good job	1
Eye opening process	1
Report supports goals that were already established	1
Decisions being made on outdated data	1
Comments at one meeting not addresses at next	1
Don't blame BCRTS for PennDOT's plans	1
Limit future development	1
DVRPC has hidden agenda	1

EMAILS from INDIVIDUALS

General Comment*	Total
Improvements needed at Main St & Afton Ave in Yardley	1
Improvements needed at Dollington and Taylorsville Rd	1
Need more enforcement	1
Upgrade / expand Bypass	1
Signal at Bypass & PA 532 problematic	1
Issues with roundabout at Stoopville Rd & Washington Crossing	2
Re-do truck data when Stoopville is not closed	1
Truck counts outdated	1
Durham Rd & Stoopville Rd intersection needs signal	1
Supports Stoopville Rd traffic calming	1
Improve functionality of Newtown Bypass	11
Mill Creek improvements: address vertical / horizontal curves	1
Enforcement on Mill Creek	1
Roundabout at Stoopville Rd & Washington Crossing facilitates Northern Bypass	15
Ban trucks on Mill Creek	1
Police need RADAR for enforcement	1

*Respondents may have given more than one answer / comment



**Summary of the Comments Received at the BCRTS
September 20, 2007 Public Open House #3**

STAKEHOLDER / CITIZEN GROUP WRITTEN COMMENTS

General Comment	Total	Received from:
Reevaluate PennDOT Swamp Rd project	1	SRRG*
All comments regarding trucks invalid due to lack of information	1	SRRG
New third entrance at BCCC supersedes need to lengthen WB left turn lane	1	SRRG
Redesign Swamp Rd project to incorporate lower cost ideas	1	SRRG
Delete Second Street Pk corridor and intersection improvements	1	SRRG
Swamp Road users and residents deserve to be safe	1	SRRG
Add <i>Project Scope</i> to background materials	1	RCC**
Add statement in <i>Project Scope</i> to preserve open space	1	RCC
Reclassify arterial roads to collector where applicable	1	RCC
Does not favor the location of the Stoopville & Washington Crossing roundabout	1	RCC
Add page 2.1.07 of PennDOT's Design Manual to Chapter 2	1	RRTS***
Add PennDOT's latest functional class map for Bucks Co to Chapter 2	1	RRTS
Recommend continued study of using rail in region	1	RRTS
Introduce <i>Recommendations vs. Municipal Goals & Objectives</i> in Ch. 5	1	RRTS
Compare recommendations to municipal Comp Plan goals & objectives	1	RRTS
Location of Stoopville Rd & Washington Crossing roundabout	1	RRTS
Investigate alternatives to roundabout at Stoopville Rd / Washington Crossing	1	RRTS
Northern Bypass is direct opposition to DVRPC traffic calming policy	1	RRTS
Add <i>Engineering and Traffic Study Elements, Summary Matrix</i> to Ch. 5	1	RRTS
Traffic uses Lindenhurst Rd and Stoopville Rd due to Bypass ill funding	1	RRTS
Explain why traffic uses Lindenhurst Rd and Stoopville Rd instead of Bypass	1	RRTS
Quarry drivers prefer the Bypass but hit every red light	1	RRTS
Bypass should construct over- & underpasses to relieve congestion	1	RRTS
Bypass should operate optimally at all times	1	RRTS
Page 5-15 shows Lindenhurst Rd incorrectly - should be an Urban Collector	1	RRTS
<i>Original & Suc..Projects</i> should say Lindenhurst Rd construction has begun	1	RRTS
<i>Concurrent Projects</i> should say Lindenhurst Rd construction has begun	1	RRTS
The southern end of Lindenhurst Road should not be straightened	1	RRTS
Page 5-18 shows Stoopville Rd incorrectly - should be an Urban Collector	1	RRTS
Speed limit on Stoopville Rd needs to be lowered	1	RRTS
Page 4-6 shows Bypass incorrectly - should be a Minor Arterial	1	RRTS
The entrance to Vet Cemetery should be on Washington Crossing	1	RRTS
Explain <i>PA 413 Access Management Plan</i> as mentioned on page 5-59	1	RRTS
Examine roundabout feasibility in lieu of signal at Durham & Worth. Mill Rds	1	RRTS
Examine roundabout feasibility in lieu of signal at Durham & Second Street Pk	1	RRTS
The TSEI project has made the Bypass worse	1	RRTS
Figure 2-11 supports DVRPC's desire for the Northern Bypass	1	RRTS
Figure 2-10 supports DVRPC's desire for the Northern Bypass	1	RRTS
Figure 2-12 missing data from Stoopville Rd & Lindenhurst Rd	1	RRTS
Information gathered at January Open House is biased: not at neutral location	1	RRTS
High volumes of trucks are dangerous to residential roads	1	RRTS
Introduce a signing plan to encourage trucks to not use residential roads	1	RRTS

*Swamp Road Residents Group

**DVRPC's Regional Citizens Committee

***Residents for Regional Traffic Solutions, Inc.



Appendix C
Engineering and Traffic Study Elements
Summary Matrix

Bucks County
Regional Traffic Study

**Engineering and Traffic Study Elements
Summary Matrix**
Revised: 3/12/2007

#	Key Roadway	Average Daily Traffic (ADT)	Traffic Composition	Reportable Crash History	Reportable Crash History Composition	Prevailing Traffic Speed	Horizontal & Vertical Alignment
1	Worthington Mill Road (SR 2081)	2,900	6.0%	3.19	4.17%	47	More
2	Swamp Road (SR 2036 / SR 2079)	7,500	10.2%	2.70	4.41%	46	Average
3	Lindenhurst Road (SR 2069)	10,200	6.8%	0.98	5.33%	48	Average
4	Stoopville Road (SR 2028)	8,200	11.3%	0.68	1.67%	53	Average
5	PA 413 (SR 0413, Durham Road)	16,000	6.3%	1.29	2.24%	52	Average
6	Newtown Bypass (SR 0332)	37,600	4.4%	0.96	1.62%	55	Less
7	Newtown Richboro Road / Jacksonville Road (SR 0332)	18,000	4.3%	1.30	2.29%	48	Less
8	Second Street Pike (SR 0232)	12,100	6.7%	1.91	3.04%	53	Average
9	Bustleton Pike (SR 2065)	10,500	6.7%	2.73	2.07%	46	Average
10	Wrightstown Road (SR 2081)	2,200	11.5%	3.18	3.23%	50	Average
11	Mill Creek Road / Washington Avenue / Cherry Lane (SR 2091)	800	14.0%	2.49	13.33%	40	More
12	Township Line Road / Mill Creek Road (SR 2115)	1,900	11.7%	2.18	0.00%	37	Less
13	Newtown Bypass / Durham Road / Washington Crossing Road (SR 0532)	10,600	5.8%	1.50	2.23%	52	Less
14	Taylorville Road / Main Street / Yardley Morrisville Road / Pine Grove Road (SR 2071)	12,000	4.8%	1.11	2.63%	43	Less
15	PA 332 (SR 0332)	7,500	4.6%	1.77	2.46%	49	Less
16	PA 32 (SR 0032, River Road)	4,900	5.1%	1.13	1.15%	41	Less

Average Daily Traffic (ADT)
< 5,000
5,000 - 15,000
> 15,000

Traffic Composition
< 5.0 % Trucks
5.0 - 10.0 % Trucks
> 10.0 % Trucks

Reportable Crash History (Crashes per million vehicle-miles / 5 years)
< 1.00
1.00 - 2.00
> 2.00

Reportable Crash History Composition (Trucks)
< 5.0 % of total vehicles
5.0 - 10.0 % of total vehicles
> 10.0 % of total vehicles

Prevailing Traffic Speed (85th Percentile)
Within 5 MPH of posted speed limit
Above 5 MPH of posted speed limit
Above 10 MPH of posted speed limit

Horizontal & Vertical Alignment
Less severe
Average
More severe

* Note: Values are averaged across the study limits of the key roadway.



Appendix D

Illustrations of the Concurrent Transportation Improvement Projects Being Developed by Others Within the Study Area

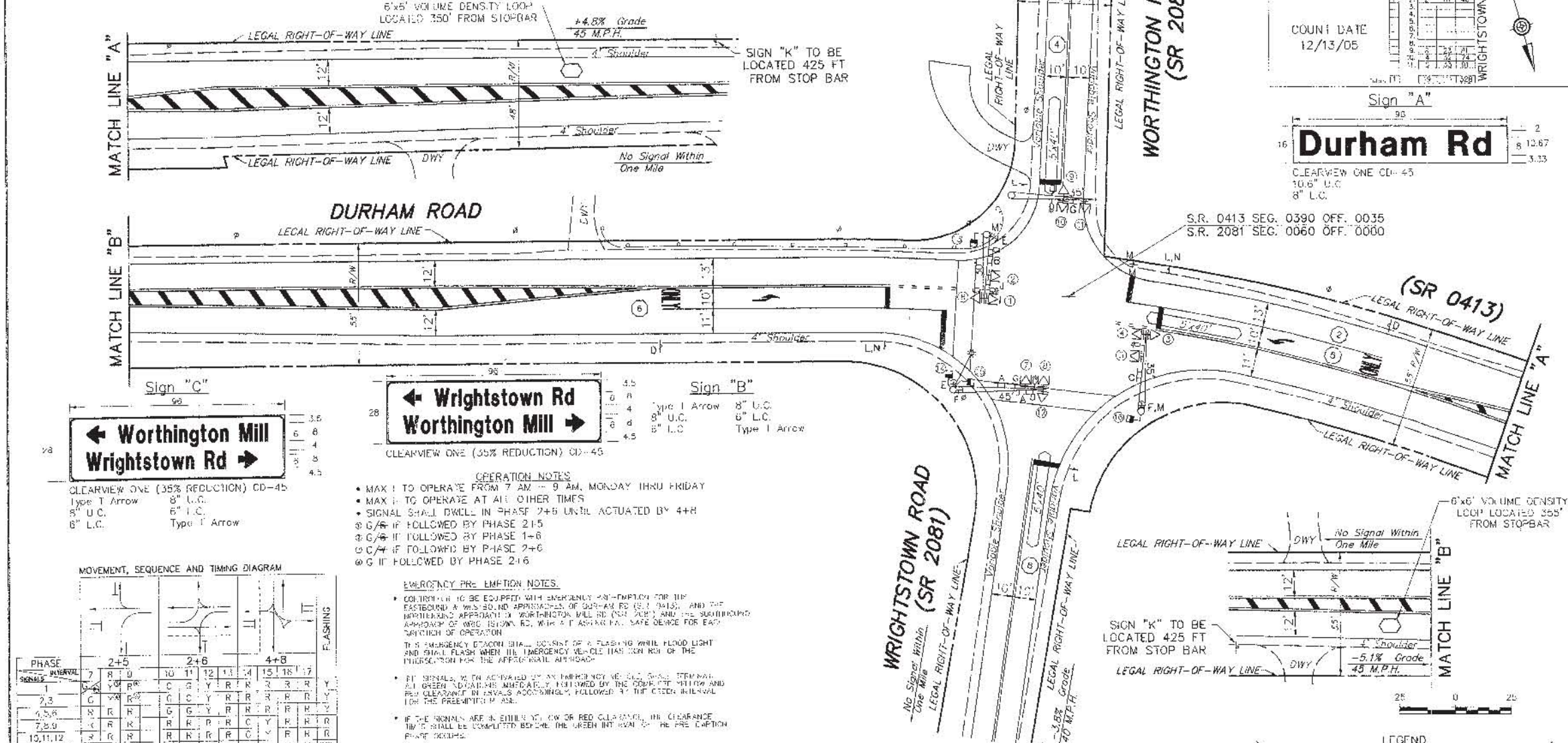
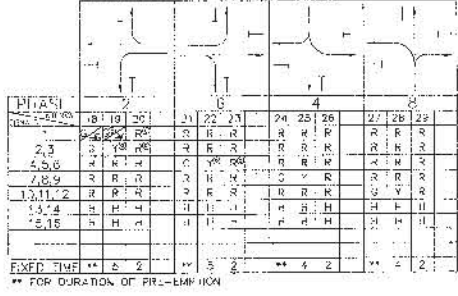
- 1. Durham Road & Wrightstown / Worthington Mill Road Intersection Improvements - Wrightstown Township**

- 2. Lindenhurst Road Traffic Calming Improvements Project - Lower Makefield Township**

- 3. Stoopville Road Traffic Calming Plan - Newtown Township & Upper Makefield Township**

SIGN TABULATION			
PLAN SYMBOL	SERIES NUMBER	SIZE	REMARKS
A	D3-4	96"x16"	STREET NAME SIGN (SEE DETAIL)
B	D3-5	96"x28"	STREET NAME SIGN (SEE DETAIL)
C	D3-5	96"x28"	STREET NAME SIGN (SEE DETAIL)
D	R3-7L	30"x30"	LEFT LANE MUST TURN LEFT
E	R10-3L	9"x12"	PUSH BUTTON FOR GREEN LIGHT
F	R10-3R	9"x12"	PUSH BUTTON FOR GREEN LIGHT
G	R10-11	30"x36"	NO TURN ON RED
J	R10-12	30"x36"	LEFT TURN YIELD ON GREEN
K	W3-3	36"x36"	SIGNAL AHEAD
L	R10-6L	24"x30"	STOP HERE ON RED
M	R9-3	18"x18"	NO PEDESTRIAN CROSSING
N	R10-6-1	24"x18"	LEFT LANE PLAQUE

EMERGENCY PRE-EMPTION PHASING MOVEMENT, SEQUENCE AND TIMING DIAGRAM



MOVEMENT, SEQUENCE AND TIMING DIAGRAM

PHASE	2+5		2+6		4+8		FLASHING
	7	8	10	11	12	13	
1	Y	Y	C	G	Y	R	
2,3	G	Y	C	G	Y	R	
4,5,6	R	R	C	G	Y	R	
7,8,9	R	R	C	G	Y	R	
10,11,12	R	R	C	G	Y	R	
13,14	R	R	C	G	Y	R	
15,16	R	R	C	G	Y	R	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	5	2	1	5	2	1	4	2							
MINIMUM SEC./ACT.	3		10		3										
MAX. INITIAL PASSAGE	5		37		3										
MIN. GAP			15		15										
MAXIMUM			23		23										
MAXIMUM # PEDESTRIAN			57		57										
MEMORY	ML		MR		L										

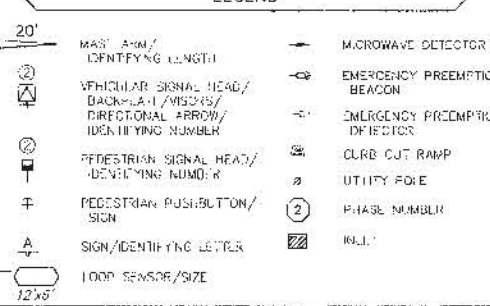
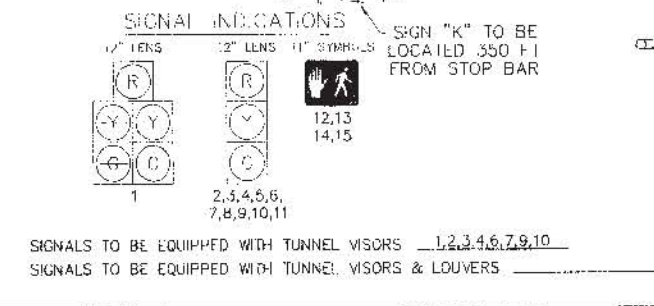
UPON PEDESTRIAN ACTUATION ONLY, OTHERWISE HOLD ALL OTHER TIMES

OPERATION NOTES

- MAX 1 TO OPERATE FROM 7 AM - 9 AM, MONDAY THRU FRIDAY
- MAX 1 TO OPERATE AT ALL OTHER TIMES
- SIGNAL SHALL DWELL IN PHASE 2+6 UNTIL ACTUATED BY 4+8
- 4+8 IF FOLLOWED BY PHASE 2+5
- 4+8 IF FOLLOWED BY PHASE 1+6
- 4+8 IF FOLLOWED BY PHASE 2+6
- 4+8 IF FOLLOWED BY PHASE 2+6

EMERGENCY PRE-EMPTION NOTES

- CONTROLLED TO BE EQUIPPED WITH EMERGENCY PRE-EMPTION FOR THE EASTBOUND AND WESTBOUND APPROACHES OF DURHAM RD (SR 0413) AND THE NORTHEAST APPROACH OF WRIGHTSTOWN RD (SR 2081) AND THE SOUTHWEST APPROACH OF WING BOWEN RD. WITH A 10-SECOND SAFE DELAY FOR EACH SWITCH OF OPERATION.
- IN EMERGENCY STATION SIGNALS, SIGNALS OF A FLASHING WHITE FLOOD LIGHT AND SHALL FLASH WHEN THE EMERGENCY VEHICLE HAS RUN RED OF THE INTERSECTION FOR THE APPROACH APPROACH.
- IF SIGNALS ARE ACTUATED BY AN EMERGENCY VEHICLE, SIGNALS SHALL REMAIN FLASHING.
- IF SIGNALS ARE ACTUATED BY AN EMERGENCY VEHICLE, SIGNALS SHALL REMAIN FLASHING.
- UPON COMPLETION OF PRE-EMPTION PHASE 2+6, PHASE 1+6 IS RETURNING TO NORMAL OPERATION PHASE 2+5 INTERVAL TO NORMAL TO LOG.
- IF ADDITIONAL PRE-EMPTION PHASES ARE ACTIVATED WHILE IN PRE-EMPTION, THE ORIGINAL PRE-EMPTION PHASE SHALL TIME OUT BEFORE PROCEEDING TO THE NEXT PRE-EMPTION PHASE.
- IF EMERGENCY PRE-EMPTION, NO PEDESTRIAN SHALL BE ESTABLISHED PRE-EMPTION SHALL BE A FIRST COME, FIRST SERVED OPERATION.
- IF FIELD LOCATIONS OF THE PRE-EMPTION DELIVERING MAY DIFFER FROM THE LOCATIONS DERIVED ON THE CONTROL PROGRAM, THE DELIVERING MAY NEED TO BE ADJUSTED AND THE ADJUSTMENT TO BE MADE BY THE OPERATOR AS NECESSARY.
- IF THE SIGNAL IS ACTIVATED BY A PEDESTRIAN PUSH BUTTON, AND IT SIGNAL IS THE EMERGENCY PRE-EMPTION PHASE, THE SIGNAL SHALL REMAIN FLASHING UNTIL THE PEDESTRIAN PUSH BUTTON IS RELEASED. THE SIGNAL SHALL REMAIN FLASHING UNTIL THE PEDESTRIAN PUSH BUTTON IS RELEASED.



GENERAL NOTES

NO MODIFICATIONS OF THIS INSTALLATION ARE PERMITTED UNLESS PRIOR APPROVAL IS OBTAINED IN WRITING BY A REPRESENTATIVE OF THE DEPARTMENT OF TRANSPORTATION.

ALL MAINTENANCE WORK INCLUDING TRIMMING OF TREES, NECESSARY FOR PROPER VISIBILITY OF THE SIGNALS IS THE RESPONSIBILITY OF THE PERMITTEE.

ALL SIGNS AND PAVEMENT MARKINGS INDICATED ON THIS DRAWING ARE CONSIDERED PART OF THE PERMIT AND SHALL BE INSTALLED AND MAINTAINED IN ACCORDANCE WITH PUBLICATION NO. 68.

POST MOUNTED SIGNALS SHALL BE INSTALLED WITH THE SIGNAL HEADS A MINIMUM OF 2 FEET BEHIND THE FACE OF CURB OR THE EDGE OF THE SHOULDER. SUPPORT HOLES FOR OVERHEAD SIGNALS SHALL ALSO HAVE A MINIMUM CLEARANCE HORIZONTALLY OF 2 FEET.

SIGNALS MOUNTED OVER THE ROADWAY SHALL HAVE A MINIMUM VERTICAL CLEARANCE OF 16 FT. ABOVE THE ROADWAY. POST MOUNTED SIGNALS SHALL BE A MINIMUM OF 8 FT. ABOVE THE SIDEWALK OR PAVEMENT.

ALL OVERHEAD SIGNALS MUST BE RIGIDLY MOUNTED, TOP AND BOTTOM, AND EQUIPPED WITH BACKSCATTERS.

THE MINIMUM HORIZONTAL DISTANCE BETWEEN SIGNALS MEASURED AT RIGHT ANGLES TO THE APPROACH SHALL BE 8 FEET.

EXACT LOCATION OF DETECTORS SHALL BE DETERMINED PRIOR TO INSTALLATION BY A REPRESENTATIVE OF PERMITTEE.

WORKING TO BE INSTALLED BY MUNICIPALITY AND WHERE NOTED, SHALL BE PLAIN CEMENT CONCRETE CURB OR GRANITE CURB, INSTALLED IN ACCORDANCE WITH DEPARTMENT SPECIFICATIONS FORM 405.

PRIOR TO INSTALLATION THE CONTRACTOR SHALL CONSULT WITH THE LOCAL OFFICIALS AND UTILITY COMPANIES TO RESOLVE ANY PROBLEMS WHICH MAY BE CREATED DUE TO THE LOCATION OF UTILITIES.

THIS DRAWING CANNOT BE USED AS A CONSTRUCTION DRAWING UNLESS THE PERMITTEE COMPLIES WITH THE PROVISIONS OF ACT 187, PREVENTION OF DAMAGE TO UNDERGROUND UTILITIES, EFFECTIVE DATE OCTOBER 19, 1996.

WHEN LIQUID TUBES MONEY IS USED, SIGNAL INSTALLATION MUST CONFORM TO FORM 408 AND A COPY OF THE PROPOSED SPECIFICATIONS MUST BE SUBMITTED TO THE DISTRICT TRAFFIC UNIT, FOR REVIEW, PRIOR TO BIDDING.

PERMITTEE SHALL OBTAIN A HIGHWAY OCCUPANCY PERMIT FOR ANY CHANGES IN INTERSECTION GEOMETRY REGARDING EXCAVATION.

SIGNALS INSTALLED IN BUSHINGS ROADWAY LESS THAN 5 YEARS OLD, OR CONCRETE ROADWAY REGARDLESS OF AGE, MUST BE BORED OR JACKED UNDER THE ROADWAY. INSTALL IN ACCORDANCE WITH TRAFFIC SIGNAL STANDARDS, 10-7800 SERIES.

PENNSYLVANIA DEPARTMENT OF TRANSPORTATION ENGINEERING DISTRICT 6-0

COUNTY: BUCKS COUNTY

MUNICIPALITY: WRIGHTSTOWN TOWNSHIP

INTERSECTION: DURHAM RD (SR 0413) AND WRIGHTSTOWN RD/WORTHINGTON MILL RD (SR 2081)

REVIEWED: _____ DATE _____

RECOMMENDED: _____ DATE _____

DISTRICT TRAFFIC ENGINEER: _____ DATE _____

NO.	REVISION	DATE	REVISION	DATE	RECORD	DATE
1						
2						
3						
4						
5						
6						
7						
8						

SHEET 2 OF 2 PERMIT # 61-2714 FILE # 2714



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PICKERING, CORTS & SUMMERSON, INC.
 Consulting Engineers & Land Surveyors
 1400 N. 10th Street, Suite 200
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 Tel: (717) 653-1234
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Highway Occupancy Permit Plan
S.R. 2069 Lindenhurst Road
Traffic Calming Improvements
 LOWER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

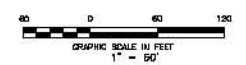


NOT FOR BID OR CONSTRUCTION

AERIAL IMAGE FROM 2005 DIGITAL ORTHOPHOTOGRAPHY BY DVPFC
 PROPOSED FEATURES BASED ON HIGHWAY OCCUPANCY PERMIT PLANS PREPARED BY PICKERING, CORTS & SUMMERSON, INC.

REVISION NO.	DATE	DESCRIPTION

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JAMES R. MAJEWSKI
 PROFESSIONAL ENGINEER, PA, LIC No. 052886-E

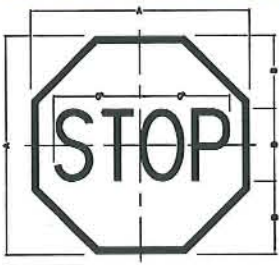
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AERIAL VIEW OF
PROPOSED LINDENHURST ROAD
TRAFFIC SAFETY IMPROVEMENTS

LOWER MAKEFIELD TOWNSHIP BUCKS COUNTY PENNSYLVANIA

PROJECT NO.	DATE
060139401	4/26/2007
DRAWN BY	ABC
CHECKED BY	ABC
SCALE	1" = 50'
SCHOOR DEPALMA	
SHEET NO.	1 of 2



SIGN A

COLOR LETTERS AND NUMBER HAVE ENLARGED BACKGROUND

SIZE	A	B	C	D	E	F	MIN. SPACING
36" x 36"	8"	8"	10"	2"	6"	6"	24"-36"
24" x 24"	6"	6"	8"	1 1/2"	4"	4"	18"-24"
18" x 18"	4"	4"	6"	1"	3"	3"	12"-18"
12" x 12"	3"	3"	4"	3/4"	2"	2"	9"-12"

REDUCE SPACING BY 1/8"

"STOP" (R1-1) SIGN A DETAIL
NOT TO SCALE



ROUNDABOUT



DECORATIVE CROSSWALK



SIGN W/ IDENTIFYING LETTER

LEGEND

GATEWAY TREATMENT

LANDSCAPED MEDIAN

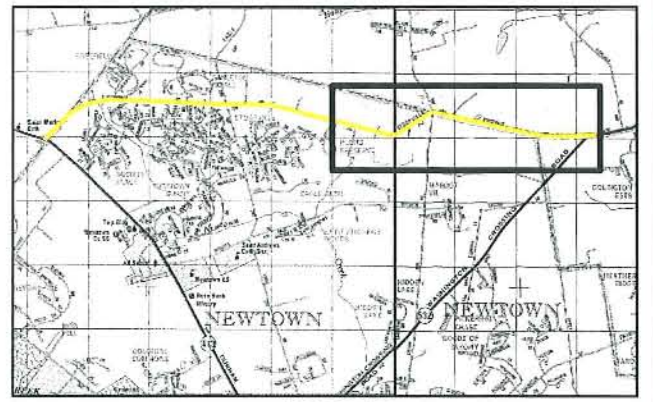
CONCEPT PLAN ALTERNATE 2
TRAFFIC CALMING PLAN
STOOPIVLE ROAD BETWEEN DURHAM ROAD & WASHINGTON CROSSING ROAD (S.R. 0532)
NEWTOWN TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

GILMORE & ASSOCIATES, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
300 EAST BUTLER AVENUE, NEW BUNYON, PA 19001-5104
164 WEST MAIN STREET, SUITE 300, TRAPPE, PA 18439

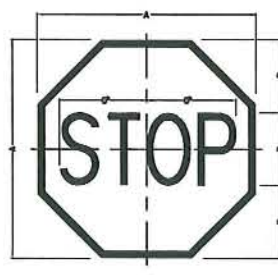
200 0 200 400
SCALE IN FEET

DESIGNED BY: TFB DRAWN BY: TFB CHECKED BY: EMK

JOB NO.: 04-1261
DATE: 1/11/07
SHEET NO. 1 OF 2



LOCATION MAP
LIMIT OF WORK



SIGN A

COLOR LETTERS AND NUMBER WHITE (EXCEPTED) ON DARK BACKGROUND

SIZE	HEIGHT	WIDTH	LETTER	NUMBER	PLATE
36" x 36"	24"	12"	0	1	36-24
30" x 30"	20"	10"	0	1	30-20
24" x 24"	16"	8"	0	1	24-16
18" x 18"	12"	6"	0	1	18-12

REDUCE SPACING BY ONE

"STOP" (R1-1) SIGN A DETAIL
NOT TO SCALE



ROUNDABOUT



DECORATIVE CROSSWALK



SIGN W/ IDENTIFYING LETTER

LEGEND

GATEWAY TREATMENT

LANDSCAPED MEDIAN

CONCEPT PLAN ALTERNATE 2
TRAFFIC CALMING PLAN
STOOPVILLE ROAD & WASHINGTON CROSSING ROAD (S.R. 0532)
NEWTOWN TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA



GILMORE & ASSOCIATES, INC.
CONSULTING ENGINEERS & LAND SURVEYORS
200 SOUTH BUCKLE PARKWAY, THIRD FLOOR, PA 19067-0200
100 WEST MAIN STREET, SUITE 100, THORPPE, PA 19088

200 0 200 400		JOB NO.:	04-1281
SCALE		IN	FEET
DESIGNED BY:	DRAWN BY:	CHECKED BY:	SHEET NO.
TFB	TFB	EMK	2 OF 2
DATE:		1/11/07	

Appendix E

Inventory of Traffic Calming Measures & Applications

Horizontal Deflection – mainly used to reduce vehicle speeds

- Curb extension/bulb-out
 - Locations
 - Street classifications: all
 - ADT: up to 15,000 vehicles per day*
 - Posted speed: up to 40 mph*
 - * For extensions that do not result in narrowing of the travel lanes
 - Uses
 - Reduce pedestrian crossing distances
 - Improve the line of sight for pedestrians
 - Slow traffic by funneling it through a narrower street opening
 - Slow vehicles making a right turn by reducing curb radius
- Chicane
 - Locations
 - Street Classifications: local streets – two-lane two-way or one-lane one-way
 - ADT: up to 3,500 vehicles per day
 - Posted speed: not given
 - Uses
 - Slows vehicles by forcing motorists to weave through extensions
- Gateway treatment
 - Locations
 - Street classification: Local roads only – entrance to a residential community
 - ADT: not given
 - Posted speed: not given
 - Uses
 - Increase driver awareness to the change in environment
 - Does not reduce speed or volume unless accompanied by other physical measures
- On-street parking
 - Locations
 - Street classifications: all
 - ADT: not given
 - Posted speed: not given
 - Uses
 - Reduce vehicle speeds by reducing effective width of the roadway
- Raised median island/pedestrian refuge
 - Locations
 - Street classifications: all
 - ADT: may be used on high volume roadways*
 - Posted speed: up to 40 mph*
 - * For medians that do not significantly narrow the travel lanes
 - Uses
 - Reduce crossing distance for pedestrians
 - Prevent passing movements

- Traffic circle – including roundabouts
 - Locations for traffic circles
 - Street classifications: At intersections with local streets
 - ADT: up to 3,500 mph
 - Posted speed: not given
 - Uses for traffic circles
 - Slows vehicles due to horizontal deflection and breaking up the line of sight
 - Locations for roundabouts (information for mini roundabouts is shown in parentheses)
 - Street classifications: not given
 - ADT: 26,250 vehicles/day for single urban with 0% left-turns and 50% cross traffic (at mini roundabouts - 15,500 vehicles/day with 0% left-turns and 50% cross traffic)
 - Posted speed: not given for urban roundabouts (at mini roundabouts - less than 35 mph)
 - Recommended max entry speed: 15 – 25 mph for urban roundabouts (at mini roundabouts - 15 mph)
 - Uses for roundabouts
 - Heavy delay on minor street
 - Large traffic signal delays
 - Heavy left turning vehicles
 - Unusual intersection geometry (more than 4 legs or Y or T)
 - History of crashes involving cross traffic or right angles
- * Mini-roundabouts are usually implemented for safety not capacity and are used in low-speed urban environments where conventional roundabout design is precluded by right-of-way constraints

Vertical Deflection – mainly used to reduce vehicle speeds

- Textured crosswalk
 - Locations
 - Street classifications: all
 - ADT: not given
 - Posted speed: up to 45 mph
 - Uses
 - Not typically used alone
 - Used in combination with raised crosswalks, raised intersections or curb extensions
- Speed hump – Watts
 - Locations
 - Street classifications: local
 - ADT: up to 3,500 vehicles per day
 - Posted speed: up to 30 mph
 - Uses
 - To slow motorists to a safe speed at or below posted speed
- Speed hump (table) – Seminole County
 - Street classifications: local and collector roads
 - ADT: up to 6,500 vehicles per day
 - Posted speed: not given but design speed is 25 – 30 mph at hump and 35 mph between humps
 - Uses
 - To slow motorists to a safe speed at or below posted speed
- Raised crosswalk
 - Locations
 - Street classifications: local and minor collectors
 - ADT: up to 10,000 vehicles per day
 - Posted speed: not given
 - Uses
 - Reduce speeds
 - Improve pedestrian visibility

- Raised intersection
 - Locations
 - Street classifications: local and collectors (typically used in commercial areas and business districts with high pedestrians)
 - ADT: up to 10,000 vehicles per day
 - Posted speed: not given
 - Uses
 - Reduce vehicles speeds on all approaches
 - Decrease conflicts between vehicles and pedestrians

Physical Obstruction – mainly used to reduce cut through traffic

- Semi-diverter
 - Locations
 - Street classifications: local streets
 - At intersections of with collector or arterial streets
 - ADT: up to 3,500 vehicles per day
 - Posted speed: not given
 - Uses
 - Reduce through traffic by eliminating movements
- Diagonal diverter
 - Locations
 - Street classifications: local streets
 - ADT: up to 3,500 vehicles per day
 - Posted speed: not given
 - Uses
 - Reduce through traffic
- Right-in/right-out island
 - Locations
 - Street classifications: local streets at intersections with arterials and major collectors
 - ADT: not given
 - Posted speed: not given
 - Uses
 - Reduce cut-through traffic on local street
- Raised median through intersection
 - Locations
 - Street classifications: arterials and major collectors at intersection with local street
 - ADT: not given
 - Posted speed: not given
 - Uses
 - Prohibit through traffic on a local street

Appendix F

Criteria for Highway Safety Corridor Designation & Assessment of the Key Roadway Network

Authority:

“*Highway safety corridor*—The portion of a highway determined by a traffic study to be targeted for the application of signs, increased levels of enforcement and increased penalties specifically for the purpose of eliminating or reducing unsafe driver behaviors that are known to result in crashes and fatalities.” (Source: *Pennsylvania Code* – Title 67, Transportation: Chapter 214)

The increased penalties refer to Pennsylvania Vehicle Code – Title 75, Section 3326 (c) – fines to be doubled.

Criteria:

A road or segment of road can be designated a highway safety corridor if four (4) conditions are met:

- (1) A crash analysis indicates that crashes related to targeted driving behaviors exceeds thresholds for the number of crashes or rate of crashes for homogeneous roadways, as determined by the Department.
- (2) The corridor meets the geometric requirements needed to allow for safe patrolling by law enforcement officers as well as a safe area to stop violators for the issuance of a traffic citation or warning.
- (3) The corridor has adequate space for the installation of traffic signs.
- (4) There is a written commitment from the local and state law enforcement agencies responsible for highway patrol along the corridor to provide visible, sustained enforcement activity within the limits of the marked corridor.

Assessment:

- (1) Eight Key Roadways (or segments of roadways) meet criteria 1, including:
 - Worthington Mill Road, Key Roadway #1;
 - Swamp Road, Key Roadway #2, (between the Wrightstown / Buckingham Township line and a point between Hickory Lane and Worthington Mill Road);
 - Durham Road, Key Roadway # 5;
 - Newtown Bypass, Key Roadway #6;
 - Second Street Pike, Key Roadway #8, (between Bristol Road and Worthington Mill Road);
 - Bustleton Pike, Key Roadway #9;
 - Wrightstown Road, Key Roadway #10; and
 - Newtown Bypass / Durham Road / Washington Crossing Road, Key Roadway #13.
- (2) The eight (8) eligible Key Roadways each have some safe areas to patrol and stop violators, although some are limited. Future opportunities to provide safe pull-off areas may be considered in roadway improvements or land development proposals.
- (3) All eligible roadways have adequate space to install traffic signs.
- (4) Written commitment needs to be acquired from local and state law enforcement agencies.

Appendix G

Criteria for Brake Retarder¹ Prohibition Signage & Assessment of the Key Roadway Network

Authority:

“General conditions—(20) *Brake retarder required.* A motor vehicle operating along a State highway and having a Gross Weight above 80,000 pounds shall be equipped with an engine-brake retarder or an exhaust-brake retarder or a hydraulic-brake retarder to supplement the service brakes. The brake retarder shall be in good working order and shall be used by the driver as necessitated by traffic or roadway conditions.” (Source: Pennsylvania Code – Title 67, Transportation: Section 179.10)

In accordance with the Pennsylvania Vehicle Code – Title, 75, Section 4103, the Pennsylvania Department of Transportation has the sole authority to regulate vehicle equipment. The use and/or prohibition of the use of engine brake retarders falls under this authority. Any municipality which plans on prohibiting the use of engine brake retarders must first obtain the written permission of the Department in accordance with the policies and procedures contained in PennDOT’s Strike-Off Letter 462-06-04, dated May 25, 2006.

General Engine Brake Retarder Policy:

1. Engine brake retarder prohibitions must be enacted as an ordinance by the appropriate local municipality. PennDOT will not enact any engine brake retarder prohibitions.
2. Municipal engine brake retarder prohibitions may be for specific highways, a portion of their municipality or the entire municipality, if approved by the Department.
3. Municipalities that enact an engine brake retarder prohibition will be responsible for procuring, erecting and maintaining the required signing. All signs shall meet the requirements of Department Publication 236M (Handbook of Approved Signs).
4. Enforcement of the engine brake retarder prohibition shall be the responsibility of the police agency that provides enforcement services for the municipality.

Criteria:

In order for an engine brake retarder prohibition to be approved for roadway(s), the following criteria are to be considered:

1. Roadway Features
 - a. Downhill grade does not exceed 4% for a distance of 500 feet or more.
 - b. Roadway is not posted with a reduced speed limit for trucks due to a hazardous grade determination.
 - c. Roadway is not posted with a reduced gear zone.
 - d. Posted speed limit or 85th percentile speed is not 55 mph or more.
 - e. Roadway is not limited access.
 - f. Roadway is not a ramp exiting from a highway with a posted speed or 85th percentile speed of 55 mph or greater.
2. Crash History
 - a. No history of runaway truck crashes in the past 3 years.
 - b. No discernible pattern of rear-end crashes in the past 3 years where a truck was the striking vehicle.

Assessment:

Except for the Newtown Bypass, where posted speed limits are 55mph, the rest of the Key Roadways are candidates. Because of the breadth of the background assessment necessary, and the value that the brakes possess (they do provide a shorter stopping distance for these vehicles), the implications upon municipal resources, and the very sensitive nature of the topic—it is suggested that further investigation, education and development of a refined plan be conducted with the public’s involvement, through the RTPTF, before proceeding.

¹ Engine brake retarders are devices that change the timing of engine exhaust valves to slow a vehicle.

Appendix H
Multi-use Trail Network

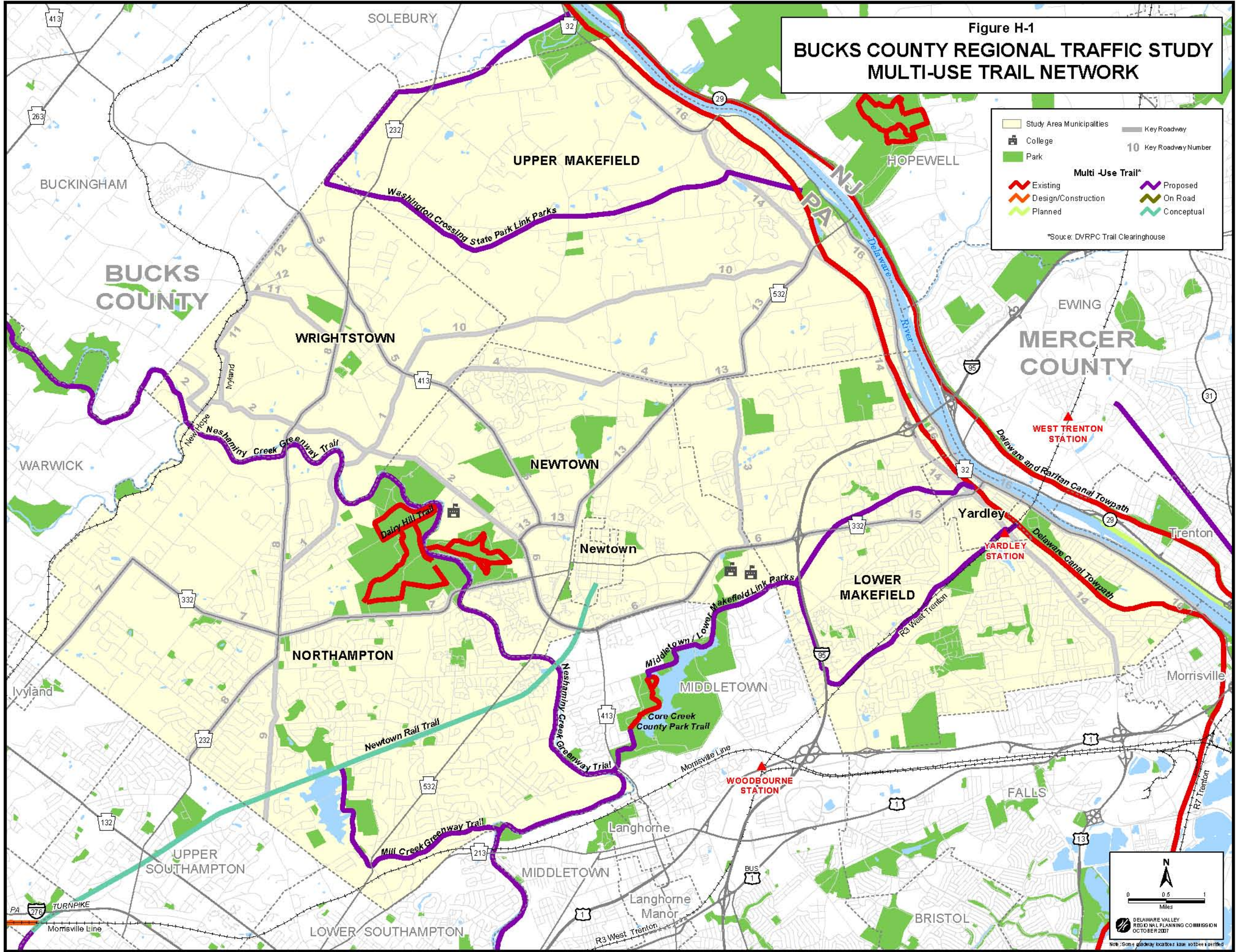
(Source: DVRPC Trail Clearinghouse.

Viewable at:

<http://www.dvrpc.org/data/mapping.htm>

Click on “Trail Clearinghouse”)

**Figure H-1
BUCKS COUNTY REGIONAL TRAFFIC STUDY
MULTI-USE TRAIL NETWORK**



	Study Area Municipalities		Key Roadway
	College		10 Key Roadway Number
	Park	Multi-Use Trail*	
	Existing		Proposed
	Design/Construction		On Road
	Planned		Conceptual

*Source: DVRPC Trail Clearinghouse

N

0 0.5 1
Miles

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
OCTOBER 2007

Note: Some roadway locations have not been verified.

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

Publication Abstract

Title of Report: Bucks County Regional Traffic Study

Publication No.: 07026

Date Published: October 2007

Geographic Area Covered: Seven municipalities in the Newtown-Yardley area of Bucks County, Pennsylvania, including: Lower Makefield Township, Newtown Borough, Newtown Township, Northampton Township, Upper Makefield Township, Wrightstown Township, and Yardley Borough.

Key Words: General traffic, heavy trucks, traffic speeds, traffic safety, mobility, transportation planning, traffic engineering, outreach, public involvement, regional growth, education, enforcement, engineering, traffic calming, traffic improvements, improvement costs, implementation schedule.

ABSTRACT: This report summarizes a multi-municipal transportation planning and traffic engineering effort executed by the Delaware Valley Regional Planning Commission (DVRPC) which systematically addressed common concerns experienced by the participating municipalities. Those issues included: general traffic safety and mobility conditions, large volumes of heavy trucks, overall traffic speeds, and traffic growth occurring as a consequence of ongoing regional development.

Elected representatives from the seven participating municipalities, collectively referred to as the Regional Traffic Planning Task Force (RTPTF), commissioned, directed and participated in the study. Study area stakeholders, community organization representatives, and the public-at-large were actively enlisted as participants for input, and to gauge the study's processes and products.

The area-wide transportation planning and traffic engineering activities focused on 16 Key Roadways (representing 70 miles of state-owned highways). Specific tasks included: roadway integrity assessments, traffic safety and operational evaluations, and traffic calming eligibility determinations for the Key Roadways. The engineering studies were performed in accordance with PennDOT's procedures, and accounted for four significant transportation improvement proposals being developed independently, along the Key Roadway network, by PennDOT and two of the study area municipalities.

The principal product was a recommended regional mobility and safety improvement program (including: education, enforcement and engineering elements; and implementation costs and schedules) to accommodate all legal road users. The final improvement program was developed with consideration of public and municipal comments on the draft report (dated, June 2007), to address the multi-jurisdictional concerns. The report and its recommendations represents a first step, and foundation for further discussions and future development of the identified improvements, and the continued activities of the Regional Traffic Planning Task Force—with the community and the governing boards of the participating municipalities.

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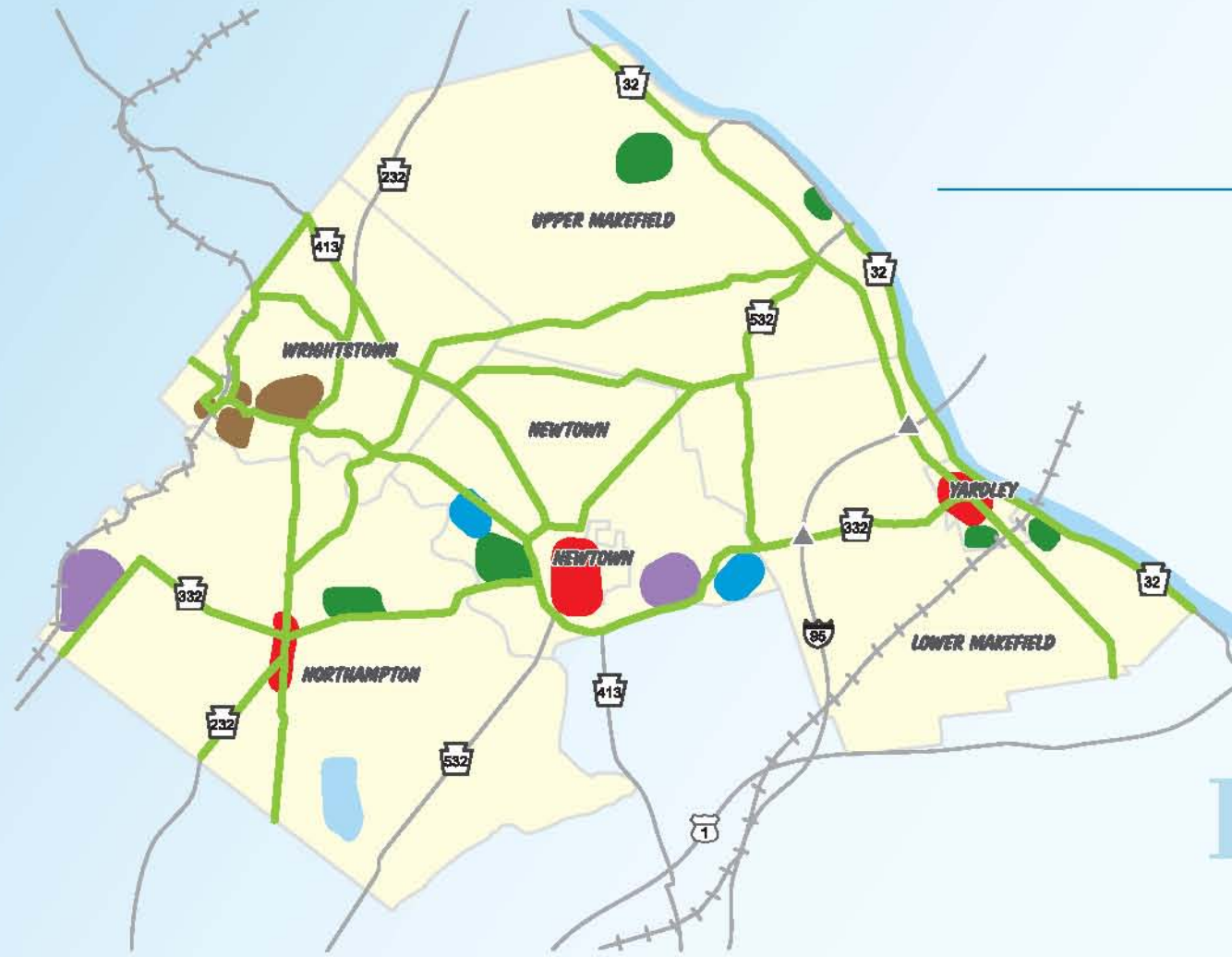
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October 2007

Bucks County Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township
Yardley Borough



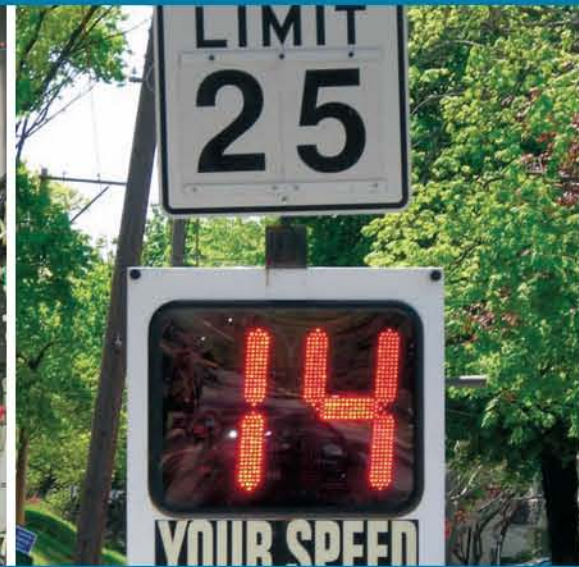
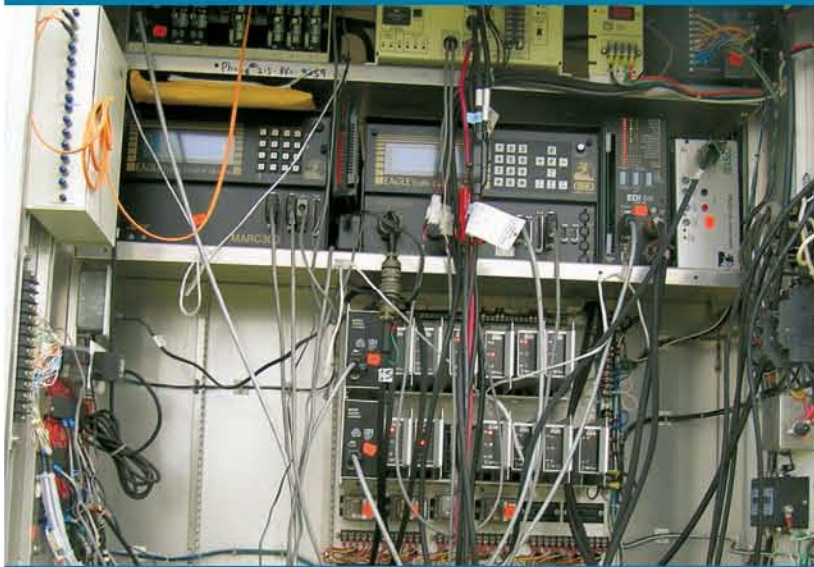
Final Report

October 2007

Bucks County Regional Traffic Study

Lower Makefield Township / Newtown Borough
Newtown Township / Northampton Township
Upper Makefield Township / Wrightstown Township
Yardley Borough

Final Report



Prepared for:
**REGIONAL
TRAFFIC PLANNING
TASK FORCE**

Prepared by:

**DELAWARE VALLEY
REGIONAL PLANNING
COMMISSION**

with the Assistance of:

JACOBS
Edwards and Kelcey
in Association with:
KMJ Consulting, Inc

and the Support of:

**Bucks County
Planning Commission**

PENNDOT