Intersection
Road Safety Audit

Pemberton Borough
Burlington County

DELAWARE VALLEY REGIONAL
PLANNING COMMISSION

April 2008

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. The authors, however, are solely responsible for its findings and conclusions, which may not represent the official views or policies of the funding agencies.

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APPENDICES

INTERSECTION ROAD SAFETY AUDIT – HANOVER STREET, PEMBERTON BOROUGH

1.0 BACKGROUND

This document represents the final report for the Hanover Street Road Safety Audit. This project represents a step towards the implementation of the Delaware Valley Regional Planning Commission (DVRPC) Regional Safety Action Plan. Improving the design and operation of intersections is a priority area for both engineering and enforcement disciplines as documented in the Plan. DVRPC has been coordinating with Pennsylvania Department of Transportation to address corridors on the District 6 Safety Plan since fiscal year 2007. In fiscal year 2008, intersection road safety audits are being conducted in New Jersey under Transportation Safety Planning in DVRPC's planning work program. The New Jersey road safety audits concentrate on intersections located on county and/or local roads. Implementation of improvement strategies identified through this process may be eligible for Local Federal Safety funds.

Whereas, the goal of this project is to improve and promote transportation safety on the region's roadways while maintaining mobility, the main objective is to address the safe operation of the roadway and ensure a high level of safety for all road users. The road safety audit program is conducted to generate improvement recommendations and countermeasures for roadway segments demonstrating a history of, or potential for a high incidence of motor vehicle crashes. The emphasis is placed on identifying low cost, quick turnaround safety projects to address the issues where possible but will not exclude the more complex projects.

1.1 The Audit

A road safety audit (RSA) is a formal safety performance examination of an existing or future road or intersection by an audit team. Road safety audits can be used on any size project, from minor maintenance to mega-projects. There are eight major steps involved in conducting a road safety audit but these can be simplified in a three step process – identify the corridor/intersection and audit team; conduct the RSA and report on the findings; and follow-up on RSA findings where feasible. Major benefits of road safety audits include – it is a proactive tool, not solely dependent on crash data; a planning tool to identify safety issues to be considered in improvement projects; can determine if the needs of all road users are adequately met; adaptable to local needs and conditions; and recommendations can be implemented in small stages as time and resources permit.

Prior to the road safety audit activities on site, DVRPC collected, reviewed, and analyzed relevant data (video of roadway under different conditions, traffic volume data, turning movement counts, maps, aerial photographs, and crash data). Using the crash data, collision diagrams were produced which showed the crashes and types for locations where they occurred.

The Road Safety Audit was conducted on March 12, 2008. The day began with a Pre-Audit meeting that involved the definition of road safety audit and how it differs from the

corridor study process; the required steps of an audit; presentation of the site issues and an exchange of ideas and knowledge of the roadway. A video showing the site under night time conditions was also shown. The field view followed where the audit team made up of state and local officials and other stakeholders walked the site and identified transportation safety issues. See ***Appendix A*** for the list of audit team members. The post-audit meeting followed and was spent discussing the findings from the field view, identifying strategies to address issues, and determining priorities.

1.2 Overview of the Study Area

The study area consists of five intersections along CR 616 (Hanover Street) in Pemberton Borough in Burlington County, New Jersey, see ***Appendix B***. CR 616 runs from New Egypt in Ocean County to NJ 73 in Mount Laurel. The study area begins at the intersection of Mary Street, goes through the intersections of Antis Street, CR 678 (Elizabeth Street), Pemberton Street and ends at the intersection of Jane Street for a distance of approximately a quarter mile. Hanover Street, functionally classified as an Urban Collector, runs in a north-south direction in the study area. Hanover Street is two lanes along the study area and parking is permitted in sections along the curb. The speed limit in the study area is 25 MPH, but varies in other sections.

There are several major roads that connect with CR 616 to the west of the study area in Mount Laurel, Medford, Southampton, and Pemberton Townships. In Mount Laurel Township, CR 616 connects with NJ 73, CR 607, and CR 603. In Medford Township CR 616 connects with Holly Medford Road and CR 641, CR 681, US 206, and CR 643 in Southampton Township. In Pemberton Township, west of the study area, CR 616 connects with CR 530. East of the study area CR 616 connects with several major roads in Pemberton and New Hanover Townships. It connects with CR 668, CR 669, CR 545, CR 680, CR 667, and CR 665.

The five roads that intersect with Hanover Street along the study area all form “T” intersections. Mary, Antis, Pemberton, and Jane Streets are all two lanes, with one in each direction. These are local roads that provide access to the adjacent residential areas and run for short distances. Elizabeth Street (CR 687) connects with Hanover Street at a signalized intersection in the middle of the study area. CR 687, which is functionally classified as an urban collector, runs in a west-east direction for a distance of 2.89 miles. Originating at Hanover Street in Pemberton Borough in the west and traveling east and connecting to CR 530 (Pemberton Mill Road). At the Hanover Street intersection, Elizabeth Street is two lanes westbound – dedicated left and right-turn lanes and one lane eastbound.

The land use along Hanover Street in the study area is mixed-use – residential, commercial, community use, and parking. United Methodist Church and Grace Episcopal Church are both located along Hanover Street in the study area. There are 36 parcels along the east side of Hanover Street, 21 are single family detached houses, 12 are commercial uses, and 3 are community uses. There are 24 parcels on the west side of CR 616; 9 are single family detached houses, 11 are commercial uses, and 4 are parking facilities.

The NJ Transit Bus Route 317, Philadelphia to Asbury Park serves Pemberton Borough. It travels on Hanover Street between CR 530 and Elizabeth Street and travels the length of Elizabeth Street to the CR 530 Bypass. The route 317 bus serves a number of commercial shopping centers, Burlington County Community College, the McGuire Air Force Base, and connects with other transit routes. The route 317 bus makes 9 northeast bound and 7 southwest bound trips per weekday.

The Burlink B1 Shuttle serves the Pemberton Borough area, providing access to the Beverly River Line Rail Station. The Burlink B1 Shuttle makes 12 eastbound and 12 southwest bound trips per weekday.

Traffic volume recorded in 1995 on Elizabeth Street west of the study area shows an average annual daily traffic (AADT) volume of 7,272 vehicles while south of CR 530 on Hanover Street volumes for the same year were 4,770 vehicles; see ***Appendix B*** for *Traffic Volume Map*. Turning movement counts were taken in January 2008 for the intersection of Hanover and Elizabeth Streets. These showed that the morning peak hour is between 6:30 AM and 7:30AM and afternoon peak hour is between 3:30 PM and 4:30 PM; ***see Appendix C***. The through movements on Hanover Street are the dominant movements in the morning and afternoon peak hours. From Elizabeth Street there is a heavy right-turn movement on to northbound Hanover Street during the morning and afternoon peak.

1.3 Crash Data

According to New Jersey Department of Transportation crash database there were 26 reportable crashes between 2004 and 2006 in the study area. Reportable crashes are crashes which may result in a fatality, injury, and/or property damage of five hundred dollars or more. A comprehensive analysis of the crash data is shown in ***Appendix C***. Of the reportable crashes, there were 8 crashes in 2004 (31%); 10 crashes in 2005 (38%); and 8 crashes in 2006 (31%). When analyzing crash frequency by month, May had the highest number of crashes with 7 (27%), October was next with 4 crashes. Crashes occurred in every month of the year with 7 months having only 1 crash.

Rear-end (10), angle (5), and struck parked vehicle (3) crashes represented 68% of the 26 reportable crashes. Rear-end (38%), angle (19%) and pedestrian (4%) were higher than 2006 New Jersey statewide county road averages of 30.32%, 18.09% and 1.89%, respectively. There were no fatal crashes during the study period. There were 22 (85%) property damage only crashes and 4 injury crashes of varying levels of severity. In an analysis of roadway surface conditions during the occurrence of crashes, 77% occurred on dry road surface. Eighty-five percent of the crashes occurred during daylight hours.

2.0 FINDINGS AND RECOMMENDATIONS

The following represents the findings and recommendations of the Hanover Street Road Safety Audit. **Shaded areas represent recommended strategies requiring low level of effort for implementation with high potential safety benefits**.

Street Name Signs

Issue

- The street name signs are too small and difficult to read by motorists.

Possible Improvement Strategies

- Upgrade street name signs to the current MUTCD standards.

Level of Effort	Potential Safety Benefit
Low	High

Painted Curbs

Issue

- Sections of curb are painted yellow to indicate “no parking” areas.

Possible Improvement Strategies

- Repaint using red paint according to the current MUTCD and supplement with the appropriate “No Parking” signs.

Level of Effort	Potential Safety Benefit
Low	Medium

Sidewalks

Issue

- Sidewalk from Jane Street to Pemberton Street is uneven on both sides of Hanover Street
- Sidewalk uneven past the Baptist Church on the west side of Hanover Street to the intersection of Elizabeth Street.

Possible Improvement Strategies

- Repair or replace sidewalk as appropriate for the safety of pedestrians.

Level of Effort	**Potential Safety Benefit**
Medium	High

Bicycle Amenities

Issue

- No bicycle amenities present in the study area.

Possible Improvement Strategies

- Install "Share the Road" signs near St. John Street and Mary Street.

Level of Effort	**Potential Safety Benefit**
Low	High

Jane Street Intersection

Issue

- Tight turning radius from Hanover Street northbound onto Jane Street.
- Utility pole on the south side of the intersection is inches from the curb.

Possible Improvement Strategies

- Install "One-Way" sign at Jane Street this will inform drivers that there is no on-coming traffic and hugging the curb is not necessary to make the turn.

Level of Effort	**Potential Safety Benefit**
Low	High

Issue

- Crosswalk at Jane Street is faded.

Possible Improvement Strategies

- Re-stripe crosswalk.

County contract will repaint in the Spring of 2008.

Level of Effort	**Potential Safety Benefit**
Low	High

Issue

- On the west side of Hanover Street opposite Jane Street there is a curb ramp leading into the road without a crosswalk.

Possible Improvement Strategies

- Add a crosswalk across Hanover Street at the intersection with appropriate signage.

County will inventory ADA ramps throughout the county and address as appropriate.

Level of Effort	**Potential Safety Benefit**
Low	High

Between Jane and Pemberton Streets

Issue

- Curbside parking spaces are only 5 feet wide on both sides of Hanover Street.

Possible Improvement Strategies

- Prohibit parking where the curb lane of the street is less than 8 feet wide.

Level of Effort	**Potential Safety Benefit**
Low	High

Pemberton Street Intersection

Issue

- No stop bar on Pemberton Street.
- Tree located south of the intersection on Hanover Street obstruct sight distance of motorists looking south from Pemberton Street.

Possible Improvement Strategies

- Add a stop bar at the Hanover Street approach on Pemberton Street in accordance with AASHTO standards.
- Add a reflective stripe along stop sign post.

Level of Effort	**Potential Safety Benefit**
Low	High

Pemberton Street Intersection, continued

Issue

- "Neighborhood Watch" sign is mounted on "Stop" sign post.

Possible Improvement Strategies

Relocate "Neighborhood Watch" sign.

Level of Effort	Potential Safety Benefit
Low	Medium

Issue

- Crosswalk pavement markings are faded.

Possible Improvement Strategies

- Repaint and replace crosswalk pavement marking using continental style.

Level of Effort	Potential Safety Benefit
Low	High

South of Pemberton Street Intersection

Issue

- Existing school speed limit flashing sign is redundant given that the posted speed limit is the same.
- There are no speed limit signs northbound in the study area from Mary Street to Jane Street.

South of Pemberton Street Intersection, continued

Possible Improvement Strategies

- Replace the existing flashing school limit signs with dynamic message signs that reflect the posted speed limit and advise drivers of their current speed.

County will need to prepare an interlocal services agreement with Pemberton Borough to modify the existing school speed limit assemblies and use the existing power supply.

Level of Effort	**Potential Safety Benefit**
Medium	High

Issue

- The school is no longer located in the vicinity and advance "school crossing" signs are still in place.

Possible Improvement Strategies

- Replace the advance "school crossing" signs to "pedestrian crossing" signs.

Level of Effort	**Potential Safety Benefit**
Low	High

Issue

- The crosswalk across Hanover Street is signed for school crossing.

Possible Improvement Strategies

- Replace "school crossing" sign with a pedestrian crossing beacon over the roadway.

Level of Effort	**Potential Safety Benefit**
Medium	High

Issue

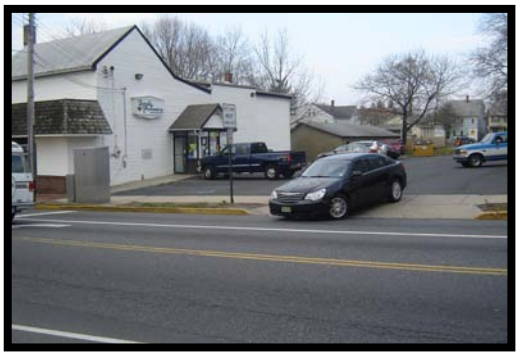
- On Sunday mornings, it is difficult for pedestrians to cross at the mid-block crosswalk at the Baptist Church. Motorists do not yield for pedestrians at the crosswalk.

Possible Improvement Strategies

Replace existing crosswalk with continental style striping to enhance visibility. Add saw-tooth "yield" pavement markings in both directions at the crosswalk. Add regulatory sign "yield to pedestrian in crosswalk."

Level of Effort	**Potential Safety Benefit**
Low	High

Boyd Pharmacy Driveway



Issue

- The driveway is too close to the Elizabeth Street intersection, this causes conflicts between entering/exiting customers and motorists at the intersection and traveling along Hanover Street.
- The driveway has a narrow apron.

Possible Improvement Strategies

- Extend the apron for the driveway and prohibit egress from the driveway at all times and restrict all left-turn movements into the parking lot during peak morning and afternoon periods;

Level of Effort	**Potential Safety Benefit**
Low	Medium

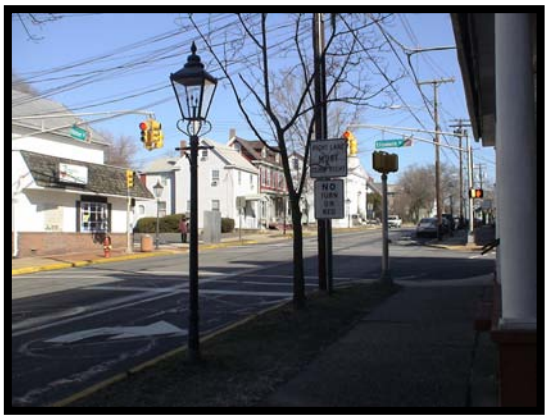
or

Possible Improvement Strategies

- Convert the driveway on Hanover Street to right-in/right-out only and utilize the access on Jarvis Street and Pemberton Street for all other movements.

Level of Effort	**Potential Safety Benefit**
Low	High

Elizabeth Street Intersection



Issue

- Crosswalks are two lines and have limited visibility.

Possible Improvement Strategies

- Upgrade all crosswalks at the intersection to the continental style.

Level of Effort	**Potential Safety Benefit**
Low	High

Issue

- The south crosswalk does not have a curb ramp on the west side of Hanover Street.

Possible Improvement Strategies

- Construct curb ramp.

Level of Effort	**Potential Safety Benefit**
Low	High

County will inventory ADA ramps throughout the county and address as appropriate.

Elizabeth Street Intersection, continued

Issue

- The stop bar for the right-turn lane on Elizabeth Street is too close to the intersection to allow pedestrians to begin crossing before a vehicle begins to turn right.

Possible Improvement Strategies

- Move back stop bar as appropriate. This will also give pedestrians waiting to cross Hanover Street a lead enhancing their visibility.

Level of Effort	**Potential Safety Benefit**
Low	High

Issue

- Prohibiting right-turns on red signal for northbound Hanover Street at the intersection exacerbates congestion and can potentially cause aggressive driving given the congestion at the intersection during peak periods.

Possible Improvement Strategies

- Replace the current "No Turn on Red" sign with a dynamic message sign which prohibits turns on red only during the protected left-turn phase at the southbound approach.

Level of Effort	**Potential Safety Benefit**
Low	High

Issue

- Southbound left-turn stacking lane is only 150 feet. The through lane cannot be developed because it is mixed with parked vehicles at the curb. Traffic coming over the crest of the hill is channeled into the left-turning lane by the curbside parking.

Possible Improvement Strategies

- Remove 3 parking spaces on the southbound side of Hanover Street and extend the left-turn lane back to 200 feet to accommodate current vehicular volumes.

Level of Effort	**Potential Safety Benefit**
Low	High

Parking is currently a concern of Pemberton Borough. At specific times existing parking lots around the study area maybe underused therefore the Borough is encouraged to coordinate with property owner for joint use agreements.

Issue

- Trucks turning right from Elizabeth Street do so across the double yellow line into oncoming traffic. The corner radius is too small for large trucks.

Possible Improvement Strategies

- Remove one parking space on the northbound side of Hanover Street to increase the taper and alleviate the conflict.

Level of Effort	**Potential Safety Benefit**
Low	High

Elizabeth Street Intersection, continued

Issue

- Motorists park illegally in the taper for the southbound receiving lane, south of the intersection.

Possible Improvement Strategies

- Crosshatch the tapers and install "No stopping and standing" signs to assist in channelizing the southbound traffic.

Level of Effort	**Potential Safety Benefit**
Low	High

Between Elizabeth and Antis Streets

Issue

- Parking/shoulder pavement markings are faded.

Possible Improvement Strategies

- Restripe as necessary.

Level of Effort	**Potential Safety Benefit**
Low	High

Issue

- At Antis Street there is no break in the pavement parking/shoulder pavement marking on Hanover Street for the intersection.

Possible Improvement Strategies

- Remove pavement marking from across the intersection.

Level of Effort	**Potential Safety Benefit**
Low	Medium

3.0 CONCLUSION

The road safety audit program is conducted to generate improvement recommendations and countermeasures for roadway segments demonstrating a history of, or potential for a high incidence of motor vehicle crashes. The safety issues identified during the audit and documented in this report along with recommended strategies should improve the overall safety of the study area. Many of the strategies identified can be implemented through routine maintenance. The full impact of the improvement strategies will be realized when they are combined, but time and budget constraints may dictate when remedial strategies are implemented.

Engineering strategies alone will not eliminate the traffic safety issues identified along the corridor. Therefore, enforcement and education are necessary components to address the human behavioral aspects to effectively reduce the number of crashes occurring. Policy or legislative issues may be involved in addressing safety concerns, engaging the appropriate stakeholders are important. Coordination and collaboration is the key to making the roadway safer for all users.

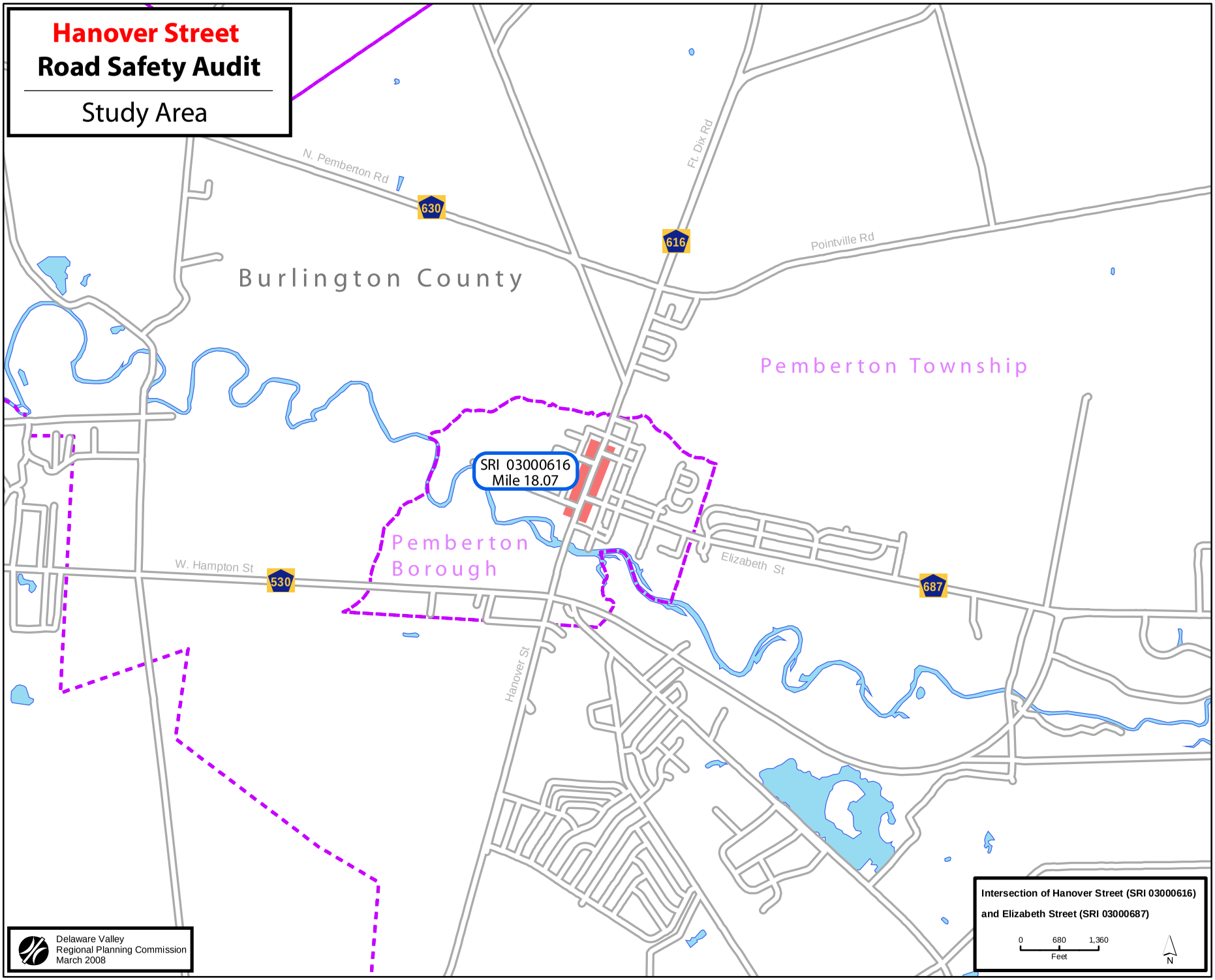
APPENDIX A
Audit Team

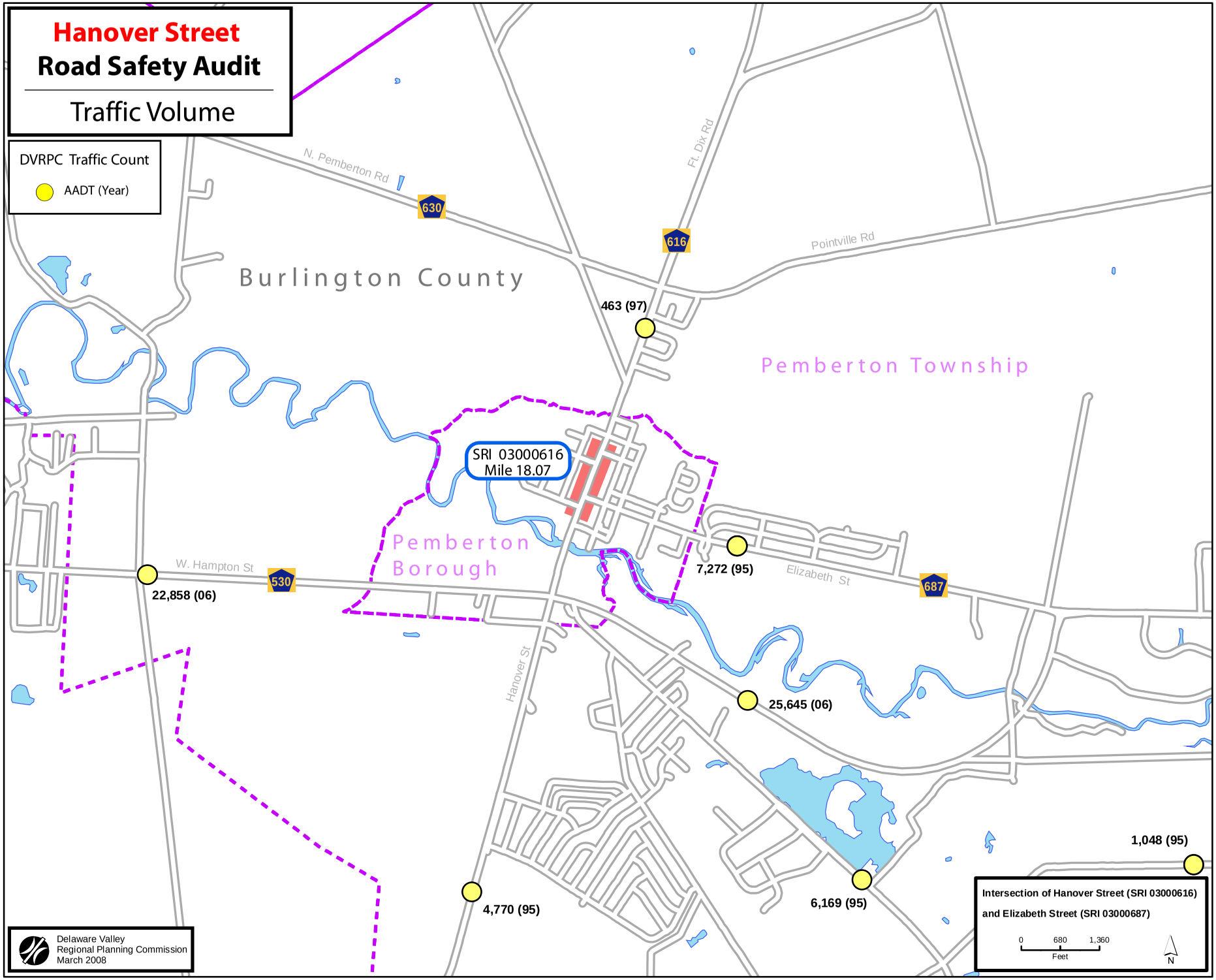
Hanover Street, Pemberton Borough - Road Safety Audit

Audit Team

Name	Organization
Rosemarie Anderson	Delaware Valley Regional Planning Commission
Chief Joseph Conlin	Pemberton Borough Police Department
Martin Livingston	Burlington County Engineering Department
Regina Moore	Delaware Valley Regional Planning Commission
Kevin Murphy	Delaware Valley Regional Planning Commission
Marhaba Omer	New Jersey Department of Transportation
Ray Reeve	New Jersey Division of Highway Traffic Safety

APPENDIX B
Maps

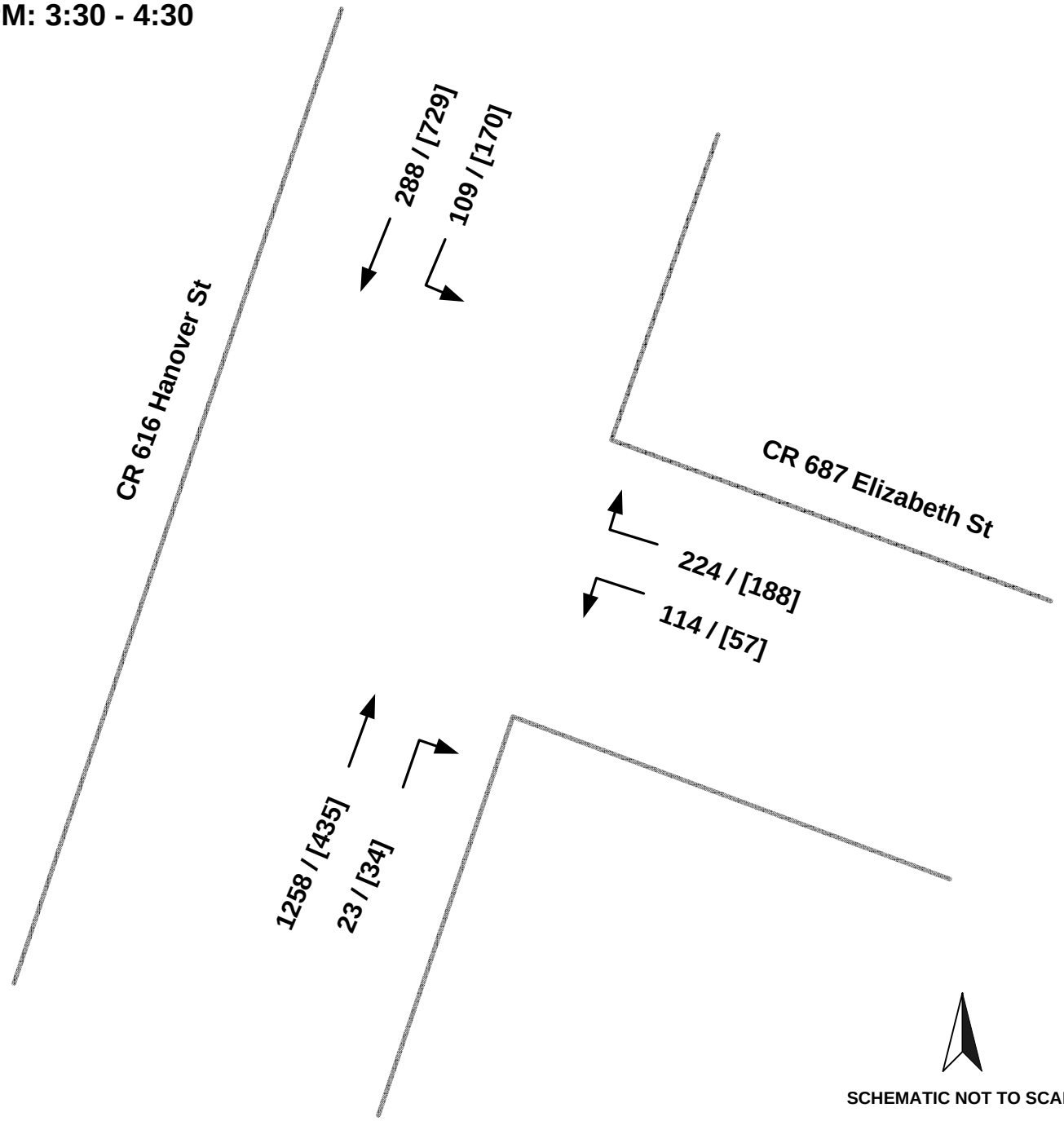

Hanover Street
Road Safety Audit
Study Area
N. Pemberton Rd
630
Ft. Dix Rd
616
Pointville Rd
Burlington County
Pemberton Township
SRI 03000616
Mile 18.07
Pemberton
Borough
W. Hampton St
530
Elizabeth St
687
Hanover St
Delaware Valley
Regional Planning Commission
March 2008
Intersection of Hanover Street (SRI 03000616)
and Elizabeth Street (SRI 03000687)
0
680
1,360
Feet
N


Hanover Street
Road Safety Audit
Traffic Volume
DVRPC Traffic Count
AADT (Year)
N. Pemberton Rd
630
Ft. Dix Rd
616
Pointville Rd
Burlington County
463 (97)
Pemberton Township
SRI 03000616
Mile 18.07
Pemberton
Borough
W. Hampton St
530
22,858 (06)
7,272 (95)
Elizabeth St
687
Hanover St
25,645 (06)
1,048 (95)
4,770 (95)
6,169 (95)
Intersection of Hanover Street (SRI 03000616)
and Elizabeth Street (SRI 03000687)
0
680
1,360
Feet
N
Delaware Valley
Regional Planning Commission
March 2008

APPENDIX C
Traffic Data

Pemberton Borough
CR 616 Hanover Street and CR 687 Elizabeth Street Intersection
Peak Hour Turning Movement Counts AM & [PM]

Peak Hours
AM: 6:30 - 7:30
PM: 3:30 - 4:30



SCHEMATIC NOT TO SCALE

Delaware Valley Regional Planning Commission
March 2008

Intersection of Hanover Street and Elizabeth Street, and Vicinity
Pemberton Borough, New Jersey

Intersection Crash Summary
NJDOT Crash Database
2004 - 2006

COLLISION TYPE	
Rear End	10
Right Angle	5
Struck Parked Vehicle	3
Same Direction Side Swipe	2
Backing	2
Left Turn/U Turn	1
Fixed Object	1
Pedestrian	1
Non-fixed Object	1
Total	**26**
LIGHT CONDITION	
Day	22
Night	2
Dusk	1
Dawn	1
Total	**26**
SURFACE CONDITION	
Dry	20
Wet	6
Total	**26**
SEVERITY	
Fatal	0
Major Injury	0
Moderate Injury	1
Minor Injury	3
Property Damage Only	22
Total	**26**

N

Crash Location

Delaware Valley
Regional Planning Commission
March 2008

ROAD SAFETY AUDIT
Intersection Crash Summary, 2004 - 2006
CR 616 Hanover St (MP 18.0 - MP 18.24), and CR 687 Elizabeth St (MP 0.00)
Pemberton Borough, New Jersey

YEAR		
2004	8	31%
2005	10	38%
2006	8	31%
Total	26	100%

MONTH		
Jan	1	4%
Feb	1	4%
March	3	12%
April	1	4%
May	7	27%
June	1	4%
July	1	4%
August	2	8%
Sept	3	12%
Oct	4	15%
Nov	1	4%
Dec	1	4%
Total	26	100%

DAY OF WEEK		
Monday	6	23%
Thursday	5	19%
Tuesday	4	15%
Wednesday	4	15%
Friday	3	12%
Sunday	2	8%
Saturday	2	8%
Total	26	100%

COLLISION TYPE		
Rear End	10	38%
Right Angle	5	19%
Struck Parked Vehicle	3	11%
Same Direction Side Swipe	2	8%
Backing	2	8%
Left Turn/U Turn	1	4%
Fixed Object	1	4%
Pedestrian	1	4%
Non-fixed Object	1	4%
Total	26	100%

SEVERITY		
Fatal	0	0%
Major Injury	0	0%
Moderate Injury	1	4%
Minor Injury	3	12%
Property Damage Only	22	85%
Total	26	100%

LIGHT CONDITION		
Day	22	85%
Night	2	8%
Dusk	1	4%
Dawn	1	4%
Total	26	100%

PREDOMINANT DRIVER ACTIONS		
Driver Inattention	11	42%
None	11	42%
Following Too Closely	2	8%
Unsafe Speed	1	4%
Backing Unsafely	1	4%
Total	26	100%

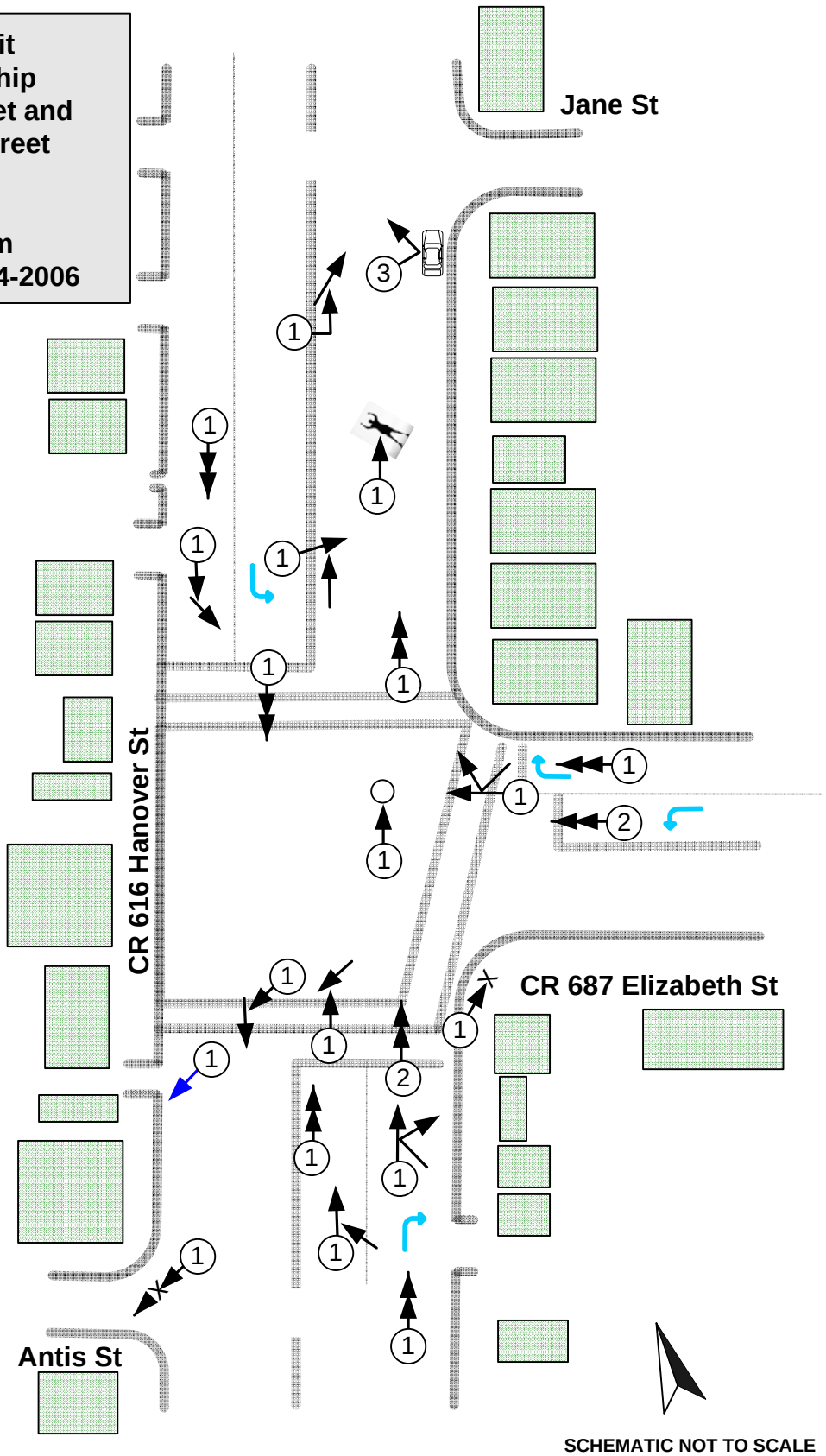
SURFACE CONDITION		
Dry	20	77%
Wet	6	23%
Total	26	100%

TIME OF DAY (SUMMARY)		
Midnight to 5:59 AM	2	8%
AM Peak Period (6 - 8:59 AM)	1	4%
Midday (9AM - 3:59 PM)	14	54%
PM Peak Period (4 - 6:59 AM)	8	31%
7PM - Midnight	1	4%
	26	100%

Road Safety Audit
Pemberton Township
CR 616 Hanover Street and
CR 687 Elizabeth Street
Intersection

Collision Diagram
Crash Data Years 2004-2006

Total Crashes = 26
Pedestrian Crashes = 1



Crash Type Legend

(1) = # crashes

- Angle
- Rear End
- Same Direction Sideswipe
- Left Turn
- Hit Fixed Object
- Hit Non-fixed Object
- Hit Pedestrian
- Struck Parked Vehicle
- Backing

Possible Miscoding

- **Other "Backing"**

SCHEMATIC NOT TO SCALE

Delaware Valley Regional Planning Commission
March 2008

CRASH SUMMARY

County Road 616 MP 18.07 at County Road 687(Elizabeth ST)
Pemberton Borough, Burlington County
01/01/2004 THRU 12/31/2006

TOTAL CRASHES: 7

SEVERITY	COUNT	% OF TOTAL	2006 Average
Fatal	0	0.00%	
Injury	1	14.29%	29.16%
Property Damage	6	85.71%	70.57%
Total	**7**		

INTERSECTION	COUNT	% OF TOTAL	2006 Average	**
At Signalized Intersection	7	100.00%	100.00%	
At Unsignalized Intersection	0	0.00%		
Between Intersections	0	0.00%		
Railroad Crossing	0	0.00%		
Total	**7**			

COLLISION TYPE	COUNT	% OF TOTAL	2006 Average	**
Same Dir.-Rear End	2	28.57%		
Same Dir.-Sideswipe	2	28.57%	11.45%	
Angle	2	28.57%	18.09%	
Head On	0	0.00%		
Parked Vehicle	0	0.00%		
Left Turn / U Turn	0	0.00%		
Backing	0	0.00%		
Encroachment	0	0.00%		
Overturned	0	0.00%		
Fixed Object	1	14.29%	11.89%	
Animal	0	0.00%		
Pedestrian	0	0.00%		
Pedalcycle	0	0.00%		
Non - Fixed Object	0	0.00%		
Railcar - Vehicle	0	0.00%		
Unknown	0	0.00%		
Other	0	0.00%		
Total	**7**			

SURFACE CONDITION	COUNT	% OF TOTAL	2006 Average	**
Dry	4	57.14%		
Wet Surface	3	42.86%	19.67%	
Snow	0	0.00%		
Ice	0	0.00%		
Unknown	0	0.00%		
Other	0	0.00%		
Total	**7**			

LIGHT	COUNT	% OF TOTAL	2006 Average	**
Day	6	85.71%	70.25%	
Dusk	0	0.00%		
Night	1	14.29%		
Dawn	0	0.00%		
Unknown	0	0.00%		
Total	**7**			

Note:
** These columns indicate the number of fatal crashes in each accident category.
Source: New Jersey Department of Transportation, Bureau of Safety Programs, March 2008

APPENDIX D
Checklist

Delaware Valley Regional Planning Commission
Hanover Street Intersection Road Safety Audit

CHECKLIST

Audit Team Member_____

GENERAL ISSUES

Item #	***Description***	***Check***	***Comments***
1 Drainage	Do drainage items seem to be adequate?		
	Are drainage items clear of debris?		
2 Landscaping	Is landscaping in accordance with guidelines (sight distance, clearances etc.)		
3 Public Utilities	Are boxes, poles, and/or posts located in a safe position?		
	Do the above items interfere with sight distance?		
4 Access Management	Are there locations at and near the intersection where access management is problematic?		
5 Lighting	Is lighting needed in the vicinity of the intersection?		

ALIGNMENT AND CROSS SECTION

Item #	***Description***	***Check***	***Comments***
1 Visibility	Are sight distances adequate for the speed of traffic approaching the intersection?		
	Is adequate sight distance provided at intersection?		
2 Driver expectation	Are there any sections of the intersection which may cause driver confusion such as:		
	a. Is alignment of roadway clearly defined?		
	b. Are crossroads or hidden driveways properly signed along corridor?		
	c. Are bicycle lanes clearly defined?		
	d. Do streetlight and tree lines conform with the road alignment?		

3 **Widths**	Are all the traffic lanes and roadway widths adequate?		

INTERSECTIONS

Item #	***Description***	***Check***	***Comments***
1 **Location**	Are there any roadside objects nearby which would intrude on driver's line of sight?		
	Are the intersections adequate for all vehicular movements?		
2 **Controls**	Are pavement markings and intersection control signing satisfactory?		
	Are there any pedestrian signals?		
3 **Signage**	Is the intersection appropriately signed?		
	Are there advance warning signs indicating the intersection?		
	Are signs appropriately located and of the appropriate size?		
4 **Layout**	Is the intersection layout obvious to all users?		
	Is the alignment of curbs satisfactory?		
	Are turning radii and tapers appropriate?		
	Are there driveways located at or near the intersections?		
5 **Visibility, and Sight Distance**	Is sight distance adequate for all movements and all users?		
6 **Transit**	Are there bus stops located near the intersections?		
	a. If so are the bus stops near side or far side?		
7 **Turn Lanes**	Do the turning lanes have sufficient storage?		

	Are there locations where a left-turn lane is needed?		

TRAFFIC SIGNALS

Item #	***Description***	***Check***	***Comments***
1 Signal Operation	Are traffic signals operating correctly? (Example clearance time)		
	Should there be left-turn signal protection for the approaches?		
2 Signal Heads and Visibility	Are traffic signals clearly visible to approaching motorists?		
	Are signal heads adequately placed not to cause driver confusion?		
	Are the signals post mounted, wire mounted, or mast arm mounted?		
	Are "signal ahead warning" signs needed?		
	Is the number of signal heads adequate?		
	Are the signal heads too small for motorists to notice?		
	Are the signals hard to see due to sun glare?		

PEDESTRIANS

Item #	***Description***	***Check***	***Comments***
1 Land Use Factors	Are there schools or other pedestrian generators nearby?		
2 Sidewalks	Are sidewalks continuous throughout the corridor?		
	Are the sidewalks in good conditions (uneven, cracked, etc.)?		
	Are the sidewalks wide enough to accommodate persons using mobility aides?		
3 Facilities at CR 616 and CR 678	Are crosswalks provided at the intersection?		
	Are the pedestrian ramps adequate?		

intersection	Are there pedestrian signals located at intersection?		
	Is the intersection clearly delineated for the visually impaired?		
	Is there adequate drainage at the intersection?		
	Are crosswalks clearly marked?		
4 Area near the CR 616 and CR 678 intersection	Is the speed limit appropriate for all road users?		
	Is there on street parking that would impede pedestrian visibility?		
	Are there safety concerns for pedestrian crossings midblock?		
	Are the pedestrian ramps adequate for midblock crosswalk?		
	Is the midblock crosswalk along CR 616 visible to motorists?		
5 Lighting	Is the sidewalk adequately lit for pedestrians to see and feel safe?		
	Are there dark places or hiding places which represent a personal security issue?		
	Are the pedestrian crosswalks adequately lit for pedestrians and motorists?		
6 Visibility, and Sight Distance	Are pedestrians waiting to cross visible to motorists?		
	Can pedestrians see approaching vehicles?		
	Are there temporary or permanent obstructions near crosswalks (parked vehicles, vegetation, fences, etc.)		

BICYCLISTS

Item #	***Description***	***Check***	***Comments***
	Are there share the road signs posted?		
	Is the road surface of suitable quality for bicyclists?		

	Are parked vehicles an obstruction to bicyclists?		

SIGNAGE, PAVEMENT MARKINGS, DELINEATION AND LIGHTING

Item #	***Description***	***Check***	***Comments***
1 Signage	Are there signs missing from key locations?		
	Are signs easy to understand?		
	Are the correct signs used for each situation, and is each sign necessary?		
	Are signs effective for all likely conditions (i.e. day, night, oncoming headlights, etc.)?		
	Is there sign clutter at the intersection?		
	Are all necessary regulatory, warning, and direction signs in place? Are they conspicuous?		
	Are they redundant?		
	Are traffic signs in their correct locations, and properly positioned with respect to lateral clearance and height?		
	Are signs placed so as to restrict sight distance, particularly for vehicles?		
	Do signs supports conform to guidelines?		
2 Pavement Markings and Delineation	Does existing pavement markings need to be re-painted?		
	Do raised pavement markers need to be installed at the approach of the intersection?		
	Are pavement markings easily visible and effective for all likely conditions (i.e. at night, day, inclement weather etc.)?		

TRANSIT

Item #	***Description***	***Check***	***Comments***
1 Buses	Are bus stops located at or near the intersection of CR 616 and CR 678? Or along Maple Avenue and Main Street?		

ON STREET PARKING

Item #	***Description***	***Check***	***Comments***
1 Parking	Are there time parking restriction signs posted?		
	Does parking obstruct through lane traffic?		
	Is parking located at the edge of intersections which could cause conflict for right-turning traffic?		
	Does parking obstruct vehicular or pedestrian movement?		

PAVEMENT

Item #	***Description***	***Check***	***Comments***
1 Pavement defects	Is the pavement free of defects (i.e. excessive roughness, potholes) which could result in safety problems?		
2 Ponding	Is the pavement free of areas where ponding may occur resulting in a safety problem?		

APPENDIX E
Response Sheet

Delaware Valley Regional Planning Commission

Hanover Street - Intersection Road Safety Audit
Response Sheet

ISSUES	Solution	Decision Agree/Reject	Planned Completion Date	Comments
Street Name Signs				
• The street name signs are too small and difficult to read by motorists.	• Upgrade street name signs to the current MUTCD standards.			
Painted Curbs				
• Sections of curb are painted yellow to indicate “no parking” areas.	• Repaint using red paint according to the current MUTCD and supplement with the appropriate “No Parking” signs.			
Sidewalk				
• Sidewalk from Jane Street to Pemberton Street is uneven on both sides of Hanover Street • Sidewalk is uneven past the Baptist Church on the west side of Hanover Street to the intersection of Elizabeth Street.	• Repair or replace sidewalk as appropriate for the safety of pedestrians.			
Bicycle Amenities				
• There are no bicycle amenities present.	• Install “Share the Road” signs near St. John Street and Mary Street.			

ISSUES	Solution	Decision Agree/Reject	Planned Completion Date	Comments
Jane Street Intersection				
• Tight turning radius from Hanover Street northbound onto Jane Street. • Utility pole on the south side of the intersection is inches from the curb.	• Install "One-Way" sign at Jane Street this will inform drivers that there is no on-coming traffic and hugging the curb is not necessary to make the turn.			
• Crosswalk at Jane Street is faded.	• Re-stripe crosswalk. ***County contract will repaint in the Spring of 2008.***			
• On the west side of Hanover Street opposite Jane Street there is a curb ramp leading into the road without a crosswalk.	• Add a crosswalk across Hanover Street at the intersection with appropriate signage. ***County will inventory ADA ramps throughout the county and address as appropriate.***			
Between Jane and Pemberton Streets				
• Curbside parking spaces are only 5 feet wide on both sides of Hanover Street.	• Prohibit parking where the curb lane of the street is less than 8 feet wide.			

ISSUES	Solution	Decision Agree/Reject	Planned Completion Date	Comments
Pemberton Street Intersection				
• No stop bar on Pemberton Street. • Tree located south of the intersection on Hanover Street obstruct sight distance of motorists looking south from Pemberton Street.	• Add a stop bar at the Hanover Street approach on Pemberton Street in accordance with AASHTO standards. • Add a reflective stripe along stop sign post.			
• "Neighborhood Watch" sign is mounted on "Stop" sign post.	• Relocate "Neighborhood Watch" sign.			
• Crosswalk pavement markings are faded.	• Repaint and replace crosswalk pavement marking using continental style.			
South of Pemberton Street Intersection				
• Existing school speed limit flashing sign is redundant given that the posted speed limit is the same. • There are no speed limit signs northbound in the study area from Mary Street to Jane Street.	• Replace the existing flashing school limit signs with dynamic message signs that reflect the posted speed limit and advise drivers of their current speed. ***County will need to prepare an interlocal services agreement with Pemberton Borough***			
• The school is no longer located in the vicinity and advance "school crossing" signs are still in place.	• Replace the advance "school crossing" signs to "pedestrian crossing" signs.			

ISSUES	Solution	Decision Agree/Reject	Planned Completion Date	Comments
South of Pemberton Street Intersection (continued)				
• The crosswalk across Hanover Street is signed for school crossing.	• Replace "school crossing" sign with a pedestrian crossing beacon over the roadway.			
• On Sunday mornings, it is difficult for pedestrians to cross at the mid-block crosswalk at the Baptist Church. Motorists do not yield for pedestrians at the crosswalk.	• Replace existing crosswalk with continental style striping to enhance visibility. Add saw-tooth "yield" pavement markings in both directions at the crosswalk. Add regulatory sign "yield to pedestrian in crosswalk."			
Boyd Pharmacy Driveway				
• The driveway is too close to the Elizabeth Street intersection, this causes conflicts between entering/exiting customers and motorists at the intersection and traveling along Hanover Street. • The driveway has a narrow apron.	• Extend the apron for the driveway and prohibit egress from the driveway at all times and restrict all left-turn movements into the parking lot during peak morning and afternoon periods; or • Convert the driveway on Hanover Street to right in/right out only and utilize the access on Jarvis Street and Pemberton Street for all other movements.			

ISSUES	Solution	Decision Agree/Reject	Planned Completion Date	Comments
Elizabeth Street Intersection				
• Crosswalks are two lines and have limited visibility.	• Upgrade all crosswalks at the intersection to the continental style.			
• The south crosswalk does not have a curb ramp on the west side of Hanover Street.	• Construct curb ramp ***County will inventory ADA ramps throughout the county and address as appropriate.***			
• The stop bar for the right-turn lane on Elizabeth Street is too close to the intersection to allow pedestrians to begin crossing before a vehicle begins to turn right.	• Move back stop bar as appropriate. This will also give pedestrians waiting to cross Hanover Street a lead enhancing their visibility.			
• Prohibiting right-turns on red signal for northbound Hanover Street at the intersection exacerbates congestion and can potentially cause aggressive driving given the congestion at the intersection during peak periods .	• Replace the current "No Turn on Red" sign with a dynamic message sign which prohibits turns on red only during the protected left-turn phase at the southbound approach.			

ISSUES	Solution	Decision Agree/Reject	Planned Completion Date	Comments
Elizabeth Street Intersection (continued)				
• Southbound left-turn stacking lane is only 150 feet. The through lane cannot be developed because it is mixed with parked vehicles at the curb. Traffic coming over the crest of the hill is channeled into the left-turning lane by the curbside parking.	• Remove 3 parking spaces on the southbound side of Hanover Street and extend the left-turn lane back to 200 feet to accommodate current vehicular volumes.			
• Motorists park illegally in the taper for the southbound receiving lane, south of the intersection.	• Crosshatch the tapers and install “No stopping or standing” signs to assist in channelizing southbound traffic.			
Between Elizabeth and Antis Streets				
• Parking/shoulder pavement markings are faded.	• Restripe as necessary.			
• At Antis Street there is no break in the pavement parking/shoulder pavement marking on Hanover Street for the intersection.	• Remove pavement marking from across the intersection.			

Title of Report: ***INTERSECTION ROAD SAFETY AUDIT*** **– HANOVER STREET, PEMBERTON BOROUGH**

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Geographic Area Covered:
The study area consists of a section of Hanover Street (CR 616) from Jane Street to Mary Street in Pemberton Borough, Burlington County, New Jersey. Included in the study area is the signalized intersection of Elizabeth Street (CR 687).

Key Words:
Road, safety, audit, potential, fatalities, injuries, reportable, crashes, pedestrians, issues, strategies, coordination, engineering, enforcement, education, stakeholders, prioritize, intersection, speed limit, traffic volumes, stakeholders, audit team, breakaway, geometry, pavement markings, signs, traffic signals, crosswalk, sidewalk, curb ramp.

ABSTRACT: This is a documentation of the process and findings of the Hanover Street (CR 616) Intersection Road Safety Audit (RSA) undertaken by Delaware Valley Regional Planning Commission (DVRPC). The goal of the audit is to generate improvement recommendations and countermeasures for intersections demonstrating a history of, or potential for a high incidence of motor vehicle crashes. The emphasis is placed on identifying low cost, quick turnaround safety projects to address the issues where possible. This project represents a step towards implementation of the Delaware Valley Regional Planning Commission (DVRPC) Regional Safety Action Plan. Improving the design and operation of intersections is a priority area for both engineering and enforcement discipline as documented in the Plan. Improvement strategies may be eligible for Local Federal Safety Funds for implementation. The report details safety issues identified by the audit team at the study location and remedial strategies to address them.

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Intersection Road Safety Audit

Hanover Street

Pemberton Borough
Burlington County

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

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