

ACCESS MANAGEMENT

Along Pennsylvania Highways

IN THE DELAWARE VALLEY



City Avenue/US1

Case Study Corridor



Delaware Valley Regional Planning Commission

2005

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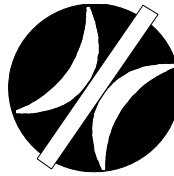
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Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency that provides continuing, comprehensive and coordinated planning to shape a vision for the future growth of the Delaware Valley 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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EXECUTIVE SUMMARY

This report presents a conceptual plan for the improvement of congestion and safety along City Avenue / US 1 between 54th Street and the I-76 interchange ramps. The project began in support of PENNDOT's effort to create model access management ordinances for implementation by municipalities statewide. Because of its relation to PENNDOT's statewide access management project, this report and the recommended improvement strategies focus largely on access management principles.

DVRPC's access management work program involved a regional steering committee comprised of regional and county transportation and community planners, and representatives from the City of Philadelphia's Streets department, PENNDOT District 6-0 Traffic Engineering and Highway Permits units, and SEPTA Service Planning department. This steering committee helped DVRPC staff during all of the steps of this project. With the help of the steering committee members, DVRPC staff identified two corridors for case study evaluation – City Avenue, US 1 (63rd Street to I-76 interchange ramps) and County Line Road, PA 3 (North Wales Road to the Sellersville Bypass). Each corridor illustrates a different area type and development pattern, and therefore, are good examples of access management implementation in diverse circumstances.

Initially, PENNDOTs' ordinances were to be organized around "area type", which is one reason why the case study corridors are so diverse. The current project plan calls for the ordinances to be based on functional class. Even with this change in emphasis, the chosen corridors are useful for illustrating the applications of access management in diverse settings.

This Technical Memorandum focuses on City Avenue, which is a densely developed roadway with mixed land uses directly abutting sidewalks. The presence of St Joseph's University within this corridor contributes to a high level of pedestrian use in some areas. This corridor represents a more urban area type and would primarily require retrofit access management strategies.

DVRPC staff evaluated PENNDOT's model ordinances in relation to the current conditions along the City Avenue case study corridor and identified the access management approaches that would have the greatest impact on the corridor through retrofit implementation. These approaches were then assembled into a theoretical conceptual plan.

During the evaluation of the case study corridor, it was found that the northern portion of the corridor — where traffic volume is highest — recorded a distinct decline in the number of traffic accidents. In this area many access management strategies, such as a non-traversable median, designated left turn lanes, joint driveways with cross access, service roads, and bus pullouts, are already being employed. The combination of these access management practices reveals the expected outcome of traffic accident reduction even in a high congestion area.

The conceptual plan cites several access management related improvements that aim to increase safety and efficiency along City Avenue. Since the northern portion of the corridor already exhibits many access management principles, most of the recommendations relate to the area between 54th Street and 50th Street.

This case study corridor of City Avenue is just one example of the potential impact of access management. This case study focuses on a densely developed, mixed use area, which is one of the hardest environments in which to make meaningful changes. The challenges of retrofit implementation further illustrate the value of establishing access management ordinances prior to the development of an area whenever possible. The case study conceptual plan exercise for City Avenue demonstrated, in real terms, the traffic safety benefits of the access management practices already in place along the corridor. Even in areas with relatively high volumes of traffic and congestion, traffic safety can be improved through the implementation of simple access management techniques such as medians, designated turn lanes, service roads, and joint access.

It is hoped that the City Avenue corridor conceptual plan's proposals will foster coordination between municipal leaders, PENNDOT personnel, and the development community. These partners can work together to establish comprehensive municipal plans and land development practices, develop official maps for future roadway rights of way, and locate and design sensible access points along state and local highways in Lower Merion Township and the City of Philadelphia.

1 INTRODUCTION

Access Management is one of many strategies that a municipality can use to improve the function of its roadways. The methods employed in access management seek to optimize and maintain the existing transportation system while preparing for its future growth. Access management is a relatively low cost strategy to reduce congestion and increase both the efficiency and safety of a roadway. When consistently implemented, these strategies produce impressive results. National studies show that access management techniques can contribute to a 40 percent reduction in highway collisions and increase vehicular mobility by 30 percent. The methodology behind DVRPC's work program emphasized the implementation of appropriate access management strategies in association with PENNDOT's Model Access Management Ordinances project to extend the serviceability and improve the traffic safety along state and local roads.

The methodology of the Delaware Valley Regional Planning Commission's (DVRPC) Access Management Planning is based in its regional Congestion Management System (CMS) Planning. The aim of the Congestion Management System is to minimize congestion and enhance the mobility of both people and goods. Additionally, the Congestion Management System acts as a connection between the region's Long Range Plan and the region's Transportation Improvement Program (TIP) to ensure that the appropriate regional transportation facilities are improved. An initial step of Congestion Management System Planning was to define congested corridors and subcorridors within the Delaware Valley. The system plan then considered the characteristics of each subcorridor and provided strategies for congestion mitigation at each location — one being access management strategies.

DVRPC's access management work program was created to support the effort of PENNDOT's Model Access Management Ordinance project. Since the DVRPC's work program for this project focused on case studies, it was a logical step to use the Congestion Management System Planning as a guiding philosophy for choosing case study areas. To help DVRPC narrow in on candidate case study corridors, a steering committee was formed to contribute to the work and provide comments on the products of PENNDOT's statewide program. The steering committee was comprised of regional and county transportation and community planners, and representatives from the City of Philadelphia's Streets department, PENNDOT District 6-0 Traffic Engineering and Highway Permits units, and SEPTA Service Planning department. This steering committee helped DVRPC staff during all of the steps of this project. With the help of the steering committee members, DVRPC staff identified seven preliminary corridors for evaluation. The initial evaluation considered several documents and factors such as land use, future growth areas, area type, and accident records. Congestion Management System documents were utilized to identify high priority corridors in which access management was specified as an appropriate congestion management strategy. The Delaware Valley Regional Planning Commission's year 2005 forecast of congested highway facilities was also consulted to narrow down the possible case study areas.

After analyzing the aforementioned resources, two corridors were selected as case studies for this work program – City Avenue, US 1 (63rd Street to I-76 interchange ramps) and County Line Road, PA 3 (North Wales Road to the Sellersville Bypass).

Each corridor illustrates a different area type and development pattern, and therefore, are good examples of access management implementation in diverse circumstances.

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This Technical Memorandum focuses on City Avenue, which is a densely developed roadway with mixed land uses directly abutting sidewalks. The presence of St Joseph's University within this corridor contributes to a high level of pedestrian use in some areas. This corridor represents a more urban area type and would primarily require retrofit access management strategies.

On the other hand, County Line Road is characterized by the more scattered development set back from the roadway that is typical of suburban or even rural areas. Sidewalks are not common in the corridor and subsequently pedestrian use of the corridor is very low. Since this corridor is currently becoming more popular for development, access management techniques here could be mixed between retrofit strategies and preventative methods. A separate Technical Memorandum discusses access management in this corridor.

2 ROADWAY CHARACTERISTICS

As a principal arterial with four primary travel lanes, City Avenue is a heavily utilized path between the City of Philadelphia and its immediate suburbs. Land use within the City Avenue case study corridor is primarily institutional, residential, and commercial. Figure 1, the Delaware Valley Regional Planning Commission's 2000 Land Use map, shows mixed residential and institutional uses mainly south of 54th Street, which is the area occupied by St Joseph's University. Commercial concentrations exist from 54th Street north to I-76. Infill opportunities are available in the eastern section of the corridor, north of Belmont Avenue. For example, a mixed-use Target retail store and residential development is proposed on the site of the former Adam's Mark Hotel at Belmont Avenue. The corridor is also highly utilized by pedestrians, especially in the area south of 54th Street due to the activity of St Joseph's University students.

SEPTA operates two regional rail lines within the City Avenue corridor. The R5 travels north-west from the City of Philadelphia to Paoli/Thorndale. Stops in the case study area include Overbrook (63rd Street & City Avenue) and Merion (Hazelhurst & Idris Roads) Stations. Bala Station (Bala & City Avenues), a stop along the R6 line to Cynwyd, is also in the case study area. Various bus routes travel the corridor, mostly between 63rd Street and the Schuylkill River at the end of the corridor. Between 2000 and 2003, almost all bus routes in the case study area lost ridership at rates varying from 8 percent to 42 percent declines. Only Bus Route # 65, which travels from Germantown to 69th Street, experienced a gain in ridership (3 percent). Nevertheless, with several buses utilizing the corridor, continued safe and convenient access to public transportation should be considered.

Traffic conditions within the corridor illustrate considerable levels of volume and congestion. The Annual Average Daily Traffic (AADT) for the corridor ranges from 36,000, between US 30 and 63rd Street, to 72,000 at I-76. Additionally, the overall ratio of volume to capacity ratio (V/C Ratio) along the corridor is 1.01. This figure ranges between 0.93 and 1.40 north of 63rd Street. These volumes are more clearly indicated in Figure 1.

Staff also collected traffic accident data for the City Avenue corridor. The explanation and analysis of this data is revealed in further detail below. In short, driveway accidents and pedestrian related accidents were the most common accident types along City Avenue. Furthermore, these accidents were primarily concentrated in the commercial area north of 54th Street.

While access management techniques can improve the function of nearly any roadway, these practices would have the most immediate impact along City Avenue in the area north of 54th Street. Here, extensive commercial land use results in a greater number of driveways and other access points that could be controlled and coordinated with access management techniques. This area also experiences higher traffic volumes, with AADT's in the range of 42.3 to 45.6 and the I-76 ramps recording 72.0 AADT. The highest volume of traffic accidents also occurs within the commercial area of City Avenue north of 54th Street.

Due to this further analysis, DVRPC staff narrowed the scope of the City Avenue case study to the more concise corridor between 54th Street and the I-76 interchange ramps. The revised corridor, which is marked as a 35 mph area, was studied for the following traffic analysis and conceptual plan development.

City Ave (US 1) Case Study Corridor

Figure 1:
Traffic Volumes & Land Use



3 TRAFFIC SAFETY EVALUATION

Access Management aims to improve both the efficiency and safety of a given roadway or corridor. To assess the current traffic safety conditions within the revised City Avenue, US 1, case study corridor (54th Street to the I-76 interchange) crash data was obtained from PENNDOT. The data summarizes reportable traffic accidents¹ that occurred over the five year period between 1998 and 2003 on both state and local roadways within the corridor. It should be noted that this data does not provide information for every accident (ie., nonreportable accidents are not included) and does not give exact incident information. Rather the data provides a general description of accident types and a relative level of traffic accidents occurring in one segment of the corridor verses another area. The data is organized by roadway segment and includes roadway type, weather conditions, types of crashes, etc.

Access management aims to increase safety by reducing through travel interruptions and making vehicle entrances and exits to/from intersecting highways and driveways as controlled as possible. Organizing traffic accidents by location and type is a logical way to identify and assess common problems in the corridor. With a general knowledge as to the cause of the incidents, a focused group of possible solutions was derived, including access management related countermeasures.

Locations:

A summary of the accident situation along City Avenue is detailed below. Locations where a higher number of accidents occurred in comparison to the incident occurrence corridor-wide are known hereafter as “priority locations.” These areas are more closely evaluated. Since the PENNDOT accident cluster data does not give a specific accident location, the priority locations generally represent a stretch of roadway in which the accidents occurred. The five priority locations are:

#	Priority Location
1	Bryn Mawr Avenue to 50 th Street
2	47 th Street to Belmont Avenue
3	Stout Road to Kings Grant Avenue
4	Decker Boulevard to Monument Road
5	Presidential Boulevard to I-76

¹ Reportable accidents in Pennsylvania are defined to be those resulting in injury or death and/or requiring a tow-away.

Table 1 summarizes the traffic accident conditions for the City Avenue case study corridor, with a focus on the priority locations previously listed.

**TABLE 1 - ACCIDENT LOCATIONS
US 1 / CITY AVENUE CORRIDOR**

LOCATION	ACCIDENTS (1998-2003)		INJURIES	FATALITIES
	#	% of Total		
Bryn Mawr Ave to 50th St	117	25.2	145	0
47th St to Belmont Ave	94	20.2	107	0
Stout Rd to Kings Grant Dr	68	14.6	81	0
Decker Blvd to Monument Rd	58	12.5	66	0
Presidential Blvd to I-76	128	27.5	139	0
TOTAL	465	100.0	538	0

During the five-year time period from 1998 to 2003, 538 injuries resulted from traffic accidents in the five priority locations mentioned above. There were no fatalities as a consequence of these 465 accidents. Just over sixty percent of all reported accidents in the corridor occur in one of the five priority locations. The highest concentration of these occurs in the divided section between Presidential Boulevard and the interchange ramps for I-76, the Schuylkill Expressway (128 incidents). The second highest concentration (117 incidents) occurs at the opposite end of the corridor between Bryn Mawr Avenue and 50th Street — the area of City Avenue marked by intense commercial land use and few access management techniques.

Patterns:

The pie charts in Figure 2 provide a comparison of the types of accidents that occurred in each priority location. The size of the pie chart corresponds to the number of accidents occurring at that location. All locations show a high proportion of rear-end (blue) and angle (yellow) accidents, though the remaining composition varies between sites. Notice that the share of pedestrian related accidents (light blue) generally decreases as one travels northward along the roadway. This corresponds to the change in land use from institutional (St. Joseph's University) and dense commercial to more spacious office complexes and a controlled highway interchange predominating the northern end of the corridor. While this project did not include a direct study of pedestrian activity, it is possible that the development patterns in the northern portion of the corridor result in less pedestrian activity, which therefore contributes to a declining level of pedestrian related accidents. Nevertheless, considering that the traffic volumes in the northern portion of the corridor are over one and one half times as high as those in the southern portion of the corridor, the steady decline in pedestrian related accidents is significant.

City Ave (US 1) Case Study Corridor

Figure 2:
Traffic Accident Types
at Priority Locations





Scale: 1" = 650'



DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
JUNE 2005*

*Aerial photos from the year 2000

Type of Accident at Accident Priority Locations											
Number	Location	# of Accidents	Non-Collision	Rear-End	Head-On	Backing Up	Angle	Sideswipe	Hit Fixed Object	Hit Pedestrian	Unknown
1	Bryn Mawr Ave to 50th St	117	0.0%	39.3%	0.9%	0.9%	40.2%	6.0%	4.3%	8.5%	0.0%
2	47th to Belmont	94	1.1%	52.1%	0.0%	0.0%	30.9%	3.2%	1.1%	11.7%	0.0%
3	Stout Rd to Kings Grant Dr	68	1.5%	82.4%	1.5%	0.0%	8.8%	0.0%	1.5%	4.4%	0.0%
4	Decker Blvd to Monument	58	0.0%	69.0%	0.0%	0.0%	17.2%	3.4%	5.2%	3.4%	1.7%
5	Presidential Blvd to I-76	128	0.8%	43.0%	0.0%	1.6%	35.9%	6.3%	10.2%	2.3%	0.0%

* Size of chart proportional to the number of accidents at each location

Source: PennDOT Crash Record System (1998 - 2003)

Table 2 details the type of accidents at each priority location.

**TABLE 2- ACCIDENT PATTERNS
US 1 / CITY AVENUE CORRIDOR**

Accident Type	Bryn Mawr Ave to 50th St		47th St to Belmont Ave		Stout Rd to Kings Grant Dr		Decker Blvd to Monument Rd		Presidential Blvd to I-76		TOTAL	
	#	Total	#	Total	#	Total	#	Total	#	Total	#	Total
Non-Collision	0	0.0	1	1.1	1	1.5	0	0.0	1	0.8	3	0.6
Rear-End	46	39.3	49	52.1	56	82.4	40	69.0	55	43.0	246	52.9
Head On	1	0.9	0	0.0	1	1.5	0	0.0	0	0.0	2	0.4
Backing Up	1	0.9	0	0.0	0	0.0	0	0.0	2	1.6	3	0.6
Angle	47	40.2	29	30.9	6	8.8	10	17.2	46	35.9	138	29.7
Sideswipe	7	6.0	3	3.2	0	0.0	2	3.4	8	6.3	20	4.3
Hit Fixed Object	5	4.3	1	1.1	1	1.5	3	5.2	13	10.2	23	4.9
Hit Pedestrian	10	8.5	11	11.7	3	4.4	2	3.4	3	2.3	29	6.2
All Others	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Unknown	0	0.0	0	0.0	0	0.0	1	1.7	0	0.0	1	0.2
TOTAL	117	25.2	94	20.2	68	14.6	58	12.5	128	27.5	465	100.0

Rear-end accidents account for more than half of all accidents within in the corridor and 30 percent of incidents are angle accidents. The highest amount of pedestrian related accidents occurred in the first two priority locations. Thirty-four percent of pedestrian accidents within the priority locations occurred between Bryn Mawr Avenue and 50th Street (10 accidents) and an additional 38 percent happened between 47th Street and Belmont Avenue (11 accidents.)

Among the priority locations, thirty-five percent of sideswipe accidents occur between Bryn Mawr Avenue and 50th Street. Five of the seven sideswipe accidents at this priority location are attributed to improper lane changing and exiting onto City Avenue. Surprisingly, sideswipe accidents are also common in the northernmost priority location — Presidential Boulevard to I-76, which is divided. Here, eight incidents accounted for 40 percent of all sideswipe accidents in the priority locations — six of these caused by careless lane changing, passing, or turning. It should also be noted that several of the thirteen accidents that involved hitting a fixed object between Presidential Boulevard and I-76 were attributed to collisions with ramp medians and other traffic channelization devices due to excessive speed, improper driving techniques, or inclement weather.

During the analysis of this data it was found that certain types of accidents occurred frequently throughout the corridor, creating a corridor wide accident pattern. While angle accidents and rear end accidents were common at every priority location, each location also included a unique mixture of other accident types as well.

The four most common patterns were identified. They are: (1) left turn collisions at intersections and mid-block locations; (2) rear end collisions at intersections and mid-block locations; (3) sideswipe collisions; (4) pedestrian and vehicle collisions.

Causation Factors:***Rear End Collisions at Intersections and Mid-Block***

There are certain characteristics of City Avenue that make this type of accident difficult to remediate. Though the length of the corridor between 54th Street and Kings Grant Drive contains a center left turn lane, the number of individual access points on both sides of the roadway causes the use of this center lane to be constant and confusing. The congestion in the center lane occasionally results in queues that overflow into the through travel lanes. Similarly, small turning radii, insufficient corner clearance, and shallow setbacks are all issues that appear at various points throughout the corridor, and can increase the likelihood of a rear-end collision.

Left Turns at Intersections and Mid-Block

Throughout the corridor left turns are difficult to make due to the many private driveways at mid-block locations, a lack of consistent and clear turn lanes, and overall congestion. Though a center left turn lane exists between 54th Street and Kings Grant Drive, the high volume of left turns still contributes to congestion, as vehicles waiting to turn into the crowded center left turn lane block through traffic. The high volume of left turns also contributes to angle accidents predominately, but also to rear end and sideswipe accidents as other vehicles change into adjacent travel lanes to avoid a stopped turning vehicle.

Sideswipe Collisions

Similar to rear end accidents, sideswipes are frequently attributed to turning vehicles or drivers entering City Avenue from an intersecting driveway. In these incidences, drivers may sideswipe adjacent vehicles in the process of changing lanes. Additionally, insufficient turning radii, as well as sight restrictions, may result in an increase in collisions between vehicles on City Avenue, and those turning onto City Avenue from one of the many intersecting private driveways.

Pedestrian and Vehicle Collisions

Residential areas, St Joseph's University, and embarking and disembarking bus riders are significant pedestrian generators in the southern portion of the City Avenue Corridor. While sidewalks are prevalent along the roadway, numerous curb cuts create a somewhat hazardous environment for pedestrians (and bicyclists.) Crossing City Avenue is difficult and dangerous for pedestrians, primarily because of the high level of congestion and turning vehicles. The lack of an adequate median or pedestrian refuge island along most of the corridor makes crossing the arterial even more challenging.

Countermeasures:

City Avenue is a mature, densely developed, heavily traveled and congested roadway. Institutional, commercial and residential land uses lie in close proximity to one another. Public street crossings and private driveways intersecting the highway are frequent. Traffic signals control many of these locations.

Accident mitigation strategies, both access management related and otherwise, will have to be retrofitted to the current conditions in order to make an impact on this roadway. With little opportunity for the reconstruction or redesign of the entire roadway, more site-specific strategies should be incrementally employed to make travel smoother and safer. The implementation of such improvements would require a partnership between individual property owners and developers and local municipalities. Funding for the implementation of larger, corridor-wide, strategies, may be pursued through DVRPC's Transportation Improvement Program (TIP), or other state and federal transportation programs. In some instances, the recommended access management techniques may be incorporated into a broader roadway improvement project. This arrangement not only ensures the most efficient use of limited transportation funds, but is also likely to cause the least disruption to the roadway and its travelers.

The Model Access Management Ordinances drafted by PENNDOT were used as a basis for the case study corridor recommendations. These ordinances are separated into three tiers that each address different access management techniques. The first tier focuses on access management techniques for individual parcels, while the second tier addresses techniques for roadways, and the final tier reviews more complex comprehensive traffic planning practices.

DVRPC staff evaluated these tiers in relation to the current conditions along the City Avenue case study corridor and identified the access management approaches that would have the greatest impact on the corridor through retrofit implementation.

The recommendations that follow are not an inclusive listing but rather a selection of strategies appropriate for the existing condition—leading toward a conceptual plan for the City Avenue corridor.

4 CONCEPTUAL PLAN

The conceptual plan was generated with consideration given to the existing conditions and the Model Access Management Ordinances. Figure 3, located in the back pocket of this report, visually details the conceptual plan for this corridor. On the following page, Table 3 details the current conditions along City Avenue compared with the elements and adjustments included in the conceptual plan to address the corridor's future.

**TABLE 3 – ACCESS MANAGEMENT STRATEGIES
US1 / CITY AVENUE CORRIDOR**

CHARACTERISTIC	CURRENT	PLAN
NOTABLE AM TECHNIQUES	<ul style="list-style-type: none"> § Bus pull-outs N of Conshohocken Rd. § Center turn lane § Some cross access § N portion of corridor: Divided median, Joint driveways, Use of side streets for access 	<ul style="list-style-type: none"> § Bus pull-outs S of Bala Av. § Joint driveways & cross access § Divided median § Restricted turning movements § N portion of corridor: Right turn deceleration lanes
# TRAFFIC SIGNALS	§ 9	§ 9
SIGNAL SPACING	§ About 1,000 feet	§ About 1,000 feet
# PUBLIC STREETS	§ 14	§ 14
PUBLIC STREET SPACING	<ul style="list-style-type: none"> § South of 50th St: about 500 ft § North of 50th St: less uniform, ranging from 400ft to 1,200ft 	<ul style="list-style-type: none"> § South of 50th St: about 500 ft § North of 50th St: less uniform, ranging from 400ft to 1,200ft
# DRIVEWAYS	§ 45	<ul style="list-style-type: none"> § 23 § Closed 22 & provided joint access with remaining existing driveways
DRIVEWAY SPACING	<ul style="list-style-type: none"> § Overall: about 200ft § North of 50th St, in Montgomery County: about 500ft 	<ul style="list-style-type: none"> § South of 50th St: about 200ft § North of 50th St: 300-800ft ; infrequent driveways and more use of side streets for access

During the evaluation of the case study corridor, it was found that many access management strategies are already being employed in the northern portion of the corridor, north of 50th Street. In this area, a non-traversable median and designated left turn lanes create an organized atmosphere and limit the amount of left turns that are made across opposing lanes of travel. Similarly, driveways are spaced fairly reasonably at about 500ft of separation, and many of them are shared jointly between several parcels with internal cross access available. Many parcels also gain access from the other public streets that surround their property in addition to City Avenue. In Montgomery County, these service roads include St Asaph's Road and Presidential Boulevard, while businesses in the City of Philadelphia also use Presidential Boulevard as well as Winding Drive and Stout Road.

In addition, several bus pullouts along this segment make transit a more safe and convenient option for riders, while limiting the characteristic effects of frequent mid-block stops on through traffic.

The combination of these access management practices reveals the expected outcome of traffic accident reduction. The pie charts in Figure 2 visually illustrate the drop in the level of accidents as one travels north along the City Avenue corridor.

In the northern portion of the corridor — where traffic volume is highest — traffic accidents decline in number.

Since this area of the corridor already contains many access management design practices, the only improvement suggested in the conceptual plan is the addition of right turn deceleration lanes at major driveways and public streets that intersect City Avenue. The addition of a right turn deceleration lane widens the travel area of a roadway and makes crossing more difficult and dangerous for pedestrians. While this is certainly a drawback of this access management technique, the combination of this strategy with the previously existing non-traversable median allows for the controlled and safe crossing of pedestrians at designated intersections where median breaks occur. Similarly, creating a median with a pedestrian refuge provides added protection for pedestrians to safely cross the roadway.

In most areas along City Avenue, there is no shoulder, but rather a curb barrier. With no extra room from which to create an additional lane, the construction of a right turn deceleration lane(s) would require roadway widening and possibly the acquisition of right-of-way. The implementation of such lanes is detailed in PENNDOT's Tier II, Section A.1. The deceleration lanes are visually detailed in Figure 3 in the back pocket of the report.

From Presidential Boulevard to the I-76 ramps, the area represented by the fifth accident pie chart, the accident rate increases. This change is primarily due to interchange related rear end, angle, and sideswipe accidents. While there are few access management techniques that could ameliorate this accident situation, early directional signage or lane striping, may help to clarify the lane destinations for travelers and therefore, may contribute to a reduction in accident rates in this area.

The area south of 50th Street is a more challenging area in which to implement access management techniques as it is densely developed with few opportunities for reconstruction or redesign of the roadway and adjacent parcels. The primary existing access management technique in this portion of City Avenue is a continuous two-way center left turn lane; a feature that is sometimes suggested as a roadway improvement to increase its efficiency (Tier III A.1).

In the case of City Avenue, where nearly every property maintains its own access point along the main roadway, the inclusion of turning movements across travel lanes at any point along the road results in numerous conflict points and a more dangerous corridor. The center left turn lane also makes the roadway more hazardous for crossing pedestrians.

In an effort to increase safety and efficiency of this section of the corridor, several access management related improvements were suggested for the area between 54th Street and 50th Street. To decrease the number of conflict points, the plan calls for the addition of a non-traversable median with median breaks at traffic signals (Tier III A.3). While all turning movements would be permitted at traffic signals, only right turns would be allowed at other driveway locations. Additionally, in most places this median would be designed as a pedestrian refuge island to ensure improved safety and mobility for

pedestrians as well as vehicles. As an average median width is eight feet, and the center left turn lane along City Avenue provides eleven feet of roadway, the redesign of the street to include a median rather than a center lane should not require any additional acquisition of right-of-way.

Joint driveways and cross access between properties would limit the number of access points without impacting convenience (Tier I A.6). In all, staff recommended the closure of twenty-two driveways with modified internal connections in order to maintain a comparable level of access. Similarly, service roads behind businesses that front City Avenue would provide the necessary connections between signalized public streets to ensure efficient travel and easy access to parcels (Tier III A.2). Where possible current public roadways, such as 53rd Street, were utilized as service roads to limit the amount of disruption to the surrounding community.

Finally, two bus pull-outs were designated along this portion of City Avenue to make transit use more convenient and safe for riders, and less disturbing to through traffic. One bus pull-out is proposed between 51st Street and Bryn Mawr Avenue in Philadelphia, with the second pull-out location in Montgomery County between Bryn Mawr Avenue and Bala Avenue. While SEPTA requests that the location of bus pull-outs be located near signal protected crosswalks, mid-block positions such as the ones proposed can be modified for optimum safety and transit service. The use of the recommended median barrier eliminates concern for “jay-walking” by forcing pedestrian actions to occur at intersection locations. An increase in the length of the bus pull-out acceleration lane would also improve the mid-block location by increasing the ability of the bus to merge into traffic. For a detailed review of these recommendations please see both Table 3 and Figure 3.

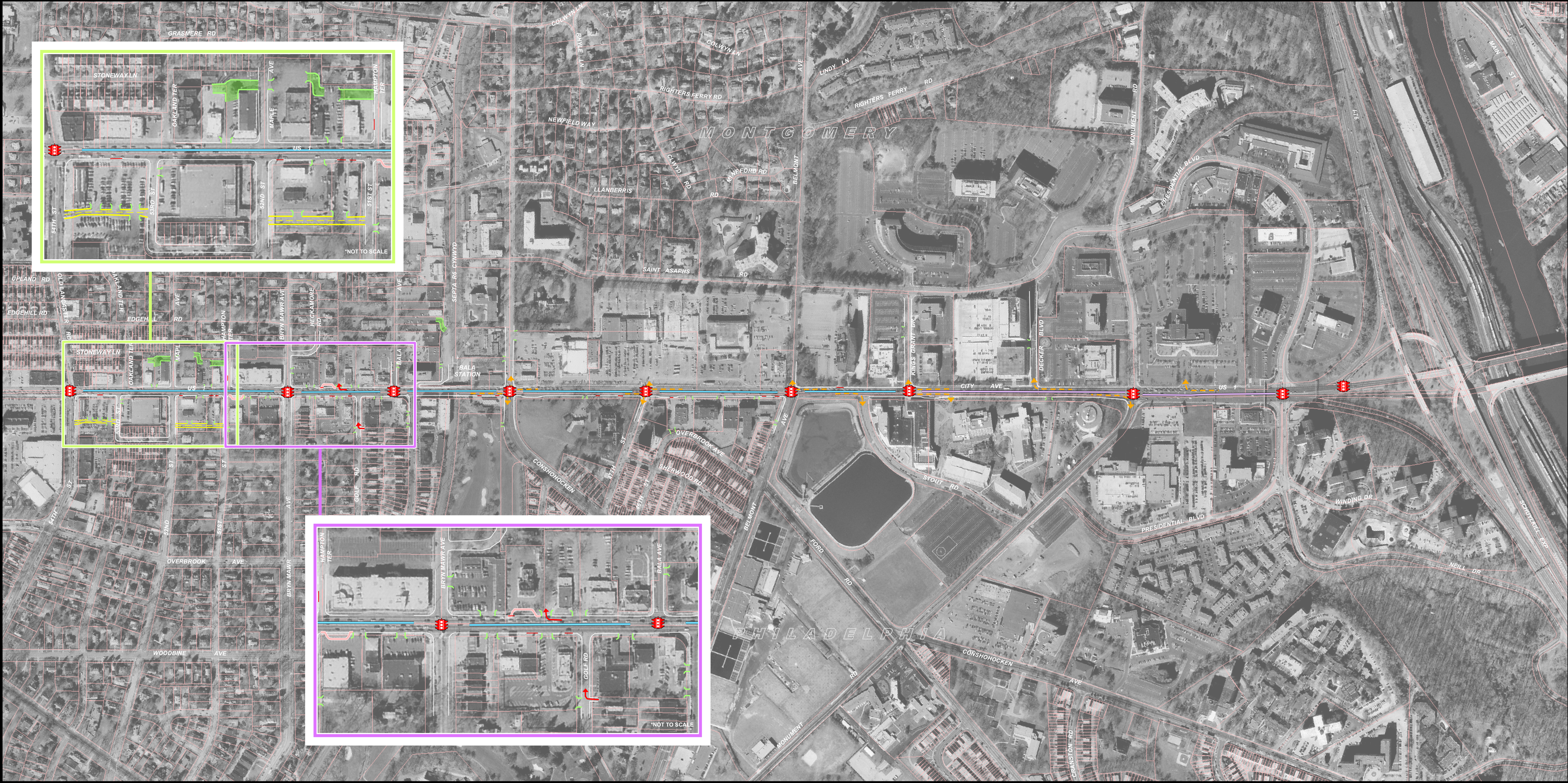
5 CONCLUSIONS

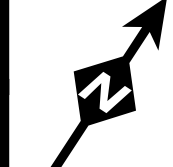
The City Avenue case study corridor is just one example of the potential impact of access management. This case study focuses on a densely developed, mixed use area, which is one of the hardest environments in which to make meaningful changes. The challenges of retrofit implementation further illustrate the value of establishing access management ordinances prior to the development of an area whenever possible. While retrofit access management implementation is not easy, it is possible to make small progressive changes that can improve the efficiency of the roadway. Along City Avenue, the anticipated redevelopment of the Adam's Mark Hotel site at Monument Road into a Target retail store is a perfect example of the opportunities for change that consistently appear in fully developed corridors.

The case study conceptual plan exercise for City Avenue demonstrated, in real terms, the traffic safety benefits of the access management practices already in place along the corridor. Even in areas with relatively high volumes of traffic and congestion, traffic safety can be improved through the implementation of simple access management techniques such as medians, designated turn lanes, service roads, and joint access. The ideas and recommendations in this report are suggestions. It is hoped that the City Avenue corridor conceptual plan's proposals will foster coordination between municipal leaders, PENNDOT personnel, and the development community. These partners can work together to establish comprehensive municipal plans and land development practices, develop official maps for future roadway rights of way, and locate and design sensible access points along state and local highways in Lower Merion Township and the City of Philadelphia.


City Ave (US 1) Case Study Corridor

Figure 3:
Conceptual Highway
Access Management Plan







0 250 500 1,000
Feet





DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
MARCH 2005*
*Aerial photos from the year 2000


SOURCES: DVRPC, UPPER MERION TOWNSHIP &
PHILADELPHIA CITY PLANNING COMMISSION

 Existing Traffic Signal


 Driveway Closure


 Tax Parcel Boundary


 Possible Future Deceleration Lane


 Restricted Turn Movement


LEGEND

 Existing Non-Traversable Median

 Proposed Non-Traversable Median

 Designated Bus Pull-Off

 Proposed Service Road

 Proposed Joint Driveway with Cross Access

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

Publication Abstract

Title:	Access Management Along Pennsylvania Highways in the Delaware Valley — City Avenue / US 1 Case Study Corridor	Date Published:	September 2005
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Geographic Area Covered: West Philadelphia and the immediate suburb of Lower Merion Township in Montgomery County, Pennsylvania.

Key Words: Access Management, congestion management, safety, accident mitigation, corridor planning, model ordinance, growth management

ABSTRACT

This project was created in support of PENNDOT's effort to establish model access management ordinances for use by municipalities statewide. Two corridors were selected as case studies to help PENNDOT illustrate the possible benefits of proactive access management implementation. This corridor report highlights US1 / City Avenue between 54th Street and the I-76 interchange ramps (the second case study focuses on PA 309 County Line Road). The work was preformed with the help of member governments, regional transportation providers, and PENNDOT.

The project began with the documentation of existing conditions along the City Avenue corridor. Access management related problem areas and specific issues were identified and studied in further detail. Recommendations to improve the congestion and safety concerns along the corridor were based on PENNDOT's statewide model access management ordinances.

A theoretical conceptual plan was prepared as a result of these recommendations and a map of these suggestions is included in this report. Additionally, this conceptual plan acted as a base for the interactive exercise that PENNDOT included in their access management model ordinance statewide training sessions.

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