

Access Management on Arterial Roads

Best Management Practices for the Lehigh Valley



Lehigh Valley Planning Commission

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EXECUTIVE SUMMARY

Following in the footsteps of two previous reports, *Community Planning and Transit: A Case for Transit Supportive Design* (1995) and *Creating Better Traffic Circulation* (1996), *Access Management on Arterial Roads* continues to explore how we can create a better transportation network through planning, coordination and design.

Capacity will continue to decline on the arterial road system as demand continues to outstrip the ability to create additional capacity. (Arterial roads are roads that primarily exist to carry through-traffic movements.) Preserving current capacity is a good way of maintaining mobility. Whereas access points/driveways cumulatively degrade the capacity and safety of our arterial roads, means of minimizing this degradation are needed. Access management is such a means.

Access management is “the process that provides (or manages) access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity and speed.”⁽¹⁾ Access management can provide significant benefits for the traffic circulation system.

- Crashes can be reduced as much as 50%.⁽²⁾
- Capacity can be increased by 23-45%. And ⁽²⁾
- Travel time and delay can be reduced by 40-60%.⁽²⁾

Municipalities have a role in access management. Access management need not exclusively be a PennDOT activity along the arterial road system. PennDOT's rules and regulations provide municipalities with authority to co-regulate access points on state roads. Recent court decisions have affirmed this authority. Numerous best management practices are available to implement access management. They deal with access from alternate roads, lotting and site development, driveway location and design, and arterial road design. These practices can be implemented through provisions in zoning ordinances and subdivision and land development ordinances. They can also implement the recommendations of plans like corridor studies and neighborhood circulation/access plans.

The report explores the ways in which PennDOT is involved in access management including the issuance of highway occupancy permits and the creation of access covenants. Better access management can be achieved through increased coordination between municipalities and PennDOT. Formal mechanisms can provide for municipal input into the PennDOT highway occupancy permit decision process.

Recommendations for improving access management are spelled out. PennDOT, the Lehigh Valley Planning Commission and municipalities each have their own roles to play in this endeavor. Recommendations are provided for each.

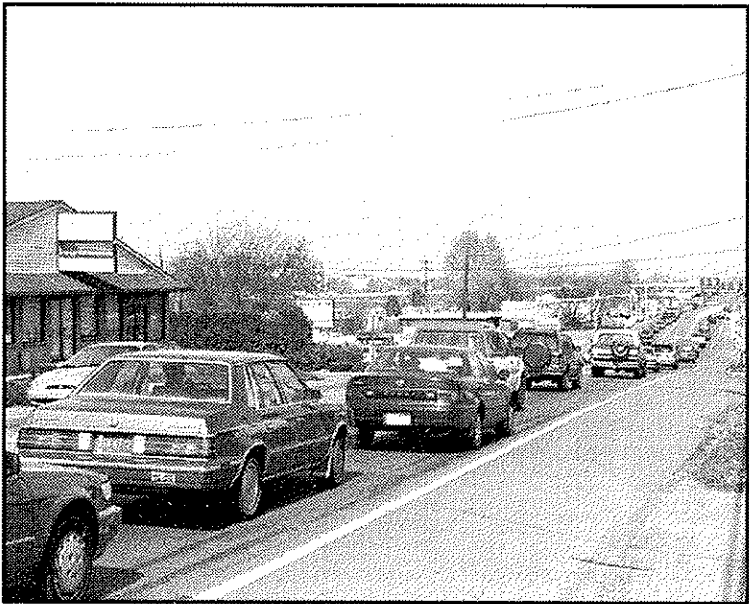
INTRODUCTION

Traffic congestion consistently tops our surveys as the issue that most concerns Lehigh Valley residents. People perceive that getting around the Lehigh Valley keeps getting more difficult. They become increasingly frustrated as they find themselves at congested intersections or otherwise stuck in traffic as in photo 1.

These perceptions are solidly grounded. Our population has increased. More importantly though, the number of cars per household has grown rapidly. One and two car families have been replaced by three and four car families. The number of vehicles on the road has never been greater. The amount of driving is increasing much faster than our population growth. At the same time, there has not been a corresponding increase in the capacity of the road system. While highway improvement projects tackle specific bottlenecks and a few new major roads are built, for the most part we continue to use the road network that is in place.

We expect these trends to continue. The population will continue to increase. The number of vehicles will continue to rise. Although highway improvements will continue, no one expects these improvements to fully offset the increased need for highway capacity. However, this does not mean that we are doomed to ever decreasing levels of mobility. Solutions exist.

Studies show that access management can increase safety and make our roads operate more efficiently. Access management can make a significant difference in these areas. The Pennsylvania State Transportation Advisory Committee draft report on access management included the following findings:



- **Access management programs have been proven to reduce crashes by as much as 50%.⁽²⁾**
- **Capacity can be increased by 23-45%.⁽²⁾**
- **Travel time and delay can be reduced by 40-60%.⁽²⁾**

These benefits are substantial. The costs of alternative means to accomplish the same benefit dwarf the costs of access management.

Access management is a means of preserving existing capacity. We advocate the use of access management to preserve capacity along arterial roads. These are the roads that link our communities together. Their function is to facilitate through traffic movements. Providing access to abutting properties is a distinctly secondary function. Businesses are drawn to locating along arterial roads by the high volumes of traffic. The traffic equates to potential customers. Each access point along the arterial road compromises safety and the ability of the arterial road to do its job. Travel from one part of the region to another is degraded.

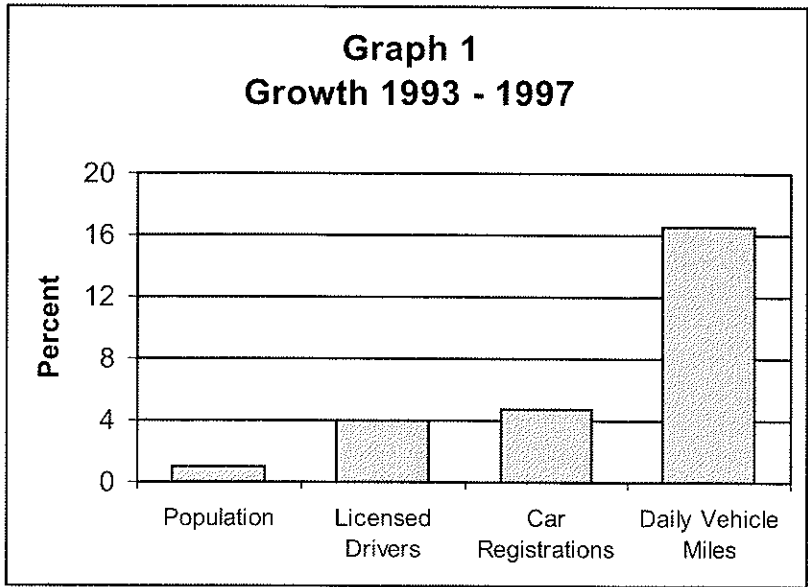
The purpose of this report is to focus attention on access management and to provide municipalities with ideas, tools and standards in a series of best management practices to implement access management. By using the practices outlined in this report, municipalities can stem the decline in the available road capacity and improve safety.

Municipal officials may wonder why access management issues cannot simply be assigned to PennDOT. After all, nearly all of the arterial roads in the Lehigh Valley are in the state highway system. Permits are required by PennDOT in order to establish access points. Shouldn't that jurisdiction and the existence of that permitting system adequately deal with these issues? Unfortunately, they do not. Two reasons account for this. First, some of the access management techniques go beyond the direct control of access points and are therefore beyond PennDOT's jurisdiction. Second, PennDOT's implementation of access management is subject to state policy, as well as laws and regulations. Although it recognizes that "Highway safety and capacity are being eroded by not managing access to the system."⁽³⁾ PennDOT implements a state policy that "emphasizes preserving the right of access as a guiding rule."⁽⁴⁾ If PennDOT instead consistently and aggressively incorporated access management objectives into their permitting process, a lesser need for an extensive municipal role would exist. The Pennsylvania State Transportation Committee released its final report on *Statewide Highway Access Management and Growth Accommodation* in January 2000. The report's recommendations are that the types of access control measures described in this LVPC report are municipal responsibilities. Recommendations for PennDOT center on improved coordination.

At this point, we would like to explicitly recognize the existence of divergent opinion on the subject of access management. Opposition to access control measures can be expected as the interests of the general public and particular property owners collide. While the general public has interests in mobility and safety, some adjoining property owners consider access management from the perspective of their property values. In some instances, adjoining property owners will oppose access management measures believing that the measures will hurt the viability of the businesses or potential businesses on their property and thus reduce property values. Any consideration of access management necessarily involves the consideration of these differing and sometimes conflicting interests and the balancing of them in an equitable manner to meet local needs.

BACKGROUND

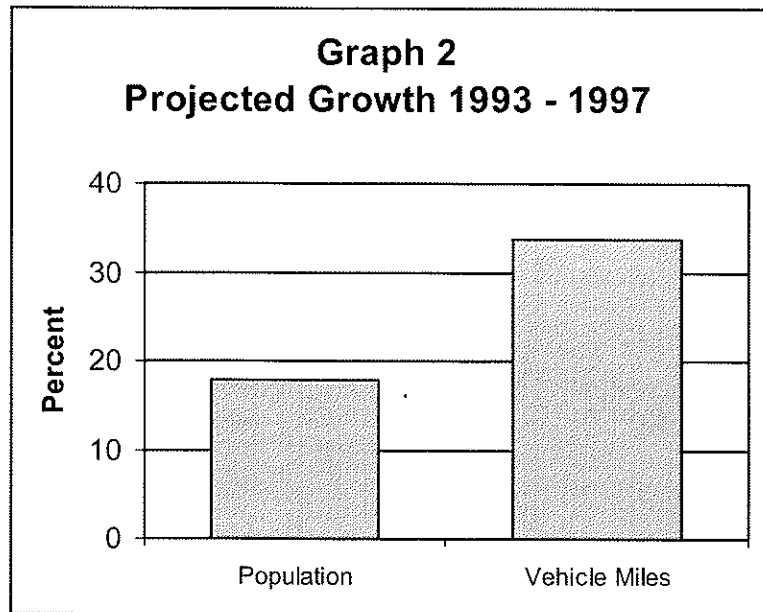
Current and Projected Conditions



Area roads are becoming increasingly clogged with traffic. Although this situation is related to population increase, other factors are more important. The population of Lehigh and Northampton Counties increased by 5,729 persons between 1993 and 1997, up 1.04%. In the same period, the number of licensed drivers in the two counties went up by 15,615. The increase in the number of licensed drivers was 3.99% or almost four times the rate of population increase. The rate of growth in the number of passenger cars was even greater.

The increase in the two counties in this period was 15,600, or 4.72%. Most importantly though, the number of daily vehicle miles traveled increased by 1,785,169, up 16.51%. This is more than 15 times the rate of population increase. In short, there are more people. There are even more drivers and cars. Each driver is driving more than before.

These trends are expected to continue. The Lehigh Valley Planning Commission population projections show a 17.77% population increase from 1997 to 2020. The rate of increase in vehicle miles driven in the future is expected to continue to outpace the rate of population growth. The Lehigh Valley Planning Commission projects that the number of daily vehicle miles of travel will increase by 33.78% between 1997 and 2020. Absent countermeasures to preserve and increase roadway capacity, these trends have resulted and will continue to result in increasing congestion levels.



Arterial Roads

This report focuses on access management along arterial roads. An arterial road is described as “a highway primarily for through traffic, usually on a continuous route” according to American Association of State Highway and Transportation Officials (AASHTO).⁽⁵⁾ Arterial roads serve “major centers of activity of a metropolitan area.” They have the highest traffic volumes and involve the longest trip lengths of any road classification excluding expressways. Regarding the access function of arterial roads, AASHTO comments, “Urban arterials are capable of providing some access to abutting property. Such service should, however, be only incidental to the primary functional responsibility of travel service to major traffic movements.”

The Lehigh Valley is served by a network of arterial roads. PennDOT’s functional classification of Lehigh Valley roads is attached as maps 1 and 2. The maps show that arterial roads can be found in most although not all municipalities.

Problem Statement

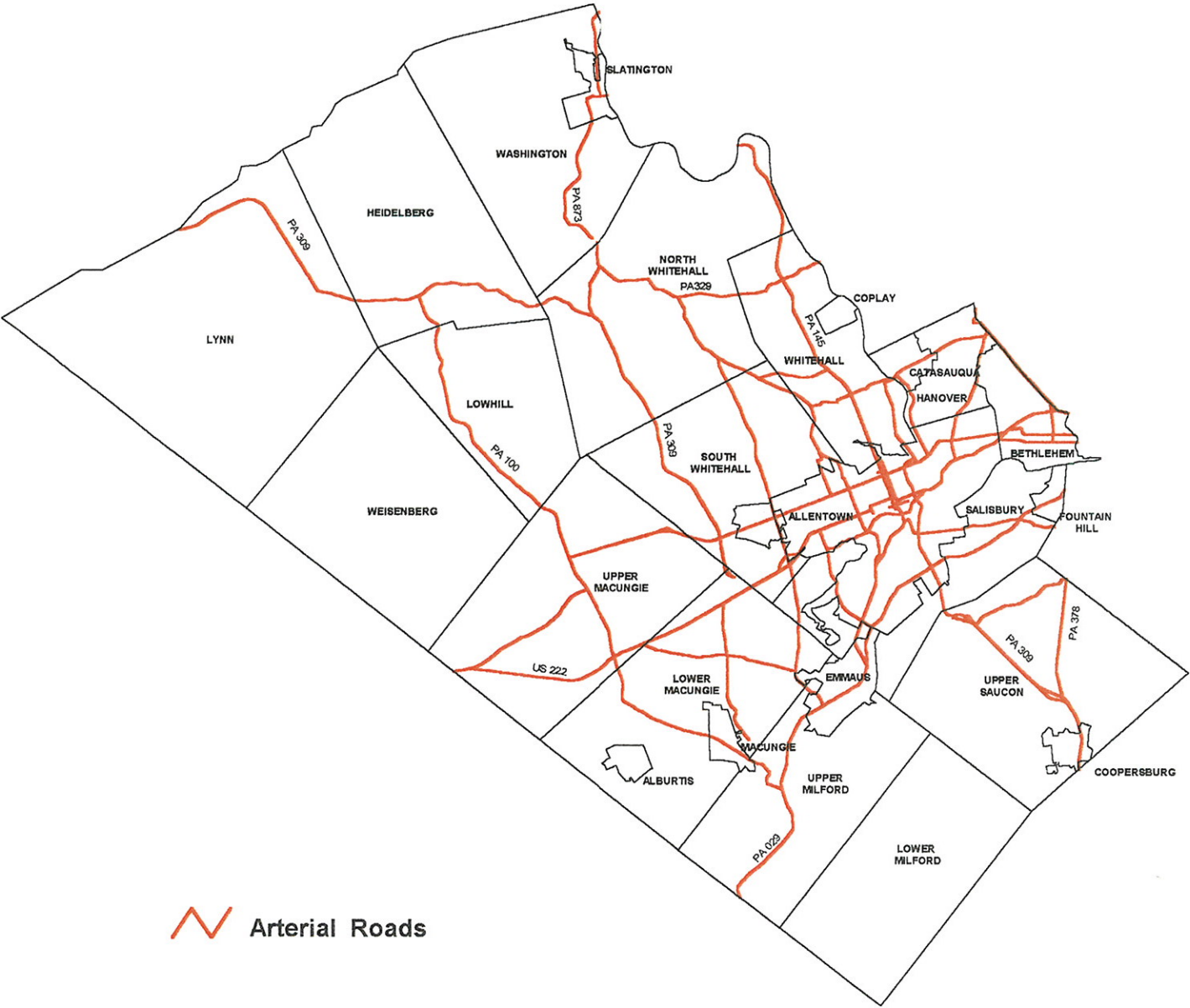
The detrimental effect of access points to the functioning of arterial roads is widely recognized. The problems relate both to capacity and safety. AASHTO observes, “where the entrances are numerous and have heavy traffic volumes, particularly those serving industrial and commercial establishments, the capacity and safety of the highway are adversely affected.”⁽⁶⁾

Safety

Safety problems are created by the introduction of conflicting traffic movements deriving from access points. That is, vehicles entering or exiting from an access road cross traffic lanes and enter other traffic lanes. Each additional point of conflicting traffic movement represents a potential safety problem. This problem is magnified by the higher design speeds typical of arterial roads as compared to lower class roads. Local roads are best suited to these conflicting traffic movements as they feature the lowest design speeds. Safety is also threatened by the interruptions posed by turning movements. Rear end collisions sometimes happen when a vehicle is slowing for an intended turn or a line of vehicles is stopped behind a vehicle waiting to turn left.

Numerous studies have documented these safety problems. The Institute of Transportation Engineers research has concluded that accident rates increase in proportion to the number of access points per mile.⁽⁷⁾ The National Cooperative Highway Research Program (NCHRP) has documented that the accident rates rise as the total access points per mile increase. This increase occurs in all situations, including urban areas, rural areas, on roads with medians, on roads with two-way left-turn lanes (TWLTL) and on roads without medians or left turn lanes. The NCHRP research concluded that “in urban and suburban areas, each access point (or driveway) added would increase the annual accident rate by 0.11 to 0.18 on undivided highways and by 0.09 to 0.13 on highways with TWLTLs or nontraversable medians.”⁽⁸⁾ This research demonstrates that each access point increases the accident rate by its very existence and use even though it may meet PennDOT sight distance and other relevant criteria.

MAP 1 LEHIGH COUNTY ARTERIAL ROADS



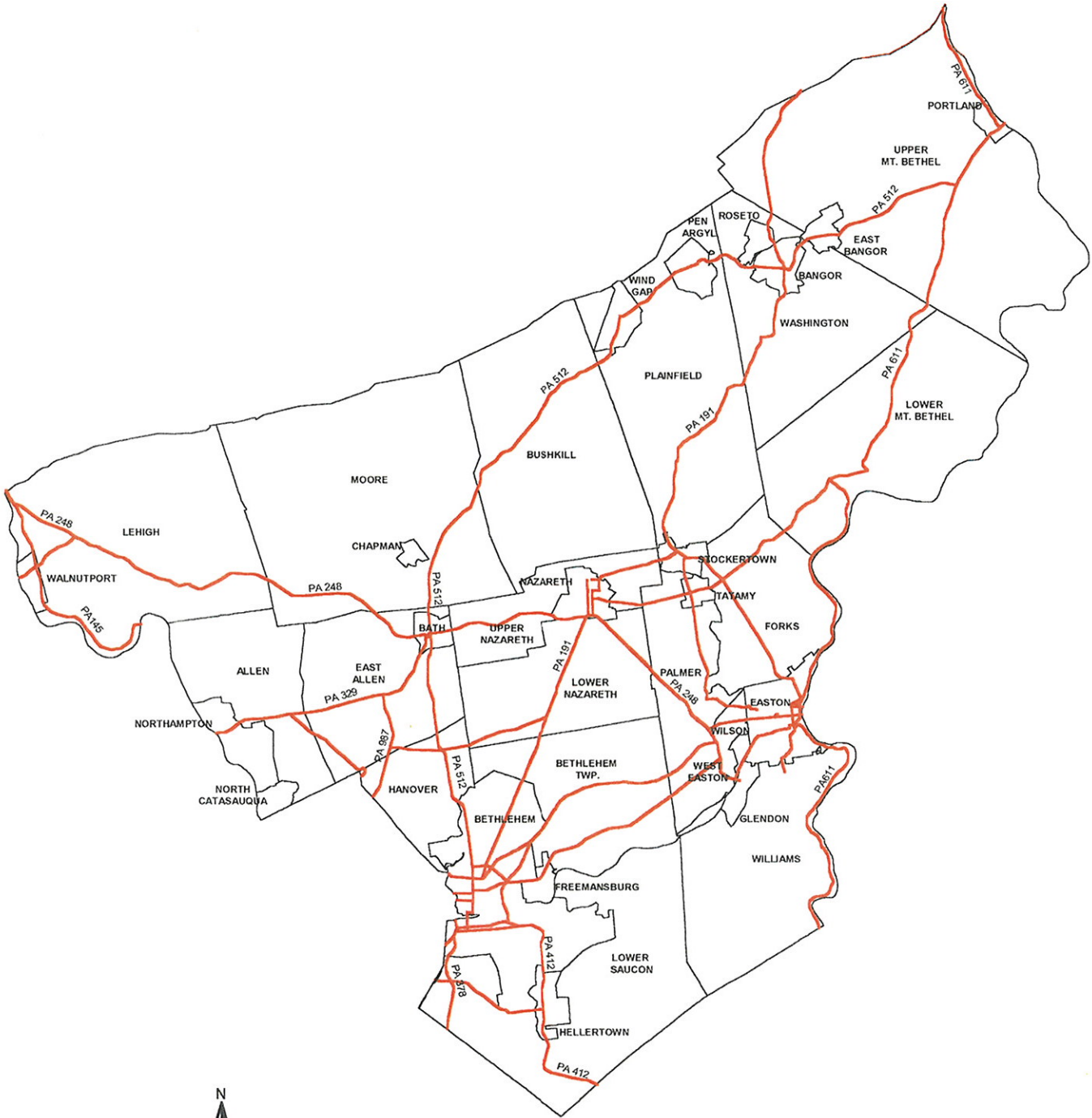
 Arterial Roads



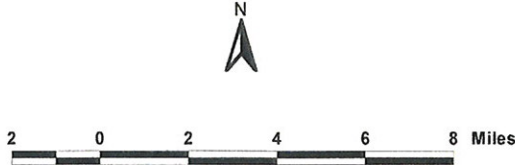
2 0 2 4 Miles

Prepared by: Lehigh Valley Planning Commission

MAP 2 NORTHAMPTON COUNTY ARTERIAL ROADS

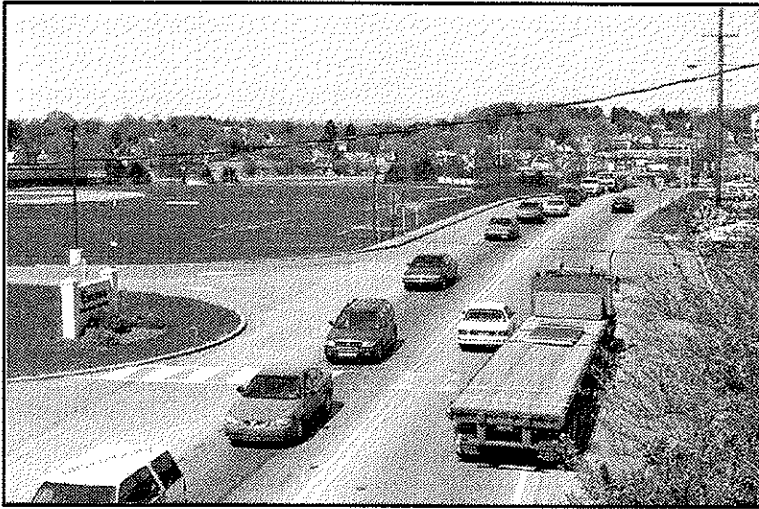


 Arterial Roads



Prepared by: Lehigh Valley Planning Commission

Photo 2



stopped vehicle that is waiting to make a left turn. The NCHRP reports that “A synthesis of safety experience indicates that the removal of left turns from through traffic lanes reduced accident rates by roughly 50 percent.”⁽¹⁰⁾

Other studies have dealt with the placement of driveways close to the intersection of arterial roads with other roads. Studies have concluded that “placing driveways too close to intersections correlates with higher accident frequencies-sometimes as many as one-half of all accidents involved are driveway-related.”⁽¹¹⁾

Capacity

Reduced capacity along the arterial road in part results from the lower operating speeds forced by the access points. Drivers must react to and accommodate other drivers who are braking for their turning move or accelerating upon exiting the access point. Studies have quantified this speed reduction. The NCHRP estimates that speeds are reduced by 0.25 mph for every access point up to a 10-mph reduction for 40 access points per mile along unsignalized multi-lane divided highways.⁽¹²⁾ Using computer simulations, the Florida DOT found that poor spacing, design and location of driveways could reduce average travel speed by 5 to 10 mph.⁽¹³⁾

Left turns are particularly problematic in that traffic movement in a given lane can be halted because the vehicle attempting the turning movement needs to wait until a sufficient gap in opposing traffic appears. Research in the Transportation Research Record finds that “where left-turn lanes are provided along multi-lane highways, each opposing left-turning vehicle reduces the through vehicle capacity by the number of through lanes it crosses (e.g., 100 left turns/hour across three traffic lanes reduces the through vehicle capacity by 300 vehicles).”⁽¹⁴⁾ This research finds that the solution of this capacity shortfall may not be solved by the installation of a traffic signal. They also found that “where there are six left turns per traffic signal cycle, virtually all through vehicles in the shared lane may be blocked by the left-turning vehicles.”

Right turns also reduce highway capacity. As vehicles slow to make the turn, trailing vehicles must also slow, particularly if there is no right turn lane. The portion of total traffic in the lane that must

brake for turning vehicles depends on the number of turning vehicles and the spacing of the access points. The percentage of affected vehicles increases as the number of turning vehicles increases and the distance between the access points decreases. A considerable portion of the vehicles in the lane may be affected. For instance, assuming that the access points are 200 feet apart, the percentage of affected vehicles is 14.7% if 30 or fewer vehicles turn per hour. Over 80% of the vehicles in the lane are affected if more than 90 vehicles turn per hour.⁽¹⁵⁾

The Highway Research Board has described this access induced road capacity problem as a cycle of functional obsolescence. Kirk Bishop described this cycle in the American Planning Association's Report *Designing Urban Corridors*:

"The construction or reconstruction of a roadway provides increased accessibility to an area, which drives up land values and spurs development or redevelopment. As development occurs, traffic continues to mount. More business development along the roadway brings more driveways, more conflicts, and more congestion. Eventually traffic service levels drop so low that further roadway improvements or completely new facilities are required, and the cycle starts again."⁽¹⁶⁾ Thus, significant amounts of public investment in road improvements are necessitated by the introduction of access points along roadways for the benefit of abutting property owners.

Access Management

Access management is a key means by which the above-described problems can be minimized. The Transportation Research Board (TRB) describes access management as a "response to the problems of congestion, capacity loss and accidents along the nation's roadways."⁽¹⁷⁾ The need for access management has been widely recognized. Locally, the need for access management has been recognized in county and municipal comprehensive plans. For instance, the Upper Macungie Township Comprehensive Plan states that "proper management of access along major roads is needed. This includes coordinating access over the long-term among numerous individual properties and planning how access will be provided to land before it is proposed for development."⁽¹⁸⁾ The Comprehensive Plan for Lehigh and Northampton Counties includes the policy "Preserve arterial roads for their through traffic carrying function by reducing on-street parking and curb cuts for driveways."⁽¹⁹⁾

The definition of the term "access management" as set forth by the TRB is as follows: "*Access management is the process that provides (or manages) access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity and speed.*"⁽¹⁾ This definition reflects the concept of accomplishing multiple objectives with a single approach. Access management is intended to "preserve the functional integrity and operational viability of the road system. It attempts to balance the movement and access functions associated with streets and highways."⁽²⁰⁾ Access management seeks to balance traffic movement needs and access functions. Without access management, the balance would favor access functions at the expense of traffic movement needs.

Access management, of necessity, involves the control of access. "Control of access is the condition where the right of owners or occupants of abutting land or other persons to access, light, air, or view in connection with a highway is fully or partially controlled by public authority."⁽²¹⁾ In this context, full control involves connections with only a selected few public roads. Connections with private

access points are completely prohibited. In contrast, partial control provides some connections with private access points although the needs for through traffic movements are important. Access management for arterial roads, the focus of this report, involves partial control.

The legal basis of access management derives from the police power, which is the inherent power of the government to protect and promote public health, safety, morals and general welfare. Land use controls such as zoning ordinances and subdivision and land development ordinances similarly derive their authority from the police power. The authority derived from the police power is not limitless. The regulations deriving therefrom should 1) represent the minimum standards needed to accomplish the objective, 2) regulate the use of private property without confiscating private property as set forth in the State and Federal Constitutions and 3) have a substantial relationship to the objectives. For access management, the objective is "to balance movement and access functions in a way that preserves the integrity of the road system while simultaneously providing reasonable access to adjoining property."⁽²²⁾

ACCESS MANAGEMENT PRACTICES

The principles of access management are simple. Flora described them as follows in the Federal Highway Administration report *Access Management for Streets and Highways*:

- Minimize the number of conflict points;
- Separate basic conflict areas;
- Limit deceleration requirements; and
- Remove turning vehicles from through lanes.⁽²³⁾

These principles can be accomplished by using best management practices. Broadly, these practices can be characterized as follows:

- Practices relating to the presence, siting and design of access points (driveways);
- Practices relating to the arrangement of the buildings and the internal circulation on the properties to which driveways are provided; and
- Highway design practices.

This report will deal with all three of these types of best management practices. Most of the emphasis will be placed on the first two because municipalities can implement them through regulation. Highway design, although an important component of access management, is under the purview of PennDOT. (Almost all arterial roads in the Lehigh Valley are state roads. As such, PennDOT is responsible for their design.)

The following text will describe these best management practices and provide illustrations and local examples of their use where appropriate. The text will indicate whether the best management practices are of a planning or a regulatory nature. Most of the regulatory best management practices involve provisions to be found in zoning ordinances or subdivision and land development ordinances (SALDO).

Access Point Location and Design

Legal Basis for Municipal Regulation

This group of best management practices regulates the existence, location and design of access points along arterial roads. These measures, if adopted as part of the municipal SALDO or zoning ordinance, are controlling along state highways, regardless of any permits that may have been issued by PennDOT. That is, PennDOT permit actions do not override municipal restrictions related to access points. Parties seeking to gain access onto a state highway must satisfy both PennDOT and municipal regulations. This situation is based on provisions of the Pennsylvania Code, Title 67. Transportation, Chapter 441. Access to and occupancy of highways by driveways and local roads. Section 441.2(b) states, "Issuance of a permit under these regulations does not relieve the permittee from any additional responsibility to secure other Federal, State, or local approvals or permits as may be required by law." This provision is reinforced by Section 441.6(2), which states that "All work

authorized by the permit shall be subject to the following: (i) All applicable laws, rules, and regulations, including but not limited to the following: ... (F) Ordinances enacted by local municipalities which contain more stringent minimum safety requirements than this chapter.” Clearly, PennDOT regulations anticipate and accommodate municipal regulations that are more stringent than those of the Department itself.

The validity of this position was upheld in a key ruling by the Commonwealth Court in a May 28, 1997 decision. The appellate court issued its ruling in the case of Francis Ice, Robert Beer and Alice Beer v. Cross Roads Borough, (Atlantic Reporter, 2d., Vol. 694, p. 401). In the case, the property owners had purchased a lot in a subdivision. The lot had frontage both along a state highway and a local road. The subdivision plan bore a note that indicated that exclusive access to the lot was to be obtained from the local road, as a response to a borough SALDO requirement that “Subdivisions shall be designed to eliminate driveways, where possible, abutting state highway routes.” Despite the note on the subdivision plan, the property owners sought to gain access from the state highway. Upon the receipt of an application, PennDOT issued two highway occupancy permits. The property owners constructed the driveways leading to the state highway. The borough took action against the property owners seeking compliance with its SALDO. In their defense, the property owners asked the courts to determine that the Borough had no basis to interfere with their right to use the driveways created pursuant to the PennDOT permits.

The Commonwealth Court decision sided with the Borough. The Court concluded “if a municipality has ordinances, as in the case here where the Borough’s subdivision ordinance allowed for the condition limiting access to only subdivision roads, then a landowner seeking access to a state highway must be given permission for this access by both governmental entities. If either entity has a legitimate basis for denial then the access cannot be granted.”

Access from Alternate Roads

The most effective way to manage access along arterial roads is to simply not provide access from the arterial roads. In these instances, access is obtained from other roads. Each of the following best management practices covers a different approach. Obviously, these best management practices are not workable in all circumstances. However, they are recommended where the alternate access arrangements are possible.

Required Access from Local Roads in Lieu of Arterial Roads

For properties that have frontage on both an arterial road and a local or collector road that intersects with the arterial road, the prohibition of access onto the arterial road is a simple and effective means for limiting access onto the arterial road. Access to the property would be gained from the local or collector road. Traffic from the property would enter the arterial road from the local or collector road. Thus, access to the arterial road would occur at an existing, concentrated point.

This prohibition can be effected by additions to the zoning ordinance. Milford Township (Bucks County) has an appropriate provision in their zoning ordinance. It states “no tract within the Arterial Corridor (Overlay) District shall be provided direct access to the arterial if adequate alternative access can be provided by way of a secondary, primary, collector or marginal access street ...”

Frontage Roads (Service) Roads

Service or frontage roads are lower classification roads that provide direct access to abutting roads. They are parallel to the arterial road and are bounded by the arterial road on one side and the abutting properties on the other. The service (frontage roads) can either provide one way traffic or two way travel. Figure 1 illustrates this arrangement. Photo 3 shows the use of a frontage road in Wilson. A grass strip separates the commercial development and its associated parking from 25th Street. From the perspective of access management, service (frontage) roads allow the reduction in the number of access points. Each property has one or more access points onto the service (frontage) road. However, only a few access points are provided onto the arterial road at selected intersections.

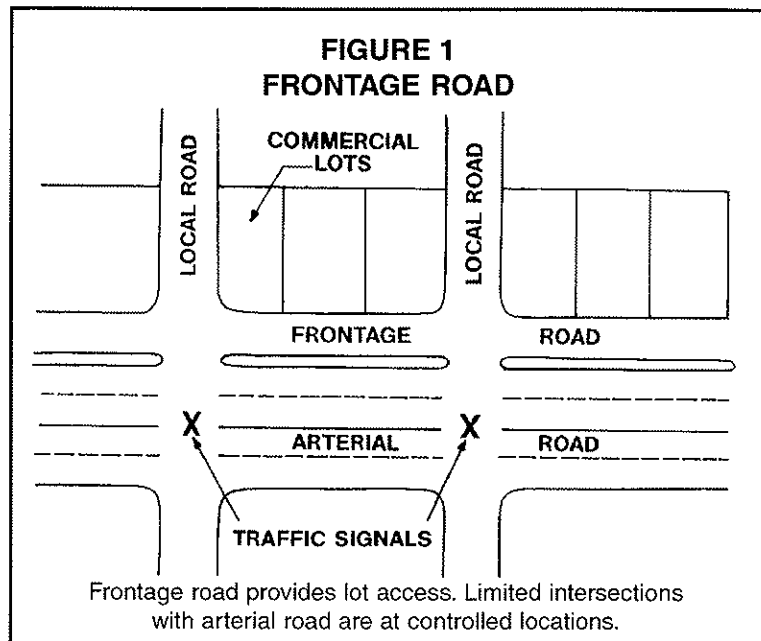
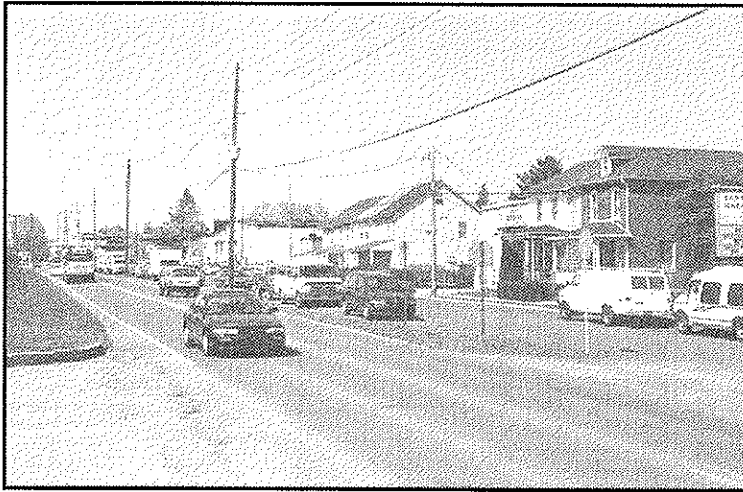


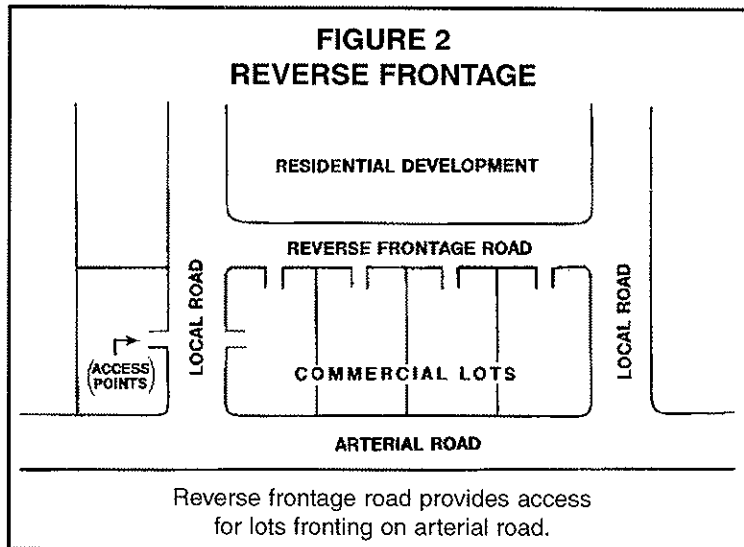
Photo 3



Service (frontage) roads also have weaknesses which must be considered. The AASHTO remarks that the intersections between the access roads and the arterial roads create numerous conflict points and are liable to wrong-way entry. For this reason, AASHTO recommends that service road (frontage) roads be limited to short sections unless they are related with freeways. The Institute of Transportation Engineers also expounds on the weaknesses of service (frontage) roads. They state that when commercial development occurs along frontage roads, the traffic volumes result in congestion and crash potential as a result of the low-capacity, overlapping maneuver areas, close proximity of numerous conflict points and the need for the driver to observe a large, poorly defined area. The right of way requirements of service (frontage) roads is a second consideration. Right of way must exist for each of the additional lanes. In the Lehigh Valley, the existence of additional, unused right of way along existing arterial roads is rare. Therefore, the use of this measure would typically require right of way acquisition, which is both difficult and expensive.

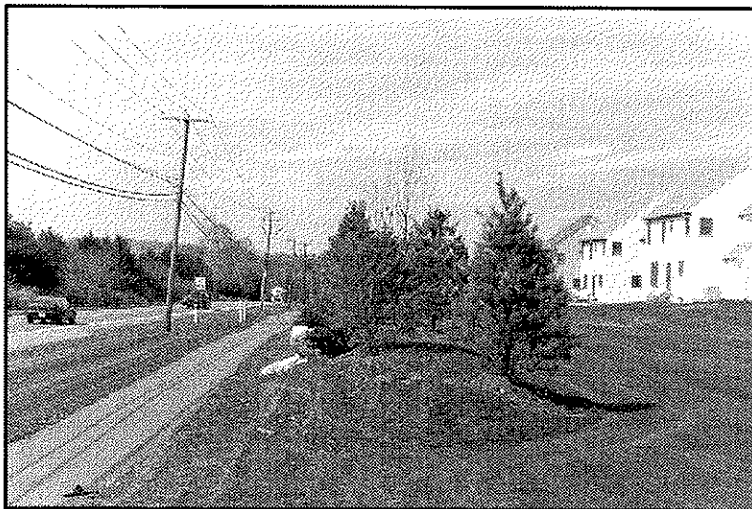
Reverse Frontage Roads

Although reverse frontage roads are also parallel to the arterial road, they differ from service (frontage) roads in that they are separated from the arterial road by a row of lots rather than directly abutting the arterial road. Figure 2 illustrates this approach. Properties abutting the arterial road receive access from the reverse frontage road. Thus, the number of access points is reduced since access to the arterial road is only gained where cross roads intersect both the reverse frontage road and the arterial road. The use of reverse frontage roads is effective as a way of reducing the number of access points onto the



arterial road only if direct access to the arterial road is prohibited in the zoning ordinance. Language such as was quoted above in the subsection entitled “Required Access from Local Roads in Lieu of Arterial Roads” is necessary. Allowing access onto arterial roads despite the presence of an access road largely defeats the purpose of building the reverse frontage road. That is exactly what happened in Upper Macungie Township on the west side of Route 100 immediately south of Interstate 78. A number of commercial lots were created. A reverse frontage road was built. That road intersected Route 100 at a location served by a traffic signal. However, each of the lots was also permitted one or more access points onto Route 100.

Photo 4



Reverse frontage roads are most appropriate where an extended area abutting the arterial road is to be developed. If more than one property owner is involved, coordination between the development plans of the owner is required. Reverse frontage roads have a limited impact if they serve few properties.

Reverse frontage is effective for access management for both residential and non-residential development. For residential development, the use of reverse

frontage roads has the additional benefit of creating a buffer between the arterial road and the homes. The buffer is created because there will typically be a greater distance between the arterial roads and the buildings. Also, the back yard areas are ideally suited for plantings, fences, and berms that can provide both a visual barrier and sound deadening benefits. Photo 4 shows how a reverse frontage

layout has been used to separate residential development in Lower Macungie Township from Brookside Road.

Outparcels

Shopping center developers have noticed that certain other businesses take advantage of the draw of the shopping center by locating around the shopping center. The shopping center developers have used outparcels as a way of capitalizing on the construction of the shopping center. Outparcels are properties developed and leased as part of an overall site development plan for the shopping center. They provide siting opportunities for businesses that wish to be close to the shopping center but do not wish to be in the shopping center itself. Fast food restaurants are a typical example of businesses likely to seek outparcel locations. Typically, outparcels are located at the perimeter of the site and abut the major road that provides access to the shopping center.

When reviewing shopping center plans, municipalities should consider the proposed access arrangements for the outparcels as they relate to access management objectives. Outparcels should not receive direct access from arterial roads. Exclusive access should be provided from the internal road network connected with the shopping center.

Lotting and Site Development

The ways in which lots are created, buildings are arranged on the lots and parking lots are designed have access management implications. Favorable arrangements provide access management benefits. Conversely, bad arrangements lead to problems. Appropriate best management practices follow.

Lot Width

Increased lot width requirements have been used to minimize the number of access points needed along arterial roads. Assuming that each property created along an arterial road needs access, the reduction in the number of lots created reduces the number of access points needed. The number of lots possible is decreased as the minimum lot width requirement in the zoning ordinance is increased. For instance, if the zoning district required a minimum lot size of 20,000 square feet and a minimum lot width of 80 feet, a property with 480 feet of frontage along an arterial road could be developed into six lots, each measuring 80 feet in width and 250 feet in depth. The need for six access points along the arterial road would be created. However, if the zoning regulations required a minimum lot width of 120 feet along arterial roads, with the same 20,000 square foot lot size standard, the same property with 480 feet of frontage would only support four lots fronting on the arterial road, thus cutting the number of access points needed by one third. The number of lots that the developer could create from the parcel would not necessarily be reduced because the reduced lot depth requirement would allow that land to be used as part of other lots.

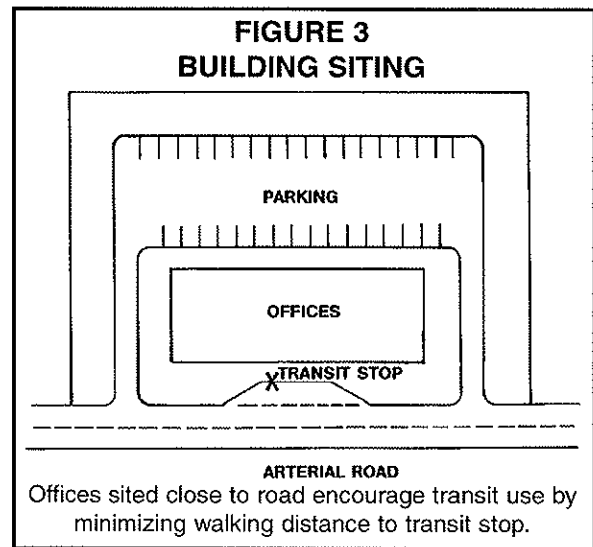
Increased lot width requirements also have other access management benefits. With a reduced number of driveways, achieving desired minimum driveway separation standards is easier. Wider lots are also advantageous because they provide greater flexibility for the location of the access points. This could be used, for instance, to line up access points with existing access points on the opposite side of the road.

Corner Lots

Corner lots pose particular difficulties relating to the provision of good access. As discussed on page 19, good access management practices call for the separation of driveways from intersections. The greater the amount of separation, the better. Because of the need for the separation, corner lots have less frontage along a given road available for the siting of an access point than a mid-block lot with the same amount of frontage would have. The appropriate response for this situation would be to impose larger minimum lot size requirements for corner lots than for mid-block lots in the same zoning district. The larger lot size requirement would also be advantageous in that the setback requirements associated with a lot with two possible front yards could be more easily met.

Building Siting

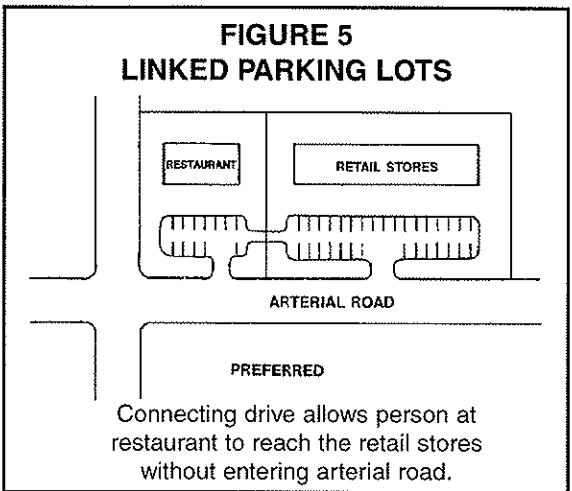
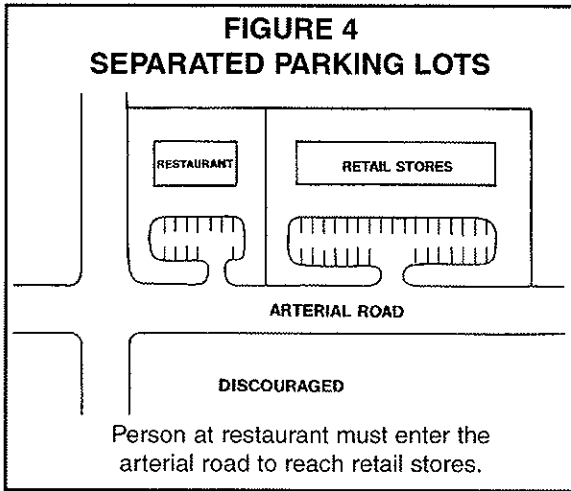
In recent years, the typical site layout for commercial uses places the building near the rear of the lot. The parking lot separates the building from the street. This arrangement affirms the predominance of the automobile compared to pedestrians and transit users. Some Lehigh Valley planners have advocated that commercial buildings be sited close to the front property line instead as illustrated in Figure 3. This arrangement allows the creation of a more traditional streetscape along the arterial road, shifts the emphasis from automobiles to people and benefits transit users by minimizing the distance between bus stops and building entrances. This arrangement can also have access management benefits. With the parking lot at the rear of the lot from the arterial road, the throat area of the access drive is increased. The greater throat length, as explained on page 17, allows vehicles turning from the arterial road to make the move more quickly. Safety and capacity benefits accrue. A variation of this idea can be used in connection with frontage roads. In this instance, the building would be located close to the arterial road, both creating a streetscape along the arterial road and providing a convenient connection to transit users who disembark along the arterial road.



Offices sited close to road encourage transit use by minimizing walking distance to transit stop.

Linked Parking Lots

The use of linked parking lots provides an opportunity to improve circulation along the abutting arterial road. Linked parking lots are most useful in connection with stores and other businesses. Linked parking lots provide direct connections between the parking lots of adjoining properties. Motorists visiting both businesses can travel from one business to the other without entering and then quickly exiting the abutting arterial road. This sort of traffic movement slows speeds on the arterial roads as the entering and exiting vehicle is moving at slower speeds while executing these moves and does not remain on the arterial road for a sufficiently long distance to accelerate to the speed of the prevailing traffic movement. Further, moving these trips from the arterial road to the access way that connects the two parking lots reduces the volume of traffic on the arterial road. Figures 4 and 5 illustrate how a linked parking lot can substitute for two separate lots.



The use of linked parking lots can also provide other design benefits. In some cases, the number of access points onto the arterial road can be reduced. The linked parking lots can also allow for a more efficient parking lot design.

Linked parking lots can be promoted through provision such as those in the Palmer Township Zoning Ordinance. Section 190-198 D states “shared parking lots and driveways connecting adjacent nonresidential lots are strongly encouraged.”

Photo 5

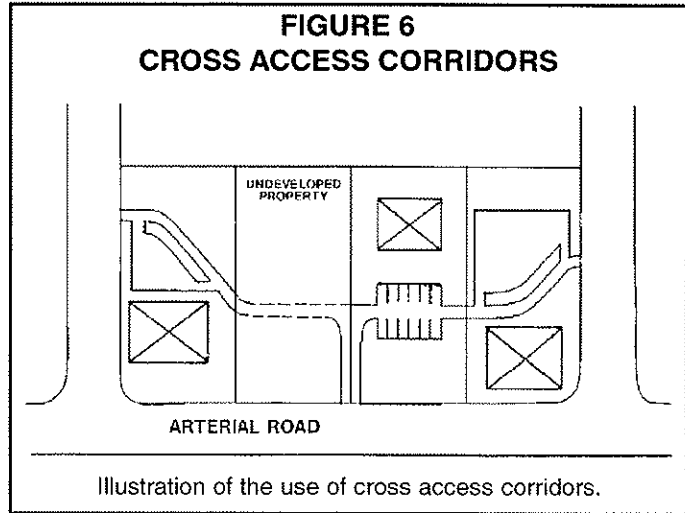


A good example of linked parking lots can be found in Whitehall Township along MacArthur Road. Photo 5 shows the road that connects the parking lot for the Sears Homelife Center (formerly the Best Products store) to the parking lot for the MacArthur Square Shopping Center. Shoppers at one set of stores can reach the other without entering MacArthur Road.

Orlando, Florida pursues a strategy of creating “cross access corridors”, their term for a coordinated network of linked parking lots. Orlando’s standards include the following:

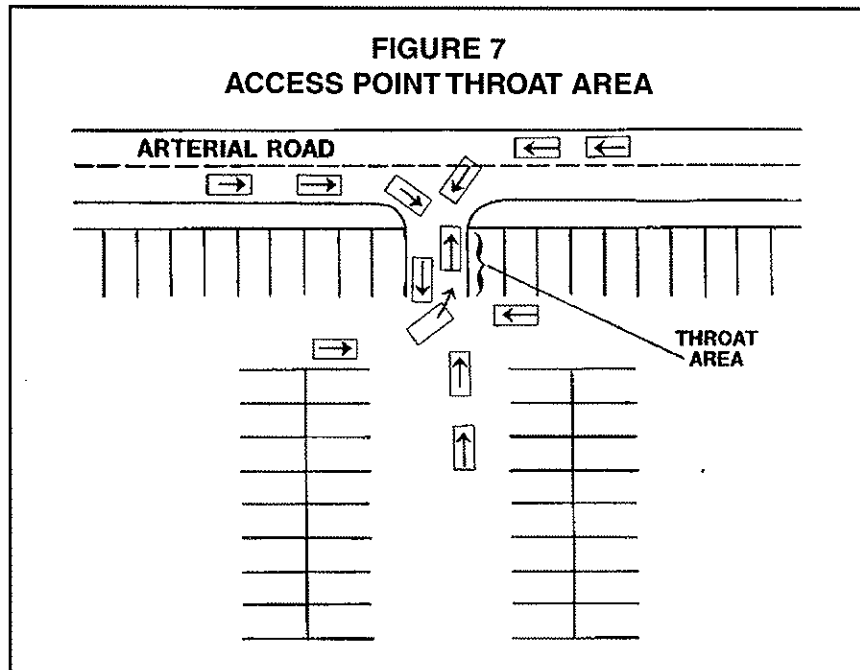
- The corridor must extend along the entire block or be at least 1,000 feet in length.
- The design speed shall be 10 mph.

- The corridor shall accommodate two-way travel for the types of vehicles expected to use the road.
- The design shall make it visually obvious that the abutting properties are tied in by cross-access.
- Linkages shall be provided to other cross access corridors.

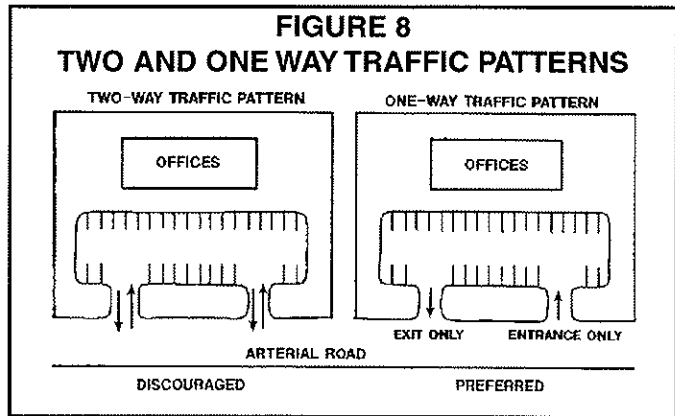


Access Point Throat Area

The lot's internal circulation system needs to be arranged to provide a smooth transition for vehicles entering the lot from the arterial road. An adequate distance is needed to allow the vehicles to properly reduce speed before entering parking spaces or internal lanes. Also, the distance must be sufficient to handle the expected amount of vehicles within stacking areas. If insufficient area is provided, vehicles will be forced to stop in the cartway of the arterial road. This situation is undesirable both from the safety perspective in that it creates the potential for rear end collisions on the arterial road and from the capacity perspective as it prevents through traffic movement on the road. Figure 7 depicts these problems for a driveway with insufficient throat length.



Another access point throat design principle is to minimize conflicting traffic movements, that is points where one traffic movement crosses another. Such points are the sites of potential crashes or can cause a backup onto the arterial road. One way of minimizing the conflicting traffic movements is to create separate access into and out of the site. This would obviously apply to sites that would have two access points. In this situation, one access point would solely serve inbound traffic to the site. The other would only serve outbound traffic from the site. The one-way traffic circulation pattern is advantageous compared to having two access points, each involving two-way traffic. Figure 8 illustrates this comparison. The use of one-way circulation does not eliminate the need to provide for an adequate throat length.



Driveway Location and Design

Driveway location and design standards are central to good access management. Properly located and designed driveways substantively contribute to the safe and efficient functioning of arterial roads. Improperly located and designed driveways lead to safety problems and reduced road capacity.

Sight Distance

Adequate sight distance allows vehicles to safely enter and exit a driveway. Adequate sight distance lets the driver on the road to see the driver entering or exiting the driveway, providing time for a safe response. The length of the minimum sight distance is related to the posted speed limit on the road, road grades and other factors. Assuring adequate sight distance is a key focus of PennDOT's Highway Occupancy Permit process. As such, municipalities may rely upon PennDOT's review for assuring the presence of adequate sight distance when the access point involves a state road. Achieving adequate sight distance is a very important factor in the selection of the access point location along the lot frontage. Municipal sight distance standards may be appropriate along any arterial roads that are not state roads. These standards should equal or exceed the PennDOT standards.

Limiting the Number of Access Points for Each Property

Standards limiting the number of access points onto arterial roads are a direct means of controlling access onto arterial roads. These standards are either based on a flat number per property or based on the amount of road frontage. A variety of standards exist. PennDOT may allow one access point for residential lots. For non-residential lots, PennDOT may allow two access points when the frontage is less than 600 feet. Additional access points may be allowed for non-residential lots with more than 600 feet of frontage. Other governmental units are more restrictive. The California Department of Transportation only allows a single access point unless the property has more than 1/2 mile of frontage. Milford Township (Bucks County) allows only one access point. Two access points are allowed if the access points have a minimum separation of 500 feet. The Transportation Improvements Plan for the

Quakertown (Bucks County) area allows only one access point unless a second point is needed for “good traffic operation.” (The term “good traffic operation” appears to be a subjective term. The Plan does not further define it.) The NCHRP recommends no more than one access point for lots with 200 feet of frontage or less. Palmer Township adds a wrinkle not reflected in other standards. Their standards of one access point for properties with up to 250 feet of frontage and two access points for properties with more than 250 feet of frontage refer to access points accessed by left turns. The Palmer Township ordinance is silent on the number of permitted access points that only involve right turns. Presumably, no numerical limitation exists for these access points. Municipalities seeking standards that are alternative to the PennDOT standards may wish to research the above sources.

The standards cited above work in combination with other restrictions. For instance, if a municipality both restricted the number of access points along an arterial road and also prohibited access points if access were available from an intersecting street, a property that had access from a side street would not be allowed access from the arterial road, even though the regulations might allow one access point on the arterial road for a lot with the designated amount of frontage.

Minimum Spacing Between Driveways

Setting minimum standards for the distance between two driveways along an arterial road is another approach to access management. Three primary rationales exist for the use of such standards. First, separating driveways improves safety. Adequate distances are provided in order to minimize overlapping deceleration and acceleration movements for drivers entering and exiting different driveways along the arterial road. For example, a driver decelerating to enter a particular driveway can do so safely without conflicting with a driver accelerating away from a different driveway into the traffic flow. Second, “minimizing the number of access points that a driver must monitor simultaneously simplifies the driving task.”⁽²⁴⁾ The spacing guidelines would “reflect the acceptable frequency with which the influence length for a right turn-in vehicle would extend to or beyond another driveway.”⁽²⁵⁾ Third, the minimum spacing standard may reduce the number of driveways that might be otherwise located along the arterial road.

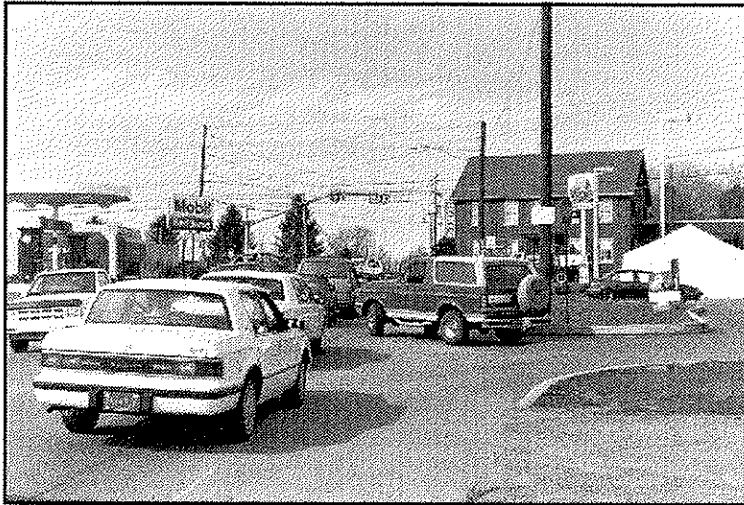
The appropriate standards for driveway spacing differ according to the road classification (arterial, collector etc.), the setting (urban or rural), roadway speed limits and traffic volume. For example, the standard for the minimum spacing of unsignalized driveways on major arterial streets is 350 feet according to the ITE publication, *Transportation and Land Development*. A municipality wishing to establish driveway spacing standards should contact a traffic engineer to select the appropriate standard.

The use of minimum spacing standards is most effective in developing suburban or rural areas. Minimum spacing standards are more difficult to implement in highly developed urban areas where existing lotting patterns and driveways limit opportunities to meet the standards. Examples of municipalities using minimum driveway spacing standards can be found in Bucks County. Bedminster, Dublin, New Britain and Plumstead are among the municipalities using such standards.

Minimum Separation Between Driveways and Intersections

Separating driveways from intersections has the same safety benefits as was just described for minimum spacing for driveways. These safety benefits could be particularly important where the intersection between roads featured a high volume of traffic. Subdivision ordinances routinely include minimum separation standards.

Photo 6



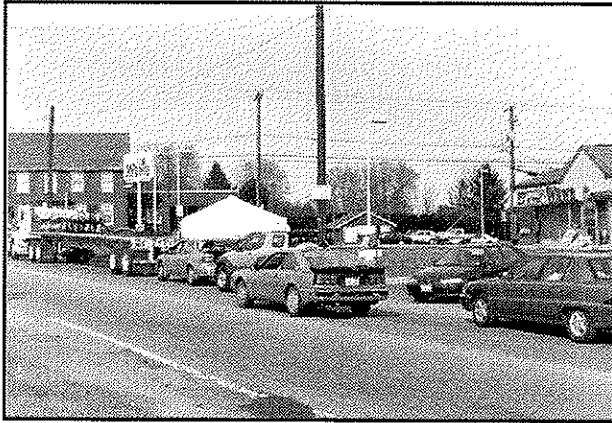
The rationale for the provisions and standards differs based on the location of the site relative to the intersection. “The near-side corner clearance requirements should consider the spillback of queuing across a driveway at a traffic-signal-controlled intersection.”⁽²⁶⁾ (Near side refers to points along a road prior to the intersection.) Photo 6 shows an example of inadequate corner clearance. In this view, the separation from the Airport Road-Schoenersville Road intersection is insufficient to allow the sport-utility vehicle to exit

the convenience store parking lot by executing a right hand turn. The queue from the intersection stretches well beyond the access point.

“Far-side clearances should provide adequate separation between vehicles turning onto a roadway and those entering or leaving a driveway.”⁽²⁷⁾ (Far-side refers to points along a road past the intersection.) If the intersection and the access point are close, drivers are unsure as to where a particular driver coming from the opposite direction may be turning and may not know how to react.

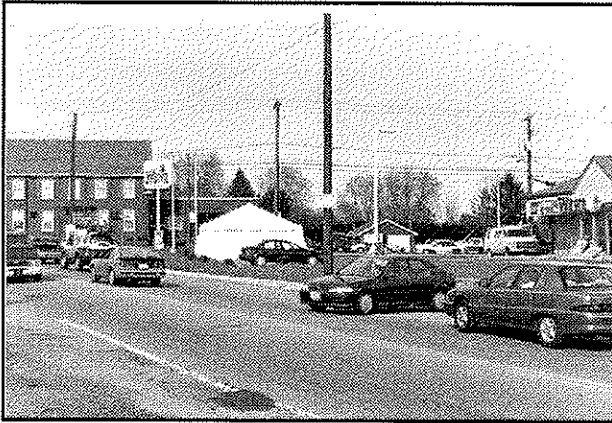
The range of standards in use is strikingly far-ranging. The least stringent requirements are those used by PennDOT in considering highway occupancy permit applications. PennDOT requires a minimum 10-foot tangent distance between the intersecting highway radius and the radius of the driveway. PennDOT also requires that the distance from the edge of the pavement of the intersecting road to the radius of the driveway be a minimum of 20 feet on curbed highways and 30 feet on uncurbed highways. Should these regulations be impossible to meet, PennDOT regulations include specific waiver provisions. The standards recommended by the Stover and Koepke work for the Institute for Traffic Engineers (ITE) are for 450 and 350 feet of separation between driveways and intersections along principal arterials. The 450-foot standard applies when the driveway precedes the intersecting road in terms of the direction of the traffic flow on the side with the access points. (That is, if a driveway and a road intersect an east-west arterial from the south side, the 450 foot standard would apply if the driveway were west of the road.) The 350-foot standard applies when the intersecting road precedes the driveway. Along minor arterials, the separation standards are 350 and 300 feet respectively.

Photo 7



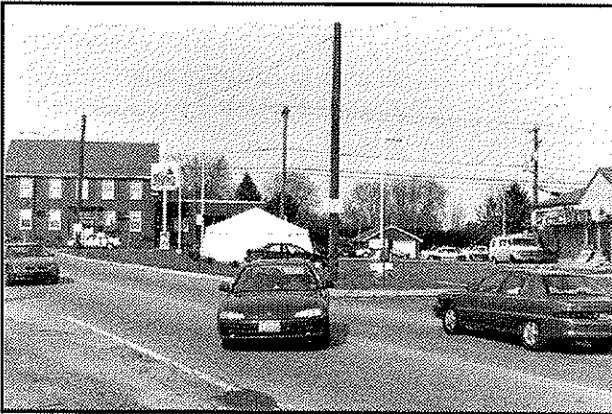
Other model standards include ITE standards for a separation of 115 feet if the intersections are not signalized and 230 feet if one of the intersections is signalized. The Lehigh Valley Planning Commission's *Suggested Municipal Subdivision and Land Development Ordinance* recommends a separation of 150 feet between the centerline of the driveway and the intersection for all driveways along arterial roads excepting those serving single-family residences. A minimum separation of 50 feet is recommended for driveways serving single-family residences. The Transportation Research Report states that the access points should be located as far away from the intersection as possible, no more than ten feet from the far property line.

Photo 8



Another best management practice for dealing with access points near intersections is to prevent left hand turns by building a physical barrier in the median. Such barriers would eliminate risky traffic movements like those shown in the photographs on this page. In this sequence, the driver emerging from the convenience store is attempting to turn left (southbound) on Airport Road. In photo 7, the vehicle is prevented from completing the movement by stopped northbound vehicles. In photo 8, the driver has entered Airport Road. He is stopped, blocking the northbound lane until he can find a gap in the southbound traffic. Photo 9 shows the completion of the turning motion within the gap in southbound traffic. The sequence also illustrates delays to northbound through traffic on Airport Road caused by the turning movement.

Photo 9



Standards also control the separation between access points and interchanges with limited access highways and arterial roads. A survey by the NCHRP found the range of required separations to be 300 to 700 feet in urban areas, in different states. PennDOT regulations specify a minimum 50 foot separation between access points and the interchange ramp or its speed change lane.

Shared Driveways

The number of access points can be reduced if two or more adjoining lots can share a single access point instead of having each use with its own separate access point. In order for a shared access arrangement to be workable, access easements need to be established in the bounds of the shared access in favor of the involved property owners. These access easements can be established as part of the subdivision or land development plan.

Zoning ordinance and subdivision ordinance provisions can be used to encourage the use of shared driveways. Palmer Township's Zoning Ordinance includes a provision that encourages, although it does not mandate, the use of shared driveways. "Where practical, access to two (2) or more non-residential lots should be combined and/or shared and/or coordinated to minimize the number of access points onto an arterial street." Other ordinances provide incentives for the use of shared driveways. The Route 313/613 Corridor (Quakertown area) Transportation Improvements Plan recommends that the municipalities offer a 15% reduction in the minimum lot frontage width and minimum lot size requirements when two or more adjacent property owners agree to combine access points.

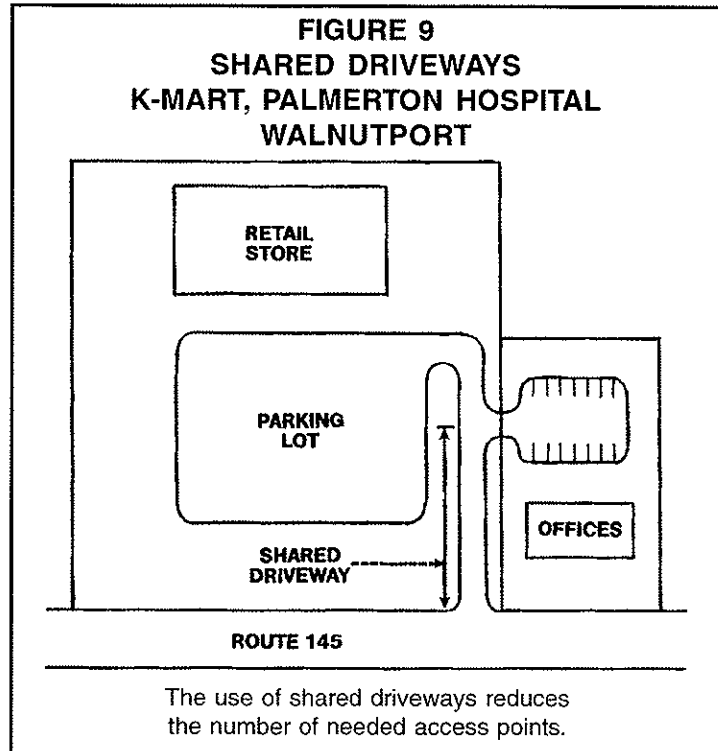
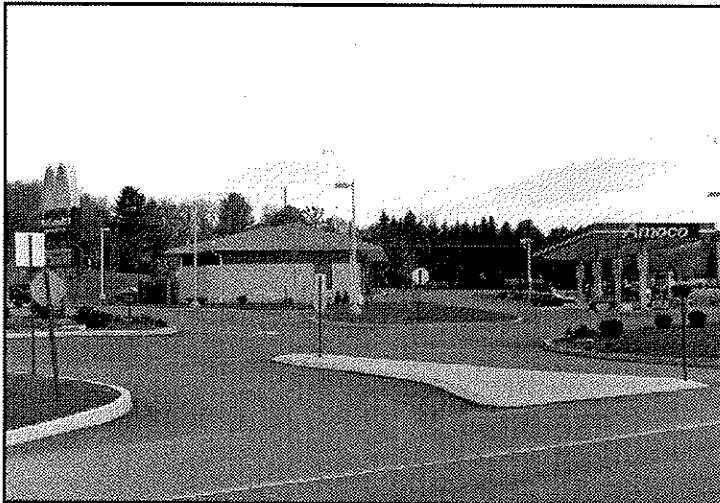


Photo 10

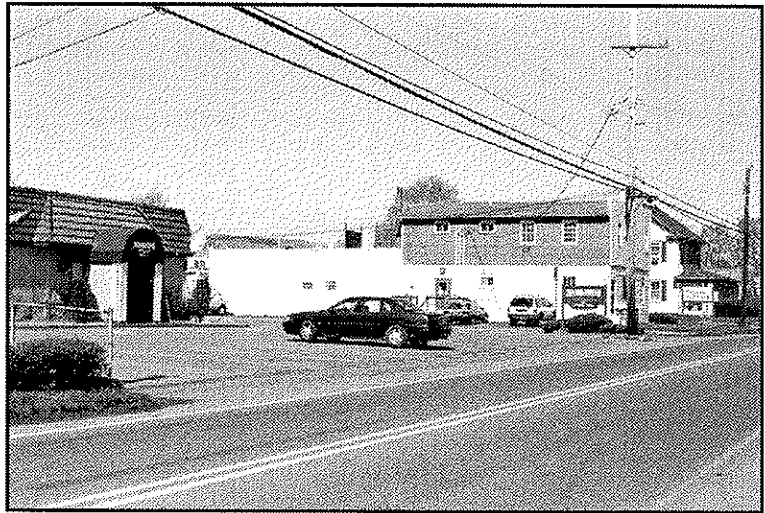


The Lehigh Valley has examples of shared driveway arrangements. Figure 9 is taken from the development of two adjoining properties along Best Avenue (Route 145) in Walnutport. Instead of establishing a separate access on the highway for the medical office building, the access was tied to the internal road leading to a discount store. Photo 10 shows the shared driveway that serves a fast-food restaurant and a gas station, each on a separate lot along Hamilton Boulevard in South Whitehall Township.

Channelized Driveways

Lot access should be provided through well-defined driveways. Continuous access along a lot's frontage, as is illustrated by photo 11, is antithetical to the concept of access management. Continuous access represents a safety problem as the lack of predictable traffic movements by other drivers in and out of the property increases the chance for a collision with one of these vehicles. Also, the prudent decision to approach such a situation cautiously and at lower speeds unfortunately increases the chances for a rear-end collision by other vehicles on the arterial road. Curbing and landscaping are most commonly used to define the access points.

Photo 11



PennDOT highway occupancy permit regulations do not allow the creation of continuous access along state roads. As such, the creation of new situations with continuous access is unlikely. The focus instead is on the upgrading of property access in situations where continuous access already exists. Upgraded access can be part of an access management plan (see PLANNING STUDIES). Alternately, such improvements can be required in connection with building expansion proposals or parking lot reconfigurations, submitted to the municipality as land developments.

Eliminate Existing Driveways

The elimination of existing driveways can be one best management practice identified in an access management plan or a neighborhood circulation plan (see page 29 for more details about these plans) in order to improve an existing situation. These plans can identify alternate access arrangements for existing uses, as they did in Gorham, Maine. As part of an access management plan covering the town's business district, driveways were closed. In some cases, existing driveways were replaced by new access points on side streets. In other cases, multiple existing driveways were replaced by new shared driveways.

Arterial Road Design

Good access management does not end at the property line. Design aspects of the abutting arterial road also contribute to the adequacy or inadequacy of the access situation. Arterial roads can incorporate design features that promote safe and efficient turning movements to and from access points and the efficiency of the arterial road itself. Roads that lack these features are more likely to endure congestion

and suffer safety problems. The following subsection features several of these highway design best management practices.

Intersection Spacing

Like driveway spacing, intersection spacing affects the functioning of the arterial road. Each intersection represents a point of conflicting traffic movements. Left-hand turns are particularly troublesome in that a gap in the opposing traffic must be available. If the roads intersecting the arterial road have sufficiently high traffic volumes, traffic signals are typically provided. The signals allow the traffic on the intersecting roads to accomplish their desired movements. These signals, though, degrade the functioning of the arterial road. The maintenance of desired traffic flow along the arterial roads punctuated by a series of traffic signals is difficult, particularly if the intersections are not properly spaced.

In order to promote efficient traffic flow along arterial roads, the proper spacing of intersecting roads is necessary. Numerous factors are called into play in determining the proper distance between intersections. Chester County's *Circulation Handbook* cites the following considerations: design speed, grade, existing signal spacing, number, volume and location of existing access points, lot width and sight distances. The *Circulation Handbook* offers the following minimum intersection standards. Separate standards are provided depending on whether the arterial road is serving a suburban or a rural area.

Minimum Intersection Separation in Feet for Suburban Arterial Roads

Type of Road	Arterial	Collector	Local
Arterial	2640	2000	500
Collector	2000	1500	450
Local	500	450	400

Minimum Intersection Separation in Feet for Rural Arterial Roads

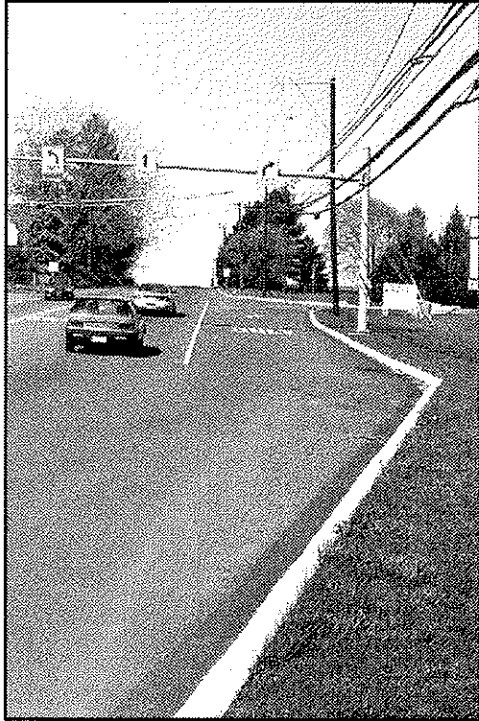
Type of Road	Arterial	Collector	Local
Arterial	2640	2000	500
Collector	2000	1500	450
Local	500	450	400

Source: *Circulation Handbook*, Chester County Planning Committee, West Chester, PA., (1994), pg. 4-79.

Using the above table for rural arterial roads, one would find that a local and a collector road that intersected an arterial road should be separated by at least 450 feet.

Deceleration and Acceleration Lanes

Photo 12



Deceleration and acceleration lanes are additional lanes located immediately prior to and after the access point or intersection. For vehicles travelling along the arterial road that need to make a right hand turn into the driveway, the deceleration lane provides a space in which a slower speed needed for the turning movement can be achieved without worry about a rear-end collision with a trailing vehicle. The acceleration lane allows vehicles exiting the driveway that are making a right turn a space in which to gain sufficient speed to successfully merge into the flow of traffic on the arterial road. The use of deceleration and acceleration lanes is desirable for medium and high volume access points. They are not necessary for low volume access points. Photo 12 depicts a deceleration lane along Route 191 in Bethlehem Township.

The major difficulty in implementing this concept relates to the right of way needs. The existing right of way connected with the arterial may not be sufficient to accommodate these lanes. Acquiring additional right of way is not a problem where the deceleration lane and acceleration lane abut the property being developed. However, should the lanes extend beyond the frontage controlled by the developer, right of way acquisition may be difficult. The developer must then negotiate with those adjoining property owners. Should negotiations fail, the developer does not have the power of eminent domain by which the adjoiners can be compelled to cede their property. Experience in the Lehigh Valley is that PennDOT and the municipalities have been reluctant to use their powers of eminent domain in such situations.

Under current Pa. Municipalities Planning Code provisions, deceleration and acceleration lanes are considered to be on-site improvements. As such, their costs can be assigned to the developer without the need for a traffic impact fee ordinance as set forth in Section V-A of the Planning Code. The logic for this delineation is that these improvements are for the exclusive benefit of the developer.

Left Turn Lanes

The deceleration and acceleration lanes described in the previous text only address certain traffic movements. Traffic movements entering or leaving the access drive requiring left turns are not assisted. Separate lanes on the arterial road and on the access drive solely dedicated to left hand turns may be needed. The benefits of these lanes are equivalent to those gained by the use of deceleration and acceleration lanes. Alternately, a two-way left turn lane (TWLTL) can be constructed. This lane would be a continuous part of the arterial road, not just connected with the development of a single access point. The TWLTL would be used for left turn movements by drivers travelling the arterial road in both directions. These two types of improvements have both capacity and safety benefits. Capacity is increased as left turn movements are removed from the through traffic lanes. Studies have shown that

where roads have been retrofitted with TWLTLs, accident rates have dropped by an average of 33%.⁽²⁸⁾ Experience has shown that potential for head-on collisions between vehicles attempting to use the TWLTLs is minimal.

Right of way acquisition again may be an implementation problem for this best management practice. The addition of a left-turn lane or a TWLTL in the arterial road requires a widening of the road. Additional right of way may need to be acquired if sufficient right of way does not exist. The developer would be responsible for acquiring the right of way from property owners located on the opposite side of the arterial road. The developer's lack of authority to use eminent domain can hinder the ability to implement the project.

As with deceleration and acceleration lanes, left-hand turn lanes required for the use of an access point are considered on-site improvements within the context of the Pa. Municipalities Planning Code. The costs of the improvements can be assigned to the developer since he or she directly benefits. TWLTLs are more extensive projects. They must be undertaken by PennDOT.

Median Barriers

Median barriers provide numerous benefits in appropriate circumstances. One of these benefits directly relates to access management. By preventing access at locations other than intersections, median barriers improve safety whereas the locations where conflicting traffic movements can occur are reduced and are better defined. As compared to roads without medians, roads with medians feature an accident rate that is 35% lower.⁽²⁹⁾ As such, median barriers are a very effective means of access management. Whereas the left-turn movements are transferred to available intersections, intersection design needs to provide adequate storage for turning vehicles. Without adequate storage, the benefits of the median are reduced.

The installation of median barriers on existing or even improved roads is often resisted by the owners of abutting commercial property. They fear that they might lose business as potential customers find the location to be less convenient. Thus, the use of median barriers, while technically feasible, is not possible at times due to the concerns of the abutting property owners.

Median barriers can be of both the mountable and unmountable types. The two photographs on page 28 illustrate. Photo 13 depicts the mountable barrier installed on Route 512 in Hanover Township (Northampton County). Photo 14 shows an unmountable barrier installed on MacArthur Road in Whitehall Township. This photo also shows signage for the jughandle to be used by turning motorists.

Planning Studies

The best management practices described in this report are implementation tools for achieving the twin objectives of promoting safety and preserving capacity. They can be used generally, that is, throughout a municipality. However, sometimes access management needs to be focused upon specific roads or even specific road segments within a municipality. These roads or road segments may need particular attention because of existing or anticipated problems relating to safety and/or capacity. They may be

Photo 13

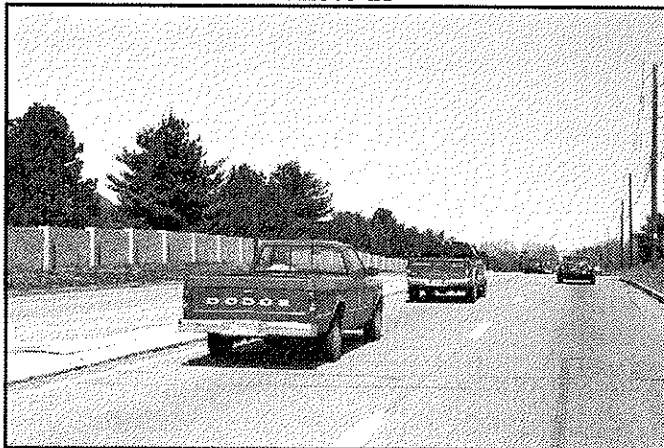
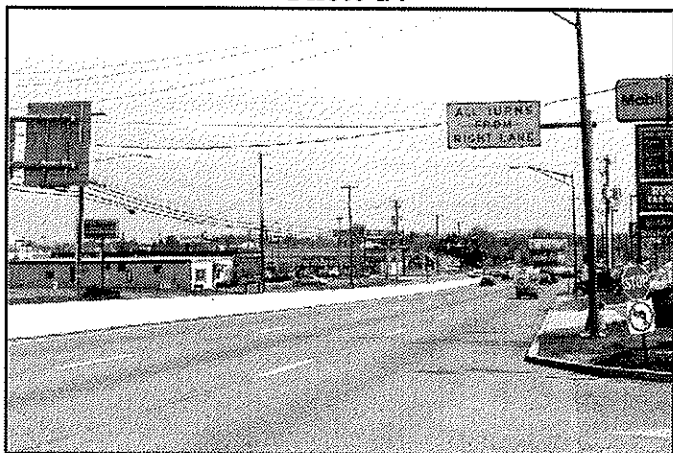


Photo 14



areas where a strong demand for developing properties along the arterial road is anticipated or where such development has already started. These may be areas where increases in traffic have led to congestion. In some instances, these roads or road segments cross municipal boundaries. Areas needing special attention would benefit from a coordinated approach to access management as defined from a plan. That plan would examine the particular circumstances, problems and needs of that area and prescribe uniquely appropriate solutions. Those solutions can include one or more of the access management methods described in this report. Different kinds of plans are appropriate for different circumstances. Several of these plan types are described in the following text.

Corridor Studies

Corridor studies involve the comprehensive consideration of traffic movement along a roadway. Corridor studies (sometimes termed strategic plans for critical corridors) often identify significant roadway improvements that would be needed in order to meet the capacity demands. Access management is one component of the corridor study. The access management component can reduce the scope of the needed improvements. Components of the corridor study include a description of the existing situation using population data, employment data, a description of the physical characteristics

of the road, the identification of the nature of access onto the roadway, adjacent land use, crash data, traffic volumes, characteristics and patterns. Existing traffic conditions are analyzed. Problems such as inadequate capacity and safety problems due to roadway geometry or access locations are identified. Future scenarios are then constructed. Assumptions and forecasts of the amount of future traffic and development in the area of the roadway are key components of the scenarios. Solutions are devised and tested for effectiveness. As previously mentioned, these solutions often include recommendations for roadway improvements and appropriate land use regulations. Access management actions can preserve capacity, reduce the need for expensive improvements and support safety.

As this study focuses on arterial roads, which, in the Lehigh Valley, are state roads, corridor studies will involve PennDOT as a participant, if not a sponsor, of such studies. The Lehigh Valley Transportation Study, the region's Metropolitan Planning Organization, and the Lehigh and Northampton Transportation Authority will often become involved in corridor studies.

Neighborhood Circulation/Access Plans

As the name implies, neighborhood circulation/access plans are more localized in scope than corridor studies. This allows the plans to focus more closely on access management as it relates to individual properties, seeking opportunities to minimize the number of access points while providing adequate access to each property. In Colorado, access plans are to have the following elements according to the Department of Transportation. They must include "a conceptual roadway design plan, proposed access designs and signal locations, and provisions for temporary and phased access construction. In addition, all highway construction projects incorporate improved access design and location standard to the extent feasible within the project scope and budget."⁽³⁰⁾

Neighborhood circulation/access plans can deal both with areas yet to be developed and areas already developed. In areas yet to be developed, the creation of an overall access plan that coordinates the access needs for that area is possible. In areas that are already developed, the neighborhood circulation/access plan focuses on existing access points that feature undesirable locations or geometric problems. Alternative access arrangements and access points that can be eliminated are identified. For example, the Gorham (Maine) study considered 23 existing access points along Main Street in the village center area. The study identified that some access points could be reduced in width and others could be eliminated through the use of a shared drive or obtaining access from a side road. The plans then included ideas on how these specific recommendations were to be implemented.

IMPLEMENTATION OF BEST MANAGEMENT PRACTICES

This section of the report provides an overview of the different types of ordinances where the access management methods can be located. Some additional best management practices that can be used to reduce the amount of traffic on arterial roads are presented.

Subdivision and Land Development Ordinance (SALDO)

SALDOs regulate the processes of creating new lots and changing lot lines. Under the land development segment, SALDOs regulate the site layout of most types of proposed development including commercial, industrial and institutional uses. Even under the residential category, only single family dwellings escape the authority of the SALDOs. Among its objectives, SALDOs assure that adequate infrastructure exists for the proposed lots and developments. All Lehigh Valley municipalities are covered by SALDOs. Most municipalities have adopted their own ordinances. The remaining municipalities are covered by County adopted ordinances.

Roads, lot access and access points are three of the areas covered by SALDO regulations. Therefore, many of the regulatory best management practices covered in this report would be appropriately included within SALDOs. Some of these regulatory best management practices could alternately be included within zoning ordinances. The choice between the two can be a matter of municipal practice. The only disadvantage of using SALDO provisions is that single family detached home proposals on preexisting lots would not be covered. This may not be a major concern in communities where little potential exists for new singles on existing lots along arterial roads. Appropriate best management practices for inclusion in SALDOs include:

- Required access from local roads in lieu of arterial roads
- Frontage (service) roads
- Reverse frontage roads
- Access point throat area standards
- Number of access points per property standards
- Minimum spacing between driveways
- Minimum separation between driveways and intersections
- Shared driveways
- Channelized driveways
- Intersection spacing
- Deceleration and acceleration lanes
- Left turn lanes and
- Median barriers.

Traffic Impact Studies

Traffic Impact Studies estimate the effect of the traffic connected with a subdivision or land development on the nearby road system. If the study identifies problems, it then also develops solutions. Many SALDOs require the preparation of traffic impact studies for proposals larger than a specified minimum size, i.e. industrial buildings over 100,000 square feet. Some zoning ordinances also require the preparation of traffic impact studies in connection with the consideration of uses under a discretionary use approval process like special exception use or conditional use.

Traffic impact studies can be used to deal with access management issues. To accomplish this end, the ordinances should require the preparation of a traffic impact study for proposed uses abutting arterial roads generating more than a prescribed minimum number of trips. The *Comprehensive Plan for Lehigh and Northampton Counties* recommends that traffic studies be prepared for uses that generate 1,500 trips per day or more. In congested corridors, traffic studies may be useful even for uses that generate fewer than 1,500 trips per day. The study will estimate the number of trips entering and exiting the site at each proposed access point as well as indicating the direction of travel to and from the site. This information can be used to identify the effects of the proposed access point on the functioning of the arterial road. Solutions are to be identified.

Zoning Ordinance

Zoning ordinances implement community development plans by regulating land uses, lot sizes, lot dimensions and other aspects of lot development. Zoning regulations can be used to promote access management objectives. They often regulate parking, parking lot design and lot access. As was previously mentioned, some of these regulations may overlap provisions found in SALDOs. These include best management practices related to:

- Minimum separation between driveways and intersections;
- Require access from local roads in lieu of arterial roads;
- Sight distances;
- Shared driveways; and
- Channelized driveways.

Other best management practices are unique to zoning regulation. They include:

- Increase lot width;
- Increase the size of corner lots;
- Reduce the amount of traffic by controlling the land use and amount of development;
- Allow mixed uses in employment centers;
- Using outparcels;
- Siting buildings close to the front lot line; and
- Using linked parking lots.

Provisions related to access management can be tied together by the institution of a separate zoning district, an arterial corridor overlay district. Overlay districts are districts that impose a second set of controls on a mapped area. Both the regulations of the underlying district, whether residential, industrial

or other, and the overlay district apply. The purpose of creating an overlay district is to recognize special characteristics common to that area, characteristics needing a particular treatment. The need to manage access is the defining characteristic for an arterial corridor overlay district. It can be composed of all properties that front on the arterial road. The types of regulations mentioned under zoning best management practices can be applied to the properties included in the overlay district without involving properties where the practices would not be relevant. Palmer Township has used this best management practice. They have created two overlay zoning districts, each with its own district provisions. One is for Route 248. The other is for William Penn Highway.

Reducing the Amount of Traffic by Controlling Land Uses and the Amount of Development

Controlling the type and amount of development in an area will influence the number of traffic movements between the arterial road and the parcels of land. A scenario with a lower number of turning movements off of or onto the arterial road will have fewer opportunities for crashes and better flowing traffic on the arterial road than a scenario with a higher number of turning movements, all other factors being equal. Influencing the types of land uses and the scale of development is within the purview of zoning regulations.

If one wished to minimize the number of turning movements along a given arterial road, one could allow uses that generate relatively fewer trips during the peak hours of roadway use. The ordinance would not provide for high traffic generating uses within the range of uses otherwise appropriate for the district. High traffic generating uses should be sited in those areas of the municipality where the roads are suited for handling the traffic. Distinguishing low traffic generating uses from high traffic generators can be accomplished by consulting the latest edition of the *Trip Generation* by the Institute of Transportation Engineers. This reference work provides trip generation rates for numerous land uses based on case studies. The rates are calculated by various factors such as the number of trips per 1,000 square feet of building size.

The number of trips connected with a site is also a factor of the size of the building or the intensity of the use. A 10,000 square foot office building can be expected to generate fewer trips than a 50,000 square foot office building, assuming similar types of tenants. Controlling the size of the building will in turn influence the number of trips connected with the site. Zoning ordinances typically limit the size of buildings through a combination of factors including maximum building coverage, maximum building height, parking requirements and the maximum impervious coverage (which in general terms limits the percentage of the site that can be covered by both the building and the parking lots). These standards work in combination to limit the maximum intensity of site development. For instance, at times the maximum impervious coverage standard limits the building size even though the maximum building size percentage is not exceeded, because a larger parking lot would be required than the impervious coverage standard would allow. Lowering the number of trips from a site can be manipulated by adjusting these standards to the desired levels.

Mixed Uses in Employment Centers

In downtowns, some office workers use their lunch hours by going out to eat, to shop or to run an errand. Office workers in industrial and office parks show the same inclination. However, if their industrial or office park does not include any restaurants or shops, they will travel outside of the park for their trip purposes. Such trips can increase the traffic volumes on arterial roads if the industrial or office park abuts an arterial road. In many cases these trips are necessitated by the absence of restaurants and shops within the park. Often, they are not permitted uses. Therefore, one way of reducing arterial road travel is to allow for restaurants and shops within the industrial and office park.

Access Management and Change in Use or Expansion

Some existing buildings or uses along an arterial road have undesirable access features. For instance, the lot may have a parking area with continuous access as in the case shown in photo 15. Zoning ordinances can be used in certain cases to bring the access situation into closer conformance with good access management practices. These circumstances can include the change of a use on the lot, even if it is from one allowed use to another.

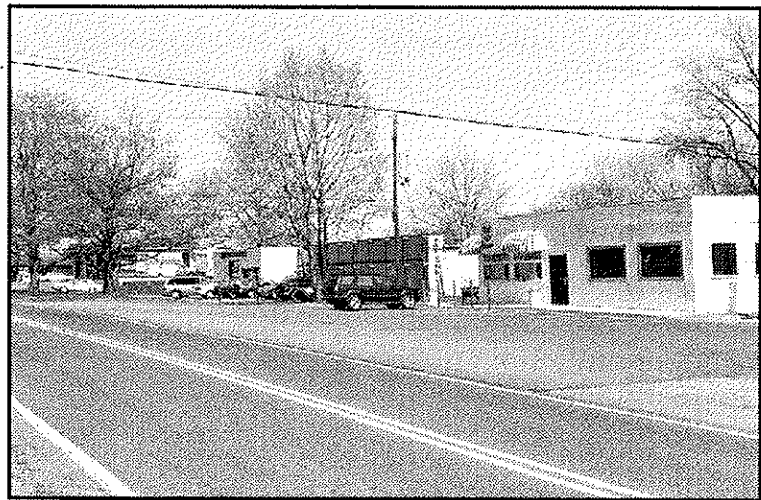
The other circumstance would be the expansion of the use. In either case, the zoning ordinance can require that the change or expansion be approved only if the access management requirements of the ordinance be met.

In the interests of fairness, such requirements are only applied when the change or expansion produces a "significant change in trip generation". Several states have adopted criteria to define this term. Colorado's criteria, for instance, include the following:

- The amount of traffic to the site increases by at least 10 cars per day and by 20%.
- Left turns from the site increase by at least 5 trips per day and by 20%.
- Truck traffic to the site increases by at least 10 trips per day and by 20%.
- The access point fails to meet current sight distance requirements.

Access management standards must be met by uses that exceed one of these standards. Access management standards do not apply where the criteria are not exceeded.

Photo 15



ACCESS MANAGEMENT AND PENNDOT

As was discussed earlier, PennDOT is substantively involved in access management along arterial roads. Almost all arterial roads within the Lehigh Valley are state routes. PennDOT permits are required for the establishment or modification of any access point onto a state route. The report established that municipalities also have the right to regulate access onto roads within that municipality, whether or not that access is also subject to PennDOT permitting requirements. This portion of the report delves a little more deeply into the PennDOT permitting process and coordination between municipal actions and PennDOT in the interests of proper access management.

Highway Occupancy Permits

PennDOT's authority and responsibility for allowing access points onto state highways derives from Pennsylvania Code, Title 67. Transportation, Chapter 441 Access to and Occupancy of Highways by Driveways and Local Roads. Section 441.3(a) establishes the necessity for a PennDOT permit in order to build or alter a driveway or a road within state highway right-of-way. The purpose of the provisions is for "security, economy of maintenance, preservation of proper drainage and safe and reasonable access" according to Section 441.2. Driveway location restrictions are both general and specific. Several of the general restrictions are related to access management objectives. These include Section 441.7(b) (2) "The free movement of normal highway traffic is not impaired.", (3) "The driveway will not create a hazard" and (4) "The driveway will not create an area of undue traffic congestion on the highway." The general restrictions also state that "access to a property which abuts two or more intersecting streets or highways may be restricted to only that roadway which can more safely accommodate its traffic." (Section 441.7(c)(3)) In the earlier text, we have discussed how the addition of access points onto arterial roads reduces the capacity of arterial roads and reduces safety. In practice, PennDOT has not aggressively used these provisions to deny access points on arterial roads for access management purposes. PennDOT has allowed the creation of new access points on arterial roads in situations where access could have been obtained from local roads.

In the Lehigh Valley, though not necessarily elsewhere in the state, PennDOT's permitting process is integrated into the municipal SALDO approval process. Municipal SALDO provisions that require the receipt of a highway occupancy permit for any proposed access point onto a state highway or for any lot that solely fronts on a state highway. This provision assures that the lot will have suitable access. Subdivision approvals will not be issued absent needed PennDOT permits.

Access Covenants

The provisions of Section 441.6(16) also allow PennDOT to restrict future access for access management purposes. According to the section, "If the Department anticipates that a property may be subdivided and that such subdivision will result in an unacceptable number or arrangement of driveways, or both, the Department may require the property owner to enter into an access covenant ... prior to the issuance of a permit. The access covenant will restrict access to the approved locations

regardless of whether the land is later subdivided or conveyed to other persons..." The covenant is to be recorded in the County Recorder of Deeds Office.

Local PennDOT engineers occasionally use access covenants in connection with highway occupancy permits. Access covenants are attached to an estimated 5 to 10% of highway occupancy permit applications. Generally, the access covenants limit the highway occupancy permits to those issued in connection with the current application. The covenants are predicated upon an analysis of the plans that shows that the remainder of the property can be developed with lots receiving access from either local roads or internal roads to be built as part of the subdivision. Through these covenants, PennDOT has been successful in reducing the number of potential access points onto state roadways.

PennDOT could achieve greater success in access management by the greater use of the access covenant process. PennDOT currently lacks precise guidelines delineating situations in which the use of access covenants should be required. Accordingly, their use has been inconsistent. Access covenants can be productively used in many situations beyond their current use.

Municipal Coordination with PennDOT

The coordination described above represents the minimum level of municipal-PennDOT coordination. But, further coordination is desirable as problems can still occur. For instance, a municipality, in its review of a preliminary plan application, believes that the proposed access proposals are undesirable. When the municipal planning commission suggests the consideration of an alternative layout, the developer produces a highway occupancy permit issued by PennDOT. He then argues that the issuance of the permit legitimizes the proposed access arrangement and that any municipal recommendations are moot. Thus, the developer is able to intimidate the municipality from dealing with access related decisions, unless the municipality is aware of its co-equal regulatory rights. The procedures set forth in Section 441.3 (j) can prevent the above-described problem and assure proper coordination.

A municipality can participate in the highway occupancy permit application process. To enter into this relationship with PennDOT, the municipality or its planning commission must write to the District Engineer and request that they be apprised of any highway occupancy permit application within their municipality. Subsection (3) states that "each application for an access driveway within one of these jurisdictions must be accompanied by evidence which indicates that the location and type of access being requested has been reviewed by that municipality or agency." Subsection (4) continues, "The Department will consider any comments or recommendations resulting from this review prior to approving the access permit." This avenue of proactive participation in the highway occupancy permit process will preclude the type of problem described in the previous paragraph. The Lehigh Valley Planning Commission has entered into such an agreement with the District 5-0 involving permit applications in any municipality subject to the Lehigh County SALDO and the Northampton County SALDO.

Municipalities may also wish to consider coordinating with PennDOT when undertaking land use planning and zoning. Municipal decisions on land use designations and zoning classifications set the land use pattern for an area. These decisions can have an impact on the access demands that follow when subdivision and land development applications are filed consistent with the municipal zoning

ordinance. By soliciting PennDOT comment on the transportation implications of land use and zoning designations that are being considered, municipalities can make decisions that will better dovetail with highway capacity and safety interests. PennDOT recognizes that a proactive role is a more productive means of access management than solely dealing with highway occupancy permits at the conclusion of the process.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Capacity will continue to decline on the arterial road system as demand will continue to outstrip the ability to create additional capacity. Preserving current capacity is a good way of maintaining mobility. Access points/driveways cumulatively degrade the capacity and safety of our arterial roads. Considerable safety and capacity benefits can accrue by the use of access management principles.

Municipalities have a role in access management. Numerous best management practices are available to implement access management. They deal with access from alternate roads, lotting and site development, driveway location and design, and arterial road design. These practices can be implemented through provisions in zoning ordinances and subdivision and land development ordinances. They can also implement the recommendations of plans like corridor studies and neighborhood circulation/access plans. Recent court decisions have affirmed state rules and regulations that municipalities have an ability to co-regulate access points on state roads.

Recommendations

Access management can be better achieved if the following actions are taken:

PennDOT

1. Incorporate access management considerations into corridor studies.
2. Aggressively incorporate access management principles in accord with the authority currently found in Chapter 441, when considering highway occupancy permit applications.
3. Review and modify the rules and regulations in Chapter 441 for considering highway occupancy permit applications in order to better implement access management principles.
4. Aggressively use the access covenant provisions of Chapter 441 to promote access management principles. Develop consistent guidelines for the applicability of using access covenants.
5. Increase cooperation with municipalities in the highway occupancy permit process. Consider and utilize the input provided by municipalities in response to highway occupancy permit applications.
6. Provide education and awareness training for municipal officials and consultants in access management.
7. Publicize access management benefits.
8. Develop model ordinances for access management.
9. Incorporate access management considerations in projects involving safety initiatives.
10. Develop and implement access management standards for new roadway projects.

Lehigh Valley Planning Commission

1. Increase awareness of access management issues and measures by developing and conducting presentations and a workshop.
2. Advocate the application of access management principles in reviews of zoning ordinances, subdivision and land development ordinances and subdivision and land development applications.
3. Recommend the consideration of access management best management practices as part of corridor studies.
4. Identify opportunities to initiate a demonstration access management plan for a selected corridor with PennDOT and municipal partners.

Municipalities

1. Incorporate the locally appropriate best management practices outlined in this report into the municipal zoning and subdivision and land development ordinances.
2. Apply the practices that have been incorporated into the ordinances in considering development applications.
3. Enter into a cooperation agreement with Penn DOT by which the Department will seek municipal input on highway occupancy permit applications.
4. Develop neighborhood circulation/access plans in areas along arterial roads where access and congestion problems abound or where a significant amount of development is anticipated.
5. Review the zoning ordinance to assure that the traffic implications of the development allowed can be handled by the road system as is or with realistically possible improvements. Revise the ordinance appropriately if the road system cannot handle the development allowed.

FOOTNOTES

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3. Final Report: Statewide Highway Access Management and Growth Accommodation, Pennsylvania State Transportation Advisory Committee, Harrisburg, Pa. (2000), pg. 2.
4. Ibid. Appendix C pg. 2.
5. A Policy on Design of Urban Highways and Arterial Streets, American Association of State Highway Officials, Washington DC (1973). pg. 155.
6. Ibid. pg. 142.
7. Circulation Handbook, Chester County Planning Commission, West Chester, Pa., (1994), pg. 4-143.
8. Gluck, Jerome, Levinson, Herbert, and Stover, Vergil, "Impacts of Access Management Techniques" Report 420, Transportation Research Board, Washington DC (1999), pp. 3,5.
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10. Ibid. pg. 9.
11. Ibid. pg. 7.
12. Ibid. pg. 5.
13. Williams, Kristine and Forester, J. Richard. "Land Development Regulations that Promote Access Management" Synthesis of Highway Practice 233, Transportation Research Board, Washington DC (1996), pg. 3.
14. Gluck, Levinson and Stover, "Impacts of Access Management Techniques", pg. 133.
15. Ibid. pg. 5.
16. Bishop, Kirk R., "Designing Urban Corridors", American Planning Association, Chicago, Il. (1989). Pp 16-17.
17. Koepke and Levinson, "Access Management Guidelines for Activity Centers", pg. 9.
18. Comprehensive Plan, Upper Macungie Township, Fogelsville, Pa. (1992) pg. 72.
19. Comprehensive Plan for Lehigh and Northampton Counties, Pennsylvania, Joint Planning Commission Lehigh-Northampton Counties, Allentown, Pa. (1993), pg. 44.
20. Ibid. pg. 1.
21. A Policy on Design of Urban Highways and Arterial Streets, pg. 141.
22. Koepke and Levinson, "Access Management Guidelines for Activity Centers", pg. 7.
23. Gluck, Levinson and Stover, "Impacts of Access Management Techniques", pg. 16.
24. Ibid. pg. 43.
25. Ibid. pg. 43.
26. Ibid. pg. 67.
27. Ibid. pg. 67.
28. Gluck, Levinson and Stover, "Impacts of Access Management Techniques", pg.69.
29. Ibid. pg. 72.
30. Williams and Forester, "Land Development Regulations that Promote Access Management", pg. 8.

