Chapter 15

Access Management

This chapter discusses access management techniques that have potential application to highways and streets. The chapter is organized to describe the context in which access management is commonly used; MassHighway's role in managing access, including guidelines and driveway design; other access management techniques; and, land use strategies that local jurisdictions can use as part of an access management program.

Access management applies roadway and land use techniques in order to preserve the safety, function, and capacity of transportation corridors. The objective is to ensure roadway safety and efficient operations while providing reasonable access to the adjacent land uses. Access management can also improve the environment for pedestrians, bicycles, and motor vehicles in all settings and on all roadway types by reducing and consolidating driveway conflict points.

In addition to the guidance provided in this Chapter, TRB's *Access Management Manual* and NCHRP's *A Guidebook for Including Access Management in Transportation Planning* provide more information on the development of access management programs including:

- Principles and effects of access management;
- Access management techniques and their potential advantages, disadvantages, and applications;
- The interrelationship with land development and how to address access management in the context of comprehensive planning and land development regulation;
- The rationale for spacing standards and how to choose appropriate standards for connections, signals, corner clearance at intersections, and interchange areas;

- Information on the location and design of access features, such as driveways, medians, auxiliary lanes, and service roads; and
- Legal considerations that guide program development and implementation.

15.1 Relationship to Context

The application of access management tools varies according to the area through which the roadway passes and the function of the roadway itself. Access management can be an important component of new facility plans since the designer has more flexibility in the location and design of driveways. Access management techniques can also be applied on retrofits of existing facilities where the designer, through regulatory or negotiated processes, can reduce the number and improve the characteristics of access to properties along the corridor. In Massachusetts, the vast majority of access management activities involve retrofits of existing facilities.

15.1.1 Area Types

Access management can be applied anywhere. It can be particularly helpful if an access management program is developed for an area prior to its development to systematically plan for access, or limits to access, along a corridor. Within rural developed and suburban zones, development is often comprised of significant commercial development of medium to large-sized lots, which are favorable to an access management program. In village, town center and urban locations, where constraints exist, there may be less applicability of access management techniques.

15.1.2 Roadway Type

Access management describes a wide range of regulatory and design techniques to ensure that both access to property and regional mobility are provided by roadway facilities. Degrees of access control that influence access management, and their relationship to different roadway types, are described below.

15.1.2.1 Access Control

A consideration in access management is the concept of access control. ***Access control*** defines the degree to which properties are connected to a roadway. The following degrees of access control are possible:

- **Controlled Access** – Freeways or other major arterials where access to the roadway is limited to interchange points or major intersections.
- **Limited Access** – Typically arterials where intersections are widely spaced and driveway connections are limited (often to right-in, right-out operations or widely spaced signalized intersections). Driveways to properties may be consolidated to limit connections to the roadway. Major intersecting streets may be signalized or handled at interchanges. Minor intersecting streets may be limited to right-turn in right-turn out operations or may be grade-separated.
- **Full Access** – Typically arterials or collectors where access is provided to adjoining properties without restrictions on turning movements. Driveway spacing and other design guidelines are typically applied. Intersecting streets usually provide the full complement of turning movements.
- **Uncontrolled** – Typically collectors and local roads where access controls are not employed.

15.1.2.2 Access Management, Access Control, and Functional Classification

Often, access management plans are developed for arterial roadways that serve local and regional travel and freight movement as part of a corridor upgrade or planning study. Although most commonly applied to arterials, access management techniques are also applicable to collectors which carry higher speed, higher volume flows. Access management tools are infrequently applied on local streets. Access management can be an integral part of planning for safety or addressing high crash locations on all types of facilities.

Access management can be an integral part of planning for safety or addressing high crash locations on all types of facilities.

Access management can be used to improve the relationship between the adjacent land use and the functional classification of the road. The designer may have the ability to design access points to the facility that are consistent with the roadway's functional classification, as described below:

- **Freeways** – Roadways with controlled access. Access is limited to interchange points and intersecting roads are treated using one of the methods described in Section 15.3.6.
- **Major Arterials** – Limited access or full access may be provided. Access management is an important element of the design and

driveway spacing and configuration should minimize impact to regional traffic flow. The designer should work with adjacent land owners to develop driveway spacing and layout consistent with purpose of the roadway using the guidelines and tools discussed in this chapter.

- **Minor Arterials and Major Collectors** – In most cases, full access is provided. These roadways fall within the middle of the functional classification system and provide a combination of access to land and regional mobility. Access points are likely to be more frequent than on major arterials and greater impedance to regional traffic flows is expected on these roadways. Nonetheless, the access management techniques remain important for these roadways and the designer should meet the driveway spacing and corner clearance guidelines described in this chapter.
- **Minor Collectors** – Full access or uncontrolled access is usually provided. Minor collectors provide the highest degree of land access of the facilities in which MassHighway is typically involved. Parcel access is often more important than regional mobility on these roadways. As described above, however, benefits for all users can be obtained by providing well-designed access points.
- **Local Roads** – Access is usually uncontrolled. The primary function of local roads is to provide access to the adjacent land use. Access and driveway design is usually performed to meet the guidelines of the local jurisdiction.

15.2 The Commonwealth's Role in Managing Access

Access management must consider road design principles as well as land use planning principles to be effective. As such, it requires a joint effort between MassHighway and the appropriate communities. While MassHighway is responsible for providing a safe transportation network, local jurisdictions are responsible for orderly growth patterns that minimize the impacts of land use on the transportation system.

15.2.1 Access Guidelines

MassHighway has an active role in access management with the responsibility to issue permits for all new curb cuts and for modifications of existing curb cuts on state-owned routes (MGL Chapter 81, Section 21). Design standards for the provision of access onto state highways have been in place for decades and have been updated several times.

The goal established by MassHighway for the review and issuance of access permits is to provide for safe and efficient access while maintaining safety and the operational integrity of the highway. A design review has also been developed to ensure that driveways are properly designed so that the safety of all users is maintained.

The MassHighway District Highway Director is responsible for maintaining the function and operations of roadways with respect to access in his/her District. In this capacity, the District Highway Director has discretionary access permitting authority to permit or deny access if it is not designed adequately (through his/her Permit Engineer). Details on the process for when access permits are needed and how they are obtained is available from each MassHighway District Office.

MassHighway strives to provide well-designed access as part of its projects; however, a more effective access management program requires the development of a more systematic approach that considers roadway classification, traffic volumes, speeds, and local land use policies, as discussed in this chapter.

15.2.2 Monitoring, Reviewing and Responding to New Development

MassHighway's Public/Private Development Unit (PPDU) monitors development proposals that may affect state highways. Many development projects require permits from MassHighway for access or indirect access to its facilities. The review and approval of development projects occurs at the local level following local regulations expressed in zoning codes, development guidelines, and administrative procedures. MassHighway's focus is on the safety and operational impacts to public ways. Larger projects exceeding the review thresholds included in state regulation are also reviewed under the Massachusetts Environmental Policy Act (MEPA) provisions.

Both local and MEPA development review procedures usually require an assessment of the impacts on nearby roadways of new development proposals. These transportation impact and access studies (TIASs) often result in commitments for access design and offsite roadway improvements. The development project proponent should consult the *Guidelines for EIR/EIS Traffic Impact Assessment* (1989, as amended) by the Executive Office of Transportation and the Executive Office of Environmental Affairs, as well as other statutes,

regulations, executive orders or policy directives that govern roadway and traffic issues.

These review procedures, either under MEPA or local regulation, provide numerous opportunities for public review and comment on development projects themselves and associated roadway improvements. Depending upon the outcome of these review processes, MassHighway's PPDU works with developers and their consultants to ensure that access points and offsite improvements are designed and constructed to meet standards, including the context sensitivity and multimodal accommodation goals of this Guidebook. In many cases, the developer constructs improvements to roadways once the designs are reviewed and approved by MassHighway and other responsible parties such as the municipal planning, public works, or building departments.

Larger projects that require completion of an Environmental Impact Report (EIR) by the Executive Office of Environmental Affairs, also require a Section 61 Finding, issued by MassHighway relative to access, prior to the issuance of an access permit. The Section 61 Finding specifies the driveway access and off-site mitigation measures necessary for initial occupancy of the project. Additional mitigation measures and the construction timing of the measures relative to phased development of a project may also be specified in the Section 61 Finding to ensure that the anticipated impacts from the development do not adversely impact the transportation system.

15.2.3 Driveway Design

Driveways are points of access from public streets to private property and, therefore, are not intersections as defined in Chapter 6. The requirements for making turning movements between public streets and driveways, however, are similar to the turning movements required at intersections. Intersection design criteria are presented in Chapter 6.

Driveways are intended for low-speed vehicle operation, and therefore should have corner radii reflecting low speeds. Where higher speeds are required, due to the nature of the public street or due to traffic volumes on the driveway (as in a commercial parcel), design guidelines for intersecting streets, as discussed in Chapter 6, are applicable. Single-lane driveways are appropriate for two-way traffic for all single family residential uses, as well as for small aggregations

of residential units such as free-standing apartments. For aggregations of residential use of around ten dwelling units or greater, a two-lane driveway (24 feet in width) becomes appropriate. For small commercial uses with employee-only traffic (i.e., no retail customers or frequent visitors) a single-lane driveway is adequate. For commercial uses with retail customers and regular visitors, a two-lane driveway is preferable. Guidelines for Basic Driveway Dimensions are provided in Exhibit 15-1.

Exhibit 15-1
Basic Driveway Dimension Guidelines

	Residential	Commercial	Industrial
Nominal Width (feet)			
One-Way	10	15	20
Two-Way	10	30	40
Right Turn Radius or Flare (R)			
Minimum (feet)	5	15	20
Minimum Spacing			
From Property Line	R	R	R
Minimum Angle	45°	45°	30°

To allow reasonable entrance and exit speeds without causing vehicle under-ride and edge clearance problems, the vertical profile of the driveway cannot exceed certain limits. Maximum grades for residential driveways are 10 to 15 percent and for commercial 5 to 8 percent. Vertical curves at least 10 feet in length may be used to connect the tangent slopes.

Where an open channel is used for roadside drainage, the channel should intercept the driveway at approximately a 90-degree angle. The driveway side slope, including the pipe end section for the channel, should not exceed 1:6 and, preferably, will be 1:12. If construction will make radical changes on unpaved driveways, it may be necessary to pave the surface for proper drainage and erosion prevention. In all cases, the driveway should be paved to a point established in the field by the District Permit Engineer.

Sidewalks, bikeways, and parking lanes must be considered in the geometric design of driveways. A minimum 4 foot wide flush wheelchair path of no more than 1.5 percent cross slope must be provided where a driveway crosses a sidewalk.

Elements of driveway design that minimize the negative impact of driveways on pedestrian travel on sidewalks are:

- Minimum width of driveways, using single-lane driveways wherever possible.
- Minimal change to grade and cross slope of the sidewalk, even if this requires a break in the driveway grade.
- For low volume driveways, the sidewalk across the driveway may be at the same level as the adjoining sidewalk. Heavier volume driveways should be treated as an intersecting roadway with the sidewalk ramping down to the roadway surface.
- Continuation of the sidewalk paving material across the driveway, rather than continuity of the driveway paving material across the sidewalk. Where the paving materials are the same, the sidewalk should be outlined with joints or saw cuts across the driveway.

Turning and storage lanes should be considered on high-speed, high-volume driveways. Chapter 6, Intersections, and Section 15.3 discuss the design and warrants for these lanes.

15.2.3.1 Driveway Spacing and Consolidation

Separation of conflict areas is recognized as an effective way to improve pedestrian, bicycle, and vehicle safety. Extensive safety studies have confirmed that crash rates increase as the spacing of unsignalized access points decrease. This is especially true for commercial entrances and exits. Vehicles entering or leaving the road at driveway locations generally operate at slower speeds than the prevailing traffic, which increases crash potential and slows roadway travel. Managing driveway spacing often enhances operations and safety for the entire corridor.

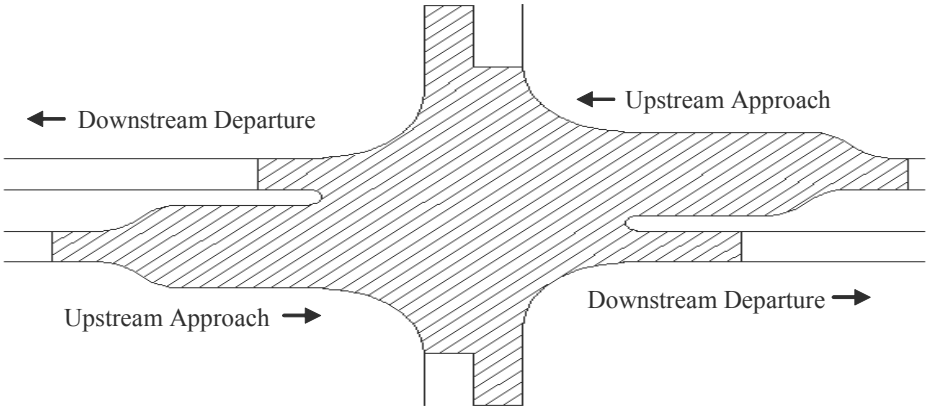
Minimum driveway spacing guidelines for the construction of new driveways are based on posted speed and roadway type, and need to consider:

- Stopping and intersection sight distances;
- The functional areas of upstream and downstream intersections;
- The influence of right-turns on through traffic; and
- Egress capacity

TRB's *Access Management Manual* presents detailed spacing guidelines for the various roadway types and environmental conditions. A brief description of each follows:

- **Sight Distances -** Stopping sight distance and intersection sight distance are important considerations in driveway location and design. A discussion of these design criteria is provided in Chapter 3, Section 3.7 of this Guidebook.
- **Functional Area –** All access points, signalized and unsignalized, have functional areas that often extend beyond the immediate physical intersection. This area is comprised of auxiliary lane vehicle storage (or queue) space, and a decision and maneuvering distance approaching an intersection, as well as merging and acceleration space departing an intersection, as illustrated in Exhibit 15-2.
- **Right-turn Influence** – Driveways that are spaced too closely can impact through traffic operations when a driver must monitor more than one right turn merging movement (called right-turn conflict overlap), or when upstream through traffic is required to brake and slow down for right-turning vehicles (referred to as the driveway's influence distance).
- **Egress Capacity** – Closely spaced driveways can interfere with each other and restrict egress capacity. This can be a result of increases in decision-making time and the influence of vehicle maneuvering and acceleration at adjacent access points.

Exhibit 15-2
Intersection Functional Boundary



Ideally, driveway spacing as wide as possible is desirable, both from intersections and from other driveways. However, the small property parcel size in most settled areas and the right of parcel owners to gain access to the adjoining street often dictates a minimum spacing.

In certain areas, provisions need to be made for access to existing parcels of land. However, where multiple existing parcels develop as a single entity, as in the case of a shopping center, coordinated and shared access is preferable. Furthermore, indirect access via secondary roads should be seen as a way to help implement the minimum standard. Finally, elimination, consolidation, or reconstruction of sub-standard access points should be incorporated into redevelopment projects and corridor improvements.

For new residential subdivisions on major arterials, a consolidated point of access from an internal road network is preferable for all house lots. Ideally, new lots should not be provided direct access from major arterials. If lots front on arterials, the advantages and disadvantages of loop driveways should be considered. Their advantage in eliminating cars backing out onto the roadway may be offset be the negative effects of doubling the number of driveway

openings. Furthermore, connections should be made to surrounding developments to facilitate bicycle and pedestrian, as well as motor vehicle access.

Driveway closures are another way of eliminating conflicts with an arterial that has too many entering access points. Rather than closing a driveway, access can be restricted to right-in and right-out turns only to improve the overall safety of the arterial. Existing properties with multiple points of access onto major arterials are well-suited for this type of treatment.

15.2.3.2 Corner Clearance

Corner clearance is a related issue to driveway spacing and addresses the distance from roadway intersections to the nearest driveway entrance. A primary safety concern at or near controlled intersections is the reduction of interferences from side-street activity. Whenever practical, driveways should not be situated within the functional boundary of at-grade intersections (see Exhibit 15-2). This can become a significant concern since inadequate corner clearance can result in backups from the intersection extending across driveway entrances and blocking ingress and egress.

Although there are insufficient data, most access management research has concluded that:

- Crashes appear to increase as corner clearances decrease;
- Retrofitting corner clearances is both difficult and expensive; and
- A preferred proactive approach involves establishing a desired access location in conjunction with minimum frontage requirements that meets or exceeds the desired corner clearances.

Corner clearance should be provided on the main roadway and on the intersecting side streets. It is applied to both the upstream approach and downstream departure side of an intersection. The standards for each roadway classification are quite different. A restrictive median can reduce corner clearance requirements. Additional distance may be needed to provide for increased vehicle queuing at signalized intersections. MassHighway guidance for recommended minimum corner clearances is provided in the *Access Management Manual*.

Additional guidance for the minimum spacing of driveways from freeway ramps is provided in Chapter 7.

15.3 Access Management Techniques

A wide array of techniques can be used to manage roadway access. Appropriate measures vary according to roadway classification and existing context.

15.3.1 Turning Treatments

Removing turning vehicles from through lanes reduces the conflicts associated with the speed changes necessary to make turns (acceleration and deceleration). As such, turn lanes can improve safety and reduce delays at access locations. The majority of driveway-related crashes involve turns to or from the major road.

15.3.1.1 Left Turns

Left-turn lanes provide a safety benefit.

The safety benefits of left-turn lanes are well documented. The median crash rate reduction resulting from installation of left-turn lanes is 50 percent, although right-angle crash rates show mixed results at unsignalized intersections (NCHRP Report 420). Left-turn lanes also benefit highway operations by delay reductions to through traffic.

Several left-turn warrant methodologies have been developed that indicate the need for a turn lane based on the volume of left-turning vehicles as a function of the volume of opposing traffic. The National Highway Institute (NHI) suggests that such warrants may be appropriate for rural highways. The 2000 Highway Capacity Manual indicates the need for left-turn lanes where space permits when left-turn volumes exceed 100 vehicles per hour (vph), and recommends dual left-turn lanes when volumes exceed 300 vph.

Various standards also exist regarding the length of left-turn lanes. The standards are generally a function of vehicle speed and traffic volume, and are designed to allow turning vehicles to leave the travel lane, decelerate, and make the turning movement, accounting for queuing at the intersection.

The length of turn lanes and tapers should be based on MassHighway left-turn warrants, intersection operations, and design criteria (see Chapter 6).

15.3.1.2 Right Turns and Use of Paved Shoulder

Similar warrants and design standards exist for right-turn lanes. Right turn lanes should be considered at new commercial entrances and the entrances to new residential subdivisions where heavy turning volume is anticipated. Where numerous commercial or residential driveways exist in close proximity, consideration should be given to using an expanded right shoulder as a continuous turn/auxiliary lane. Since right-turn lanes can cause a shift in the roadway curb or edge and can result in traffic crossing over bike lanes on the roadway, care should be taken to ensure that such a treatment does not create an impediment to bicycle or pedestrian accommodations.

15.3.2 Median Treatments

The selection of an appropriate median type can be critical in providing for safe and efficient travel along a major arterial. In selecting a median type, a balance is often needed between providing access to adjacent properties and ensuring adequate throughput capacity and travel speeds.

By separating oncoming traffic, and by managing turning movements, non-traversable medians offer the most significant potential to improve roadway safety and operations. The provision of a non-traversable median that separates opposing traffic effectively limits left-turns on a roadway. Safety data have shown the crash rate reduction attributable to installation of medians is up to 35 percent (NCHRP Report 420). Wide non-traversable medians prevent cross-over crashes, provide shelter for vehicles making left-turns from or to a side street, and provide refuge for pedestrians or bicyclists crossing the street.

In four-lane roadway sections, research has shown that the selection of an appropriate median type is dependent on a number of factors, including number of access points, intensity of use of these access points, speed limit, presence of pedestrians, environment (developed, developing, rural),and the provision of adequate shoulders.

Two-way, left-turn lane (TWLTL) roadway sections as a median treatment can be appropriate in: 1) volume conditions less than 25,000 vehicles per day, 2) roadway sections with high driveway

densities and low to moderate volumes, and 3) sections with high left-turning volumes relative to the overall traffic flow. Residential and low-density commercial areas are the prime examples of this type of roadside development. In both cases, TWLTL sections generally are posted for travel speeds between 25 and 45 miles per hour.

The design of a TWLTL section can also minimize safety concerns if shoulders are provided and the width of the center left-turn lane is adequately sized. A 12-foot minimum (16-foot maximum) is suggested for a center two-way left-turn lane. The center turn lane is a shared space, so drivers tend to enter this area cautiously. Therefore, in areas with higher driveway densities, driver transitions into the turn lane will tend to occur at slower speeds. In addition, in these areas, the provision of a wider center turn lane (14 to 16 feet) is likely to result in fewer vehicles partially blocking the through travel lane. On long corridors, TWLTL sections should broken by median islands to prevent the lane being used as a passing or travel lane and in locations with pedestrian crossings.

As discussed in Chapters 5 and 11, segments of non-traversable median interspersed with left-turn lanes is often preferable to the use of a TWLTL section to provide pedestrian accommodation and to reduce the perceived width of the street. Additionally textured, colored pavements and other features can be combined with TWLTLs to improve their function.

15.3.3 Signal Spacing and Timing

The spacing of signalized intersections dramatically impacts safety and traffic operations. Management of signal spacing includes planning for the frequency of signals, as well as the uniformity of their spacing. This technique is useful in managing access in some of the developed and developing corridors, particularly where several traffic signals already exist.

Optimal spacing depends on travel speed and cycle length. Research data indicate that as speed and cycle length increase, so does desired spacing.

Minimum signal spacing should be one-half mile in developing areas, and one-quarter mile in developed areas. In all cases, signal timing should be coordinated to facilitate traffic flow. For undeveloped sections of a corridor, two-mile spacing should be considered.

Along developing sections of highways, development should be carefully planned to avoid the proliferation of new traffic signals, and to ensure that minimum spacing standards are maintained. Local zoning plays a significant role in managing the intensity of development and redevelopment that will occur.

As areas experience infill and redevelopment, existing driveways and circulation patterns should be reconfigured to complement the signal system to the maximum extent. This may involve closing existing driveways, rerouting traffic to secondary streets, and providing connections between parcels. Roundabouts might also provide a technique for reducing the number of signalized location (see Chapter 16, Traffic Calming for a discussion of roundabouts).

15.3.4 Inter-Parcel Connections and Internal Roadway Systems

Inter-parcel connections for both pedestrians and motorists can limit short trips on the main route. These often take the form of simple driveway and sidewalk connections between commercial sites, so that traffic moving from one to the other need not access the arterial.

Large residential developments can also be planned to provide a minimum number of access points on the main highway by internalizing private driveways on local subdivision streets, which in turn connect to a feeder road that has direct and full access onto the main highway. It is important to also plan for future growth of residential development by planning for interconnections of the development with adjacent (potentially undeveloped) properties. This will help avoid a single-entry cul-de-sac serving each development and ensure that the best and fullest use of the existing access point on the main highway is utilized.

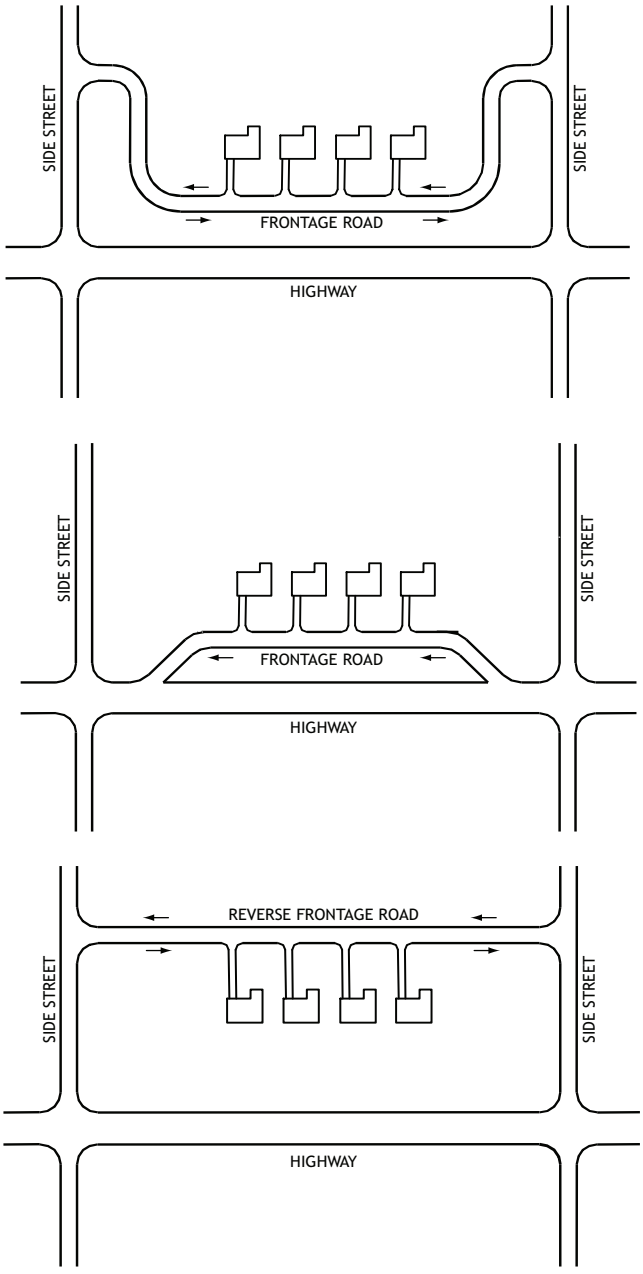
In some communities, commercial and large residential developments are allowed only to have indirect access onto a major roadway or restricted right-in/right-out access, with the full access point on the side street. This is also done when a driveway is anticipated to have an adverse effect on traffic safety and operations.

15.3.5 Frontage Roads

An effective treatment to consolidate the number of access points, and therefore conflict points, on an arterial highway can be achieved through the construction of a frontage road or a reverse frontage road. These concepts are depicted in Exhibit 15-3.

A frontage road is a local street (one-way or two-way) that serves multiple land uses (properties) and provides one to two points of access onto the main roadway. A frontage road can be constructed without taking existing buildings fronting the roadway when the buildings are setback far enough to accommodate the roadway and maintain the minimum setback from the road required by zoning.

Exhibit 15-3
Frontage Road Concepts



Frontage roads have a place in serving commercial development as well as residential access needs. When carefully designed to facilitate access and maintain signal operations, frontage roads can be a viable access management technique for large commercial developments.

15.3.6 Full Access Control Highways

When full access control is proposed for an existing highway or a new freeway, each intersecting public or private way must be handled using one of the following options. The options listed below also apply to dedicated pedestrian and bicycle facilities.

- The intersecting facility can be dead-ended, thereby effectively terminating through traffic.
- The intersecting facility can be re-routed to maintain connectivity, often as a frontage road.
- The intersecting facility can be grade separated as either an underpass or an overpass, thereby maintaining through traffic, but effectively terminating access to the intersecting highway.
- The intersecting facility can be reconstructed as an interchange, thereby maintaining through traffic access to the intersecting highway.

The importance of the continuity of the crossing road or the feasibility of an alternate route will determine whether a grade separation without ramps or interchange is provided. An interchange should be provided on the basis of the anticipated demand for access to the minor road. The decision to provide a grade separation without ramps rather than an interchange is often based on the following considerations:

- Lacking a suitable relocation plan for the crossroad, a highway grade separation without ramps may be provided to maintain connectivity of low volume roadways. All users desiring to access one facility from the other are required to use other existing routes. In some instances, these users may have to travel a considerable distance, particularly in rural areas.
- A grade separation without interchange ramps may be provided to avoid having interchanges so close to each other that signing and operation would be difficult. This approach eliminates interference with large major road interchanges and increases safety and mobility by concentrating turning traffic at a few points where it is

feasible to provide adequate ramp systems. On the other hand, undue concentration of turning movements at one location should be avoided where it would be better to have additional interchanges.

- In rugged topography, the site conditions at an intersection may be more favorable for provision of a grade separation than an at-grade intersection. If ramp connections are difficult or costly, it may be practical to omit them at the structure site and accommodate turning movements elsewhere by way of other intersecting roads.
- Many times partial interchanges are constructed initially because the traffic volumes do not support a full interchange or the required right-of-way is not available when the interchange is first constructed. As time passes however, the need for a complete interchange develops or the right-of-way is obtained.

15.4 Land Use Controls

Because access management deals with the relationship between transportation and land use, it requires cooperation between MassHighway and local government agencies. Local governments are encouraged to identify corridor preservation goals and address land use access requirements in their comprehensive plans.

The Commonwealth, Regional Planning Agencies, and the municipalities should cooperate carefully to manage access along the arterial roadway network. Local land use plans and zoning ordinances that discourage highway dependent development and sprawl are supportive of MassHighway's goals to protect and preserve the safety and function of the Commonwealth's transportation network.

Some recommendations included in this section fall under the purview of MassHighway and others fall under control of the local governments. Consistent application of access management plans, by all parties and across jurisdictional boundaries, will produce greater success in preserving the highway system into the future.

The following sections describe approaches to managing access through land use controls at the local level and are included as examples of steps local governments can take to improve the relationship between local land uses and the regional highway system.

15.4.1 Zoning and New Development

Revisions to local zoning standards are often necessary to effectively implement access management. Zoning that targets development in areas with good multi-modal access, requires shared access along streets and highways, and encourages compact centers as opposed to strip development is helpful in managing access through land use control and improving the relationship between land use and access control.

Subdivision regulations and local ordinances should require minimum lot frontages, dimensions, and street layouts that recognize the intended function of the roadway (traffic flow versus property access). The higher the roadway classification, the fewer the number of access points that should be provided along the roadway. The ability of the municipalities to provide zoning restrictions to require minimum parcel frontages on important roadway corridors can significantly aid in the enforcement of driveway spacing standards (i.e., minimum parcel frontage standard consistent with driveway spacing guidelines). Chapter 7 of the *Access Management Manual* provides guidance on land use zoning, access controls and subdivision site plan review processes that are helpful in achieving the full benefit of a access management plan.

15.4.2 Highway Corridor Overlay District

One of the most effective tools in applying corridor-specific standards is the highway corridor overlay district (HCOD). This is a separate set of zoning regulations for parcels within a certain distance from a roadway, usually an arterial highway. An HCOD generally would not be used on lower classification roadways. The ordinance implementing an HCOD contains additional regulations that are over-riding, and in some cases, additive, to existing zoning regulations. HCODs involve standards governing access, visibility, and corridor aesthetics. They generally provide standards for number and location of access points, inter-parcel connections, size and location of signs, and landscaping and buffer requirements.

Several communities within the Commonwealth have successfully implemented HCODs; however, they are often implemented in response to an already congested roadway. Elements of a model overlay district that designed for incorporation into municipalities' zoning ordinances are overviewed below.

15.4.2.1 Intent

The HCOD should state its intended effects which are generally to enhance the safety, function, and capacity of designated highways. As major traffic routes, these highways represent significant community investments, and contribute to public health, safety, and welfare. They provide access to jobs and schools, facilitate delivery of emergency services, support the movement of goods and services, and enhance economic development. Furthermore, these corridors serve as first impressions of the community for visitors and the traveling public.

15.4.2.2 Applicability

The applicability of the HCOD should be clearly stated, as an example:

> *The HCOD shall also apply to redevelopment projects, as defined herein, regardless of whether such redevelopment requires site plan or subdivision review. As an overlay district, the HCOD shall complement the requirements of the underlying zone, which shall remain in effect. Wherever the requirements of the HCOD conflict with those of the underlying zone, the greater or more stringent standard shall apply.*
>
> *To ensure adequate coordination with MassHighway regarding highway access management and traffic improvements, no site plan or subdivision plat shall be approved without a written finding from the MassHighway District Highway Director that the proposed roadway, driveway, and circulation systems are consistent with the Access Management Plan.*

15.4.2.3 Access

The purpose of the HCOD is to manage vehicular and non-vehicular access. To achieve this goal, all site plans should include an access plan drawn to the same scale as the site plan. These plans should show the location and dimensions of all streets, driveways, crossovers, parking areas, access aisles, sidewalks, and any other relevant information. Access to the HCOD corridor should be provided by direct or indirect means, consistent with the following planning guidelines:

- Minimal number of access points;
- Required corner clearance of driveways from intersecting streets;
- Minimum sight distances along the highway for the design speed;

- Internal street layout and connections to the maximum extent feasible;
- Shared access to the maximum extent feasible;
- Good pedestrian and bicycle access to minimize conflicts with vehicular traffic; and
- Pedestrian circulation systems that connect uses within individual projects to adjacent parcels and activity centers.

In order to promote the orderly retrofit of existing developments that do not conform to the requirements of the HCOD, while encouraging reuse of previously developed properties, redevelopment standards should be defined in the language of the ordinance. Given the varying conditions of existing development, some administrative flexibility is required in applying standards to redevelopment.

15.4.2.4 Traffic Impact Analysis

As part of HCODs, consideration is often given to requiring a traffic impact analysis (for example, for all developments generating more than 1,000 average daily trips). The projected number of average daily trips should be based on trip generation rates as defined by the most recent publication of the Institute of Transportation Engineers "Trip Generation," or an acceptable substitute. In addition, a traffic impact analysis may be required for developments generating fewer daily trips when it is determined, in consultation with the MassHighway District Highway Director, that safety considerations warrant such analysis. The traffic impact analysis should identify level of service impacts of the proposed development and should be used to determine necessary improvements to support the development. The analysis should be conducted for the morning and evening peak commuter hours as well as for other peak hours applicable to the proposed use (e.g., a Saturday peak hour for retail development). At a minimum, the impact analysis shall address the following:

- Definition of pedestrian, bicycle, and motor vehicle access
- Turn lane and access improvements
- Internal site circulation
- Shared access/access to adjacent sites
- Impacts to intersections and median crossovers
- Potential need for signalization or roundabouts

15.4.2.5 Required Improvements

Required improvements, the need for which is generated by the proposed development, is determined in consultation with the MassHighway District Highway Director based on the traffic impact analyses. The developer shall be responsible for provision of the improvements.

15.4.2.6 Setbacks

In order to preserve and enhance highway safety and efficiency, setbacks are often specified in the language of the HCOD. Typically, setbacks are to remain free from all development, including buildings, parking areas, gas pumps, canopies, and similar structures and facilities. Where necessary to accommodate an approved circulation plan, access driveways are permitted within setbacks.

Setbacks can also be defined for the purposes of establishing streetscape improvements, or to provide for the future widening of a corridor when warranted.

15.4.2.7 Other Design Elements

To manage growth in a manner consistent with the intended traffic safety, operations, and corridor appearance objectives of the HCOD, design guidance for a number of other physical elements of the corridor, such as signage, lighting, and landscaping, are worthwhile considering.

Well planned and maintained signage, landscaping, and lighting will achieve several benefits in furtherance of this ordinance:

- Preserve and enhance traffic operations
- Enhance the pedestrian environment
- Preserve and enhance the visual quality of designated corridors

Site plans that include a landscaping plan drawn to the same scale as the site plan, and that show the location, size, and description of all landscaping materials in relation to structures, parking areas, and driveways should be required.

15.4.3 Retrofitting Existing Development

Effective access management requires both retrofit and policy actions. A comprehensive access management plan will include recommendations to improve existing problem areas, as well as

requirements to ensure that new development does not degrade the future highway corridor function. The application of access management guidelines is not as straight-forward on existing roadways. While some land uses may be replaced in the future development, a best-fit (or retrofit) approach must be used to try to achieve the access management objectives with existing uses.

As an example, a new shopping center or residential development could provide an access road that connects to an existing church property that has poor access. This would allow for modification of the access to the church property. This is a proactive process that cannot be designed in advance but must be responsive as adjacent development occurs.

Major highway reconstruction projects should always review the potential for improvements to access management. A coordinated effort on the part of municipal officials and MassHighway is required to ultimately bring corridors up to desired standards.

15.5 For Further Information

- *Access Management Manual*, Transportation Research Board. Washington D.C., 2002.
- *A Guidebook for Including Access Management in Transportation Planning*, NCHRP Report 548, 2005.
- *Access Management Guidelines for Activity Centers*, NCHRP Report 348, 1992.
- *Impact of Access Management Techniques*, NCHRP Report 420, 1999.
- *Land Development Regulations that Promote Access Management*, NCHRP Synthesis 233, 1996.
- *Corridor Management*, NCHRP Synthesis 289, 2000.