ACCESS MANAGEMENT GUIDELINES

APRIL 2002

Prepared by the

NASHUA REGIONAL PLANNING COMMISSION

with funding by

This project was funded in part by the New Hampshire Department of Transportation.
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**WHAT IS ACCESS MANAGEMENT?**

Access management is the practice of coordinating the location, number, spacing and design of access points to minimize site access conflicts and maximize the traffic capacity of a roadway. Uncoordinated growth along some of the region’s major travel corridors has resulted in strip development and a proliferation of access points. In most instances, each individual development along the corridor has its own access driveway. Numerous access points along the corridor create conflicts between turning and through traffic which causes delays and accidents.

Historically, transportation and access management plans concentrated primarily on the movement of vehicles. Current planning efforts focus on all modes of transportation including vehicles, public transit, bicycles and pedestrians. These guidelines consider all of these modes of transportation and discuss: 1) the importance of managing access; 2) access management techniques; and 3) methods of implementing the techniques. In addition, the Appendix provides examples of site plan and/or subdivision regulation language that may be useful for communities wishing to implement the techniques.

**WHY MANAGE ACCESS?**

Numerous benefits are derived from controlling the location and number of access points to a roadway. The benefits include:

- improving overall roadway safety;
- reducing the total number of vehicle trips;
- decreasing interruptions in traffic flow;
- minimizing traffic delays and congestion;
- maintaining roadway capacity;
- extending the useful life of roads;
- avoiding costly highway projects;
- improving air quality;
- encouraging compact development patterns;
- improving access to adjacent land uses; and
- enhancing pedestrian and bicycle facilities.

Through the years there have been many discussions over which came first - the development or the road. In general, improvements to the transportation network lead to additional development that creates more traffic and the need for further roadway improvements which in turn generates additional development.
The Nashua region is a prime example of this cycle. Over the past 50 years the area has experienced tremendous growth; population increased 276% from 52,000 in 1950 to 196,000 in 2000, while housing units increased 345% from 16,723 to 74,341. Road miles increased 61% from 850 miles in 1950 to 1,325 in 2000.

Because of this tremendous growth, many segments of the region’s arterial and collector roadway system are significantly congested. Most of these congested segments are located on established roadways that provide through routes for commuters as well as local access to employment centers or commercial strips.

Roadway corridors in the region that experience significant congestion include:

- NH 101A, Nashua west of the Turnpike
- Daniel Webster Highway, south Nashua
- NH 102, Hudson north of Hudson center
- US 3, Merrimack
- NH 3A, Lowell Road, Hudson

In addition, there are a number of roadway corridors in the region that are rural in character, yet have the potential for substantial future development. Although these corridors may not experience the high traffic volumes and congestion of other more developed areas, access management techniques can preserve the existing capacity and improve safety as new development occurs. These roadway corridors include:

- NH 101 in Amherst
- NH 101 in Wilton
- NH 101 in Milford west of the bypass to Wilton Town line
- NH 13 in Brookline
- NH 130 in Hollis
- NH 111 in Hollis
- NH 130 (Broad Street) in Nashua west of the FEE Turnpike
- NH 3A in Litchfield
- NH 102 in Litchfield and north Hudson
- NH 38 in Pelham

Figure 1. Congested Roadway segments in the Nashua region.

Figure 2. Roadway segments that may benefit from access management techniques.
In addition to preserving capacity, access management techniques can be coordinated with design guidelines to significantly enhance the aesthetics of a roadway corridor. Currently, many of the congested roadway corridors are highly diverse, auto oriented environments that reflect a lack of vision. A common vision that includes guidelines for access in addition to a unified design for signage, landscaping and pedestrian facilities can significantly improve the function and aesthetics of a roadway corridor.

Build It and They Will Come
The NH DOT reported that average daily traffic volume between exits and 5 and 6 on the FEE Turnpike increased by 10,000 cars in one year, 2000-2001. The Turnpike widening project, from 2 to 3 lanes between Exits 1 and 8, was completed in 1999.

Figure 3. Regional roadway showing a lack of vision.

ROADWAY CLASSIFICATION
The New Hampshire Department of Transportation (NH DOT) functional classification system places all roads into one of four categories. The majority of new roads constructed since 1950 are classified as local roads, predominantly built to serve subdivisions. Thus the system of arterial and collector roadways that existed in 1950 provides access to the majority of the region’s commercial, industrial and residential development.

NH DOT Functional Classification

**Controlled Access Highway:** Provides for high speed/volume interstate traffic movement over very long distances with highly controlled access limited to ramp interchanges. Examples: FEE Turnpike and NH 101Bypass.

**Limited Access Highway:** Provides for high speed/volume, interregional traffic movement over long distances with limited access. Examples: NH Route 111 in Hudson.

**Principal Arterial:** Provides for substantial movement of statewide or interstate travel and serves major traffic movements in urbanized areas and through-traffic. Examples: NH Routes 101, 101A & 3.

**Minor Arterial:** Serves trips of moderate length at lower level than principal arterial; provides access to smaller geographic areas; and provides intra-community continuity but does not penetrate neighborhoods. Examples: NH Routes 111A, 13 & 3A.

**Collector Road:** Collects traffic from local roads and channels it into the arterial system and provides land access and traffic circulation within residential neighborhoods and commercial and industrial areas.

**Local Road:** Provide local access to adjacent residential, commercial or industrial development.
ACCESS MANAGEMENT TECHNIQUES

There are a number of access management techniques that can be used to preserve or enhance the capacity of a roadway. Specific techniques for managing access are discussed in this section and illustrated with examples from around the region. Not all techniques will apply to every community. Some of them are more appropriate to less developed rural areas, whereas others are more appropriate to existing urban areas. In the urban areas, the techniques can be applied when existing sites are redeveloped or when negotiations with landowners are successful. Therefore, it is up to each Planning Board to determine what will work best based on local conditions.

NUMBER OF ACCESS POINTS

Controlling the number of access points (driveways) from a site to a roadway reduces potential conflicts between cars, pedestrians and bicycles. Each parcel should only be allowed one access point as per NH RSA 236:13,III(b), and shared access should be encouraged. Provisions can be made in the local land use regulations to allow for more than one access point where special circumstances would require additional access. Incentives such as density bonuses or reduced frontage requirements can encourage developers to utilize access from existing side roads or to construct side roads rather than directly access an arterial or a collector road.

Figure 4. Single point of access, Nashua.

Figure 5. Multiple points of access.

Local Examples

**Town of Litchfield:** The northern commercial zone requires 500 feet of frontage on Route 3A and limits the number of access points in the district to one per 500 feet. If an access is constructed to Town standards or access is taken from an existing Town road, then the frontage requirement is reduced to 150 feet.

**Town of Hudson:** The driveway regulations permit only one driveway per parcel.

**Town of Amherst:** The commercial zones allow no more than one access to any lot wherever desirable for traffic safety and they allow for combining access points where two or more lots are being developed.

Local Actions

Review the zoning ordinance, subdivision and site plan regulations and determine the number of access points permitted per parcel or frontage.

Amend the zoning ordinance to: 1) limit the number of access points to one per parcel or one per required frontage for the district; and 2) encourage the use of side roads or shared driveways.
SPACING OF ACCESS POINTS

Establishing a minimum distance between access points reduces the number of points a driver has to observe and reduces the opportunity for conflicts. Spacing requirements should be based on the classification and design speed of the road, the existing and projected volume of traffic as a result of the proposed development, and the physical conditions of the site. Minimum spacing standards should be applied to both residential and commercial/industrial developments.

Access Separation Distances (Feet) Based on Spillback Rate*

<table>
<thead>
<tr>
<th>Posted Speed (mph)</th>
<th>Spillback Rate* 5%</th>
<th>10%</th>
<th>15%</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>335 (a) 265(b) 210(c)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>355 (a) 265(b) 210(c)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>400 340 305 285</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td>450 380 340 315</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>50</td>
<td>520 425 380 345</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>590 480 420 380</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(a) Based on 20 driveways per mile.
(b) Based on 25 driveways per mile.
(c) Based on 30 driveways per mile.

*Based on an average of 30-60 right turns per driveway.

**Spillback occurs when a right-lane through vehicle is influenced by right-turn-in to or beyond a driveway upstream of the analysis driveway. The spillback rate represents the percentage of right-lane through vehicles experiencing this occurrence.


Local Examples

**Town of Brookline:** The driveway regulations require that any driveway be separated a minimum of 50 feet from another driveway.

**Town of Bedford:** The zoning ordinances require a minimum separation of 120 feet between curb cuts.

**Town of Mont Vernon:** The zoning ordinance requires 500 feet of frontage on NH Route 13 and permits one access road per 1,000 feet.

Local Actions

Review the zoning ordinance, subdivision, site plan and driveway regulations to determine the existing standards for driveway separation.

Amend the subdivision and site plan review regulations to establish minimum driveway spacing standards.
Width of Access Points

Uncontrolled access is a serious hazard for vehicles entering or exiting the site, vehicles passing by the site, bicycles and pedestrians. In addition to limiting the number of access points, the width of the access point should be restricted based on the use of the site. Residential driveways should be limited to a maximum width of 15 feet at the edge of pavement, including turning radii. The maximum width for a commercial or industrial site entrance with two-way traffic should be limited to 36 feet including 2 foot shoulders. The width of the entrance should be determined based on the type of use for the site, the type of traffic (i.e. cars vs. 18 wheel trucks), and the projected volume of traffic.

Figure 7. Restricted access width ensures safety for vehicles and pedestrians, Nashua.

Figure 8. Unrestricted access. The entire frontage of this site can be accessed, creating a safety hazard.

Figure 9. The site illustrated in fig. 8 (above) could be redesigned to restrict the width of the access points

Local Examples

Town of Amherst: The subdivision regulations limit the maximum width of any driveway to 20 feet for each lane, or 40 feet for a two way driveway.

Town of Hudson: The driveway regulations limit the maximum driveway width to 50 feet with provisions for flaring the entrance to accommodate the turning radius of vehicles expected to use the site.

Local Actions

Review the zoning ordinance, subdivision, site plan and driveway regulations to determine the existing standards for driveway or access width.

Amend the subdivision, site plan and/or local driveway regulations to define minimum and maximum driveway width standards.
**TURNING RADIUS**

The turning radius of a driveway or access road affects both the flow and safety of through traffic as well as vehicles entering and exiting the roadway. The size of the turning radius affects the speed at which vehicles can exit the flow of traffic and enter a driveway. In general, the larger the turning radius, the greater the speed at which a vehicle can turn into a site. An excessively small turning radius will require a turning vehicle to slow down significantly to make the turn, therefore backing up the traffic flow or encroaching into the other lane. An excessively large turning radius will encourage turning vehicles to travel quickly, thereby creating hazards to pedestrians. Either of these situations increases the potential for accidents.

The speed of the roadway, the anticipated type and volume of the traffic, pedestrian safety and the type of use proposed for the site should be considered when evaluating the turning radius. Proposed uses that would require deliveries by large trucks (such as major retail establishments and gas stations) should provide larger turning radii to accommodate such vehicles. Other uses such as banks, offices or areas with high pedestrian traffic could adequately be served with smaller turning radii based on the type of traffic they would generate.

**Minimum Inside Turning Radii**

| Minimum inside turning radius: 14.4 feet |
| Maximum inside turning radius: 28.3 feet |

The minimum turning radius should be used in areas with heavy pedestrian traffic such as downtowns and near schools, and on low speed roadways providing access to residential streets and driveways. Commercial areas will require a wider turning radius based on the proposed use, type/volume of traffic and roadway speed.


**Local Examples**

**Town of Hollis:** The subdivision regulations permit a minimum driveway turn radius of 15 feet and a maximum of 50 feet as needed to serve the anticipated type of traffic.

**Local Actions**

Review the subdivision and site plan review regulations, roadway standards and driveway regulations to determine the minimum and maximum turning radii standard.

Amend the subdivision and site plan review regulations, roadway standards and/or driveway regulations to define minimum and maximum turning radii standards for access points based on land use.

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Figure 10. The turning radius on this corner is excessively large, encouraging vehicles to approach the corner at high speeds inappropriate for a residential area.
CORNER CLEARANCE

Corner clearance is the distance between a driveway and an intersection. Providing adequate corner clearance improves traffic flow and roadway safety by ensuring that the traffic turning into the driveway does not interfere with the function of the intersection. Local regulations should require that driveways be located a minimum distance from an intersection based on roadway classification or speed.

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Distance to Corner (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>325</td>
</tr>
<tr>
<td>35</td>
<td>425</td>
</tr>
<tr>
<td>40</td>
<td>525</td>
</tr>
<tr>
<td>45</td>
<td>630</td>
</tr>
<tr>
<td>50</td>
<td>750</td>
</tr>
</tbody>
</table>


Local Examples

Town of Brookline: The zoning ordinance requires that all driveways be located a minimum of 100 feet from an intersection.
**Throat Length**

Throat length is the length of the driveway that is controlled internally from turning traffic measured from the intersection with the road. Driveways should be designed with adequate throat length to accommodate queuing of the maximum number of vehicles as defined by the peak period of operation in the traffic study. This will prevent potential conflicts between traffic entering the site and internal traffic flow. Inadequate throat length may cause turning traffic to back up onto the road thereby impeding traffic flow and increasing the potential for accidents. The NH DOT recommends a minimum throat length of 150’ for a major driveway entrance, with 300’ desirable.

![Figure 14. Poor throat length.](image1.png)

*Figure 14. Poor throat length. Vehicles in the parking lot conflict with vehicles entering the parking lot.*

![Figure 15. Adequate throat length.](image2.png)

*Figure 15. Adequate throat length. Vehicles entering the parking lot have room to maneuver without conflict.*

**Local Actions**

Review the zoning ordinance, subdivision, site plan and driveway regulations. Assess existing standards for throat length.

Adopt minimum throat length site plan review regulations.

Adopt site plan requirements to improve throat length considerations during redevelopment of sites.

![Figure 16. Poor throat length.](image3.png)

*Figure 16. Poor throat length.*

![Figure 17. Adequate throat length.](image4.png)

*Figure 17. Adequate throat length.*
**Shared Access**

Access points should be shared between adjacent parcels to minimize the potential for conflict between turning and through traffic. Shared access can be used effectively for both residential and nonresidential developments. Since the issues surrounding shared access for residential and nonresidential development are slightly different, they are discussed separately.

**Residential**

Residential subdivisions located along arterial or collector roadways should be required to construct an internal road system rather than be developed along the existing roadway frontage or a single access cul-de-sac. Subdivision proposals should encourage a coordinated street network by providing rights-of-way or stubs for the extension of streets to adjacent parcels. This will prevent the proliferation of driveways on arterial and collector streets and provide for an interconnected street network.

![Figure 18. This subdivision in Brookline allows for future connections to adjacent undeveloped parcels.](image)

Figure 18. This subdivision in Brookline allows for future connections to adjacent undeveloped parcels.

Shared driveways could also be used to minimize the number of curb cuts in residential districts, particularly along rural arterial and collector roads. If access is necessary from an arterial or collector then shared driveways should be required. Shared driveways serving more than two homes should be built to fire lane standards and identified with a street name.

![Figure 19. This shared driveway in Hudson provides access to three homes from a single one curb cut.](image)

Figure 19. This shared driveway in Hudson provides access to three homes from a single one curb cut.

**Local Examples**

**Town of Brookline:** The zoning ordinance permits common driveways service a maximum of four lots.

**Town of Hollis:** The zoning ordinances permit common driveways serving no more than two adjacent lots.

**Local Actions**

Review the zoning ordinance, subdivision, site plan and driveway regulations for provisions for shared or common driveways.

Review the subdivision and site plan regulations to identify requirements for interconnections between developments.

Amend the subdivision regulations as necessary to require: 1) interconnections between subdivisions; and 2) to require rights-of-way be provided to adjacent undeveloped land.

Amend the zoning ordinance to: 1) permit shared driveways for residential development; and 2) define the maximum number of units that can be located on a shared driveway.

Establish standards for shared driveways in the driveway regulations.
Commercial

Joint driveways providing access to adjacent developments, and interconnections between sites, should be required for all development proposals on arterial and collector roadways. Interconnections between sites can eliminate the need for additional curb cuts, thereby preserving the capacity of the roadway. This is particularly important for commercial/industrial sites and should be used to encourage the development of internal or collector roadway systems servicing more than one parcel or establishment. Future roadway rights-of-way should also be provided to promote interconnected access to vacant parcels or to facilitate the consolidation of access points for existing developments.

Pedestrian access between developments will allow people to walk between establishments, thereby reducing the number of vehicle trips. Every opportunity should be taken to provide for interconnections between existing and future developments for both vehicles and pedestrians.

Figure 20. Opportunities for shared access, Nashua. Currently the four lots are unconnected. Connections between parking lots can be made in order to remove traffic from the major arterial.

Figure 21. Good cross access between adjacent developed parcels, Nashua.

Local Examples

Town of Wilton: The commercial and industrial zoning districts along NH Route 101 require the design and construction of streets or side roads to permit travel between adjacent lots without accessing NH Route 101.

Town of Amherst: The zoning ordinance has explicit provisions to limit points of access to commercial and office zones and encourages combining access points where two or more lots are being developed. In addition, direct access to NH 101A in the industrial zone is not allowed unless other access is unavailable.

Local Actions

Review the Site Plan review regulations to determine current requirements for joint and cross access.

Amend the site plan review regulations to require: 1) the use of joint driveways; 2) cross access and interconnections between developments; and 3) access rights-of-way to adjacent parcels for new commercial and industrial developments and redevelopment of existing sites.

Identify existing deficiencies and work with property owners to develop a plan to take advantage of opportunities for cross and joint access on existing sites.
**ALIGNMENT OF ACCESS POINTS**

Street and driveway intersections represent points of conflict for vehicles, bicycles and pedestrians. All modes of travel should be able to clearly identify intersections and assess the travel patterns of vehicles and pedestrians through the intersection. To minimize the potential conflicts and improve safety, intersections and driveways should be aligned opposite each other wherever possible and intersect roadways at a 90 degree angle. Good driveway alignment will provide vehicles, bicycles and pedestrians with a clear line of sight and allow them to traverse the intersection more safely.

**Local Examples**

- **City of Nashua:** The subdivision regulations require that streets intersect as nearly as possible to a right angle but in no case shall one street intersect another at less than 60 degrees.

- **Town of Amherst:** The driveway regulations state that driveways should intersect the street at a 90 degree angle and should be no greater than 30 degrees from normal.

**Local Actions**

Review the subdivision, site plan and driveway regulations to define existing standards for street and driveway alignment.

Amend the subdivision and site plan review regulations to prescribe minimum and maximum standards for street intersections and driveway alignments.

Require that redevelopment sites comply with the intersection and alignment standards to the maximum extent possible.

**Driveway Alignment**

<table>
<thead>
<tr>
<th>Ideal Angle:</th>
<th>90 degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Angle:</td>
<td>60 degrees</td>
</tr>
</tbody>
</table>

*Source: Policy on Geometric Design of Highways and Streets, AASHTO, 2001*
**SIGHT DISTANCE**

Sight distance is the length of the road that is visible to the driver. A minimum safe sight distance should be required for access points based on the roadway classification. The American Association of State Highway and Transportation Officials (AASHTO) publication *A Policy on Geometric Design of Highways and Streets* contains recommendations for sight distance based on the roadway design speed and grade. The sight distance will be greater for a roadway with a high speed and a downgrade as vehicles will take longer to stop in such a circumstance. For example, the safe stopping sight distance for a state highway with a design speed of 50 mph would be greater than the sight distance required for a residential street with a design speed of 30 mph. Sight distance may be more of a consideration in rural areas because of higher speeds and rolling/hilly terrain.

### Safe Stopping Sight Distance on Grades

<table>
<thead>
<tr>
<th>Design Speed (mph)</th>
<th>Safe Stopping Sight Distance (ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Downgrades 3%</td>
</tr>
<tr>
<td>25</td>
<td>158</td>
</tr>
<tr>
<td>30</td>
<td>205</td>
</tr>
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<td>45</td>
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<tr>
<td>50</td>
<td>446</td>
</tr>
<tr>
<td>55</td>
<td>520</td>
</tr>
</tbody>
</table>


**Local Examples**

**Town of Hudson:** The driveway regulations require 400 feet of safe sight distance in each direction.

**Town of Hollis:** The driveway regulations require safe sight distances based on the speed of the roadway.

**Local Actions**

Review existing zoning, subdivision, site plan and driveway regulations to determine the sight distance requirements. Amend the driveway regulations to establish minimum safe sight distance requirements based on the design speed of the road.
**TURNING LANES**

Turning lanes and tapers remove turning traffic from the through travel lanes. Turning lanes are used in situations with high traffic volumes. Tapers are used with lower traffic volumes and in areas with right-of-way limitations. Right turn lanes and tapers reduce traffic delays caused by the slowing of turning vehicles. Designated right or left turn lanes are generally used in high traffic situations on arterial and collector roadways. A traffic impact study will identify the need for turning lanes or tapers based on the existing traffic volumes, speed and the projected impact of the proposed use, and make recommendations on the design of the turning lane or taper. The length of the turning lane should be a minimum 2 car lengths and based on the number of vehicles likely to arrive in a 2 minute period at peak hour (unsignalized) or the signal length and timing.

![Continuous left turn lane](image1)

![Slip-by lane/paved shoulder in rural area](image2)

In rural corridors with lower traffic volumes and higher speeds, paved shoulders or slip-by lanes may be used to allow through traffic to pass by left turning vehicles.

Continuous two way left turn lanes can reduce the conflict and delays caused by vehicles turning left through on-coming traffic. Left turn lanes also reduce accidents caused by slowing vehicles and traffic going around on the right. Two way left turn lanes should only be used to retrofit areas of existing development. New roads that utilize other access management techniques should not need a two-way left turn lane.

![Full Right Turn Lane](image3)
**MEDIANS**

Medians are used to control and manage left turns and crossing movements as well as separating traffic moving in opposite directions. Restricting left turning movements reduces the conflicts between through and turning traffic, resulting in improved safety. Medians are typically used on arterial or other roadways with high volumes of traffic and four or more lanes of traffic.

The use and design of a median is determined by the characteristics of the roadway such as: traffic volumes, speed, number and configuration of lanes, right-of-way width and land uses along the roadway. The need for a median can be identified through engineering review, a traffic study assessing the impact of a proposed project, or as a recommendation of a roadway corridor study. Median designs need to consider pedestrian safety and should incorporate a pedestrian refuge at all crossings.

In addition, medians are often used in commercial and residential developments to separate lanes of traffic and limit conflicts caused by left turns. Medians can also add to the overall aesthetics of a roadway corridor or a development by incorporating landscaping or other items of visual interest.

**Local Actions**

Review the subdivision and site plan review regulations to determine the requirements for traffic impact studies.

Amend the subdivision and site plan review regulations to require traffic impact studies to identify needed roadway improvements resulting from the proposed development.
**PEDESTRIAN AND BICYCLE ACCESS**

A key aspect of access management is reducing the number of vehicle trips. This can be accomplished by providing safe and appealing pedestrian access within developments and between adjacent developments.

All new development and redevelopment of existing sites should address pedestrian and bicycle access to and within the site. Sidewalks should be provided in all urban residential subdivisions and in or adjacent to commercial or industrial developments. Sidewalks and other pedestrian facilities should comply with the Americans with Disabilities Act Standards for Accessible Design.

Crosswalks should be clearly marked and located in appropriate areas. Paint or paving materials can be used to delineate crosswalks. In addition to traditional brick, an alternative involves imprinting the asphalt with a brick design and then painting the crosswalk.

![Figure 30. Good separation of vehicles and pedestrians.](image1)

![Figure 31. Poor pedestrian access, Somerset Parkway. The crosswalk is poorly marked and crossing distance may be prohibitive for children, elderly and those with disabilities.](image2)

![Figure 32. Inaccessible crosswalk. The curb is a barrier.](image3)

![Figure 33. Accessible crosswalk, Milford.](image4)

![Figure 34. Redesigned pedestrian access, Somerset Parkway.](image5)
Parking lot designs need to address pedestrian access to the site and circulation within the site. Five foot wide sidewalks or striped pedestrian crossings should be provided from adjacent sites through parking lots to promote safe pedestrian access. Safe and appealing pedestrian circulation systems allow people to park their cars once and walk to different establishments, resulting in an overall reduction in the number of vehicle trips. For additional information on parking lot design see the NRPC publication *Non-Residential Community Character Guidelines*, 2000.

Joint and cross access between developments can provide opportunities for shared parking. Shared parking can reduce the overall number of spaces required for adjacent developments, particularly if the peak demand for specific uses are complimentary. For example, a bank and a movie theater would have their peak parking needs at different times of day. In addition, recent trends in parking standards call for establishing minimum and maximum standards for the number and the size of parking spaces required for specific uses. Requirements for the number and the size of parking spaces will vary depending on the size of the community and the type of use. Decreasing the amount of parking required reduces the distance between facilities and results in a shorter walking time for pedestrians.

Many urban and rural communities are constructing bicycle and pedestrian pathways connecting neighborhoods with schools, downtowns, employment centers and commercial districts. Maintaining existing and developing new corridors for walking and biking will promote the use of these transportation modes and reduce the overall number of vehicle trips.
Local Examples

Town of Litchfield: The road design standards require developments along Albuquerque Avenue to construct an 8 foot pedestrian/bicycle path.

City of Nashua: The subdivision regulations require the construction of 5 foot wide sidewalks in residential, commercial and industrial developments.

Town of Merrimack: The subdivision regulations require sidewalks be constructed along all existing or proposed collector or arterial streets or streets constructed as part of a subdivision.

Town of Brookline: The site plan regulations provide for shared parking and for minimum and maximum parking provision requirements.

Local Actions

Review the subdivision and site plan review regulations and the roadway standards to determine the existing requirements for pedestrian and bicycle access to and within developments.

Amend the subdivision and site plan review regulations and/or roadway standards to require the construction of a 5 foot wide, ADA compliant sidewalk with a 4-6 foot planting strip between the sidewalk and the street.

Amend the site plan review regulations to provided for shared parking and for minimum and maximum parking provision requirements.

Develop a community wide plan for sidewalks and bicycle paths to connect activity centers with neighborhoods.
**TRANSIT PROVISIONS**

Provisions should be made for bus turnouts and shelters in areas served by transit systems, particularly on arterials. Turnouts allow buses to pull off the road without impeding the flow of through traffic. Large new commercial developments or redevelopment of existing facilities in areas served by transit systems should include shelters, drop-off locations and pedestrian access in the overall site design.

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**Local Examples**

**City of Nashua:** The site plan regulations require provisions for public transit connections be provided where deemed necessary and appropriate by the public transit agency.

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**Local Actions**

Review the subdivision and site plan review regulations to determine existing requirements for transit facilities.

Amend the subdivision and site plan review regulations to require bus turnouts and shelters for developments such as large retail or employment centers where existing or proposed transit services are provided.

Amend the site plan review regulations to require that pedestrian connections be provided to the transit stop, and that appropriate shelters are constructed.

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*Figure 40. Bus pull-off design. Buses can pull out of the flow of traffic and there are pedestrian connections to the bus shelter.*

*Figure 41. Bus stop redesign. This bus stop on Route 101A could be improved to provide pedestrian access, shade trees and a shelter (Terrance DeWan and Associates).*
FRONTAGE AND BACKAGE ROADS

Frontage and backage roads generally run parallel to an arterial or major collector and provide direct access to adjacent properties. As the names imply, frontage roads are located in front of the buildings/parcels - between the buildings and the arterial. Backage roads run behind the parcels providing access to the rear of parcels that front on the arterial. The major benefit of frontage/backage roads and service roads is the elimination of conflict points along the arterial. Eliminating the need for direct access improves the efficiency and safety of the arterial or collector.

Frontage and backage roads are most commonly used or identified with commercial and industrial land uses. In addition, many commercial and industrial developments are developed as subdivisions with an internal road network that provides frontage and access to the individual businesses.

One key factor to the development of these types of roads is the separation of the intersection of the frontage/backage road with a cross road and the intersection of the cross road with the arterial. A 300 foot separation of the frontage/backage road intersection with the cross road and the cross road intersection with the arterial is recommended by the Transportation Research Board in Report 348, Access Management Guidelines for Activity Centers. Similar to providing adequate driveway throat length, the 300 foot separation reduces vehicle conflict at the intersection of the cross road and the arterial.

Local Examples

City of Nashua: The subdivision regulations require the construction of a “parallel” road to provide access to land adjacent to a limited-access highway, railroad right-of-way or an open watercourse. The parallel road must be at a sufficient distance that the land between the two roads can be used for another use in conformance with the zoning ordinance.

Town of Litchfield: The zoning ordinance encourages the use of an “internal” road to provide access to land along NH Route 3A by reducing the frontage requirement from 500 feet along 3A to 150 feet along an internal road.

Local Actions

Review provisions for frontage/backage roads in the zoning ordinance, subdivision and site plan review regulations.

Amend the zoning ordinance to allow reduced frontage requirements along arterials and collectors when a frontage/backage road is used instead of a driveway.

Adopt subdivision and site plan requirements to require construction of frontage/backage roads to service parcels adjacent to arterials or collectors. Allow for temporary access to the arterial while the internal road is being developed.
ROUNDABOUTS

Many communities in the United States are beginning to embrace the concept of "roundabouts." A roundabout is an intersection control measure used successfully in Europe and Australia for many years. A roundabout is composed of a circular, raised, center island with deflecting islands on the intersecting streets to direct traffic movement around the circle. Traffic circulates in a counter-clockwise direction making right turns onto the intersecting streets. There are no traffic signals; rather, entering traffic yields to vehicles already in the roundabout.

Advantages of roundabouts include reduced traffic delays, increased safety and reduced right of way requirements. They can reduce delays because the stop signal phase (when vehicles entering the intersection are unable to move) is eliminated. At the same time, roundabouts can improve safety because the number of potential impact points, and the number of conflict points the driver must monitor, are both substantially reduced over a conventional four-way intersection. Properly designed roundabouts can also accommodate emergency vehicles, trucks and snow plowing equipment.

Unlike the typical New England “traffic circle” or “rotary,” design standards for roundabouts are very specific and the Federal Highway Administration (FHWA) has prepared a design guide for modern roundabouts in the United States. Development of a roundabout should only occur as a result of an intersection study by a qualified Traffic Engineer and when the minimum capacity and design criteria can be met. The FHWA has determined that the maximum flow rate that can be accommodated at a roundabout depends on the geometric elements (circle diameter, number of lanes), the circulating flow (vehicles going around the circle), and entry flow (vehicles entering the circle). A single lane roundabout can accommodate up to 1,800 vehicles per hour and a double lane roundabout can accommodate up to 3,400 vehicles per hour. The capacity of a roundabout will be lower, however, as the entry flow increases (i.e. more vehicles trying to get on the roundabout conflicting with those already going around the circle).

Figure 43. Typical roundabout design.

Source: FHWA, Roundabouts: An Informational Guide.

Figure 44. Typical roundabout.

The National Transportation Research Board examined traffic delays before and after roundabouts were installed at eight intersections in the United States. The study determined that delays (the time spent stopped and moving up to the intersection) decreased on average by 78% and 76% during the AM Peak Hour and PM Peak Hour, respectively.² The results indicate that roundabouts can reduce congestion in certain circumstances. In addition, the FHWA studied safety characteristics of a sample of eleven roundabouts in the United States. The agency determined that the number of personal injury accidents and property damage-only accidents decreased 51% and 29%, respectively, after roundabouts replaced conventional intersections.¹ Roundabouts may be an appropriate solution for certain problem intersections in the region.

Local Actions

Review existing zoning, subdivision, site plan review regulations and road standards to determine if any provisions would prohibit the use of roundabouts in the community.

Amend the subdivision and site plan review regulations and the road standards to provide for the use of roundabouts including: 1) a general statement describing the community’s purpose and intent for using/encouraging roundabouts; and 2) the basic parameters for the use of roundabouts.

Revise the road standards to reference the FHWA design criteria for roundabouts.

IMPLEMENTATION OF ACCESS MANAGEMENT TECHNIQUES

There are a number of ways to implement the access management techniques described in the previous section, including: 1) the Master Plan; 2) the zoning ordinance; 3) the subdivision and site plan review regulations; 4) corridor studies; 5) consolidation of access points; 6) master planning – undeveloped sites; and 7) master planning - redevelopment sites.

MASTER PLAN

The purpose of a Master Plan is to guide the development of a community. Preparing the Master Plan is one of the main responsibilities of the Planning Board. The Master Plan provides data on current conditions and historical trends; outlines the community’s policies toward development; recommends future land use and development patterns; and serves as the basis for the community’s zoning, subdivision and site plan regulations. The general land use policies of the Master Plan define what the community wants to look like in the future.

The transportation chapter covers the specifics of the transportation network within the community. The chapter reports on existing conditions such as roadway classifications, traffic counts, accident data, roadway conditions, roadway level of service, traffic forecasts, the impact of future projects, and specific transportation issues within the community such as access management.

General transportation policies should be defined relative to access management. These could include such general statements as:

“Promote an interconnected street network by limiting the use of dead end streets/cul-de-sacs and requiring stub connections to vacant parcels for future road development;” or “Provide internal pedestrian and vehicular connections between adjacent commercial uses wherever possible;” or “Promote shared access between commercial/industrial developments and residential subdivisions.” Other policies could address specific access management issues in a community. For example, the Town of Brookline Master Plan states that “Frontage roads paralleling NH Route 13 should be encouraged in order to limit the number of curb cuts on NH Route 13;” and the Town of Litchfield Master Plan asserts that “No driveways will take direct access from Albuquerque Avenue.”

In addition, communities should evaluate their roadway system to identify important local corridors and issues surrounding future development within these corridors. Once the local planning process is completed, communities should meet with representatives from the NHDOT to discuss local issues and policies for future development outlined in the Master Plan.

NH RSA 674:1

Planning Board Duties

“It shall be the responsibility of every planning board established under RSA 673:1 to prepare and amend from time to time a master plan to guide the development of the municipality.”

The Planning Board should also identify any corridors in need of additional planning. Comprehensive studies can assist in maintaining roadway capacity through a higher awareness of the impacts of various land uses and development designs.
ZONING ORDINANCE

The zoning ordinance is the principal tool for implementing the Master Plan. It establishes the basic development parameters for the community by defining what types of development will be permitted, where they will be allowed and the basics of how they will be designed. In most communities in New Hampshire, amendments to the zoning ordinance must be voted on by town residents on the official ballot.

If a community does not like the patterns of development that have occurred, chances are the zoning ordinance may be at fault.

A community’s zoning ordinance defines land development patterns and has a significant impact on the transportation network. Having evaluated access management issues in the Master Plan and established policies to guide future development, the community should then examine the provisions of its zoning ordinance to evaluate its impact on the capacity of the roadway system.

Many communities have based their commercial zoning districts on strip development patterns. If the community does not like the result of strip development and if it is not possible to amend the zoning to encourage more compact and/or mixed use development, then frontage, setback and building location requirements should be considered relative to access management techniques.

For example, smaller frontages increase the number of access points. Less developed rural and collector roadways in particular should require greater frontages than local roads to limit the number of curb cuts and minimize the negative impacts on roadway capacity and traffic flow. In addition, setbacks need to be sufficient to provide for adequate sight distance and sidewalks. Requiring that buildings be constructed at the front of the property with parking at the rear or side can also improve the aesthetics of the corridor, allow for adequate throat length and result in shorter walking distances from sidewalks to building entrances.

Questions to Ask about the Zoning Ordinance

Does the current zoning promote strip development along arterial and collector roads?

Does the ordinance provide opportunities for mixed use developments?

Does the ordinance limit the number of access points per parcel?

Should the frontage requirement be increased on arterial and collector roads to limit the number of access points?

Does the ordinance promote an interconnected road network?

Figure 45. Strip development with multiple curb cuts and roadway capacity difficulties, DW Highway.

Figure 46. Compact development versus strip development, (Julie Campoli, Urban Design and Landscape Architecture).
SUBDIVISION AND SITE PLAN REGULATIONS

The subdivision and site plan regulations define how development will take place within a community. These regulations are more flexible than the zoning ordinance because they are adopted by the Planning Board and can be amended at any time by a majority vote of the Board after a properly noticed public hearing. In addition, the Planning Board has the authority to waive any of the requirements within the regulations.

The regulations specify the information that needs to be provided as part of the development review process. Design standards are set forth covering such areas as roads, parking, sidewalks and pedestrian circulation, vehicle circulation, landscaping, stormwater management, utilities and fire protection. The regulations also specify what information is to be provided to the Planning Board to assist in the decision making process. One such item directly related to access management is the traffic study. The traffic study provides the planning board with the detailed information required to assess the impact of the proposed development on the existing transportation system and recommends a course of action to alleviate the impact such as constructing a turning lane or installing a traffic signal.

Most of the access management techniques discussed earlier are appropriately addressed in the subdivision or site plan review regulations. Model language can be found in the Appendix.

DRIVEWAY REGULATIONS

The NH DOT issues driveway permits for all proposals for access the state road system. Until recently, the DOT would issue permits with limited input from the local decision makers. To improve the coordination of local and state planning objectives along the state’s road system, the DOT is instituting a process to better involve local officials in the permitting process. The DOT has developed a Memorandum of Understanding (MOU) which is an agreement between the DOT and the community to coordinate the review and issuance of driveway permits to access state roads.

The MOU contains a number of requirements for the community and the DOT:

- The community must develop, adopt and enforce access management standards for state highways that comply with best management practices for access management.
- The community can develop site or parcel specific access management plans for highway corridors or segments.
- The community must notify the DOT District Engineer when it receives a development proposal that would require a state driveway permit and solicit input on the design.
- The community shall require that all access points comply with its adopted access management standards and any applicable site specific access plans.

Questions to ask about the Subdivision and Site Plan Regulations

Do the subdivision regulations promote an interconnected street network?
Do the regulations specify the number, location and design standards of driveways?
Are shared driveways and shared parking permitted by the regulations?
Do the site plan regulations promote joint and cross access in commercial developments?
Are the provisions for pedestrian and bicycle access adequate for the size of the community and do they meet FHWA and ADA standards?
Are the appropriate provisions contained in the regulations to promote interconnections for transit, pedestrian and bicycle access to and within developments?
- The community must inform the DOT of any waivers or variances from the access management standards or plans prior to local approval and provide appropriate notice for comments.
- The DOT will not approve driveway permits that do not conform to the local access management standards or plans except with the consent of the community.
- The DOT District Engineer shall notify the community and transmit copies of all driveway access permit applications to the Planning Board.
- The DOT will withhold final action on any driveway access permit until the Planning Board has formally approved the access plan for the development.
- The DOT must notify the community if it intends to issue a driveway access permit that is not in conformance with the adopted access management standards or parcel specific plan.
- All corridor or site specific access management regulations or plans must be filed with the DOT.

It is highly recommended that all communities in the region consider entering into the MOU with the DOT. In addition, communities should develop a permitting process for driveways accessing local roads. Such permits can assist with the implementation of access management techniques.

**CORRIDOR STUDIES**

In addition to identifying and discussing access management issues in the Master Plan, a Planning Board may wish to conduct specific corridor studies for arterial and collector roadways in the community. Corridor studies provide a detailed assessment of the function of the roadway and the land use conditions within an established boundary. The information collected is used to identify problems and solutions to maintain the capacity of the roadway, promote compatible development patterns and enhance the aesthetics of the corridor. The result is a unified strategy for

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**Figure 46. Excerpt from NH 101A Study Interim Report showing various access management techniques that may assist in preserving the roadway capacity.**
dealing with development in the corridor while maintaining roadway capacity.

The Regional Planning Commissions and the NH DOT can provide technical assistance to communities wishing to conduct a corridor study. Studies are currently being conducted on for NH 101A from Nashua to Milford, NH 101 from Bedford to Wilton and NH 3A in Hudson and Litchfield. Additional studies should be considered for other corridors in order maintain roadway capacity. Communities interested in a corridor study should contact their Regional Planning Commission.

Some of the interim recommendations of the NH 101A Study are shown on Figure 44, above. They include the consolidation of curb cuts, the addition of pedestrian crossings and constructing cross connections between existing developments. In addition, the Study recommends re-timing the signal system, constructing additional left turn lanes at various intersections and widening of the roadway from Celina Avenue to the Amherst Street Mall.

**CONSOLIDATION OF ACCESS POINTS**

Communities should take advantage of any opportunities to consolidate access points and provide cross access between existing developments as projects come under the review process. Reducing the number of potential conflict points will improve traffic flow and increase safety on the roadway. In addition, negotiations with property owners to consolidate multiple curb cuts may be possible under certain circumstances.

**Local Actions**

- Identify roadways with either existing capacity issues or with large areas of undeveloped land and work with the Regional Planning Commission and the NH DOT to develop management strategies.
- Prepare corridor plans for the arterials and collectors in the community to identify access management issues and plan for improvements prior to the receipt of development applications.
- Work with the Regional Planning Commission and the NH DOT to enter into a Memorandum of Understanding to address access management along state roads within the community.

![Figure 47. Multiple curb cuts can be consolidated into fewer curb cuts to reduce turning movement conflict.](image)
MASTER PLANNING - UNDEVELOPED SITES

Often, large sites get developed in small pieces rather than presenting a proposal for the overall design of the entire site. For access management purposes as well as overall site design, it is important to consider the development potential of the entire site, the types of development permitted by zoning and the types of development desired by the community. This is particularly important along the major roadways in the community where new development could have a significant impact on traffic.

Site planning can minimize many of the problems associated with the development of large parcels. For example, a mixed use development on this site in Hudson (see Figures 48-49) could reduce the overall number of vehicle trips because housing, employment, commercial and recreation opportunities could all be located on one mixed use development. In addition, the interconnections to adjacent developments could provide additional opportunities to walk or bike instead of driving. The subdivision and site plan review regulations should require that applicants present a coordinated plan for development of the entire parcel and the Planning Board should enforce this provision. Another option would be for the Planning Board to identify key undeveloped sites along arterial and collector roadways and develop overall site and access management plans for them.

Local Actions

Amend the subdivision and site plan review regulations as necessary to require that applicants provide an overall development and access management plan for large sites.

Work with applicants and staff to develop a preliminary review process to receive Planning Board input into the design at the outset of the project.

Identify key undeveloped parcels along arterial and collector roadways and devise a coordinated access management plan.
MASTER PLANNING – REDEVELOPMENT SITES

Many existing developments lend themselves to redevelopment using access management principals. Redevelopment provides an opportunity to address problems associated with existing developments, such as vehicular access, pedestrian access to and within the site and underutilization of the site. The Planning Board should consider consolidating access points to arterial or collector roadways; limiting previously unrestricted access; and providing for vehicular and pedestrian cross access between sites. In addition, there may be opportunities to increase the density of development on underutilized sites. By utilizing an existing site, curb cuts can be reduced, shared parking can be provided, landscaping can be improved and new buildings can improve the aesthetics.

Figure 48. This parking lot serving an existing retail development in Hudson could be redeveloped as shown to include mixed office and retail without a need for additional parking (CEI, Inc.).

Figure 49. Similar to the Hudson site, this shopping center in Merrimack has a potential for redevelopment with new structures along the frontage (CEI Inc.).

Local Actions

Amend the site plan review regulations to include specific provisions for the redevelopment of sites. These provisions should include: 1) requirements for consolidating access points where appropriate; 2) eliminating unrestricted access; 3) providing cross access to adjacent lots where appropriate; 4) improving pedestrian access to and within the site; and 5) taking advantage of opportunities to increase the density of development on the site if appropriate.
REFERENCES

Access Management Ordinance, City of Woodburn, OR, 1996.


Burden, Dan, Streets and Sidewalks, People and Cars, Sacramento: Local Government Commission Center for Livable Communities, pp. 41-42.


Rockingham Regional Planning Commission, Local Access Management Manual, Exeter, NH.


Williams, Kristine, Economic Impacts of Access Management, Tampa: Center for Urban Transportation Research, University of Florida.
ACCESS MANAGEMENT GUIDELINES

APPENDIX

- EXAMPLE SITE PLAN AND/OR SUBDIVISION REGULATION LANGUAGE -
INTRODUCTION
The following example site plan and/or subdivision regulation language has been adapted from various access management guidelines, ordinances and regulations from New Hampshire and around the country. The examples are designed to assist the region’s communities with amending their site plan and/or subdivision regulations as a method of implementing the access management techniques. Communities are encouraged to use the examples as a starting point and adapt them to local conditions as needed. The examples cover: 1) the number, spacing and width of access points; 2) turning radii; 3) corner clearance; 4) throat length; 5) shared access; 6) alignment of access points; 7) sight distance; 8) pedestrian and bicycle access; 9) transit provisions; and 10) roundabouts. There is no specific language for turning lanes, medians and frontage/backage roads as the need for these facilities are project specific and should be determined by a traffic study.

1. Number, Spacing and Width of Access Points
a. Driveway Approach Width (commercial/industrial): The maximum width of a driveway approach for a two-way driveway shall not exceed thirty-six feet (36’) including two-foot (2’) shoulders. The minimum width of a driveway approach for two-way driveway shall not be less than twenty-four feet (24’) including two-foot (2’) shoulders.
b. Driveway Approach Width (residential): The maximum width of a driveway approach shall not exceed fifteen feet (15’). The minimum width of a driveway approach shall not be less than ten feet (10’).
c. Driveway Access Spacing: Driveway access spacing shall be measured from the edge of the proposed driveway pavement to the nearest edge of the roadway of the adjacent or opposite driveway or street.
   i. Opposite-right driveways shall be located no closer than the minimum requirements of Table 1A. Additional opposite right spacing over and above that set forth in Table 1A may be required if the Planning Board determines that there is insufficient left turn queue storage or weave maneuver area between the opposite right driveway and proposed driveway. This determination shall be made under peak traffic conditions.

<table>
<thead>
<tr>
<th>Roadway Classification</th>
<th>Minimum Spacing (Feet)</th>
<th>Desirable Spacing (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Arterial</td>
<td>300</td>
<td>400</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>225</td>
<td>300</td>
</tr>
<tr>
<td>Collector</td>
<td>175</td>
<td>225</td>
</tr>
<tr>
<td>Local Street</td>
<td>125</td>
<td>225</td>
</tr>
</tbody>
</table>

   ii. A minimum of one hundred twenty-five (125’) shall be required between opposite-left driveways for all roadway classifications.

1 Includes: Iowa Access Management Handbook; City of Woodburn, OR, Access Management Ordinance; American Planning Association Growing Smarter Legislative Guidebook; Nashua Regional Planning Commission, draft Model Site Plan Regulations; and zoning ordinances and site plan regulations from various communities in the Nashua, NH region.
iii. Same-side adjacent driveways shall be located no closer than the minimum requirements of Table 1B.

<table>
<thead>
<tr>
<th>Roadway Classification</th>
<th>Minimum Spacing (Feet)</th>
<th>Desirable Spacing (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Arterial</td>
<td>275</td>
<td>350</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>230</td>
<td>300</td>
</tr>
<tr>
<td>Collector</td>
<td>185</td>
<td>235</td>
</tr>
<tr>
<td>Local Street</td>
<td>150</td>
<td>190</td>
</tr>
</tbody>
</table>

- OR -

b. **Driveway Access Spacing.** Driveway access spacing shall be measured from the edge of the proposed driveway pavement to the nearest edge of the roadway of the adjacent or opposite driveway or street. Driveway access spacing shall meet the requirements of Table 1A.

<table>
<thead>
<tr>
<th>Roadway Classification</th>
<th>Minimum Spacing (feet)</th>
<th>Desirable Spacing (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Arterial</td>
<td>300</td>
<td>500</td>
</tr>
<tr>
<td>Minor Arterial</td>
<td>100</td>
<td>300</td>
</tr>
<tr>
<td>Collector</td>
<td>100</td>
<td>200</td>
</tr>
</tbody>
</table>

2. **TURNING RADIUS**

a. **Turning Radii.** The principal users of the roadway shall be considered when determining the inside turning radii. The inside turning radii shall vary between a minimum of fifteen feet (15’) and a maximum of thirty feet (30’) and meet the minimum and maximum requirements of Table 2A.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Minimum Inside Turning Radii (feet)</th>
<th>Maximum Inside Turning Radii (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential Only</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>Commercial/Industrial Only</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Mixed Uses</td>
<td>15</td>
<td>30</td>
</tr>
</tbody>
</table>

3. **CORNER CLEARANCE**

a. No driveway approach may be located closer to the corner than indicated in Table 3A. The measurement shall be taken from the intersection of property lines at the corner to the nearest edge of the proposed driveway pavement. When these requirements cannot be met due to lack of frontage, the nearest edge of the proposed driveway pavement shall be located as far as possible from the intersection of property lines at the corner.
Table 3A. Distance of Driveway Approach from Corner

<table>
<thead>
<tr>
<th>Speed (mph)</th>
<th>Distance from Corner (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>325</td>
</tr>
<tr>
<td>35</td>
<td>425</td>
</tr>
<tr>
<td>40</td>
<td>525</td>
</tr>
<tr>
<td>45</td>
<td>630</td>
</tr>
<tr>
<td>50</td>
<td>750</td>
</tr>
<tr>
<td>55</td>
<td>875</td>
</tr>
</tbody>
</table>

4. THROAT LENGTH

a. Driveway Throat Length. Driveway throat length shall be measured from the edge of the property line to the furthest end of the driveway. A minimum driveway throat length of twenty-five feet (25’) for collector streets, forty feet (40’) for minor arterials, and fifty-five feet (55’) for major arterials shall be required. The purpose of the driveway throat length is to allow for traffic entering the site to be stored on site in order to avoid a queue of traffic on the roadway causing delays and a potentially hazardous situation.

5. SHARED ACCESS

a. Shared Access. Shared driveways are encouraged and may be required between adjacent lots that front on arterial and collector streets. In such cases, a joint access easement between the property owners may be required. The location and dimensions of said easement shall be determined by the Planning Board. See Diagram 7A.

![Diagram 7A. Shared Access.](image)

b. Shared Parking Provision. Parking provision for any combination of uses on the same site shall consider the opportunity for combined visits (i.e. one parking space in front of a gas station pump may count as one parking space for both the convenience store and the gas station in a combined gas station/convenience store development). Shared parking arrangements with adjoining non-residential developments or other uses on site are encouraged. Off-site shared parking shall be protected with a shared parking easement agreement which shall be reviewed and approved by the Planning Board and recorded with the approved site plan.

c. Parking shall be located within six hundred feet (600’) of the principal use and connected to the principal use by a five foot (5’) wide pedestrian path.
d. Parking shall not be permitted in any required setback or between the principal structure and a public street, including corner lots. Parking shall be located to the side or rear of the principal structure. The Planning Board may waive this requirement in situations where lot configuration or use renders such parking lot location impractical, however, effort shall be made to locate parking to the side or rear of buildings. See Diagram 7B.

e. Side yard parking shall be limited to a single row of vehicles. See Diagram 7B.

![](image)

Diagram 7B. Parking to Side and Rear of Principal Structure.

6. **Alignment of Access Points**

   a. **Intersection Alignment.** If a proposed driveway cannot meet the requirements of Section 1, above, then the proposed driveway shall be aligned directly opposite an existing or proposed opposite driveway and the configuration shall be treated as a four-way intersection.

   b. **Angle of Driveway Approach.** The angle of driveway approach shall be approximately ninety (90) degrees for two-way driveways and between sixty (60) degrees and ninety (90) degrees for one-way driveways.

7. **Sight Distance**

   a. All season safe sight distance is defined as a line which encounters no visual obstruction between two (2) points, each at a height of three feet nine inches (3'-9") above the pavement, and ten feet (10') back from the road pavement as to represent the critical line of sight between the operator of a vehicle using the access and the operator of a vehicle approaching from either direction.

   b. Safe sight distance shall be compatible with the maximum speed limit posted on the roadway as indicated in Table 6A.
Table 6A. All-Season Safe Sight Distance

<table>
<thead>
<tr>
<th>Speed Limit (mph)</th>
<th>All Season Safe Sight Distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Downgrades 6% 9%+ Upgrades 6% 9%+</td>
</tr>
<tr>
<td>25</td>
<td>158  165 173 147 143 140</td>
</tr>
<tr>
<td>30</td>
<td>205  215 227 200 184 179</td>
</tr>
<tr>
<td>35</td>
<td>257  271 287 237 229 222</td>
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<tr>
<td>40</td>
<td>315  333 354 289 278 269</td>
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<td>45</td>
<td>378  400 427 344 331 320</td>
</tr>
<tr>
<td>50</td>
<td>446  474 507 405 388 375</td>
</tr>
<tr>
<td>55</td>
<td>520  553 593 469 450 433</td>
</tr>
</tbody>
</table>


c. To prevent hardships to owners of small parcels of land or special land uses, exceptions to the all season safe sight distance requirements should be allowed for individual homes, agricultural land, public works land, highway department land and temporary accesses for vehicles such as construction vehicles, gravel trucks and log trucks. The road shall then be properly signed for “Blind Drive” or “Trucks Entering.”

8. BICYCLE AND PEDESTRIAN PROVISION

a. General Provisions. The site plan shall provide for a system of pedestrian and/or bicycle paths appropriate to the type and scale of development. This system shall connect the major building entrances/exits, parking areas and any existing sidewalks within or adjacent to the project. The pedestrian and/or bicycle network may be located either in the street right-of-way or outside of the right-of-way in open space or recreation areas. The system shall also be designed to link the project with residential, recreational, commercial facilities, schools, bus stops and existing bicycle or pedestrian facilities in the neighborhood. When deemed appropriate, connections with amenities such as parks or open space on or adjacent to the site may be required.

b. Pedestrian Paths. A minimum five foot (5’) wide pedestrian path shall be provided throughout the site, connecting adjacent streets, sidewalks and parking area(s) to the entrances of all principal structures. Pedestrian paths shall be marked by accent strips of brick, concrete block or textured paving materials to define pedestrian walkways and crosswalks. Pedestrian paths may be incorporated with accessible routes as required by the Americans’ with Disabilities Act, as amended. Guidelines for sidewalk construction features are as follows (guidelines may be modified to meet site specific situations with Planning Board approval):

i. Accessibility. Sidewalk corridors shall be easily accessible to all users, whatever their level of ability and comply with all Americans with Disability Act (ADA) standards.

ii. Adequate Travel Width. The sidewalk shall be a minimum of five feet (5’) wide.

iii. Continuity. The walking route along a sidewalk corridor shall be obvious, shall connect destinations and shall not require pedestrians to travel out of their way unnecessarily.

iv. Landscaping. Plantings and street trees in the sidewalk corridor shall create a desirable environment and shall contribute to the psychological and visual comfort of sidewalk users.

v. Social Space. Sidewalk corridors shall provide places for people to interact. There shall be places for standing and sitting.
vi. Quality of Place. Sidewalk corridors shall contribute to the character of neighborhoods and business districts and strengthen their identity. Rural pathways/trails or mixed use trails shall be considered as alternatives where appropriate (See Diagrams 8A and 8B).

Diagram 8A. Typical Residential Sidewalk Section.  
Diagram 8B. Typical Urban Sidewalk Section.

c. Bicycle Facilities. Separate bicycle facilities may be required by the Planning Board if deemed appropriate. Bicycle facilities may be provided in the form of a separate off-street path or on-street marked bicycle lanes. Bicycle facilities may be combined with pedestrian facilities. Bicycle facilities shall be designed in accordance with AASHTO, Guide for the Development of Bicycle Facilities, 1999, as amended.

9. TRANSIT PROVISIONS

a. Mass Transit Facilities. Mass transit facilities shall be incorporated within all major site plans that could generate high volumes of transit use. Transit routes, access points, bus pull-out facilities and shelter locations shall be addressed along major roadways within and on the perimeter of such projects. Transit facilities shall be provided in a manner to make transit an attractive mode of travel for both employees and patrons. Shelters shall be located next to significant clusters of buildings, and shall be provide protection from prevailing winds and inclement weather. A five foot (5’) wide pedestrian path shall connect the bus shelter to the principal structure(s) in the development. See Diagram 9A.

Diagram 9A. Mass Transit Facilities.

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2 Source: Portland, OR Pedestrian Guidelines.
b. **Bus Pull-Out Facilities.** Bus pull-out facilities shall be incorporated into all mass transit projects located along a collector or arterial roadway. A clear separation shall be provided between the pull-out facilities and vehicular traffic and parking lots or parking structures. Pull-out facilities shall not obstruct traffic flow when buses discharge passengers. See Diagram 9B.

![Diagram 9B. Bus Pull-out Facility.](image)

10. **ROUNDABOUTS**

a. **Roundabouts.** Roundabouts as defined in FHWA, *Roundabouts: An Informational Guide*, June 2000, as amended, may be used as an alternative to traditional three or four-way intersections where traffic conditions allow.

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