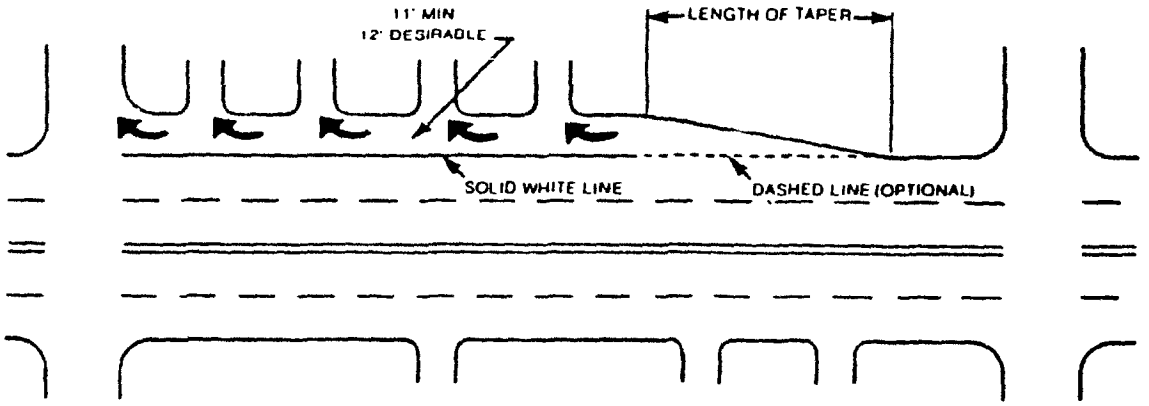
HENDERSON CITY/COUNTY

ACCESS STANDARDS MANUAL

ADOPTED BY THE CITY OF HENDERSON
BY ORDINANCE 42-90
AUGUST 28, 1990



JULY, 1990

HENDERSON CITY/COUNTY

ACCESS STANDARDS MANUAL

ACTIONS TO ENSURE THE EFFICIENT USE

OF EXISTING ROAD SPACE

prepared by

EVANSVILLE URBAN TRANSPORTATION STUDY

July, 1990

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Federal Highway Administration

ACKNOWLEDGMENTS

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(NV) = Non-Voting

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The Evansville Urban Transportation Study (EUTS) is the designated Metropolitan Planning Organization (MPO) for the Evansville urbanized area. Metropolitan Planning Organizations are federally mandated for all urban areas with a population over 50,000 in order for the local governments within the area to be eligible to receive U.S. Department of Transportation planning and construction funds. The EUTS Study Area includes the City of Evansville and all of Vanderburgh County, the Town of Newburgh and a portion of Warrick County in Indiana, and the City of Henderson and a portion of Henderson County in Kentucky. Being the federally recognized Metropolitan Planning Organization for this area, EUTS carries out highway and transit planning, grants management and traffic studies for these local governments.

INTRODUCTION

This manual was developed for the purpose of establishing guidelines and standards for the review and approval of driveway access to public roads. These guidelines apply when a rezoning, a change in land use, a conditional use permit or a certificate of occupancy is requested, or when a change in trip generation or traffic patterns is anticipated due to proposed alteration of a development site. The guidelines contained herein are based upon engineering analysis and judgment, and are intended to cover a variety of conditions, regarding various types of residential, commercial, and industrial access. Certainly, there are many variables which affect the number, location, and physical dimensions of access riveways. Thus, no one set of regulations can be expected to apply to all access situations. Therefore, a range of dimension guidelines have been developed.

The efficient and safe movement of traffic on a roadway facility is largely dependent upon the amount and type of roadway interference. Impediments to traffic flow can result in major decreases in the effective capacity of a roadway. Serious impediments can result from vehicular movements to and from residential, commercial, or industrial development along the facility. Many of these flow impediments are the result of poor design and development policies such as improper curb cut location, numerous curb cuts within a short distance, inadequate design dimensions, and lack of auxiliary lanes where required. These conditions which indicates a lack of access management, often occur along strip developments on major urban arterials.

The term access management refers to those efforts intended to minimize traffic conflicts associated with driveway ingress and egress. Regulation of the number, location, and design of access is necessary to assure safe and efficient operation of both the roadway and the access drive. If driveways are too closely spaced, they reduce the ability of traffic to enter the roadway, rather than enhance access opportunities. Poor access can, in turn, adversely impact future economic development of an area. If drives are poorly designed, turning vehicles block or slow the major traffic stream, causing unnecessary delay and creating hazardous conditions.

Access to property from roadways is normally a right of the property owner. The degree of access, however, can be limited by the public agency responsible for the route. Access management techniques can be implemented with two basic legal powers: police power and eminent domain. The first power allows the responsible public agency to restrict individual actions for public welfare. The second power allows a public agency to take property for public use provided the owner is compensated for the loss. Police power is sufficient authority for most access management techniques associated with highway operation, driveway location, and driveway design.

A comprehensive access management program can minimize traffic conflicts and accidents; reduce delays for motorists; and lower major capital expenditures on over-burdened highways. Access management techniques include locational controls and restrictions; geometric design aspects and traffic operational controls. By enhancing the efficient use of existing road space, these actions will further Henderson's Transportation Systems Management goals.

RESPONSIBLE AUTHORITY

Connection of private property to a public road for vehicular access may involve various land use and engineering considerations such as zoning, traffic generation, pavement thickness, drainage, and roadway geometrics. In order to provide for proper government review of these considerations, a person requesting access to a public street may need to obtain the correct zoning, building permit, certificate of occupancy, and/or driveway approval from the appropriate City/County governmental agent or agencies. For the purposes of this manual, the term Responsible Authority contained herein shall apply as indicated below. The Henderson-Henderson County Planning Commission shall have the final administrative authority for the access standards contained herein.

City Engineer/County Engineer

Responsible for: approval of driveway requests, and approval of site plans in regard to drainage, pavement thickness, construction details, and construction inspection.

Henderson-Henderson County Planning Commission

Responsible for: issuance rezoning approvals (which may involve access issues) and administering the subdivision and other appropriate regulations of the Planning Commission.

City and County Codes Administrator

Responsible for: administering the zoning, issuance of building permits, approval of site plans and construction inspection.

City and County Board of Zoning Adjustment

Responsible for: issuance of conditional use permits and zoning variances.

Evansville Urban Transportation Study

Responsible for: providing technical assistance and reviewing major developments for transportation impacts as requested by City/County Engineer.

DEFINITIONS

1. Access - The vehicular movement to and from an abutting property to a street; includes only that part of the driveway that lies within the established right-of-way limits of the street.

2. Access, Control of the limiting of access from a street to the abutting property through curb cut approvals and access management techniques, such as auxiliary lanes.

3. Acceleration Lane - an auxiliary lane constructed as part of the driveway which enables egressing vehicles to increase speed prior to entering the through traffic stream.

4. Annual Average Daily Traffic - the total 24-hour traffic volume computed for an annual average. The term is commonly abbreviated as AADT.

5. Approach Pavement - that portion connecting the edge of pavement of the public roadway and the driveway. May include tapers for vehicle deceleration, acceleration, turning, or other purposes supplementary to through traffic movements.

6. Channelizing Island - An area intended to control vehicle movements or provide a pedestrian refuge area.

7. Corner Clearance - the minimum dimension parallel to a street between the nearest edge of pavement of an intersecting street and the nearest edge of a driveway.

8. Curb Cut - a general term used to describe the opening along a curbed section which vehicles use to ingress or egress a site.

9. Deceleration Lane - an auxiliary lane constructed as part of the driveway which is used by ingressing vehicles to reduce speed prior to entering a site. The lane also provides some vehicle storage.

10. Driveway - every way or place not in the right-of-way of any public road, and which is used for vehicular traffic.

11. Frontage Road - a local street or road located parallel to an arterial highway for service to abutting properties for t(e purpose of controlling access on major streets.

12. Manual On Uniform Traffic Control Devices - publication detailing traffic control device, general signing, construction signing, etc. - Federal Highway Administration.

13. Passing Blister - an auxiliary lane constructed opposite of the driveway which enables through traffic to maneuver around vehicles turning left into a site.

14. Peak Hour - a term denoting the hour of highest vehicular flow. Peak hour at a site may not correspond to overall peak vehicular flow on adjacent streets.

15. Public Road, Street, or Highway - a general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.

16. Responsible Authority - the local government agent or agencies responsible for review and approval of proposed curb cuts or driveways.

17. Right-of-Way - a general term denoting land, property, or interest therein, acquired for or dedicated to public road purposes.

18. Sight Distance - the length of public roadway visible to a driver. Sight distance requirements for safe vehicle operation exist for all phases of vehicle operation such as ingress, egress, horizontal and vertical curves, and intersections.

19. Traveled Way or Portion - the portion of the public road used for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

20. Trip Generation - the number of vehicle trips produced by or attracted to a specific site. Trip generation is a function of many factors such as land use, business-type and building size.

DRIVEWAY APPROVAL REQUIREMENTS

A. Procedures and Requirements for Driveway Approval: These procedures and requirements shall apply to all access to public roads, with the exception of single-family residential driveway connections. For single-family residential driveway connections, no approval will be required. However, access approval is required for entrances to single-family subdivisions.

1. No person, firm, corporation, or developer shall construct any driveway, or approach connecting with any public roadway, nor shall any curb along such roadway be cut, or removed without approval from the Responsible Authority in accordance with Section 20-24 of the Henderson City Code and this manual. Any violation of the provisions in this manual shall constitute a violation of the Section cited above.

2. Any individual seeking driveway approval shall file their request to access a public street with the City/County Engineer for review by the Responsible Authority. The City/County Engineer shall review these requests for compliance with the standards herein by reviewing all applications for conditional use and building permits rezoning applications and any other requests to change land use. In addition plans for alterations to development sites that could increase trip generation or change internal traffic patterns affecting access to the site shall also be reviewed by the City/County Engineer under these standards. Based on this review the City/County Engineer shall be responsible for making all initial driveway determinations within the allowable range of standards as provided in this manual. After the review and a determination is made by the City/County Engineer, requests that are outside of the allowable range of standards or otherwise do not comply with this manual may be submitted for consideration by the Henderson Planning Commission as the final authority for appeals on access matters.

3. On state routes, an access permit must first be secured through the Kentucky Transportation Cabinet, and must satisfy the requirements continued in the Kentucky Permits Manual.

4. The Owners or occupants of property abutting any public road shall maintain and keep in repair all driveways, drainage structures, and approaches between the back-of-curb or edge of pavement and Right-of-Way, but no driveways or approaches shall be constructed or maintained in a manner as to obstruct or interfere with the roadway, the traffic thereon, or with any drain or ditch which has been constructed on, or which serves a roadway.

5. All work on driveways and approaches except routine maintenance such as driveway sealing shall be done to the satisfaction of the Responsible Authority and the entire expense of constructing driveways and approaches shall be borne by the person, firm, corporation, or developer to whom such approval is given.

6. When any roadway is constructed or substantially improved the construction of all public road approaches, existing private approaches and drainage structures required for roadway protection, shall be included as a part of the improvement of the roadway. The Responsible Authority may require the changing of the location of any existing drives, in the interest of safety to the motoring public when the roadway is constructed or reconstructed.

7. When there is a change in the type of business, land use, or off-street parking requirements of an existing property, the adequacy of the existing access will be reviewed by the Responsible Authority for approval of existing driveway(s) or for determination of changes in the location, design, or number of access points that are required.

8. The expense of relocation or replacement of any and all improvements within the Right-of-Way shall be the sole responsibility of the individual or firm requesting driveway approval.

9. Access drives and interior parking must be designed so that vehicles will not be forced to stop on the public roadway due to congestion on the driveway or parking lot. It will be the owner's responsibility to examine alternatives for additional access to alleviate congestion if traffic problems occur at the site on a frequent basis.

10. No entrance to which these standards apply shall be altered, relocated, or remodeled, without permission of the Responsible Authority.

11. The angle of any drive or approach shall be between 75 and 105 unless otherwise approved by the Responsible Authority. For a curved roadway section, the drive angle from the centerline of the main road to the centerline of the driveway approach must be between 75 and 105 from a tangent to the curve at the point of access.

12. When access to a public street is requested for a loading dock, then there must be sufficient distance between the dock, and Right-of-Way to prevent encroachment on the street while parking or maneuvering.

13. The property owner shall remove as soon as possible any soil or other material deposited upon a public roadway resulting from construction or improvement of a driveway so as to provide for unobstructed traffic flow.

14. Where the placement of a curb cut or driveway requires that construction activities be performed within the public right-of-way, advanced warning and traffic control shall be provided at the property owner's expense in conformance with the current Manual on Uniform Traffic Control Devices and any applicable standards adopted by the City/County of Henderson.

15. The Responsible Authority reserves the right to remove or barricade nonconforming access installations and charge all costs to the property owner.

16. All access geometrics, including location, spacing, and auxiliary lanes shall be in accordance with the current Henderson City/County Access Standards Manual and the Kentucky Permits Manual.

FUNCTIONAL CLASSIFICATION

For transportation planning and design purposes, highways are classified by function, according to their operating characteristics and land access. By developing a functional classification for an area highway network, design criteria, such as roadway width and access spacing can be applied to encourage the use of the road as intended and to allow individual facilities to function better together as a highway system. Therefore, the review of access requests should give paramount consideration to the classification of the affected streets so that the integrity of the system can be maintained.

For the City and County of Henderson, the functional classifications and their definitions are shown in the following table.

Functional Classification	Definition
Freeways/Expressways	Divided highways which provide the highest level of service; full control of access with ramps or interchanges providing access; maximum speed limit is usually permitted and largest traffic volumes experienced.
Principal Arterials	High volume corridors which serve major activity centers and longest trip desires; serve major portion of trips entering and leaving urban area, as well as intra-area travel, such as between CBD and fringe area; spacing is usually from less than one mile in the CBD to as high as five miles in suburban areas.
Minor Arterials	Interconnect with principal arterials and provide service to trips of moderate length at a lower level of mobility than principal arterials; these streets place more emphasis on land access; spacing is 1/8 to 1/2 mile in CBD and 2 to 3 miles in fringe areas.
Collectors	Collect traffic from local streets and channel it into arterial systems; provide land access service and local traffic movements within residential neighborhoods and commercial and industrial areas.
Locals and Subcollectors	All streets not classified in higher system: provide direct access to abutting land and higher order systems; have lowest level of mobility.

DRIVEWAY DESIGNATIONS

Class I - Commercial Entrance - A driveway, or driveways, by which a street with a raised curb is connected to public, or private property which is multi-residential, commercial, or industrial in nature.

Class II - Commercial Entrance - A driveway, or driveways, by which a street without a raised curb but only shoulder, is connected to public, or private property which is multi-residential, commercial or industrial in nature.

Class III - Field Entrance - A driveway connecting a street with unimproved property that is not used commercially (fields or vacant lots).

DRIVEWAY STANDARDS FOR URBAN AND RURAL AREAS

Included on the following pages are the design standards and common examples of driveways and approaches. These standards will apply in the majority of cases, since many combinations can be derived from each figure.

Additional standards which will be required are as follows:

A. Median Openings (Crossovers) - Location - Requests for private or commercial median openings will not be approved unless the proposed opening meets the minimum distance requirement, shown in Table 1, from an existing opening. Left-turn lanes will be required for all new crossovers where the median is wide enough for construction of the lane. It is the responsibility of the applicant to prove to the satisfaction of the Responsible Authority that the location of the crossover would not be detrimental to the safety of the motoring public.

TABLE 1

MINIMUM DISTANCES BETWEEN MEDIAN OPENINGS

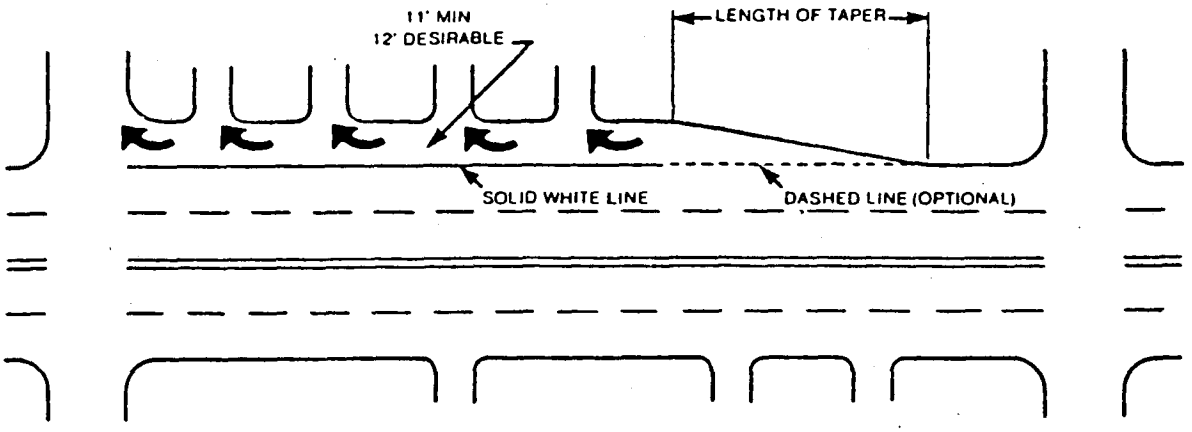
ARTERIAL SPEED (mph)	MINIMUM DISTANCE (ft.) ABSOLUTE MINIMUM	DESIRABLE MINIMUM
25	400	400
30	400	400
35	400	460
40	400	530
45	400	670
50	430	780
55	510	910

B. Continuous Right-Turn Lane - A continuous right-turn lane is a combination of a right-turn acceleration and deceleration lane that is extended to serve several nearby driveways. It is useful on highway segments where driveways cannot otherwise accommodate a large volume of right turns at sufficient speeds to prevent queues from forming in the through lanes. The advantages of this technique are that it significantly reduces rear-end accidents by removing turning vehicles at higher speeds and by eliminating right-turn queues in through lanes. A continuous right-turn lane is warranted where volumes exceed 15,000 vpd, the right turn volume exceeds 20 percent of the total volume of traffic traveling in one direction on a highway, development exceeds 60 driveways per mile, and speeds exceed 30 mph. Figure 1 illustrates the typical application of this technique.

C. Compliance - Other Law - Approval of a driveway does not relieve the requirement to obtain all other necessary approvals.

FIGURE 1

CONTINUOUS
RIGHT-TURN
LANE



D. Location - Traffic Devices - No entrance on approach shall be located or constructed so as to interfere with or prevent the proper location of necessary highway signs or other traffic control devices.

E. Location - Property Line - No part of a driveway, including approach radii, shall be constructed over a property line. This requirement does not apply to joint driveways that are constructed with the written approval of the adjoining property owner.

F. Drainage Requirements - Any improvements authorized by the Responsible Authority shall not interfere with drainage of the street or highway.

The adopted driveway standards and common examples are shown in Figures 2 through 5. Specified in the figures are the required driveway widths, radii, and other design features. The standards contained in Figures 2 through 5 are designed to permit safe and efficient ingress and egress of passenger cars, without impeding mainstream traffic flow. At those sites which serve or rely on semitrailer combination trucks for the delivery of merchandise or materials, the minimum driveway radius shall be 40'.

G. Minimum Construction Standards for Driveways

W = 24' Min., 30' Recommended, 40' Max.

R = 20' Min., 25' Recommended, 40' Max.

D = See Figure 6

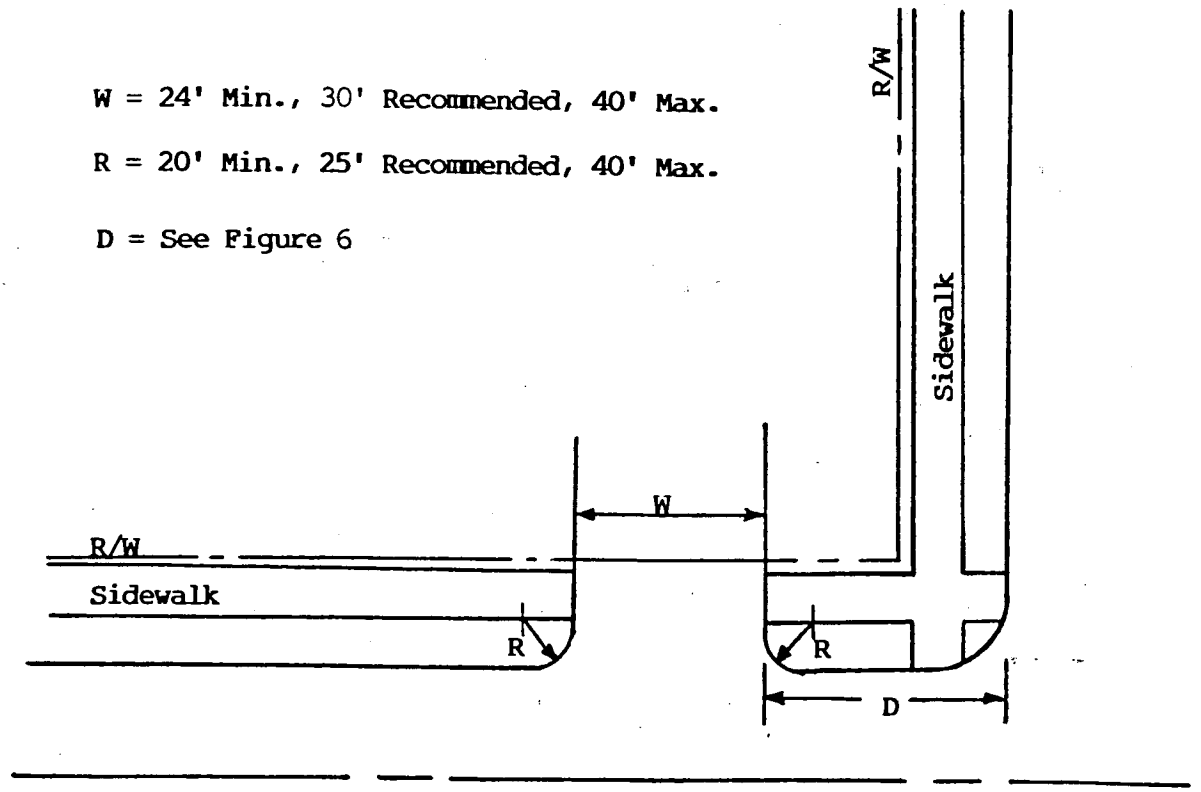


FIGURE 2

TYPICAL

CLASS I COMMERCIAL

CURBED SECTION

W = 24' Min., 30' Recommended, 40' Max.

R = 20' Min., 25' Recommended, 40' Max.

D = See Figure 6

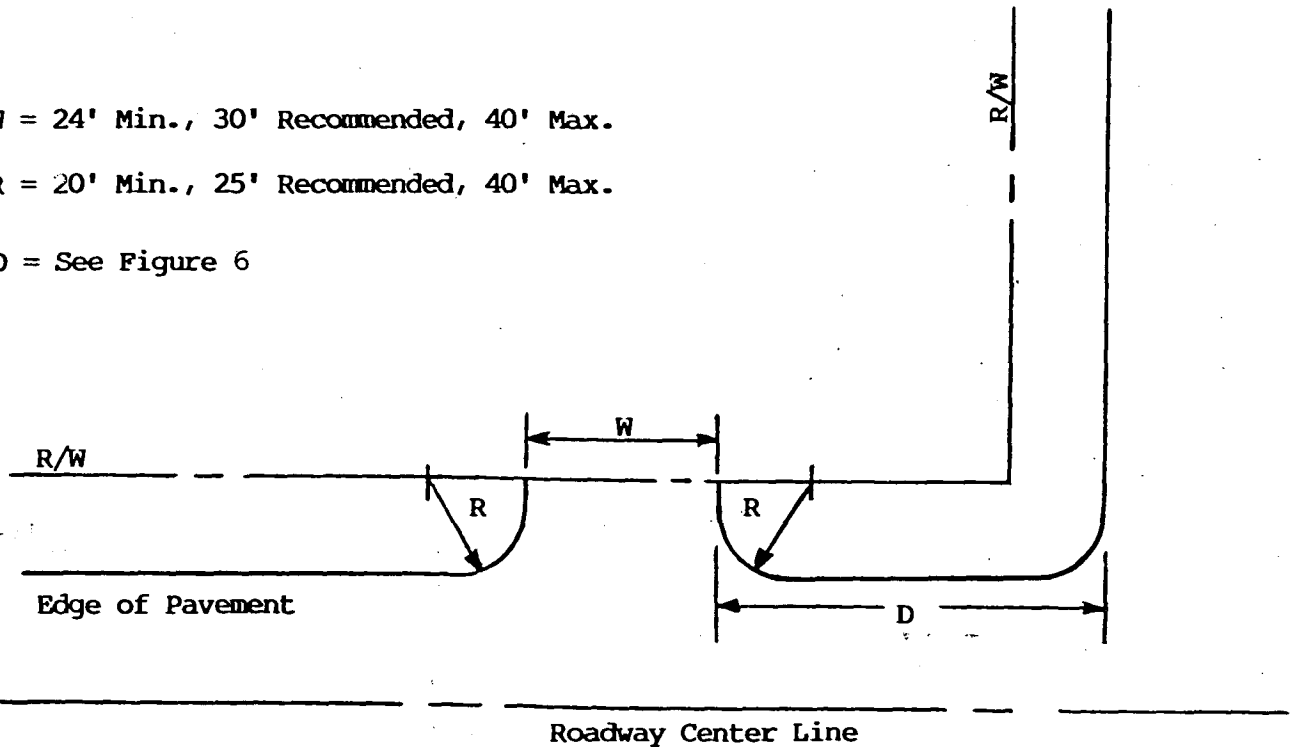


FIGURE 3

TYPICAL

CLASS II COMMERCIAL

UNCURBED SECTION

W = 12' Min., 20' Recommended, 24' Max.

R = 20' Min., 25' Recommended, 40' Max.

D = See Figure 6

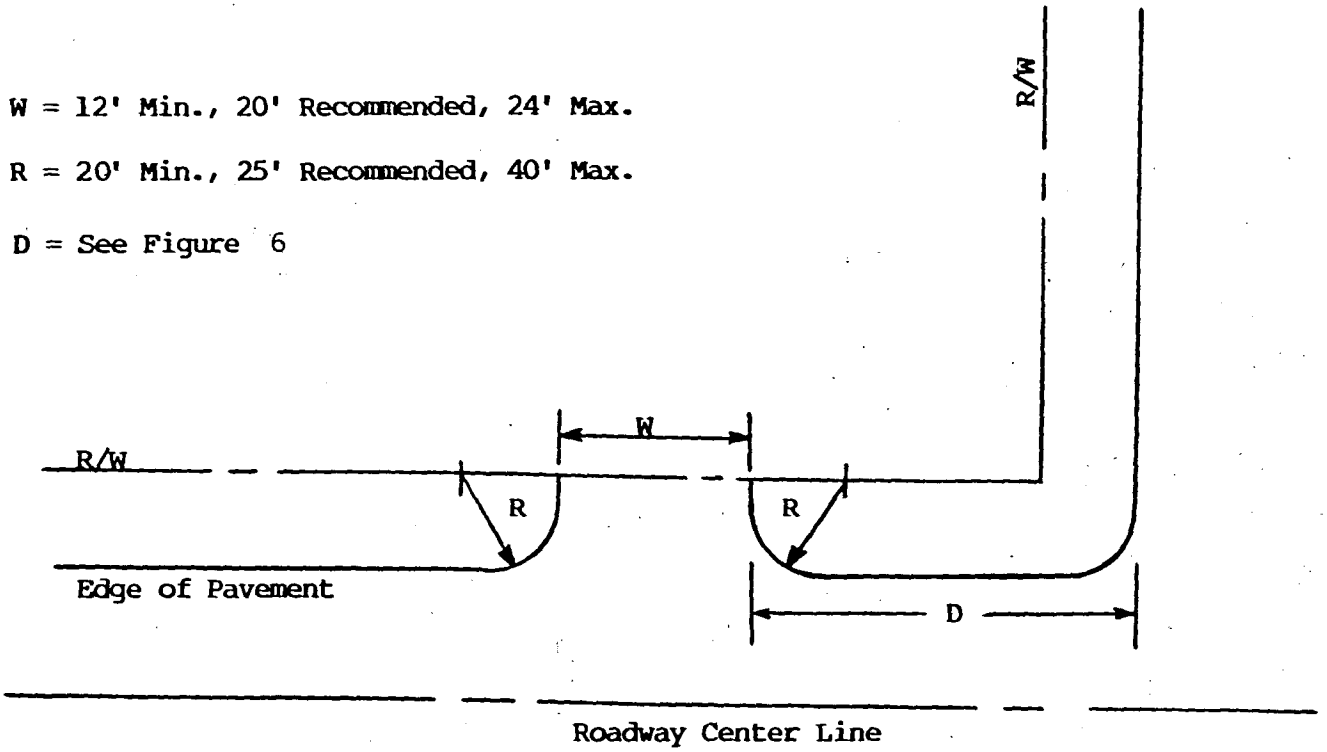


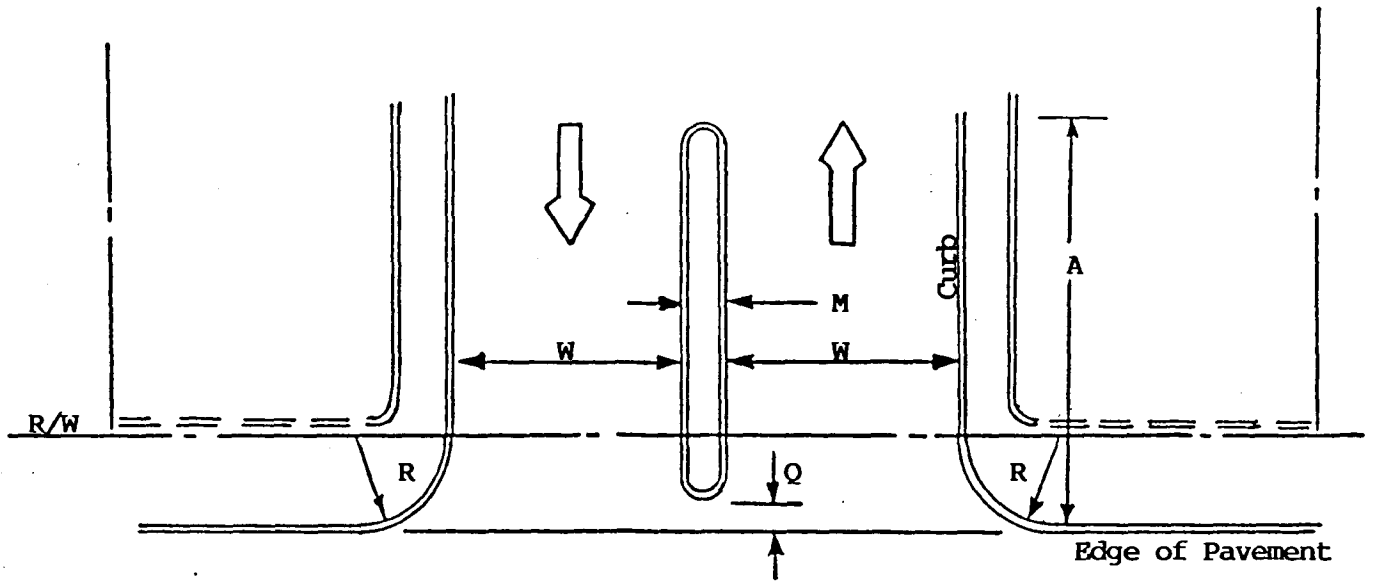
FIGURE 4

TYPICAL CLASS III

FIELD ENTRANCE

FIGURE 5

TYPICAL DIVIDED ENTRANCE*



Roadway Center Line

W = 15' Min., 20' Max.

M = 4' Min., 10' Max.

R = 20' Min., 30' Max.

Q = 2' Min., 6' Max.

A = 100' Min.

* Required if parking exceeds 200 spaces.

Number of Driveways and Spacing

The number of driveways and driveway spacing necessary to adequately serve a site is largely dependent upon trip generation, street capacity and functional classification, and surrounding land use. As a result, it is difficult to develop finite standards for every access situation. However, based upon previous experience and engineering judgement, no more than two driveways are generally needed to serve most single tracts of land.

The maximum number of driveways permitted to access property shall be dependent upon the amount of street frontage and the abutting street functional classification. A separated one-way entrance and exit will be considered a single driveway. The following are the minimum requirements which shall apply to any continuous property under single ownership. If more stringent requirements apply, such as those for shopping centers in Section 19.05 of the Henderson City Code, those requirements shall supercede the requirements below.

Commercial Frontage on Arterial	Number of Driveways
0' - 200'	1
200' - 400'	2
Over 400'	To Be Determined

Classification	Spacing Between Driveways
Local	50' minimum*
Collector	150' minimum*
Arterial	200' minimum*

* Applies to Class III and IV driveways only.

In locations where commercial frontage is less that 200' per parcel, property owners requesting additional access shall work with at least one adjacent property owner to construct a shared driveway.

In lieu of shared driveways, where there are several adjacent commercial establishments each with a limited frontage or in an undeveloped area where there is existing zoning which would allow such development and limited lot size, construction of a frontage road shall be considered as a condition of any future driveway approval. Individual drives shall connect directly to a frontage road paralleling the public roadway, with connections to the public roadway only at two approved locations along the frontage road. At those locations where a frontage road is required, and where development will occur over an extended period of time, the property owner seeking access will construct that portion of the frontage road within his or her property and will be granted a temporary access drive to the abutting public roadway. Upon connection of the frontage road to the public roadway, the temporary access drive will be removed by the property owner. Frontage roads that parallel the public roadway should be allowed access points at minimum intervals of 500 feet. Frontage roads should be set back from the public roadway in such a manner as to allow adequate storage for entering and exiting traffic.

Location of Driveways

Driveways shall be located so as to result in minimal interference and hazard to traffic flow on the abutting roadway, and to prohibit the creation of additional congested areas on the roadway. Any relocation of utilities, roadway signs, signals, lighting devices, or other traffic operation devices necessitated by the driveway location, will be the responsibility of the developer at no expense to any Henderson City/County government agency. The Responsible Authority will designate access points to be retained, relocated, added or closed to conform with spacing standards.

The spacing between a driveway and an adjacent street intersection (corner clearance) should be as great as possible to minimize operational conflicts. The desirable minimum corner clearances for signalized and unsignalized intersections are shown in Figure 6. If these corner clearances cannot be met due to corner properties with insufficient frontage lengths, then one of the following measures should be taken:

1) Left-turns should be prohibited at the driveway.

2) Access to the corner property should be limited to the collector or local street approach.

3) Common access with a neighboring property should be sought.

Sight Distance

Before a driveway permit is issued for a tract of land, it must be determined that vehicles can exit from the proposed development with a minimum of hazard and disruption of traffic flow. Therefore, a driveway should be located at the point of maximum sight distance along a property frontage, and be free of shrubbery, signs, and other objects exceeding 3.0' in height which obstruct a driver's vision. The desirable minimum sight distance requirements for driveways are shown in Figure 7. These values are the minimum distances that would permit the following:

1) Upon turning left or right, an exiting vehicle can accelerate to the operating speed of the roadway without causing approaching vehicles to reduce their speed by more than 10 mph.

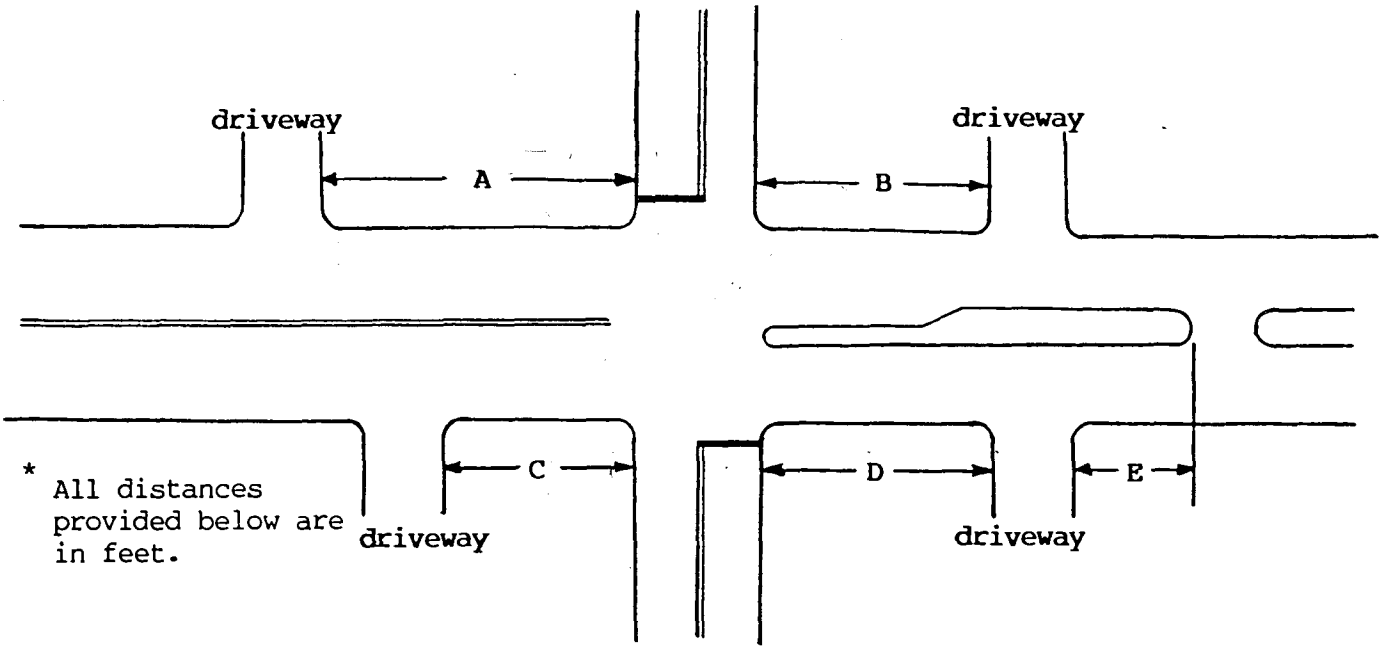
2) Upon turning left, an exiting vehicle can clear the near half of the street without interfering with vehicles approaching from the left.

3) A vehicle turning left into the driveway can safely clear oncoming through traffic without affecting the speed of the through traffic.

The minimum sight distances shown in Figure 7 were developed for urban conditions on level grades. The values should be adjusted appropriately to account for the effects of grade on vehicle operation.

FIGURE 6

MINIMUM CORNER CLEARANCE REQUIREMENTS



ITEM	FUNCTIONAL CLASSIFICATION OF ROAD		
	ARTERIAL	COLLECTOR	LOCAL
A	230	175	50
B	115	85	50
C	230	175	50
D	230	175	50
E	75	0	0

SIGNALIZED INTERSECTION CONTROL

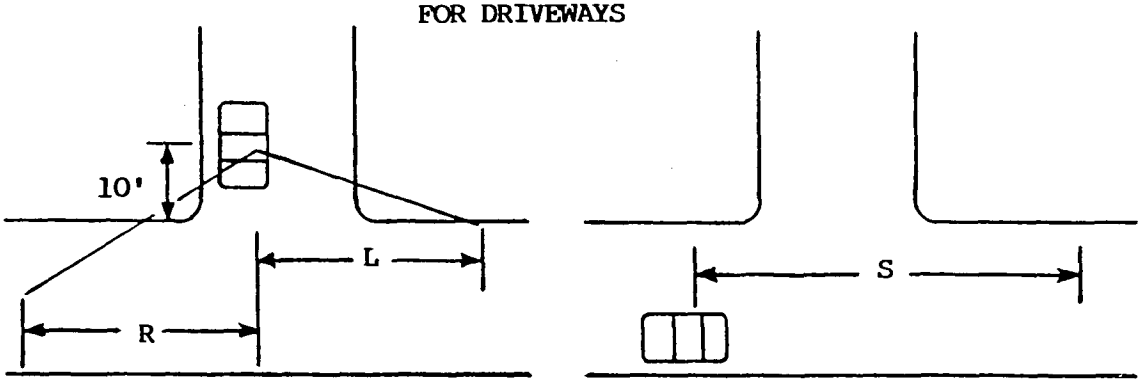
ITEM	FUNCTIONAL CLASSIFICATION OF ROAD		
	ARTERIAL	COLLECTOR	LOCAL
A	115	75	50
B	115	85	50
C	85	85	50
D	115	75	50
E	75	0	0

STOP SIGN INTERSECTION CONTROL

FIGURE 7

MINIMUM SIGHT DISTANCE REQUIREMENTS

FOR DRIVEWAYS



R - Sight distance for exiting traffic looking to the right (measured from a driveway vehicle stopped 10 feet from the street to a vehicle approaching in the lane nearest the center line).

L - Sight distance for an exiting vehicle looking to the left (measured from a driveway vehicle stopped 10 feet from the street to a vehicle approaching in the lane nearest the curb).

S - Sight distance for a vehicle entering the driveway looking straight ahead (measured from the point where the left turning vehicle stops to a vehicle in the approach lane nearest the curb).

POSTED OPERATING SPEED (mph)	MINIMUM SIGHT DISTANCE FOR PASSENGER CARS (ft)						MINIMUM SIGHT DISTANCE FOR TRUCKS (ft)					
	TWO LANE STREET			FOUR LANE STREET			TWO LANE STREET			FOUR LANE STREET		
	R	L	S	R	L	S	R	L	S	R	L	S
20	130	150	150	130	130	160	200	300	260	200	200	280
30	260	350	230	260	220	250	400	500	400	400	400	440
40	440	530	370	440	380	390	850	850	570	850	850	620
50	700	740	520	700	620	550	1600	1600	810	1600	1600	880

the minimum sight distance requirement for a driveway cannot be met due to placement of shrubbery, signs, or other objects that obstruct driver vision, then the owner will be notified to remove the obstruction. Failure to remove said obstructions will result in their removal by the Responsible Authority at the expense of the owner.

If the minimum sight distance requirement cannot be met for a specific turning movement, then that movement shall be prohibited by signs, pavement markings, and/or restrictive design features at the owners expense. Direct access to a parcel will be denied when the required sight distances cannot be attained and when restrictions to turning movements to and from the proposed development is not practical or acceptable. If such conditions occur, indirect access to the property may be allowed, at the owner's expense, in one of the following ways:

1) Compensation to an adjacent property owner to acquire access to the subject parcel through an easement.

2) Construction of a frontage road serving the subject property and connection with the public roadway at a point where safe access can be provided.

Auxiliary Lanes

Auxiliary lanes, also called speed-change lanes, can significantly enhance the operation and safety of a roadway. Basically, there are three types of auxiliary lanes: deceleration lanes, acceleration lanes, and passing blisters. The purpose of a deceleration lane is to allow turning vehicles to reduce speed and to enter the driveway safely without creating unnecessary congestion for the roadway through traffic. A deceleration lane also provides storage for left or right turning vehicles. The purpose of an acceleration lane is to allow vehicles egressing from a driveway to accelerate to the speed of the through traffic prior to the merging maneuver. Finally, passing blisters are intended to provide an additional lane so that through traffic can maneuver around left turning vehicles on a two-lane roadway.

Auxiliary lanes should be a minimum of 12'. The length of an auxiliary lane consists of three components: (1) deceleration or acceleration length, (2) storage length, and (3) entering taper. Desirably, the total length of the auxiliary lane should be the sum of the lengths for each of these three components. However, it is common to accept a moderate amount of deceleration within the through lanes and to consider the taper as a part of the deceleration length. From this, the minimum auxiliary lane lengths have been determined based on deceleration lengths (including taper), and these values are shown in Figure 8. Additional storage length may be required for the auxiliary lane in order to avoid the possibility of vehicles stopping in the through lanes, as well as avoiding the auxiliary lane from being blocked by vehicles stopped in the through lanes waiting for a signal change. This storage length, exclusive of taper, should be based on the number of turning vehicles likely to arrive in a two minute period during the peak hour. As a minimum requirement, storage length for at least two passenger cars should be provided. For locations where there is over 10 percent truck traffic, space should be provided for at least one car and one truck.

Auxiliary lanes shall be required when the conditions warrant as shown in Table 2, or where special site characteristics such as topography, sight distance, or proximity to an intersection make such lanes necessary for safety or traffic flow purposes. At locations where insufficient public right-of-way exists, the City or County may acquire, upon agreement with and at the expense of the applicant, additional right-of-way and require installation of the necessary auxiliary lanes.

In order to determine if the conditions shown in Table 2 for auxiliary lanes are met, applicants may provide estimates of the daily and peak hour traffic generated by the proposed development. These trip generation estimates shall be based upon standard trip generation rates, such as those found in the ITE Trip Generation Manual. If the applicant cannot or does not wish to provide such estimates, the trip generation of the proposed development will be determined by the Responsible Authority.

POSTED SPEED LIMIT			
W =	30/100	40/150	50/180
V =	150	220	320
H =	100	150	180

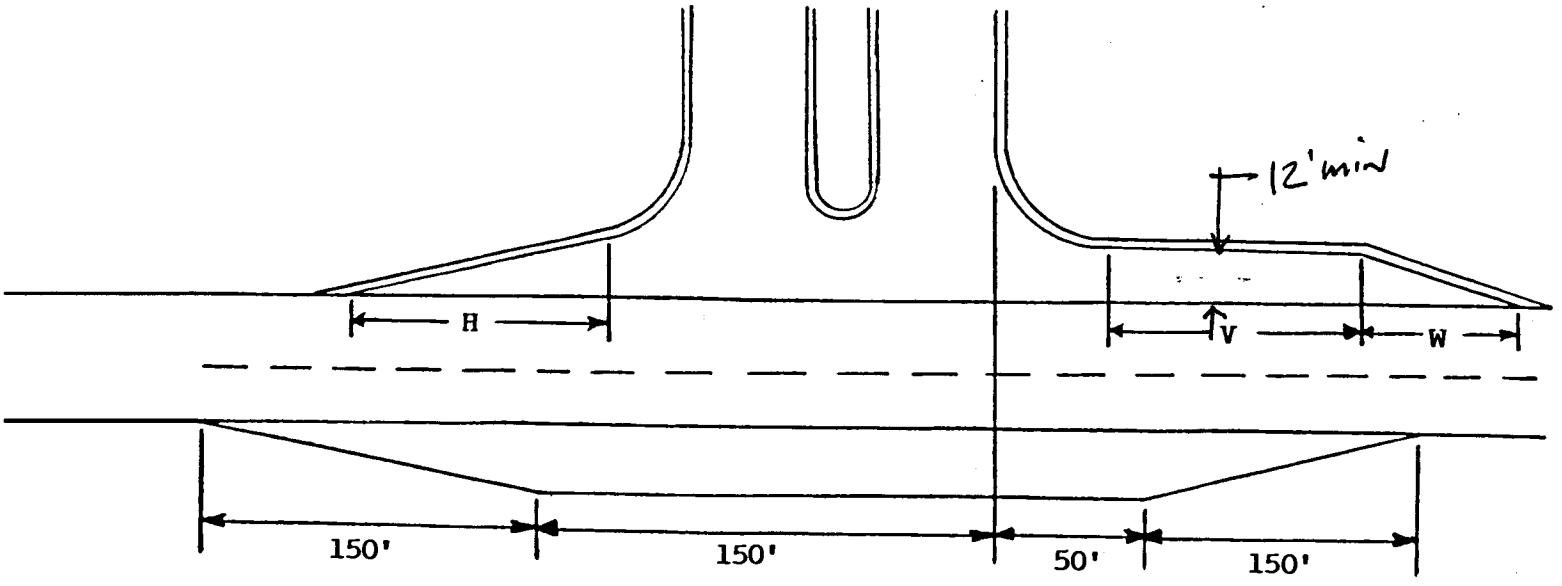


FIGURE 8

TYPICAL

AUXILIARY LANES

TABLE 2

Requirements for Right Turn Deceleration Lanes

and Median Left Turn Lanes

Public Road # of lanes	AADT	Minimum Number of Turns Into Drive During Peak Hour	Or	Minimum Daily Turns Into Drive
2	4000	30		300
4	8000	30		300

Requirements for Passing Blisters

Public Road # of lanes	AADT	Minimum Number of Left Turns Into Drive During Peak Hour	Or	Minimum Daily Left Turns Into Drive
2	4000	30		300
4	8000	30		300

Additional Access Management Techniques

The following sections present examples of additional access management techniques for traffic control of various types of driveway problems. These examples of access control techniques describe the problems that can be corrected by the control, and they also present specific warrants for their use. Since situations will vary according to the traffic volume and roadway geometrics at a particular site, these access control techniques will not provide a solution to all access problems. However, they do provide possible solutions to some of the more common types of problems encountered at driveway access points.

1. Median Channelization to Prevent Left Turn Maneuvers
   This technique controls access on roadways by preventing left turns in and out of driveways. These turns are restricted by channelizing the medians on divided roadways to physically prevent vehicles from crossing. This type of channelization is shown in Figures 9 and 10.

   This technique is warranted on multilane divided roadways with speeds of 30-45 mph, traffic volumes greater than 5,000 vehicles per day (vpd), and more than 30 driveways per mile. This technique is warranted at driveways where safety problems are caused by a small number of left-turn maneuvers. The prohibited turning volume should not exceed 100 vpd. This technique may also be justified at sites that meet accident warrants.

2. Locate Driveway Opposite A Three-Leg Intersection or Driveway and Install Signals Where Warranted
   Where traffic signal warrants can be satisfied, this technique involves locating a driveway opposite a three-leg intersection either during the driveway approval process or by relocating an existing driveway. Since traffic operations along an arterial are affected by the number and location of driveways, interference to the traffic operations should be reduced by constructing an additional driveway opposite an existing intersection. As the number of access points on an arterial decreases, the quality of traffic flow will generally improve. Due to the greater separation between access points, a more efficient progression speed for through vehicles should be achieved. The installation of traffic signals helps to regulate vehicle speeds and controls the turning movements.

   This technique is warranted on all types of roads where there is enough frontage available to locate a driveway opposite a three-leg intersection or driveway. If an existing driveway is being relocated, the separation distance before relocation should be less than 300 feet. There should be a minimum of 30 driveway-to-driveway movements during the peak hour, or 150 per day for a signalized location. The cross-street volume should be greater than 1,000 vpd and the highway volume should exceed 10,000 vpd. All traffic signal installations must meet the warrants in the Manual on Uniform Traffic Control Devices.

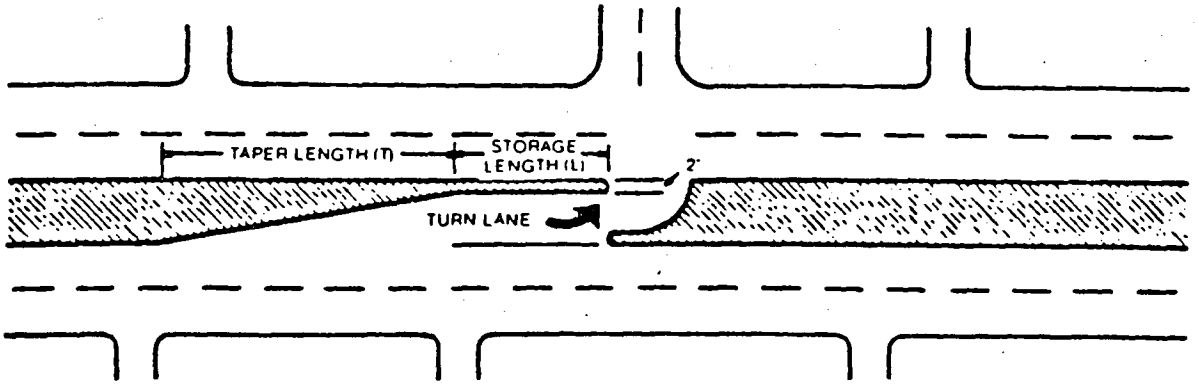


FIGURE 9

HIGHWAY MEDIAN CHARNELIZATION TO RESTRICT
LEFT-TURN EGRESS VEHICLES

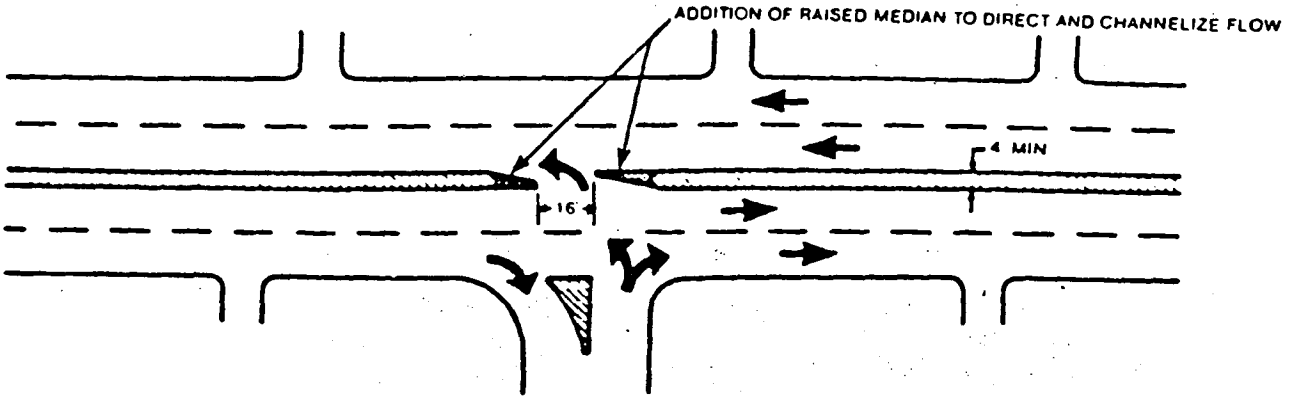


FIGURE 10

HIGHWAY MEDIAN CHANNELIZATION TO RESTRICT
LEFT-TURN INGRESS VEHICLES

3. Install Channelizing Island To Prevent Left-Turn Movements
This driveway design technique controls access by preventing left turn ingress and egress movements. The left turn movements are prohibited by a channelizing island in the driveway throat. Examples of this technique are shown in Figures 11, 12, and 13.

This control is warranted on undivided roads with speeds of 30-45 mph, traffic volumes greater than 5,000 vpd, and minimum driveway volumes of 1,000 vpd. The prohibited turns should number less than 100 vpd. High left turn accident rates will also warrant this technique.

4. Install Isolated Median and Deceleration Lane To Store Left-Turning Vehicles
The objective of this technique is to remove turning vehicles from the through lanes at a major driveway. Improvements in the operation of left turns result from the isolated median and deceleration lane which stores the left turning vehicles. This should reduce the frequency and severity of rear end accidents at the driveway. The frequency of left turn accidents should also be reduced because the turning drivers are allowed additional perception time. An example of this technique is shown in Figure 14.

This control measure is warranted on all undivided roads. Typical locations for this control would be on roads that have less than 30 driveways per mile, highway volumes greater than 10,000 vpd, and driveway volumes greater than 1,000 vpd. The left turn volume should be a minimum of 100 vehicles per hour (vph) during the peak period.

5. Install Left Turn Deceleration Lane Instead of Right-Angle Crossover
This median treatment facilitates left turn access to a driveway by providing a left turn deceleration lane in place of a right angle crossover. This technique is similar to the previous one, since the objective of this method is also removing turning vehicles from the through lanes. This reduces the frequency and severity of rear end and left turn accidents. This technique should only be considered where a median opening exists and there is sufficient median width for a deceleration lane. This is shown in Figure 15.

The potential locations for this application include all multilane divided highways with median widths of 14 feet or greater. A median opening must exist to allow for turning maneuvers. The development surrounding the type of installation should have fewer than 45 driveways per mile with major driveways or intersections 1/4 to 1/2 mile apart. The highway speed should exceed 35 mph, the highway volume should exceed 10,000 vpd, and the driveway volume should be a minimum of 1,000 vpd. Left turns should be approximately ten percent of the peak period traffic volume.

6. Increase Storage Capacity of an Existing Left Turn Deceleration Lane
The purpose of this access management technique is to increase the storage capacity of a left turn deceleration lane when the storage capacity becomes insufficient to accommodate the turning volume. The design of this technique consists of two alternatives. These alternatives consist of lengthening an existing storage lane where sufficient median length is available or widening the highway to facilitate left turn maneuvers from two lanes. These alternatives are shown in Figures 16 and 17.

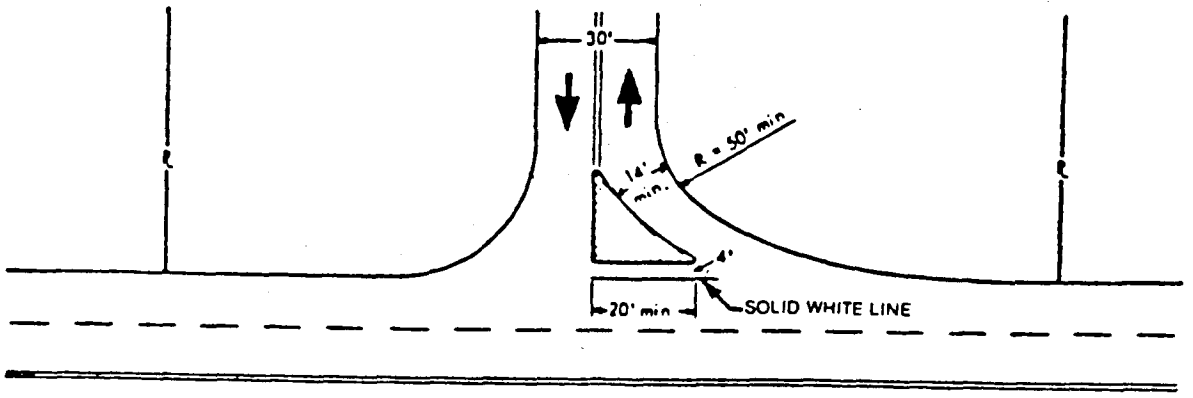


FIGURE 11

DRIVEWAY CHANNELIZING ISLAND TO PREVENT
LEFT-TURN INGRESS MANEUVERS

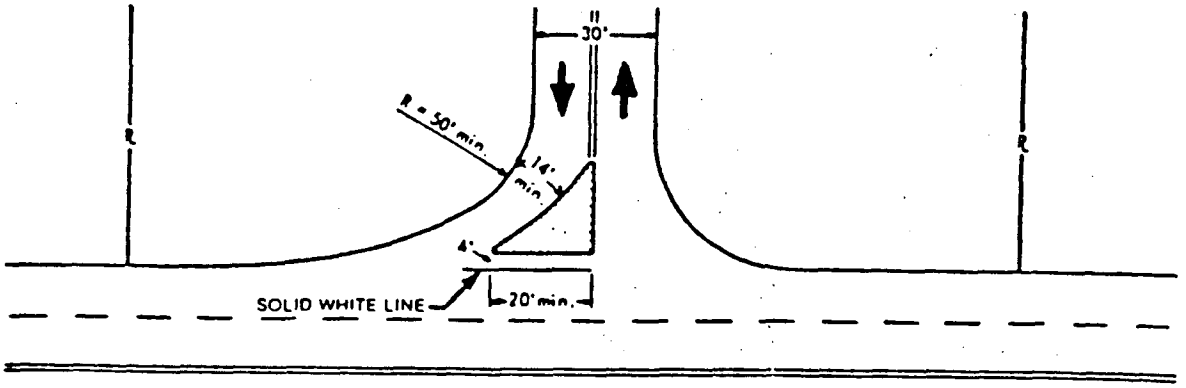


FIGURE 12

DRIVEWAY CHANNELIZING ISLAND TO PREVENT
LEFT-TURN EGRESS MANEUVERS

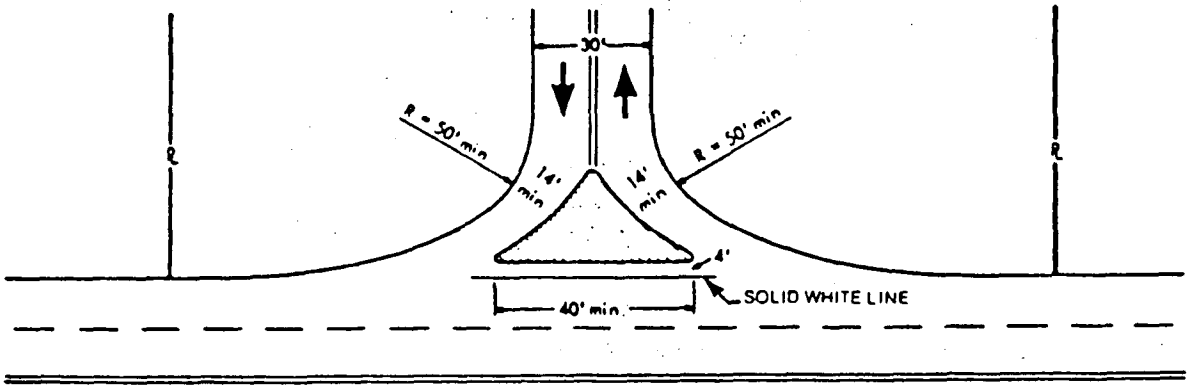


FIGURE 13
DRIVEWAY CHANNELIZING ISLAND TO PREVENT
LEFT-TURN INGRESS AND EGRESS MANEUVERS

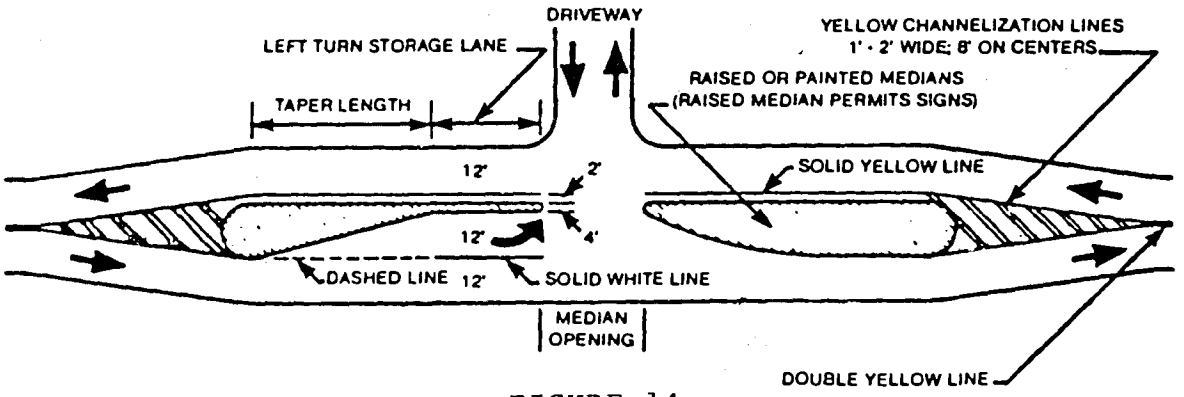


FIGURE 14

ISOLATED DECELERATION LANE DESIGN

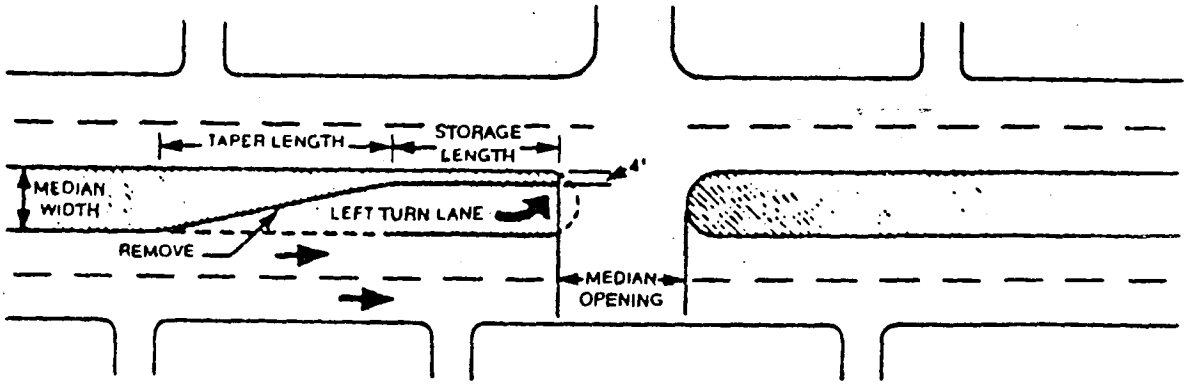


FIGURE 15

LEFT-TURN DECELERATION LANE IN LIEU OF RIGHT-ANGLE CROSSOVER

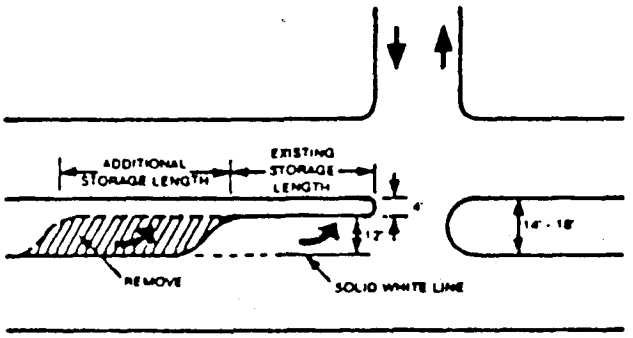


FIGURE 16

Increase Storage Capacity
Extend Left-Turn Lane
(for Median Widths 14'-18')

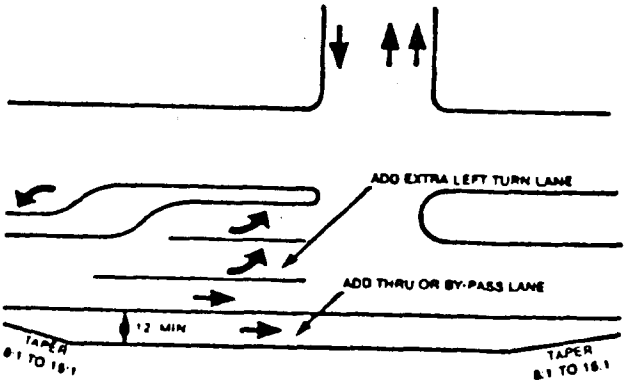


FIGURE 17

Increase Storage Capacity
(for Median Widths 14'-18'
Where Existing Lane Cannot be Extended)

The potential locations for this improvement are all multilane divided highways with existing deceleration lanes that have insufficient storage lengths. The highway section should have less than 45 driveways per mile with major driveways or intersections 1/4 to 1/2 mile apart. The driveway volume should exceed 1,000 vpd and the highway volume should be a minimum of 10,000 vpd.

7. Install An Additional Exit Lane On Driveway

This method of access management involves construction of an additional driveway exit lane to better facilitate egress movements. The left and right turn egress movements are made more efficiently since drivers are not delayed by egress vehicles waiting to turn in the opposite direction. The egress capacity of the driveway is increased by the construction of this lane, which should result in a decrease in total driveway delay. An example of an additional lane for a driveway is shown in Figure 18.

This technique can be used for all highway types that have driveways that are congested due to all egress movements using a single lane. The highway speeds should be 30 mph or greater, and the highway volumes should exceed 5,000 vpd. The driveway volume should exceed 1,000 vpd, with at least 500 of these vehicles being egressing vehicles.

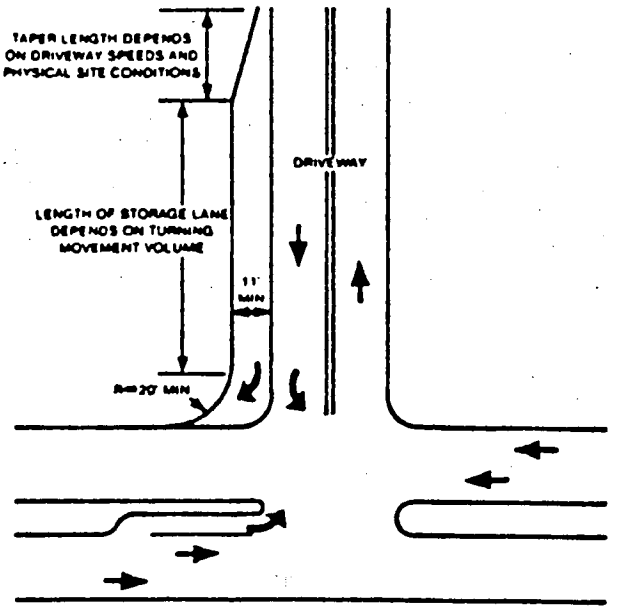


FIGURE 18

INSTALLATION OF ADDITIONAL EXIT LANE ON DRIVEWAY

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