ACCESS MANAGEMENT MANUAL

Actions To Ensure The Efficient Use Of Existing Road Space

prepared by:
Evansville Urban Transportation Study

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I. INTRODUCTION

Concerns over traffic congestion, traffic safety, and the increasing cost of upgrading our roads have generated a new interest in the effective management of our transportation network. As an area develops, the existing roads become ineffective at handling the demand and eventually, the roads must be improved at taxpayer expense to make up for capacity lost to inefficient traffic operations. The new facility provides a good travel environment, which in turn attracts additional development. Again, the efficiency of this transportation system deteriorates as the investment in the roadway infrastructure is compromised. This cycle continues until it becomes physically or economically impossible to add more capacity to the roadways. But steps can be taken through proper planning to ensure this transportation/land use cycle does not create significant problems. Access management, together with land use strategies, is a sensible and relatively low cost method for preserving the traffic flow and safety of our street system.

1. ACCESS MANAGEMENT

Land access and multimodal traffic movements are necessary and frequently conflicting functions. The property owner is entitled to reasonable access suitable to meet the needs of the highest and best use of the property, while the road user has the right to freedom of movement through the highway network and the efficient expenditure of public highway funds. The planning challenge is to provide suitable site access while maintaining safe and efficient traffic flow.

COSTS OF POOR ACCESS MANAGEMENT:

- Deterioration of roadway efficiency
- Increased traffic conflicts
- Crashes & congestion
- Higher insurance costs
- Diminishment of public investment
- Increased use of neighborhood streets to by-pass congestion

Access management can be defined as "the process that provides (or manages) access to land development while simultaneously preserving the flow of traffic on the surrounding road system in terms of safety, capacity, and speed." It involves coordinating land development and the management of the location, design, and operation of driveways, median openings, and street connections to a roadway.

BENEFITS OF GOOD ACCESS MANAGEMENT:

- Maintained efficiency and related economic prosperity
- Reduced congestion
- Reduced accident rates
- Preserved capacity of existing facilities
- Preserved public investment
- Improved air quality

The efficiency and safety of a roadway facility primarily depends upon the amount and character of roadside interference, namely vehicular movements to the residential, commercial, and industrial developments along the facility. A Florida Department of Transportation study found that the typical four lane arterial road with good access management can handle almost 10,000 more vehicles per day than the same four-lane road with poor access management.

2. HOW DOES EUTS FIT IN?

The Evansville Urban Transportation Study (EUTS) is involved in the access review process to ensure the preservation of existing and planned transportation facilities. The policies, standards, and procedures in this manual are for the purpose of managing access and have been established to protect through traffic movement and reduce vehicular conflict points throughout the urban area. Through the process of site, subdivision, and rezoning review, it is the responsibility of EUTS to recommend access standards to meet the needs of both the landowner and road user. No one set of regulations can be expected to apply to all access situations. It is therefore; recommended that the guidelines contained herein should be used in conjunction with field investigation and sound transportation engineering judgment throughout the study area.

Goal . . . to balance the need to provide efficient, safe, and timely travel along the roadway while preserving reasonable access to abutting property.

3. ENABLING LEGISLATION

In 1962, the Federal Aid Highway Act mandated that all urbanized areas over 50,000 in population establish a "3-C" (continuing, cooperative, and comprehensive) planning process in order to receive federal highway planning and improvement funding. Further legislation in 1969 created Metropolitan Planning Organizations (MPO) to conduct the 3-C planning process within these urbanized areas. The Evansville Urban Transportation Study (EUTS) has been designated as the MPO for the Evansville Urbanized Area and is responsible for conducting the 3-C planning process to meet the federal requirements.

The EUTS Study Area contains approximately 257 square miles in Indiana, including the City of Evansville, all of Vanderburgh County (with the exception of Union Township) and a portion of Warrick County including all of Ohio Township, Newburgh, Chandler, and Boonville, and a segment of Anderson Township. In Kentucky, the EUTS Study Area encompasses approximately 70 square miles, which includes the City of Henderson and a portion of Henderson County. Additionally, EUTS executed a Memorandum of Understanding (MOU) with INDOT to conduct rural planning activities for Posey and Gibson Counties.

The 1990 Clean Air Act Amendments strengthened provisions requiring that all urban and suburban areas attain federal standards for air pollutants. Non-attainment areas would not be permitted to construct new roads or build additional lanes to existing roadway until established air quality standards are met. Reducing the number of vehicles idling along existing roadways, through such methods as access management, promotes improved air quality with the study area.

The Transportation Equity Act for the 21st Century (TEA 21), signed into law on June 9, 1998, replaced the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 as the federal transportation funding bill. One focus of TEA 21 is with the preservation of the existing transportation system rather than construction of new roadways through the used of management systems such as the Congestion Management Systems (CMS). CMS is intended to efficiently manage existing and new transportation facilities through the use of travel demand and operation management strategies.

4. SUMMARY

A comprehensive access management program can minimize traffic conflicts and accidents, reduce delays for motorists, and lower major capital expenditures on over-burdened roadways. Proper access management techniques are an effective method of improving traffic flow and decreasing emissions, which will contribute to the attainment of the federally mandated National Ambient Air Quality Standards. Access management techniques include location controls and restrictions, geometric design aspects and traffic operation controls. By enhancing the efficient use of existing road space, these actions will further the transportation system management goals.

II. DEVELOPMENT

1. RESPONSIBLE AUTHORITIES

Vehicular accessibility between public thoroughfares and public/private properties by necessity involves various land use and engineering considerations, such as zoning, traffic generation, construction standards, drainage, and roadway geometrics. Any applicant seeking permission to access a thoroughfare must insure compliance with local zoning, subdivision, city, and county ordinances, as well as applicable state statutes; in addition to obtaining necessary building permits, certificate of occupancy, and/or driveway approval from the appropriate city/county/state governmental agencies. For the purpose of this manual, the term Responsible Authority shall apply to the various governmental boards, commissions, committees, and appointed officials representing the counties of Vanderburgh, Warrick, and Henderson; as well as the cities of Evansville, Newburgh, Chandler, Boonville, and Henderson. These responsible authorities and their area of regulation are outlined in Appendix A.

Additionally, the Indiana Department of Transportation (INDOT) and the Kentucky Transportation Cabinet (KYTC) have jurisdiction over access approval and construction requirements on respective state routes.

The authority of EUTS is established through the Articles of Agreement entered into by and between local authorities pursuant to Indiana Code 36-1-1 et seq., and Section 65.210 of the Kentucky Revised Statutes. EUTS engages in coordinated services to the local authorities in, but not limited to, matters affecting the transportation network, development, land use, health, welfare and safety, and any other essential transportation planning and analysis within the study area.

2. APPLICATION ELEMENTS

The Responsible Authorities for any element of accessing public roads may require any or all of the following procedures:

1. Any person, firm, corporation, or developer requesting to construct a driveway or approach connecting with any public roadway, or in any way alter, relocate, or remodel any curb along such roadway, within the jurisdiction of the Evansville Urban Transportation Study is advised to adhere to the requirements outlined in this manual. The applicant must also consult with the Responsible Authority regarding any required permits or regulation concerning same. If there are differences in requirements between those adopted ordinances of the Responsible Authority and this Access Manual, the most restrictive will apply.

2. The Responsible Authority may establish other appropriate requirements and restrictions for driveways and approaches as necessary to provide for drainage and preservation of the roadway for the safety and convenience of the traveling public.

3. Any requirements established by the Responsible Authority necessary to facilitate vehicle storage on private property with a driveway connecting to a public street might include a minimum distance between any structure limiting vehicle storage on the property and the edge of the roadway.

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

5. Access drives and interior parking must be designed so that vehicles will not be forced to stop on the public roadway due to congestion at the driveway or on the parking lot. It will be the responsibility of the owner to examine alternatives for improved access to alleviate congestion if traffic problems occur at the site on a frequent basis. However, if significant congestion and traffic delays develop and the owner takes no action to address these problems, the Responsibility Authority may contact and present recommendations to the owner on how these problems should be addressed.

6. The owner or occupant of abutting property shall maintain and keep in repairs all driveways, drainage structures, and rights-of-way. No driveway or approach 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.

7. All work on driveways and approaches shall be done under the supervision and to the satisfaction of the Responsible Authority. The entire expense of constructing driveways and approaches shall be borne by the person, firm, corporation, or developer to whom such permit is granted.

8. The expense of relocation or replacement of any and all improvements within the right-of-way shall be the sole responsibility of the applicant.

9. 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.

10. The angle of any drive or approach shall be 90 degree unless otherwise approved by the Responsible Authority. For a curved roadway section, the drive angle must be 90 degrees from a tangent to the curve at the point of access.

11. All access geometrics including location, spacing, and auxiliary lanes shall be in accordance with the current Access Standards Manual.

12. 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.

13. Where the placement of a curb cut or driveway requires the construction activities be performed within the public right-of-way, advanced warning and traffic control shall be provided at the expense of the property owner in conformance with the appropriate state Manual on Uniform Traffic Control Devices (MUTCD) or another applicable standards adopted by the Responsible Authority.

14. The Responsible Authority reserves the right to remove or barricade nonconforming access installations.

15. Before granting a permit, the Responsible Authority may require a construction bond to insure that representations by a developer concerning a permit and any conditions of permit approval will be carried out.

16. Any person, firm, corporation, or developer violating any of the provisions of this section may be subject to a "penalty" as allowed for by appropriate local codes.

3. CHANGES IN LANE USE AND ACCESS

Because the character of a roadway may change over time a new site review should be made considering the change in land use, the volume and characteristics of the traffic generated by the new use, and the current roadway conditions. Any changes in the existing use and or access to a property is subject to compliance with the new access standards as presented in this document or any subsequent amendment.

When a property with an existing, non-conforming driveway(s) applies for a permit to upgrade or change the use of the property, the Reviewing Authority will determine whether it is necessary and appropriate to retrofit the existing driveway(s). The property owner may be required to establish a retrofit plan – the objective of which is to minimize the traffic and safety impacts of the development by bringing the number, spacing, location, and design of the driveway(s) into conformance with the current standards, to the extent possible without imposing undue or inequitable hardship on the property owner. The retrofit plan many include but not be limited to:

- Elimination or consolidation of driveways
- Realignment or relocation of driveways
- Provisions of shared driveways and/or cross access driveways with abutting property
- Reversal of access (e.g. installation of a driveway to a rear access road)
- Relocation of parking – impose property-layout and parking requirements, which allow for the circulation of traffic between abutting properties.
- Traffic demand management (e.g. reduction in peak hour trips)
- Signalization
- Such other changes as may enhance traffic safety

The requirements of the retrofit plan will be incorporated as conditions to the permit for the change or upgrade of use and the property owner will be responsible for the retrofit.

4. VARIANCE

The granting of a variance shall be in harmony with the purpose and intent of this document and shall not be considered until every reasonable option for meeting the standards is explored or unless the variance is in the public interest. The Responsible Authority should be consulted for information about local variance procedures.

5. REQUIRED INFORMATION FOR SITE PLANS

Because this manual is used by various governmental agencies, the information required for submittal on site plans will vary. The applicant is responsible for supplying the information required by the applicable Responsible Authority. In all situations at least one drawing or one set of drawings shall be submitted for review. Said drawing(s) shall include a plot plan drawn to scale of the entire tract of land as recorded in the office of the County Recorder, with the proper dimensions of all proposed improvements, location, and intended use. Said plot plan, or additional attached detailed plans, to scale, shall depict the following:

a. All site drawings should be drawn to scale (engineer's scale, i.e.: 1:10, 20, 30, 40, 50, and 60).

b. Distance and name of nearest intersecting roads, streets, or railroads on both sides of the proposed improvements shall be shown and may be shown on a smaller scale location map.

c. Indicate accurate lot dimensions and property lines, as well as the relationship of the lot with neighboring properties. Indicate all easements and their widths.

d. Show all street and/or alley right-of-way widths form centerline and physical center of pavement. Include sidewalk width and location, as well as any physical features of applicable utilities.

e. Include dimensions and location from property lines on all existing and proposed additions or structures. Show distances between all structures, including gasoline pumps, signs, barriers, landscaping, etc.

f. Indicate proposed and existing areas of pavement, gravel, and/or green space.

If applicable to the subject site improvements, the following details relating to traffic movements must also be included:

g. The geometric design features of the road, including road width, median width, shoulders, parking lanes, sidewalks, and road surface type.

h. Indicate size and location of existing drives and approaches within 50 feet of the project area. Include the distance between drives and corner clearances. Indicate all existing radius of applicable approaches and intersections.

i. Include size and location of proposed curb cuts or access drives, as well as proposed approach radii and grade of approaches and driveways.

j. Include proposed length, width, and surface type of acceleration and deceleration lanes, if required.

k. Include internal parking details and movements, including aisle widths, parking stall dimensions, and angle of parking proposed.

l. Show loading areas. Include location of overhead doors and loading patterns and indicate size of loading vehicles expected.

m. Indicate placement of solid waste containers and any surrounding screening.

6. TRAFFIC IMPACT STUDY (TIS)

A Traffic Impact Study (TIS) is a report that describes the impacts that a proposed development (e.g. shopping center, office building, residential subdivision, etc.) will have on traffic entering and exiting from that development and on traffic flow on the nearby transportation network. The TIS will provide the Responsible Authority with the information necessary to determine existing traffic conditions, how much additional traffic the development will generate, how the additional traffic will impact the existing conditions, and what changes to the site plan would be required to mitigate any negative traffic effects. Utilizing a TIS can result in better land use planning, which can represent cost savings by proactively addressing development impact on an area. To insure that this is the result of a completed TIS, the TIS should be conducted and presented before the subdivision or rezoning of a property. This will allow educated decisions to be made about zonings and subdivisions petitions.

While the requirements for a TIS will vary with the Responsible Authority, the Indiana Department of Transportation (INDOT) Driveway Permit Manual outlines development thresholds for a required TIS. These values are indicated in Table 1. For the purpose of this manual, INDOT's thresholds will serve was a guideline only. A stricter threshold may be utilized.

TABLE 1: WARRANTS FOR A TRAFFIC IMPACT STUDY [10]

Land Use Type	Threshold Values
Residential	150 Dwelling Units
Retail	15,000 square feet (1400 square meters)
Office	35,000 square feet (3240 square meters) or 3 acres
Industrial	70,000 square feet (6500 square meters) or 9 acres
Educational	30,000 square feet (2790 square meters) or 250 students
Lodging	120 Occupied Rooms
Medical	46,000 square feet (4270 square meters)

Special generators with high trip generation rates, such as parking garages, banks (both drive-in and walk-in), fast food restaurants, and service stations with convenience stores, whether or not they meet the outlined thresholds, may still be required to submit a TIS. If a proposed development must access an Indiana State Highway and meets INDOT's threshold, then INDOT will require preliminary notification at the planning stage.

Guidelines for conducting the TIS are outlined in the INDOT Applicant's Guide to Traffic Impact Studies, 1996. The TIS should be prepared by a transportation professional with training and experience in traffic engineering and transportation planning. The report should document the purpose, procedure, data sources, assumptions, findings, conclusions and recommendations of the study. The TIS might include, but will not be limited to, the following:

- Study of proposed driveway locations, resulting sight distance, queuing provisions, etc.
- Safety analysis
- Traffic signal warrants and progression analysis
- Delay analysis
- Gap studies
- Trip generation estimates
- Internal parking and circulation (where applicable)
- Neighborhood impacts

If the TIS indicates there will be little impact on the adjacent roadway network, little or no street improvements will be required. However, if significant impact is indicated, mitigation measures may be required. Mitigation measures may include, but are not limited to, any of the following:

- Installation of traffic signals or traffic control devices
- Additional lanes, or acceleration/deceleration lanes
- Restriction of turning movements
- Adjustment of cycle lengths or introduction of additional signal phases

The cost of the TIS shall be borne by the developer requesting the permit. Once the TIS is completed it should be submitted to the Responsible Authority allowing at least two weeks for review prior to any administrative meeting. The Responsible Authority will make recommendations as to required traffic system improvements that will be required of the developer. Costs for these required improvements will be borne by the developer, except in certain mitigating circumstances when the Responsible Authority may share in these costs.

III. Technical Application

A. LOCATION

1. GENERAL

Driveways shall be located so as to minimize the degradation of the safe and efficient traffic flow and operation on the abutting roadway. Primary consideration will be given to driver/pedestrian safety when evaluating locations. The position of the driveway must provide the most favorable vision, grade, and alignment condition for vehicles using the roadway and the access point and will take into consideration the functional classification of the roadway, proximity to intersections, and the location of adjacent auxiliary lanes.

The number of accidents is disproportionately higher at driveways than at other intersections; thus their design and location merit special consideration.

AASHTO, A Policy on Geometric Design of Highways & Streets, 1990

The developer is responsible for securing an access permit from the applicable Responsible Authority(s) prior to beginning construction of a new access point or improvements to one that already exists. If a permit is not obtained, the Responsible Authority has the authority to require the developer to construct or reconstruct the drive approach to meet standards adopted by the Authority. There is no guarantee, implied or implicit, that the approach will be allowed to remain in the unpermitted location. Any relocation of utilities, roadway signs, signals, lighting devices, or other traffic operation devices necessitated by the driveway location will be the responsibility of and at the expense of the developer.

When seeking a change in use of a property or requesting an access point along a state highway, the applicant is required to submit a permit request to the Indiana Department of Transportation (INDOT) or the Kentucky Transportation Cabinet (KYTC). It is recommended that the applicant request review of the application by the local authorities simultaneously with State review so that all concerns can be addressed at once and unnecessary redesign can be prevented. If there are differences in requirements between the local Responsible Authority and the State, the applicant must comply with the most stringent requirement(s) of both the local and State agencies. In no case shall the approval of only one agency be considered approval of the application.

2. FUNCTIONAL CLASSIFICATION

The roadway network serves two functions: movement of traffic and property access. Roadway classification serves to define the primary purpose of a specific roadway. For instance, the principal function of a major arterial is for traffic movement, while local roads primarily serve to provide access to abutting properties. Outlined below are the functional definitions of the various roadway types. Figure 1 illustrates the schematic relationship between access and movement function of roadway categories.

a. **Freeway** — Primarily divided highways providing the highest level of service; full access control utilizing ramps or interchanges; maximum speed limit is usually permitted and the largest traffic volumes experienced.

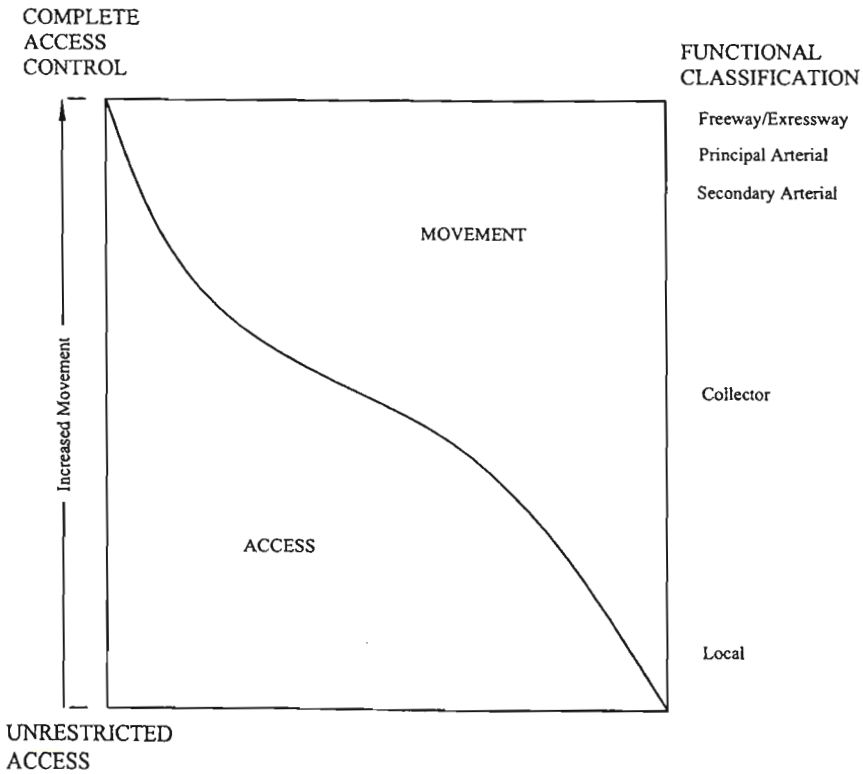
b. **Principal Arterial** — High volume corridors which serve major activity centers as part of an interconnected network of continuous routes between the central business districts and fringe areas; which primary purpose is to provide safe and efficient service for major traffic movements in which property access is subordinate.

c. **Minor Arterial** — Interconnect and augment the principal arterials; distribute traffic to geographic areas smaller than those served by the principal arterials with more emphasis placed on property access.

d. **Collector** — Provide property access as well as vehicular travel within residential neighborhoods, commercial and industrial areas; disperse traffic from arterials to ultimate destinations; collect traffic from local streets, connecting them to the arterials.

e. **Local** — All streets not classified in a higher system; provide direct access to abutting property and higher classifications of the roadway system; has the lowest level of mobility with little or no service to through traffic.

Figure 1: Functional Classification vs. Access [2]



3. DRIVEWAY APPROACHES

Driveway access points are considered at-grade intersections within any roadway classification. Design criteria for these access points will depend on the functional definition of the adjacent roadway to ensure that access does not erode the primary function of the road. For this reason, the review of access requests should give paramount consideration to the classification of the affected streets so that the integrity of the roadway system is maintained. Outlined below are the functional definitions of property access zones (i.e.: driveways).

a. Commercial Driveway/ Major This type of approach connects the roadway to private property used for commercial purposes or public property that attracts significant numbers of vehicles to warrant additional traffic control measures. These approaches typically are designed to accommodate both passenger vehicles and large semi-truck trailers. A hard pavement surface, curbs, drainage structures, auxiliary lanes, islands, tapers, and sidewalks are common elements in the construction of these approaches.

b. Residential Driveway This type of approach typically connects the roadway to private property having a residence, private garage or other outbuilding used by the owner or occupant of the premises, guests, and necessary service vehicles. These approaches should match the characteristics of the surrounding roadway and drainage conditions, utilizing approved curb cuts, hard pavement, and sidewalks where required.

c. Field/Construction An access point connecting a roadway with unimproved property, or Entrance serving as a temporary access point during construction. Approval of a temporary access point in no way guarantees approval of a permanent approach at the same location. Construction of these approaches should maintain adequate drainage and protect any existing sidewalks.

4. NUMBER OF DRIVEWAYS

Each existing land tract or parcel is entitled to at least one direct, or indirect, access point to a public roadway. Where applicable, property owners and developers will be encouraged to share access points, with no guarantee that each parcel will have a direct access point to any roadway. This will be encouraged primarily in commercial areas, but may also be utilized in residential neighborhoods when roadway conditions are such that public safety is compromised.

a. The number of driveways or other connections shall be the minimum number necessary to provide reasonable access to the property, not the maximum available for the frontage.

b. Properties with frontage on two or more roads **do not** have the right of access to all roads. Properties with frontage on two or more roads shall be provided access to the road with the lowest functional classification serving the proposed use of the property.

c. If a subdivision of property with frontage on two or more roads is proposed, access to the roads will be determined based on the minimum allowable access points permitted to the parent parcel. All lots within the subdivision will access the roads through shared use of the subdivision access only. The access system for the proposed subdivision should be coordinated with existing, proposed and planned streets outside the subdivision. (see Section 5 for additional information on subdivisions)

d. Since one-way pair driveways create two separate conflict points on the roadway, such combinations shall be considered as two individual drives. Only one (1) pair of one-way driveways may be used per street frontage. Both access points must still meet all driveway standards as set forth in this manual.

e. When in the opinion of the Responsible Authority's engineer it is in the interests of good traffic operations at the driveway and it will not adversely affect the safety, operation, or capacity of the roadway(s), additional access points may be permitted as follows:
    a. One additional driveway entrance along a continuous site in excess of 300 feet, or
    b. Two entrances along a continuous site frontage in excess of 600 feet.
    c. Any additional access points must be in compliance with all applicable sections of this regulation, state statutes, or municipal/county ordinances.

f. In locations where commercial frontage does not meet minimum sight distance or property clearances, the property owners will arrange access with at least one adjacent property owner to construct a shared driveway. Temporary access may be allowed for phased construction of the lots, however, as the lots develop, shared access points should be constructed and the temporary access points removed.

g. In areas where there are several adjacent commercial establishments with limited frontage, or in undeveloped areas where existing zoning allows such development, yet still has limited lot sizes, in lieu of a shared driveway the construction of a frontage road shall be considered as a condition of any future driveway approval. Temporary access may be allowed for phased construction of the lots; however, as the lots develop and the frontage road is constructed, permanent access points on the frontage road should be constructed and the temporary access points removed.

Other forms of access may also be proposed, such as restricted access, indirect access, signalized, divided, etc. Final determination will be at the discretion of the Responsibility Authority.

5. SIGHT DISTANCES

Sight distance standards are utilized from two different perspectives, that of the vehicle exiting a driveway onto a roadway and the amount of area a vehicle traveling along the roadway must monitor for safe passage. To provide the optimal safety and efficiency at a driveway, the drive location should be placed at the location within the property frontage with optimal intersection and stopping sight distances in accordance with AASHTO standards. If adequate intersection sight distance cannot be achieved, at a minimum, sufficient stopping sight distance should exist.

a. A sight distance triangle is a means to evaluate an intersection to insure that adequate sight distance exists for both the vehicle entering the roadway and the vehicle already

traveling on the roadway. The sight distance triangle for an intersection is based upon the speed of the roadway and should be calculated from a driver's eye located 17 feet back of the curb line (NCHRP Report 348, p. 96) to the distance to the left and right as shown in Table 2. It is necessary to have an area created by a sight distance triangle free from all obstructions between two and eight feet above the curb including parked vehicles, signs, fences, and landscaping.

TABLE 2: INTERSECTION SIGHT DISTANCE TRIANGLE (in feet) [2]

Posted Speed Limit (mph)	Distance to the Left	Distance to the Right 2-Lane Roadway	Distance to the Right 4-Lane Roadway
30	270	190	140
35	340	230	165
40	430	280	210
45	540	340	250
50	650	400	300
55	760	460	350

Note: Assumes 12' wide travel lanes

These values assume a passenger car can turn right or left into a two-lane roadway and attain 85% of the posted or design speed without being overtaken by an approaching vehicle that reduces speed to 85% of the posted or design speed. Increased sight distance is needed for the left-turn maneuver because the driver of the vehicle entering the roadway must evaluate traffic approaching from both the right and the left.

The minimum intersection sight distances shown in Table 2 were developed for 0% grades; therefore, values should be adjusted appropriately to account for the affects of grade on vehicle operation. In addition, adjustments to these minimum distances should be made for design vehicles other than passenger cars and for roadways with more than two travel lanes. Adjustments should be made in accordance with AASHTO policies.

There may be situations where visual obstructions, the curvature of the roadway, the angle of the intersection, and terrain may physically limit the obtainable intersection sight distance. For these situations, providing the minimum stopping sight distance is a must.

b. The safe stopping sight distance, defined as a minimum distance necessary for vehicles traveling on the adjacent street to perceive, react, and stop for any potential conflict within the intersection of the driveway, must be provided at every driveway. Figure 2 shows an example of where the minimum stopping sight distances are obstructed by horizontal and vertical curves, and vegetation. Values for the minimum stopping sight distance based on design speed are provided in Table 3.

OPERATING SPEED	TABLE 3: STOPPING SIGHT DISTANCE (in feet) [2]						
	Street Grade in Percent						
	Upgrades			Level	Downgrades		
	9%	6%	3%	0%	-3%	-6%	-9%
25 mph	140	145	150	150	155	160	165
30 mph	180	190	200	200	210	220	230
35 mph	215	225	235	240	255	270	290
40 mph	270	280	290	300	320	340	370
45 mph		340	350	365	390	420	
50 mph		410	420	440	470	510	
55 mph		460	475	500	540	590	

If the minimum stopping sight distance requirements for a driveway cannot be met due to on-site placement of shrubbery, signs, or other objects that obstruct driver vision, then the applicant will be required to remove the obstruction(s). Failure to remove said obstructions will result in their removal by the Responsible Authority at the expense of the applicant or the permit will be denied and the applicant will be required to seek alternate access.

After sight distance requirements are met and the access permit issued, the driveway area must remain free from any visual obstruction to the required sight distance including, but not limited to, signs, fences, landscaping and parked vehicles.

If the minimum sight distance requirement cannot be met for a specific turning/crossing movement(s), the access driveway shall be designed to prohibit such movements by the use of channelizing islands, signs, and pavement markings at the owner's expense, as required by the Responsible Authority. Direct access to a parcel will be denied when the required sight distances cannot be obtained and when restrictions to turning movements to/from the proposed development are not practical or acceptable. If such conditions occur, indirect access to the property may be allowed, at the expense of the owner, in one of the following ways:

1. Compensation to an adjacent property owner to acquire indirect access to the subject parcel through an access 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 that meets the requirements of the manual,
3. Development of access to another roadway (in the case of a corner property).

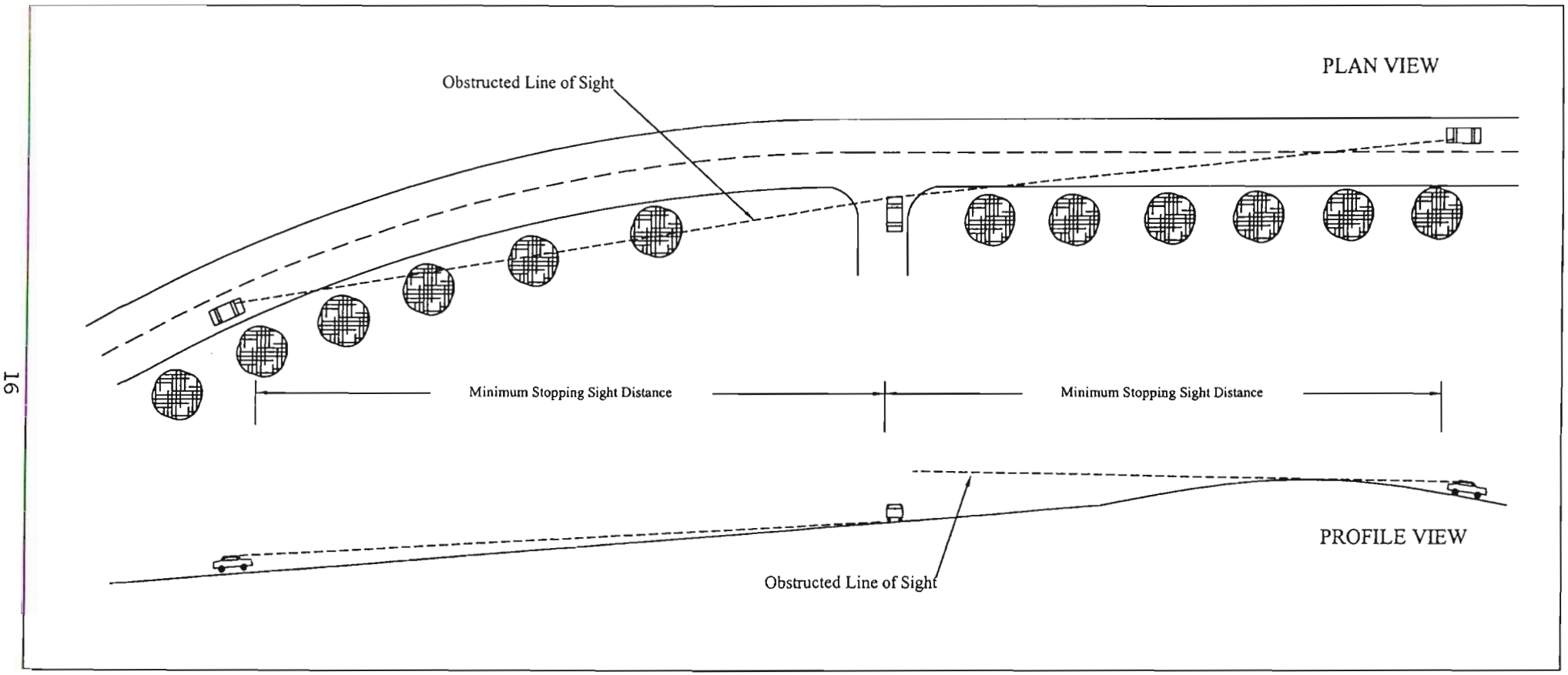


FIGURE 2: SIGHT DISTANCE EXAMPLE [2]

6. CORNER CLEARANCE

> **Driveways should not be situated within the functional boundary of at-grade intersections. This area includes the longitudinal limits of auxiliary lanes.**
>
> AASHTO, A Policy on Geometric Design of Highways & Streets, 1990

Spacing considerations for access location should begin with establishing the minimum corner clearance. The purpose of corner clearance is to separate the driveway conflict area from the intersection area. Driveways should not be situated within the functional boundary of at-grade intersections. The functional boundary of an intersection includes the return radius, the longitudinal limits of auxiliary lanes including storage lanes, deceleration lanes and tapers, and distances required for reaction time. (TRB # 1579 & NCHRP Synthesis 233)

For access to corner properties the access point shall be permitted on the roadway having the lower functional classification. In cases where the two roadways have the same functional classification, the access point will be located on the roadway having the lower traffic volume. At high volume intersections the use of cross access or frontage roads will be encouraged.

For purposes of measurement, corner clearance is measured from the end of the curb return on the intersecting roadway and the beginning of the curb return for the driveway. However, in all cases the access driveway must be outside the functional boundary of the intersection. The minimum corner clearance requirements for driveways are shown in Table 4. The recommended minimum corner clearance for driveways located near signalized intersections is equal to the peak hour signal queue length or the minimum corner clearance as listed in the table, whichever is greater, to ensure that the standing queues will not block the driveway to ingress and egress movements and to maintain the full capacity of the signalized intersection.

The spacing standards are less stringent for the approach of an intersection because the driver is generally more aware of traffic conflicts within the functional area. As the driver departs an intersection, he usually relaxes his observations as he accelerates and is not anticipating conflicts

TABLE 4: CORNER CLEARANCE AT INTERSECTIONS ALONG ARTERIAL & COLLECTOR STREETS [13]

Position	Access Allowed	Spacing Feet	Restrictive Median
Approaching	Right In/Out	115	Yes
Approaching	Right In	75	Yes
Departing	Right In/out	230	Yes
Departing	Right Out	100	Yes
Approaching	Full	230	No
Approaching	Right In	100	No
Departing	Full	230	No
Departing	Right Out	100	No

If the corner clearances cannot be achieved due to insufficient frontage lengths, then one of the following measures should be taken:

1. Left-turns should be prohibited at the driveway, especially if the driveway traffic would be required to cross three or more lanes or two lanes and a center left-turn lane. Driveways with left-turn restrictions must be designed and constructed to physically prohibit left-turn and through movements. Prohibiting traffic movements at the drive through the use of traffic signs only should not be considered a sufficient restrictive measure.
2. Access to the corner property should be limited to the roadway having the lower functional classification and should be located as far from the intersection as possible.
3. Common access with a neighboring property should be sought and is recommended for all corner developments.

Median openings shall be treated as intersections and driveways opposing a median opening shall be located so as to exceed the minimum corner clearance standard. This requirement may be waived where the median opening is specifically constructed or reconstructed to provide access to the property and the driveway is constructed in the appropriate alignment with the median opening to allow the permitted turning movements only.

7. SPACING OF DRIVEWAYS

Minimum driveway spacing is related to the operation characteristics of the roadway and the interactions between adjacent driveways. When adequate distance between adjacent driveways exists:

- Delay is reduced to through vehicles by working towards uniform traffic flow.
- Stop and go driving is minimized.
- Motorist perception and reaction is improved allowing for smoother deceleration and/or lane changes for through vehicles.
- Conflict points are separated.
- More area for pedestrian refuge and landscaping is provided.

When sufficient distance between adjacent driveways is not provided, conflicting movements at adjacent driveways overlap which increases the accident potential and reduces roadway capacity.

Table 5 indicates the minimum recommended spacing for various roadway speeds. The driveway spacing listed represent the minimum driveway spacing needed to eliminate overlap of conflict areas thus allowing the driver of a through vehicle to monitor one driveway at a time rather than two or more simultaneously. If the minimum spacing cannot be achieved, joint access driveways should be encouraged.

The ability to provide adequate driveway spacing is directly related to the amount of street frontage apportioned to individual properties. Therefore, the critical requirement of driveway spacing must be considered when subdividing land for development.

Special conditions at a driveway such as signalization or the installation of auxiliary lanes may increase the spacing requirements. These situations will be evaluated on an individual basis and the Responsible Authority will make a determination.

TABLE 5: MINIMUM SEPARATION OF ADJACENT LOT DRIVEWAYS [10]	
Roadway Speed (mph)	Minimum Spacing (ft.)
20	85
25	105
30	125
35	150
40	185
45	230
50	275

8. PROPERTY CLEARANCE

Property line clearance requirements are intended to assist in maintaining adequate driveway spacing should the minimum driveway separation distances be unattainable. The minimum property line clearance for various speeds are shown in the Table 6.

TABLE 6: ABSOLUTE MINIMUM RECOMMENDED PROPERTY CLEARANCE [10]	
Posted Speed (mph)	**Property Line (ft.)**
20	40
25	50
30	60
35	75
40	90
45	115

These recommended distances are intended to apply to neighboring property lines. Corner clearance distances are applicable on property lines running parallel to roadways.

These recommended property line clearance distances might be too restrictive in some urban areas due to limited frontage. Variation from these values **may** be considered if an engineering evaluation determines that reduced clearances will not adversely impact traffic safety or operation on the adjacent street. In these cases it will be necessary to coordinate driveway placement with the adjacent property owners to avoid indirectly restricting driveway placement and design for the neighboring development. Final determination will be at the sole discretion of the Responsible Authorities.

No part of the driveway entrance, including the access approach radii, may extend beyond a line extended perpendicularly from the roadway centerline to the point of intersection of the property line and the right-of-way without the written permission of the adjacent property owner. This does not include joint or shared driveways that are constructed to serve both properties through mutual consent.

B. DESIGN CONSIDERATIONS:

Access design standards are developed to aid in producing efficient ingress and egress designs that can accommodate the access needs of the development, while maintaining the integrity of the surrounding roadways. The specific access design elements are influenced by several factors including the volumes and types of vehicles using the driveways, the adjacent roadway speed limit, and the through volumes on the public street.

A vehicle using the driveway should be able to turn into or out of the driveway at a reasonable speed without obstructively encroaching on adjacent lanes. The access shall be designed and constructed in a manner that will encourage property use by the motorist. Physical separation and delineation along a property frontage such as curb and gutter may be required where necessary to ensure that access will be limited to permitted locations. Access for one-way operations shall be approved only when design conditions ensure one-way operation.

When pedestrian, bicycle, or handicapped facilities are affected by an access, the access design shall provide for the safe crossing and the safe use of the facility by pedestrians, bicycles, and the disabled. Sidewalks may be required where appropriate or when requested by the Responsible Authority. Bikepaths may be included in the access permit upon request of the local authority.

It is difficult to develop definitive standards for every situation. The design of access driveways and accompanying highway improvements shall comply with the standards and specifications in this manual. In the absence of specific guidance, INDOT, KYTC and AASHTO policies shall govern.

1. THROAT WIDTH AND TURNING RADII

Throat width is a technique for reducing the impact of turns and queues from through traffic by optimizing the width of the drive in conjunction with turning radii. The access throat width is the distance measured (exclusive of the return radius) at right angles to the centerline of the driveway from edge to edge of pavement for approaches without curbs, and from face to face for curbed entrances. This width is a function of several parameters including roadway and driveway operation conditions, driveway alignment, and approach return radii.

The access approach return radius is dependent upon the speed of the through traffic, volume, and type of traffic accessing the driveway, and the frequency of driveway use. The throat width should be designed to accommodate all vehicles that may have the occasion to enter the proposed development. The controlling factor shall be design for the typical type of vehicle served by the site. Secondary

Secondary consideration should then be given to all other types of vehicles that may access the site on a more infrequent basis. This standard may be relaxed under certain circumstances, but should not be omitted from design consideration. All drives should be adequate to handle all possible generated traffic.

When designing the access approach, the selection of an appropriate throat width must be coordinated with the return radii selection. Increasing the return radii at an approach provides for smoother right turns thus reducing the needed throat width. Figures 3 and 4 demonstrate the relationship between radii and throat width with respect to turning movements. Providing larger return radii, however, increases the time pedestrians are exposed to traffic and the speed at which a vehicle can execute egress and ingress maneuvers. Therefore, when determining appropriate access design, consideration should also be given to pedestrian safety and movement.

Throat width and return radii design requirements for two-way drives are presented in Table 7 (see Figure 5). For one-way driveways, the minimum and maximum throat widths are twelve feet and eighteen feet respectively. Driveways intended for one-way operation shall be designed and constructed in a manner that will encourage proper use. The Responsible Authority will approve one-way access driveways only when design conditions ensure one-way operation.

The Responsible Authority reserves the right to require the design and construction of a divided entrance for major traffic generators. This determination will be based on the parking lot capacity, anticipated traffic generation, and the effect on the service of the adjacent roadway. A typical divided entrance is shown in Figure 6.

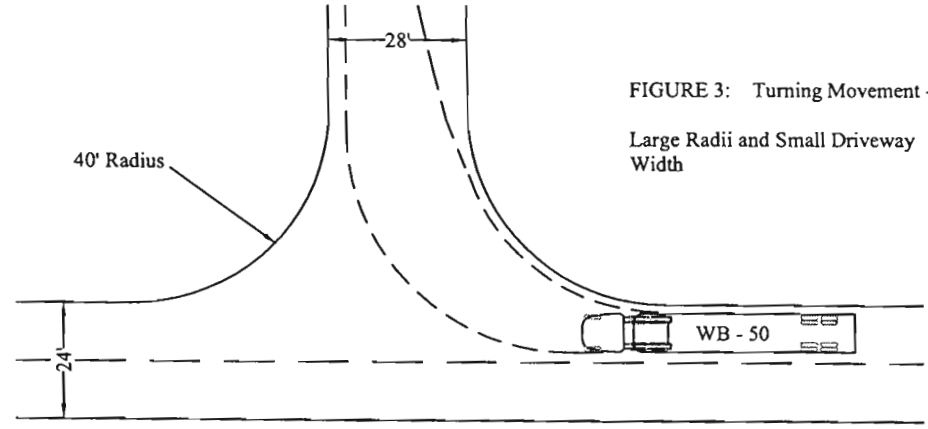


FIGURE 3: Turning Movement - Large Radii and Small Driveway Width

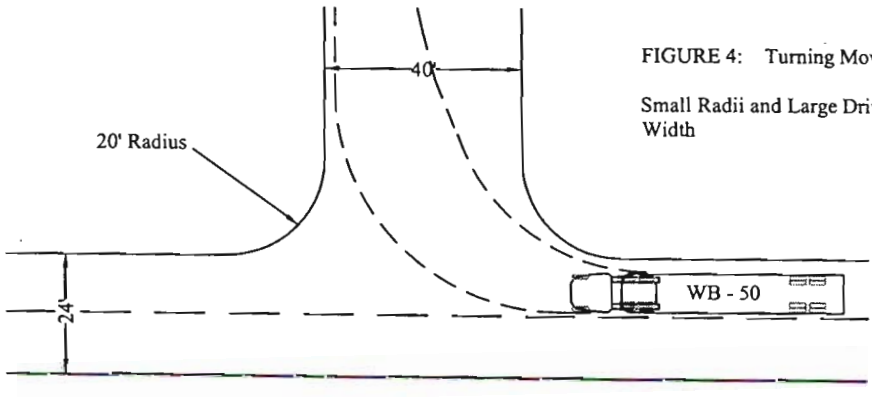


FIGURE 4: Turning Movement - Small Radii and Large Driveway Width

TABLE 7: THROAT WIDTH AND RETURN RADIUS REQUIREMENTS [8]					
		Width		Radius	
Driveway Designation		Minimum	Maximum	Minimum	Maximum
I	Residential Curbed	10	20	5	15
II	Residential Uncurbed	12	24	15	30
III	Commercial Curbed	24	30*	20	40
IV	Commercial Uncurbed	24	30*	20	40
V	Field Entrance	12	24	20	40
* 40 feet may be acceptable for driveways accommodating combination truck traffic.					

Figure 5: Typical Entrance

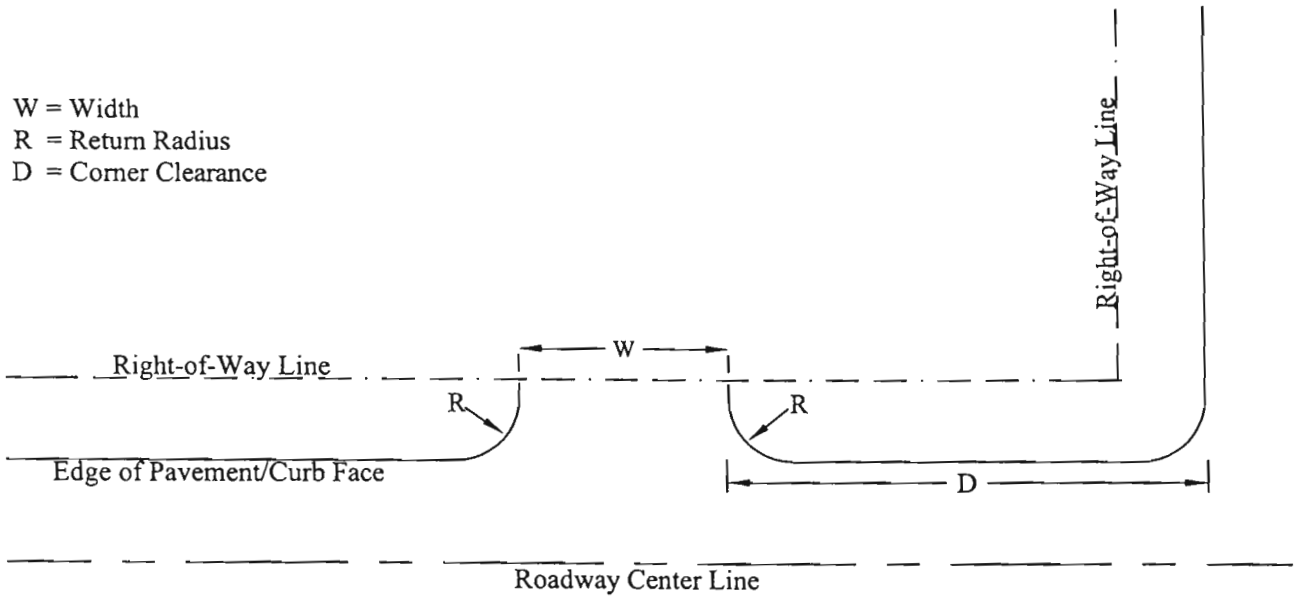
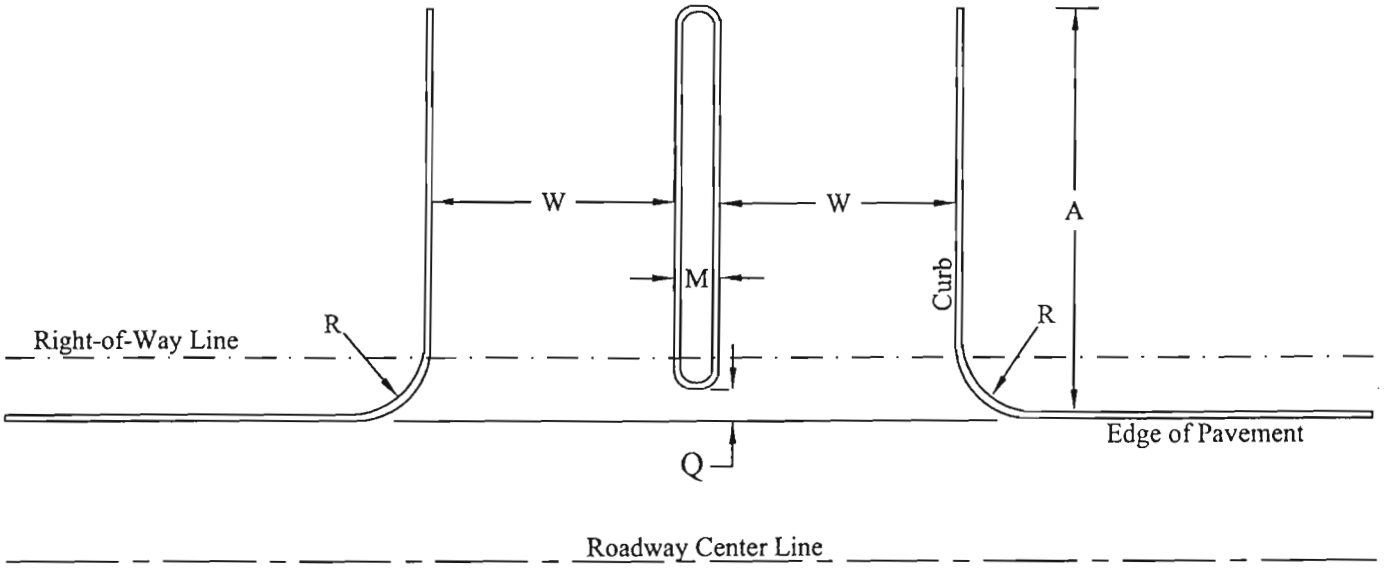


Figure 6: Typical Divided Entrance



W = Width (varies)

M = 4' min., 10' max.

R = 20' min., 40' max.

Q = 2' min., 6' max.

A = 100' min.

2. NUMBER OF LANES

In order to improve the efficiency of driveways that enter the public roadway network at a traffic control signal, two exiting lanes should be constructed. This design will include provisions for a left turn lane and a right turn lane. A through lane should be incorporated when necessary for a turn and through shared lane. Consideration should also be given to the number of receiving lanes for a development. Larger developments with a dedicated right turn lane entering the site accompanied by left turn movements into the site should utilize two receiving lanes to ensure that all vehicles entering the site have adequate room for safe ingress.

3. THROAT LENGTH

Throat length refers to the distance between the edge of street pavement to the point where driveway traffic comes into conflict with the on-site traffic circulation including parking. Adequate distance is necessary to move the parking/circulation conflict area away from the driveway entrance/exit point. The depth of the throat length must be sufficient to allow on-site storage of vehicles to prevent "spillback" onto public streets or into site parking areas. The minimum throat length should be established by either sufficient storage for three queued vehicles or consideration to adjacent roadway volume, expected arrival and departure rates, size and possible trip generations of the development, and the design vehicle type, whichever is more restrictive.

Sufficient room at gated entrances for commercial, industrial or residential developments should exist for storage of at least three design vehicles. Priority will always be given to through traffic on adjacent streets and inbound traffic.

4. APPROACH ANGLE

The approach angle, or angle of driveway intersection, directly affects the motorist field of vision and vehicular speeds as well as the selection of design features such as throat width, return radius and throat length. All two-way driveways with unrestricted turning movements shall have an approach angle as close to 90 degrees as possible dependent upon site constraints. A minimum of 60 degrees will be permitted but only when it if not possible to create a 90 degree driveway access due to topography or other site restrictions. All one-way driveways shall have an approach angle as close to 90 degrees as possible with an acceptable minimum of 45 degrees but only when site restrictions are present. When a 90 degree approach angle is not possible, adequate compensation should be given to the throat width and return radius to meet the needs of all applicable vehicular maneuvers and pedestrian safety.

5. CHANNELIZATION

Channelization is used to separate conflicting traffic movements into specific paths of travel by utilizing traffic islands or pavement markings to improve safety for both vehicles and pedestrians. The results of proper channelization of traffic include increased capacity, improved safety, maximum convenience, and promotes driver confidence. However, when channelization efforts are poorly

designed, they may have a detrimental effect, worse than if no channelization was present. Over channelization has the tendency to confuse motorists and pedestrians by forcing the driver or pedestrian to view and comprehend multiple islands and pavement markings within a short distance of roadway along with surrounding traffic.

Often, simple traffic channelization measures can produce significant reductions in accident rates. Left-turn provisions often provide the greatest results because they provide the motorist with a safe and comfortable means for completing a left-turn. Consequently, the removal of a vehicle from through traffic lanes reduces the possibility of rear-end collisions.

Channelization of at-grade intersections is generally warranted for one or more of the following factors: (AASHTO p. 796)

1. The paths of vehicles are confined by channelization so that not more than two paths cross at any one point.
2. The angle and location at which vehicles merge, diverge, or cross are controlled.
3. The amount of paved area is reduced and thereby decreases vehicle wander and narrows the area of conflict between vehicles.
4. Clearer indications are provided for the proper path in which movements are to be made.
5. The predominant movements are given priority.
6. Areas are provided for pedestrian refuge.
7. Separate storage lanes permit turning vehicles to wait clear of through-traffic lanes.
8. Space is provided for traffic control devices so that they can be more readily perceived.
9. Prohibited turns are controlled.
10. The speeds of vehicles are restricted to some extent.

The design of a channelized intersections must consider the following factors: the type of design vehicle, the cross sections of the cross streets, the projected traffic volumes in relation to capacity, the number of pedestrians, the speed of vehicles, and type and location of traffic control devices. Physical constraints such as limited right-of-way and terrain must be considered to determine whether the channelization will be economic feasible.

1. Design principals should be followed when designing a channelized intersection. The extent to which the following principals are applied should depend on the characteristics of the total design plan.
2. Motorists should not be confronted with more than one decision at a time.
3. Unnatural paths that require turns greater than 90 degrees or sudden and sharp reverse curves should be avoided.
4. Areas of vehicle conflict should be reduced as much as possible. However, merging and weaving areas should be as long as conditions permit. Channelization should be used to keep vehicles within well-defined paths that minimize the area of conflict.

5. Traffic streams that cross without merging and weaving should intersect desirably at right angles with a range of 60 – 120 degrees acceptable.
6. The angle of intersection between merging streams of traffic should be appropriate to provide adequate sight distance.
7. The points of crossing or conflict should be studied carefully to determine if such conditions would be better separated or consolidated to simply design with appropriate control devices added to ensure safe operation.
8. Refuge areas for turning vehicles should be provided clear of through traffic.
9. Prohibited turns should be blocked wherever possible.
10. Location of essential control devices should be established as a part of the design of a channelized intersection.
11. Channelization may be desirable to separate the various traffic movements where multiple phase signals are used.

6. AUXILIARY LANES

Auxiliary lanes can significantly enhance the operation and safety of a roadway. 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 a driveway safely without creating unnecessary congestion for the roadway through traffic. A deceleration lane also provides for storage of left or right turning vehicles. When a deceleration lane is installed at a driveway no other driveways should be located within the longitudinal limits of the deceleration lane, including the taper. If two or more successive driveways require the installation of a deceleration lane or if adjacent driveways are spaced so close that they would encroach on the deceleration lane, a continuous right turn lane should be provided.

The purpose of an acceleration lane is to allow vehicles exiting from a driveway to accelerate to the speed of the through traffic prior to the merge maneuver. When the adjacent roadway speeds are 40 mph and above and/or right turn egress volumes are high, an acceleration lane may enhance the safety and capacity of the driveway area.

Passing blisters are intended to provide an additional lane so that through traffic can maneuver around left turning vehicles on a two-lane roadway in lieu of a left turn lane.

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. Auxiliary lanes should be designed to the AASHTO standards as discussed in *A Policy on Geometric Design of Highways and Streets*. The minimum auxiliary lane lengths are shown in Table 8 (see Figure 7). Additional storage length may be required for the auxiliary lane to avoid the possibility of vehicles stopping in the through lanes while 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 9, or for any or all of the following reasons:

- Projected roadway traffic counts
- Accident experience
- Existing traffic patterns
- Number of existing roadway lanes
- Sight distance
- Existing speed limit
- Other specific traffic or site conditions

TABLE 8: RECOMMENDED AUXILIARY LANE DESIGN [8]

Posted Speed (mph)	W (ft.)	V (ft.)	H (ft.)
30	100	150	100
40	150	220	150
50	180	320	180

At locations where insufficient public right-of-way exists, the local jurisdiction may require, upon agreement with and at the expense of the applicant, additional right-of-way and the construction of the necessary auxiliary lanes.

To determine if the conditions shown in Table 9 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 Responsible Authority will determine the trip generation of the proposed development.

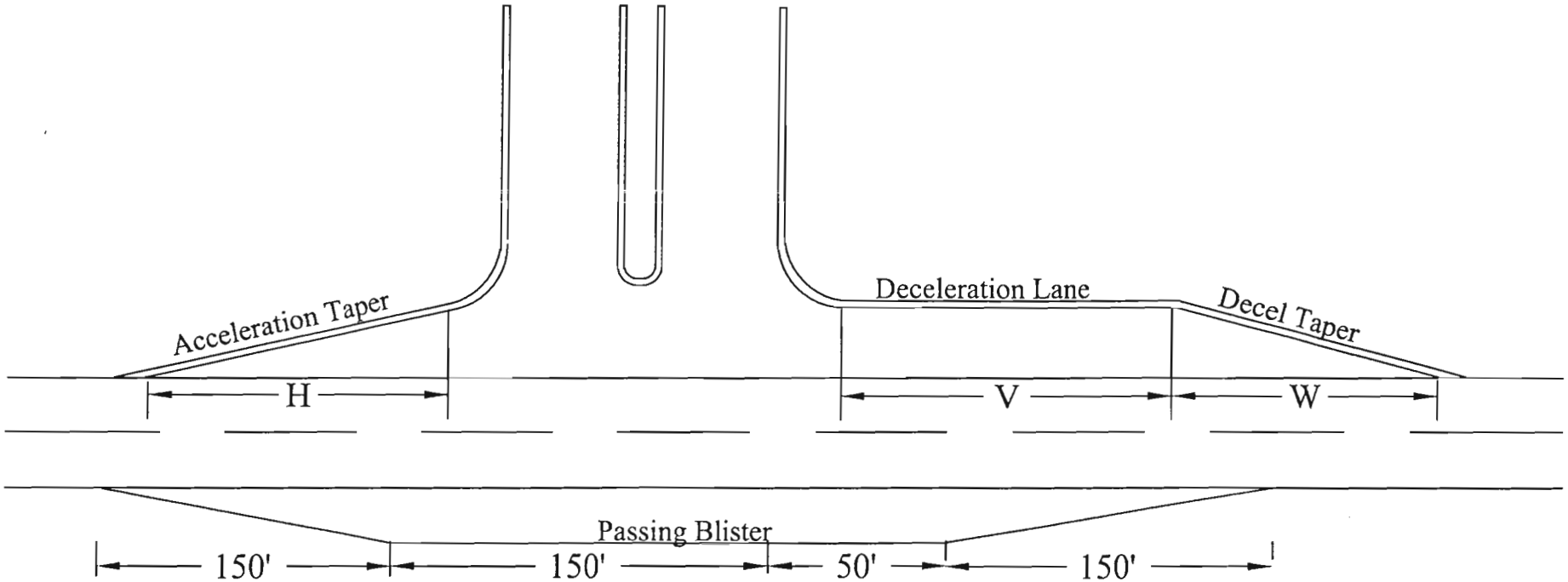


Figure 7
Typical Auxiliary Lanes

Not Drawn To Scale

TABLE 9: VOLUME REQUIREMENTS FOR AUXILIARY LANES [10]				
Requirements for Right Turn Deceleration Lanes and Median Left Turn Lanes				
Public Road Number of Lanes	Minimum Road AADT	Minimum Turns into Drive During Peak Hour	Or	Minimum Daily Turns into Drive
2	4,000	30		300
4	8,000	30		300
Requirements for Passing Blisters				
Public Road Number of Lanes	Minimum Road AADT	Minimum Turns into Drive During Peak Hour	Or	Minimum Daily Turns into Drive
2	4,000	30		300
4	8,000	30		300

7. MEDIAN ISSUES

Requests for private or commercial median openings will not be approved unless the proposed opening meets the minimum distance requirements shown in Table 10. If the requirements established are met, a median opening will be considered after review of the following conditions:

- No other alternative exists for crossover traffic.
- Safety and/or accident potential and history.
- Location to proposed median with respect to the existing intersection and turn lanes.

The provision for the median opening should not be located within the functional area an intersection including all auxiliary lanes, radii, and the reaction area. The same principal will hold true for existing right or left-turn lanes. Ideally, the spacing of median breaks should be conducive to signalization.

It is the responsibility of the applicant to prove to the Responsible Authority that a median opening will not be detrimental to the safety of the motoring public. If the requirements are addressed and the Responsible Authority deems a median opening acceptable, it is the responsibility of the applicant to construct left turn lanes provided sufficient right-of-way exists. The design of the left-turn lanes should be sufficient to accommodate peak hour traffic and have sufficient radii to accommodate truck traffic.

It is noted that a median crossover is not a property right and can be removed at any time if the Responsible Authority considers it a safety hazard. Failure of the median crossover including too many stored vehicles, excessive deceleration of vehicles in through lanes of traffic, and increased accident rates may be grounds of median closure. Median openings are also subject to closure where traffic volumes and/or accident experience warrants a signal and signal spacing criteria cannot be met.

TABLE 10: MINIMUM DISTANCE BETWEEN MEDIAN OPENINGS [8]		
Speed (mph)	Absolute Minimum (ft)	Desirable Minimum (ft)
25	400	400
30	400	400
35	400	460
40	400	530
45	400	670
50	430	780
55	510	910

8. SIGNALIZATION

Traffic signalization of a driveway shall be considered only if the signalization warrants established in the IMUTCD are met. If the projected traffic generated by the development would meet the warrants established in the IMUTCD, the proposed driveway may be subject to traffic signalization. The generated traffic projections must be documented as part of a Traffic Impact Study. Should the signalization warrants be satisfied for a driveway, the Responsible Authority shall have the final decision on whether a traffic signal should be installed. Such a decision shall be based on roadway traffic safety, delay and flow considerations as well as the efforts that driveway signalization will have on the operations at nearby signalized intersections.

Signalized intersections shall be spaced to maintain the efficient movement of through roadway traffic. Driveway signals within 2,500 feet of a signalized intersection, or where other considerations warrant, shall be interconnected and coordinated with the intersection signal to provide efficient roadway traffic flow. At signalized driveways, a separate left-turn lane shall be provided on the roadway for traffic turning left into the driveway. Any present or future installation of a traffic control signal at the access point will be the sole responsibility of the applicant or subsequent property owner.

Should traffic control signal installation not be in the best interest of the public, the applicant may be required to design access to the site in a manner that will mitigate the need for signal installation. Shared access points, indirect intersection access or closure of an existing median break to allow right-turns only may be possible mitigation measures.

IV. SITE DESIGN

1. THE ROLE OF ACCESS MANAGEMENT

Access Management plays a major role in the development process as a tool to create safe and efficient ingress and egress to all types of development. The typical development process has three steps. First the ideal building location for the business is chosen. Next, on-site parking and circulation are considered. Finally, the access point is determined based upon the first two characteristics. Access location, building location and site circulation and parking are highly related.

The typical method of site design may not be the best method from a safety concern. The drive location for a development is a key component when considering the safety of motorist entering or exiting the site and for motorist on the adjacent roadways. When the access point is considered last in the development process, it is often given less attention and often developers are willing to substitute safe access for convenient access based upon the "ideal" building location.

To provide safe access to developments, the first step in the site design process should be the access point. Establishing a safe and reasonable access point for a development should be paramount. The safety of motorists and pedestrians should take precedent over the "ideal" location of a building or parking layout. The second step should explore parking layouts and on-site circulation according to the appropriate ingress/egress location. Finally, the building location should be established in accordance with the previous process. This process of developing from the outside in, will create safer access to the site so customers will be more willing to make subsequent returns, more efficient flow of traffic on the adjacent roadway network, and increased pedestrian safety and access.

2. PARKING AND ON-SITE CIRCULATION

Poor on-site circulation and access are detrimental to the public using the facility, the adjacent roadway, and the private capital invested in the development. It is imperative that the Responsible Authority address these components within the Site Review process. Often poor access and circulation design leads to the following problems:

- Inadequate access capacity
- On-site congestion
- Congestion on the public roadway network
- High crash experience on the pubic street
- High crash experience on-site
- Pedestrian-auto crashes
- Loss of customers
- Unstable land use
- Decrease in property value

To establish a good pattern of on-site circulation, internal connection between parking isles and parking areas on opposite sides of the building or development should be provided. Situations where a motorist enters a parking aisle to find that not only are there no parking spaces available but there is no way other than backing out to exit the aisle creates a sense of confusion for the motorist and

creates a potential on-site conflict. The same holds true for motorists who enter one side of the development and find that no parking is available but instead of driving to the other side of the building via on-site circulation, the motorist is forced to exit the site, accelerate for a short distance on the roadway and then enter the site once again at another location. Forcing motorist onto the adjacent roadway network, especially for short distances while driving slowly, creates a safety hazard for the motorist and for the through traffic on the roadway. Providing adequate maneuvering room on-site and connecting parking areas and aisles will create a safe and enjoyable experience for those visiting the development.

The intersections of parking aisles should be as close to ninety degree as possible to insure adequate site distance within the parking lot. Sufficient clearance should exist to prevent parked cars from blocking visibility at aisle intersections or at the access drive. Landscaped islands at the end of parking aisles and within the parking area aesthetics to the overall development and should be encouraged. However, the landscaping used should not create site visibility restrictions for motorists or hinder on-site circulation.

To increase pedestrian safety, when parking or aisles abut adjacent sidewalks or right-of-way lines, a six-inch curb should be installed to prevent encroachment. The installation of the curbing will prevent vehicles from accidentally pulling onto a sidewalk when parking or maneuvering. All vehicle movements should be physically separated from sidewalks.

3. SHARED ACCESS AND INTERPARCEL CIRCULATION

Adjacent properties along major thoroughfares should consider the utilization of shared access points when feasible. The use of shared access points will reduce the number of conflict points and provide greater distance between conflict points. The enhanced traffic flow on the roadway will increase egress capacity and reduce vehicular crashes.

Benefits of Shared Access Points
♦ Fewer conflict areas
♦ Increased spacing of conflict areas
♦ Facilitates use of deceleration lanes
♦ Fewer pedestrian-vehicle conflict locations
♦ Fewer bicycle-vehicle conflict locations
♦ Improves Safety
♦ Increases egress capacity

Access points that are too close to each other tend to reduce the functionality of each drive. The use of shared access points allow right turn lanes to be installed which help motorists decelerate without hindering traffic on the through street. Acceleration tapers can also be installed which will ultimately make it easier for motorists to enter and leave the site.

Interparcel circulation or interconnection improves accessibility to, and often within, the site. Cross access provides an opportunity for vehicular and pedestrian movement between developments. Walking trips between developments may then be substituted for vehicle trips. Interparcel circulation reduces the need for motorists to leave on site and travel on a major roadway to reach an adjacent site and it increases safety by reducing the number of conflicts on the street.

Provisions should be made with interparcel circulation to provide adequate facilities for both pedestrians and bicyclists. The interconnection benefits the public by providing efficient circulation between businesses and benefits the development by increasing convenience and attractiveness. When considering interparcel circulation, the distance between developments should be considered

for pedestrian traffic. Pedestrians may only be willing to travel a few hundred feet to an adjacent store. If distances exceed 200 or 300 feet, pedestrian interconnections may not be feasible but vehicular interconnection should still be considered.

As a rule of thumb, the following types of establishments should be considered/required to provide interparcel circulation:

- Restaurants and gas stations
- Discount stores and shopping malls
- Specialty stores and shopping malls
- Comparative shopping stores
- Neighborhood shopping stores and gas stations
- Neighborhood shopping stores and banks
- Neighborhood commercial areas and residential areas

Other similar development types may be required to provide interparcel connections at the discretion of the Responsible Authority and as discussed at Site Review.

4. DRIVE-THRU FACILITIES

All facilities that require the installation of a drive thru to serve customers whether for restaurants, pharmacies, banks, dry cleaners, car washes and others should provide sufficient room for waiting vehicles to stack. For each specific lane use, different queuing lengths are necessary to accommodate stacked vehicles. Table 11 outlines the recommended design queues based on lane use:

TABLE 11: RECOMMENDED QUEUE LENGTHS FOR DRIVE THRU FACILITIES [5]	
Fast Food Restaurant	9 Vehicles from order board
Bank	7 Vehicles per teller stall
Car Wash – Self Serve	4 Vehicles per stall
Car Wash – Automated	10 Vehicles per stall with a minimum drying lane length of 50 feet
Pharmacy	4 Vehicles per stall
All other drive thru facilities	A minimum of 3 vehicles but more stringent requirements may be enforced at the discretion of the Responsible Authority

These requirements are necessary to prevent drive thru facilities from possibly interfering with traffic flow on adjacent streets and prevent undue congestion or confusion within on-site circulation. Depending upon use, it may be necessary to limit or remove parking that will back into the flow of drive thru traffic either before or after ordering and receiving. The 50 foot requirement for automated car wash facilities is necessary to prevent undue amounts of water from collecting on the roadway which could create a safety hazard.

5. LOADING ZONES

All developments requiring deliveries of good either to or from the site shall provide sufficient room on-site for delivery maneuvering. The space designated for a loading zone should remain free from parked vehicles and any other obstructions that would prevent the truck from accessing loading area. When entering the site, the delivery vehicle should not back to or from any street, alley or dedicated right-of-way or impede traffic flow on adjacent streets. On multi-lane facilities, trucks should be able to access the site from the outermost (right) travel lane. Trucks that are required to position themselves in inner lanes to turn into a site must cross other through travel a lane that is unsafe and cumbersome to other motorists sharing the roadway. While loading or unloading, the truck should not project into the street, sidewalk, alley, or internal circulation aisle.

6. PEDESTRIAN, BICYCLE AND TRANSIT CONSIDERATIONS

In an attempt to create a transportation environment that will accommodate all forms of travel, it is necessary to plan for not only the people who use the automobile and those who do not. Although the automobile is the predominate mode of travel, sound transportation planning should also review and encourage other forms of travel.

The goal of all businesses should be to get customers from the street, their car, or from nearby residential development to the building safely. The mode of travel to accomplish this goal can be from the automobile, bicycle, walking or public transit. However, current planning trends tend to only provide accommodations for automobile users. It order to promote other forms of travel in a safe and efficient manner, it may be necessary to rethink current site design strategies to accommodate other forms of travel. Often minor changes or additions to a site plan can create an environment acceptable to all forms of travel.

Pedestrian

To create a more conducive environment for pedestrian traffic, developments can be oriented to connect to off-site pedestrian facilities. This will allow for easy, safe access to the site. Another step is to minimize and/or consolidate driveways and conflict points along the roadway. To a pedestrian, each drive access is a possible location for an accident from motorist not paying attention to pedestrians. Providing a reasonable path through parking lots and between buildings will maximize the directness of pedestrian routes and encourage such travel. Providing direct pedestrian flows to safe crossing points and focused traffic control efforts will also enhance pedestrian traffic. On roadways, channelized vehicle paths with landscaping islands provide a point of pedestrian refuge while improving roadway aesthetics. Providing direct paths between commercial centers and abutting residential developments will encourage pedestrian traffic.

Bicycle

Providing connections to off-street facilities will improve bicycle travel safety. Reduction or consolidation of curb cuts as discussed under pedestrian considerations will also improve bicycle safety. Also, providing bicycle racks close to buildings for safe storage of bicycles is necessary to encourage bicycle travel.

Transit
To promote transit use, developments can install bus pullout bays and sidewalk connectors adjacent to the roadway. Allowing sufficient maneuvering room on-site for bus maneuvering and possibly providing a bus shelter will all help make developments more accessible to transit users.

Each of these concepts can easily be incorporated into most development plans to promote pedestrian, bicycle and transit traffic. It is not necessarily recommended that all developments comply with all of the above recommendations, but the utilization of some of these design features in site plan development will create a more multi-modal approach to planning.

7. OTHER SITE PLANNING CONSIDERATIONS

Various other components will be review within the guidelines of this section. The locations and installation of fire lanes should be reviewed to insure that proper attention has been provided for emergency vehicle access.

Special consideration to sites dealing with large vehicles on a daily basis will require additional review requirements as deemed necessary by the Responsible Authority.

The location of solid waste pick-up containers should not interfere with the normal flow of traffic on a given site. Even though garbage may be picked up "early in the morning before business hours," the site should be designed so that solid waste can be picked up at any time without creating an unacceptable traffic situation on-site.

Outparcels will be required to have access from interior streets only and have shared access points when possible. Adjoining outparcels should have interconnected parking and pedestrian access and circulation. The same site development criterion will apply to outparcels as all other developed lots as discussed within this section.

V. SUBDIVISION DESIGN

1. NUMBER OF INGRESS/EGRESS POINTS

Subdivision developments should be designed to provide access onto the abutting road with the lowest functional classification, to promote efficient flow of traffic, and to reduce the number of conflict points on the roadway. All lots within subdivision developments shall provide access to interior streets only. Funneling subdivision traffic to one or more centralized location will enhance traffic flow on major corridors more effectively than multiple access points.

Single access subdivisions may restrict emergency access and increase traffic congestion during peak hours by providing only one point for ingress and egress. According to Listokin and Walker (1989), a residential subdivision with only one access should have a maximum number of 50 dwelling units. This figure should be based upon the number of average daily trips generated by the development. Warrick County, Indiana, has adopted a similar ordinance that states any subdivision with 50 or more lots shall be served by two access points if bordered by more than one street. This figure should be based upon the number of average daily trips generated by the development.

2. *CUL-DE-SACS AND TURNAROUNDS*

Streets designed to provide singular access to multiple lots with no connection to adjacent streets should be constructed with a proper means of traffic reversal. Cul-de-sacs should be installed to provide sufficient room for all vehicles that will utilize it to maneuver without performing multiple movements. The radius of the cul-de-sac should be sufficient to provide room for emergency vehicles, school buses, delivery trucks, garbage trucks and other large vehicles that will use the street on a regular basis. Turning radii within the street should also be sufficient to allow the movements of these vehicles without driving on private property.

The minimum radius for cul-de-sacs within residential developments should be at a minimum 55 feet. Cul-de-sacs within commercial or industrial developments should provide a radius sufficient to accommodate truck traffic.

3. LOT SIZE

Lot frontage should be adequate to accommodate all requirements set forth in this manual and within applicable zoning ordinances. To insure that adequate room is available, lots on higher volume streets and streets with collector or arterial classifications should provide more linear frontage. Lots should also be platted with sufficient depth to allow for sufficient room for on-site circulation, parking and driveway though length. Wider residential lots provide more room for on-site maneuverability that encourages vehicles to enter or exit the lot without backing into the street.

Maximum lot length-to-width ratios prevent the creation of long and narrow lots that may hinder proper lot development. Long narrow lots do not provide adequate room for on-site maneuverability of traffic in commercial or residential developments. Lots should not be developed that exceed a 3:1

length-to-width ratio. This meaning that a lot that is 100 feet wide cannot exceed 300 feet in length and so forth.

4. FLAG LOTS

Flag lots are typically developed along lakes, rivers, cul-de-sacs and highways as a means to provide access to multiple lots within a limited amount of roadway frontage. The development of flag lots for this purpose shall be prohibited especially within commercial developments. Flag lots may be permissible in residential developments where physical constraints create access problems, to preserve historical or archaeological amenities, or where necessary to eliminate access to a major thoroughfare.

Flag lot development does not provide adequate drive spacing along major corridors and increases conflict points. To prevent this problem, these guidelines should be followed:

- Flag lots should be twice the size of the minimums established in the zoning ordinance
- Lots shall have no less than 20' and no more than 50' of roadway frontage
- No more than one flag lot may be developed per road
- Flag lots may not constitute more than 10% of the entire development or 3 lots whichever is more restrictive
- Flag lots may not be constructed on collector or arterial roadways
- The pole or panhandle portion of the lot may not be counted towards the total lot size to prevent drainage or septic field beds utilizing this space and creating run-off on adjacent properties

5. FRONTAGE ROADS

Frontage roads are designed to separate local traffic from higher speed through traffic on major roadways by removing slower turning vehicles from through lanes. The implementation of frontage roads helps insure that the character of a roadway is preserved and unaffected by development by reducing the frequency and severity of conflict points. When constructed, frontage roads allow lots to have visibility from a main thoroughfare while having improved access from an interior street. Placing multiple drives on the frontage road provides the roadway to maintain adequate intersection spacing that facilitates the design and construction of auxiliary lanes for deceleration and acceleration.

For a frontage road to function in an efficient manner, it is crucial that sufficient outer separation exist between the main roadway and the frontage road. A desirable separation of 300 feet should be provided when feasible to insure the safe, efficient operation of the intersection, ensure sufficient storage and placement of traffic control devices and signs, and provide an area for pedestrian refuge. A narrower separation, no less than 150 feet, may be acceptable where frontage road traffic is very light, where frontage roads operate one-way only, or where some movements can be prohibited through traffic control devices, channelization, or medians.

6. INTERCONNECTION

The interconnection of subdivision streets provides for a unified circulation pattern of vehicles on the internal street network and reduces the number of unnecessary trips on major corridors. The roadway network for proposed subdivisions should be coordinated with the existing, proposed and planned streets outside the subdivision to reduce to improve efficiency as described earlier. A connected roadway network advances the following growth management objectives:

- Fewer vehicle miles traveled
- Alternative routes for short trips
- Improved accessibility of developed areas
- Increased walking, bicycling and transit use
- A safer option for children
- More environmentally sensitive layout of streets and lots
- A sense of community
- Safer school bus routes
- Decreased congestion of major corridors

Fragmented streets often impede emergency access and increase the number and length of automobile trips on the transportation network. Since dead end streets, cul-de-sacs and gated communities force more traffic onto collector and arterial roadways, interconnection of streets will improve roadway efficiency and create a safer roadway network for all users.

7. SIDEWALKS

Sidewalks are a very important part of a community. It is important that sidewalks be well maintained to provide safe facilities for pedestrians to travel away from the motoring public. Sidewalks allow for and/or encourage non-motorist travel and replace some vehicular trips.

Sidewalks within commercial developments or mixed-use developments allow for pedestrian trips between businesses and reduce the number of short distance automobile trips made. Sidewalks within residential developments provide a safe place for children to walk or ride a bicycle and for pedestrian interconnection between developments.

All subdivisions should be required to install sidewalks to promote non-motorized trips. A waiver may be granted to reduce or eliminate sidewalk requirements but specific, pertinent reasons for not needing sidewalks should be given. Sidewalks waivers should not be granted just because of expense or because of lack of desire on a developer's behalf.

In residential developments with large lot sizes, greater than 2 acres, sidewalks may not be necessary. In other residential developments, waivers may be granted due to topography restraints or other factors that will limit the functionality of the sidewalk. In these cases sidewalks may be constructed on only one side of the roadway or other innovative measures may be used. If a developer so chooses, the construction of a pedestrian path around or throughout the development may be used in place of street sidewalks provided that all lots would have adequate access to the path. This type of sidewalk will still provide a safe harbor for pedestrian traffic while eliminating the need for street sidewalks.

In commercial districts, sidewalks should be constructed to connect abutting commercial developments. Pedestrian connector through parking lots and around shopping centers will provide a safe way for shoppers to travel by foot or bicycle away from the motoring public. Sidewalk waivers within commercial developments are not recommended.

8. TRAFFIC CONTROL AND CALMING

Street layouts within subdivision developments should be designed to easily be incorporated with the existing roadway network. New streets should be designed with provisions to accommodate further intersection improvements including the possibility of auxiliary lanes and traffic control devices.

The layout of subdivision streets should incorporate traffic calming devices to promote safer flow of traffic. Traffic calming schemes should be utilized when roadway and pedestrian conflicts will be prevalent, when speed within the subdivision or on adjacent roads is high and when the devices will improve roadway circulation and safety. Often minor adjustments to existing roadway designs will improve roadway safety for motorists and pedestrians. Construction of roads that align with the existing topography that are curvilinear in nature, promote slower speeds within developments. Introducing roadside friction such as landscaping or street trees or narrowing of internal streets also typically has a calming effect on roadway speeds. Many other innovative measures can be implemented to create effective traffic calming.

Implementing traffic calming devices along with the interconnection of subdivisions can create a much safer atmosphere for pedestrians and motorists. The residents of subdivision will have fewer worries about speeding vehicles through a subdivision while providing and alternative route between developments.

DEFINITIONS

1. Access - a Location which allows 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 as an annual daily 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. Capacity - maximum number of vehicles that can pass over a given section of a lane or roadway during a given time period under prevailing roadway and traffic conditions.

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

8. 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.

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

10. 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.

11. Design Vehicle - a selected vehicle whose dimensions and operating characteristics are used to establish design controls.

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

13. Frontage - the lineal footage of a parcel adjacent to dedicated street right-of-way which has been improved and approved by the local authority.

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

15. Lane - the portion of a roadway for the movement of a single line of vehicles; not including the gutter or shoulder.

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

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

18. 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.

19. 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.

20. Queue - a line of waiting vehicles.

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

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

23. Sight Distance - the distance along a public roadway that an object of specific height is continuously visible to the 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.

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

25. 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.

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APPENDIX A

Permitting Responsible Authorities

	City of Evansville	Vanderburgh County	Town of Newburgh	Town of Chandler	Town of Boonville	Warrick County	City of Henderson	Henderson County
Zoning/Rezoning	Area Plan Commission	Area Plan Commission	Advisory Board of Zoning Appeals	Town Council & Chandler Plan Commission	Board of Zoning Appeals & Plan Commission	Area Plan Commission	Henderson City-County Plan Commission	Board of Zoning Adjustment & Fiscal Court
Building Permits/ Commercial	Area Plan Commission & Site Review Committee	Area Plan Commission & Site Review Committee	Hired Facility Management	City Clerk & County Building Inspector	Admin. Asst. & County Building Inspector	Area Plan Commission & County Building Inspector	Code Enforcement Department	Code Enforcement Department.
Building Permits/ Residential	Building Commission	Building Commission	Hired Facility Management	City Clerk & County Building Inspector	Admin. Asst. & County Building Inspector	County Building Inspector	Code Enforcement Department	Code Enforcement Department
Certificate of Occupancy	Area Plan Commission & Building Commission	Area Plan Commission & Building Commission	Hired Facility Management	———	———	———	Code Enforcement Department	Board of Zoning Adjustment & Fiscal Court
Driveway Permit/ Commercial	Site Review Committee & City Engineer	Site Review Committee & County Engineer	Drainage Board & Town Building Inspector	Chandler Plan Commission	Town Engineer	Area Plan Commission & County Highway Engineer	City Engineer	County Engineer
Driveway Permit/ Residential	City Engineer	County Engineer	Drainage Board & Town Building Inspector	Chandler Plan Commission	Town Engineer	Area Plan Commission & County Highway Engineer	City Engineer	County Engineer
Subdivision Review	Area Plan Commission & Subdivision Review Committee	Area Plan Commission & Subdivision Review Committee	Newburgh Plan Commission	Chandler Plan Commission	Boonville Plan Commission	Warrick Area Plan Commission	Henderson City-County Plan Commission	Henderson City-County Plan Commission
Site Review	Area Plan Comm. & Site Review Committee	Area Plan Commission & Site Review Committee	Newburgh Plan Commission	Chandler Plan Commission	Dept. Heads Site Review Committee	Warrick Area Plan Commission	Henderson City-County Plan Commission & Site Review Committee	Henderson City-County Plan Commission & Site Review Committee

APPENDIX B

Evansville Urban Transportation Study
Functional Classification List

STREET	LOCATION	FUNC. CLASS
Allen Lane	(First Avenue to St. Joseph Avenue)	Collector
Ayrshire Road	(Stevenson Station Road to Euler Road)	Collector
Barker Avenue	(Emerson Street to Broadway Avenue)	Collector
Barker Avenue	(Broadway Avenue to SR 62 (Lloyd Expwy.))	Minor Arterial
Baseline Road	(County Line Road to St. Jones Road)	Collector
Bell Road	(State Road to Jenner Road)	Collector
Bellemeade Avenue	(Mulberry Street to Green River Road)	Collector
Big Cynthiana Road	(New Harmony Road to Mill Road)	Minor Arterial
Big Cynthiana Road	(Mill Road to North Boundary)	Collector
Boehne Campe Road	(Upper Mt. Vernon Road to Middle Mt. Vernon Road)	Collector
Boeke Road	(Morgan Avenue to I-164)	Minor Arterial
Boonville-New Harmony Road	(St. Wendel Road to Weyerbacher Road)	Collector
Broadway Avenue	(Barker Avenue to County Line Road)	Minor Arterial
Broadway Avenue	(County Line Road to St. Phillips Road)	Collector
Broadway Avenue	(Dixie Flyer Road to Claremont Avenue)	Collector
Browning Road	(Old Petersburg Road to Old State Road)	Collector
Buena Vista Road	(Kratzville Road to Stringtown Road)	Collector
Burkhardt Road	(Olmstead Road to Washington Avenue)	Collector
Campground Road	(Stringtown Road to First Avenue)	Collector
Cardinal Drive	(Kentucky Avenue to Stringtown Road)	Collector
Casey Road	(SR 66 to SR 261)	Collector
Castle Garden Road	(Jenner Road to Gardner Road)	Collector
Claremont Avenue	(Barker Avenue to Red Bank Road)	Collector
Columbia Street	(US Hwy. 41 to Pigeon Creek)	Minor Arterial
Court Street	(Second Street to Eighth Street)	Minor Arterial
Covert Avenue	(Governor Street to I-164)	Minor Arterial
Culver Drive	(Second Street to Riverside Drive)	Minor Arterial

Evansville Urban Transportation Study
Functional Classification List

STREET	LOCATION	FUNC. CLASS
Darmstadt Road	(Schenk Road to North Boundary)	Collector
Darmstadt Road	(First Avenue to Schenk Road)	Minor Arterial
Delaware Street	(St. Joseph Avenue to Pigeon Creek)	Minor Arterial
Diamond Avenue	(SR 65 to West Boundary)	Principal Arterial
Diamond Avenue	(Weinbach Avenue to SR 65)	Collector
Dixie Flyer Road	(Nurrenburn Road to Broadway Avenue)	Collector
Eickhoff Road	(SR 62 to Upper Mt. Vernon Road)	Minor Arterial
Eighth Street	(Walnut Street to Washington Avenue)	Minor Arterial
Eighth Street	(Court Street to Sycamore Street)	Minor Arterial
Epworth Road	(SR 66 to Telephone Road)	Collector
Euler Road	(Ayshire Road to Kansas Road)	Collector
Evergreen Road	(Darmstadt Road to Old State Road)	Collector
Fares Avenue	(Virginia Street to Diamond Avenue (SR 66))	Collector
Fifth Street	(Walnut Street to Ingle Street)	Minor Arterial
First Avenue	(Lloyd Expwy. (SR 62) to Darmstadt Road)	Minor Arterial
Fotsomville Road	(Tennyson to Taylorville Road)	Collector
Fourth Street	(Lloyd Expwy. (SR 62) to Ingle Street)	Minor Arterial
Fourth Street	(Court Street to Powell Street)	Minor Arterial
Frame Road	(SR 662 to SR 66)	Collector
Franklin Road	(Old Mt. Vernon Road to Smith Diamond Road)	Collector
Franklin Street	(Mt. Vernon Avenue to First Avenue)	Minor Arterial
Franklin Street	(First Avenue to Kentucky Avenue)	Collector
Fulton Avenue	(SR 62 to Diamond Avenue (SR66))	Minor Arterial
Fulton Avenue	(Riverside Drive to SR 62)	Principal Arterial
Fuquay Road	(Pollack Avenue to Newburgh Road)	Collector
Fuquay Road	(SR 261 to SR 62)	Collector
Gardner Road	(SR 62 to SR 261)	Collector

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Functional Classification List

STREET	LOCATION	FUNC. CLASS
Garvin Street	(Stringtown Road to Covert Avenue)	Minor Arterial
Governor Street	(Louisiana Street to Covert Avenue)	Minor Arterial
Green River Road	(I-164 to Millersburg Road)	Major Collector
Green River Road	(Millersburg Road to SR 57)	Minor Arterial
Grimm Road	(SR 662 to SR 66)	Minor Arterial
Harmony Way	(New Harmony Road to Mt. Vernon Road)	Collector
Heidelbach Avenue	(Diamond Avenue (SR 66) to Olmstead Avenue)	Collector
Heidelbach Avenue	(Walnut Street to Diamond Avenue (SR 66))	Minor Arterial
Heim Road	(Stevenson Station Road to SR 62)	Collector
Hitch & Peters Road	(Lynch Road to St. George Road)	Collector
Hogue Road	(Upper Mt. Vernon Road to Tekoppel Avenue)	Collector
I-164		Interstate
Inderrieden Road	(SR 62 to Boonville-New Harmony Road)	Collector
Jefferson Street	(Jennings Street to Bell Road)	Collector
Jenner Road	(Bell Road to Castle Garden Road)	Collector
Kentucky Avenue	(Mill Road to St. George Road)	Minor Arterial
Kentucky Avenue	(I-164 to Virginia Street)	Collector
Kentucky Avenue	(Diamond Avenue to Cardinal Drive)	Collector
Kippel Road	(Kansas Road to Boonville-New Harmony Road)	Collector
Koressel Road	(Upper Mt. Vernon Road to SR 66)	Collector
Kratzville Road	(Diamond Avenue (SR 66) to First Avenue)	Collector
Kuebler Road	(SR 65 to Meier Road)	Collector
Laubscher Road	(St. Joseph Avenue to Kratzville Road)	Collector
Lenn Road	(Sharon Road to SR 66)	Collector
Lincoln Avenue	(Liberty Way to Green River Road)	Minor Arterial
Lincoln Avenue	(Green River Road to SR 66 to East Boundary)	Collector
Lincoln Avenue	(SR 66 to SR 61)	Collector

Evansville Urban Transportation Study
Functional Classification List

STREET	LOCATION	FUNC. CLASS
Lincoln Trails Road	(Taylorville to Brooks Road)	Collector
Locust Street	(Second Street to Ninth Street)	Minor Arterial
Lynch Road	(US Hwy. 41 to Burkhardt Road)	Minor Arterial
Main Street	(Lloyd Expwy. (SR 62) to Morgan Avenue)	Collector
Market Street	(Lloyd Expwy. (SR 62) to Carpenter Street)	Minor Arterial
Martin Luther King Blvd	(Bellemeade Avenue to Lloyd Expwy. (SR 62))	Collector
Marx Road	(New Harmony Road to West Boundary)	Collector
Maryland Street	(Harmony Way to St. Joseph Avenue)	Collector
Maxwell Avenue	(Heidelbach Avenue to Fares Avenue)	Collector
Meier Road	(Kuebler Road to St. Joseph Avenue)	Collector
Mesker Park Drive	(Mill Road to St. Joseph Avenue)	Collector
Middle Mt. Vernon Road	(Lloyd Expwy. (SR 62) to Broadway Avenue)	Collector
Mill Road	(SR 66 to Mesker Park Drive)	Collector
Mill Road	(Mesker Park Drive to Kratzville Road)	Minor Arterial
Mill Road	(Kratzville Road to Kentucky Avenue)	Minor Arterial
Millersburg Road	(Inderrieden Road to State Street (Chandler))	Collector
Millersburg Road	(Oak Hill Road to Green River Road)	Collector
Morgan Avenue	(US Hwy. 41 to I-164)	Principal Arterial
Morgan Avenue	(First Avenue to Heidelbach Avenue)	Collector
Mt. Vernon Avenue	(Tekoppel Avenue to Franklin Street)	Minor Arterial
New Harmony Road	(Big Cynthiana Road to Red Bank Road)	Minor Arterial
Newburgh Road	(Lincoln Avenue to I-164)	Collector
Nurrenbern Road	(Dixie Flyer Road to Broadway Avenue)	Collector
Oak Grove Road	(Green River Road to SR 261)	Collector
Oak Hill Road	(Virginia Street to SR 57)	Collector
Ohio Street	(Ray Becker Pkwy. to Fulton Avenue)	Collector
Old Boonville Hwy.	(Green River Road to Olmstead Road to SR 62)	Collector

Evansville Urban Transportation Study
Functional Classification List

STREET	LOCATION	FUNC. CLASS
Old Mt. Vernon Road	(Broadway Avenue to Franklin Road)	Collector
Old Petersburg Road	(SR 57 to Boonville-New Harmony Road)	Collector
Old State Road	(Campground Road to North Boundary)	Collector
Olmstead Avenue	(Heidelbach Avenue to Stringtown Road)	Collector
Olmstead Road	(Burkhardt Road to Old Boonville Hwy.)	Collector
Outer Gray Street	(State Street to SR 662)	Collector
Peerless Road	(Lloyd Expwy. (SR 62) to Upper Mt. Vernon Road)	Collector
Petersburg Road	(Stringtown Road to North Boundary)	Collector
Pollack Avenue	(Riverside Drive to Green River Road)	Minor Arterial
Pollack Avenue	(Green River Road to Stacer Road)	Collector
Prospect Drive	(Vann Road to SR 61)	Collector
Ray Becker Parkway	(Lloyd Expwy. (SR 62) to Barker Avenue)	Minor Arterial
Red Bank Road	(Nurrenbern Road to SR 62)	Collector
Red Bank Road	(SR 62 to New Harmony Road)	Minor Arterial
Riverside Drive	(Culver Drive to Governor Street)	Minor Arterial
Riverside Drive	(Pollack Avenue to Vann Avenue)	Collector
Riverside Drive	(US Hwy. 41 to Pollack Avenue)	Minor Arterial
Riverside Drive	(Veteran's Memorial Pkwy. to Culver Drive)	Collector
Riverside Drive	(Fulton Avenue to Veteran's Memorial Pkwy.)	Principal Arterial
Riverside Drive	(Governor Street to US Hwy. 41)	Collector
Rosenberger Avenue	(Hogue Road to Lloyd Expwy. (SR 62))	Collector
SR 261	(SR 66 to Fuquay Road)	Minor Arterial
SR 261	(Bell Road to SR 66)	Collector
SR 261	(Fuquay Road to SR 61)	Collector
SR 57	(Oak Hill Road to North Boundary)	Minor Arterial
SR 57	(US Hwy. 41 to Oak Hill Road)	Principal Arterial
SR 61	(SR 66 to North Boundary)	Minor Arterial

Evansville Urban Transportation Study
Functional Classification List

STREET	LOCATION	FUNC. CLASS
SR 62	(US Hwy. 41 to West Boundary)	Principal Arterial
SR 62	(I-164 to SR 261)	Minor Arterial
SR 62	(Roth Road to East Boundary)	Collector
SR 62	(US Hwy. 41 to I-164)	Principal Arterial
SR 65	(Mill Road to North Boundary)	Collector
SR 65	(Diamond Avenue (SR 66) to Mill Road)	Minor Arterial
SR 65	(Maryland to Diamond Avenue (SR 66))	Principal Arterial
SR 66	(US Hwy. 41 to East Boundary)	Principal Arterial
SR 66	(SR 65 to West Boundary)	Collector
SR 66	(US Hwy. 41 to SR 65)	Principal Arterial
SR 662	(I-164 to SR 66)	Minor Arterial
Schutte Road	(Broadway Avenue to Lloyd Expwy. (SR 62))	Collector
Second Street	(Fulton Avenue to Culver Drive)	Minor Arterial
Sharon Road	(State Street to Anderson Road to East Boundary)	Collector
Smith Diamond Road	(Franklin Road to South Boundary)	Collector
St. George Road	(Kentucky Avenue to US Hwy. 41)	Minor Arterial
St. George Road	(US Hwy. 41 to Oak Hill Road)	Collector
St. Johns Road	(Boonville-New Harmony Road to Gander Road)	Collector
St. Joseph Avenue	(Laubscher Road to North Boundary)	Collector
St. Joseph Avenue	(Diamond Avenue to Laubscher Road)	Minor Arterial
St. Joseph Avenue	(SR 62 to Diamond Avenue(SR66))	Principal Arterial
St. Phillips Road	(SR 62 to North Boundary)	Collector
St. Wendel Road	(Boonville-New Harmony Road to SR 65)	Collector
St. Wendel Road	(Boonville-New Harmony Road to North Boundary)	Collector
Stacer Road	(Pollack Avenue to SR 662)	Collector
State Street	(Gardner Road to SR 62)	Collector
State Street	(Jennings Street to SR 261)	Collector

Evansville Urban Transportation Study
Functional Classification List

STREET	LOCATION	FUNC. CLASS
Stevenson Station Road	(SR 62 to Ayshire Road)	Collector
Stockwell Road	(SR 66 to SR 62)	Collector
Stringtown Road	(Petersburg Road to Diamond Avenue (SR 66))	Collector
Stringtown Road	(Diamond Avenue (SR 66) to Michigan Street)	Minor Arterial
Sycamore Street	(Second Street to Main Street)	Minor Arterial
Tekoppel Avenue	(Dixie Flyer Road to Virginia Street)	Collector
Telephone Road	(West Boundary to Fuquay Road)	Collector
Theater Drive	(Morgan Avenue to Green River Road)	Collector
Third Street	(Carpenter Street to Locust Street)	Minor Arterial
US Hwy. 41		Principal Arterial
Upper Mt. Vernon Road	(Koring Road to West Boundary)	Collector
Upper Mt. Vernon Road	(Koring Road to Tekoppel Avenue)	Minor Arterial
Vann Avenue	(Riverside Drive to Lloyd Expwy. (SR 66))	Collector
Vann Road	(SR 261 to Prospect Drive)	Collector
Veteran's Memorial Parkway	(Riverside Drive to US Hwy. 41)	Principal Arterial
Virginia Street	(Fulton Avenue to Oak Hill Road)	Collector
Vogel Road	(Stockwell Road to Burkhardt Road)	Collector
Walnut Street	(Veteran's Memorial Pkwy. to US Hwy. 41)	Minor Arterial
Walnut Street	(US Hwy. 41 to Vann Avenue)	Collector
Washington Avenue	(Second Street to Green River Road)	Minor Arterial
Washington Avenue	(Green River Road to Newburgh Avenue)	Collector
Weinbach Avenue	(Riverside Drive to Pollack Avenue)	Collector
Weinbach Avenue	(Pollack Avenue to Morgan Avenue)	Minor Arterial
Weinbach Avenue	(Morgan Avenue to Diamond Avenue)	Collector
Weyerbacher Road	(Boonville-New Harmony Road to Greenbriar Road)	Collector
Winery Road	(St. Wendel Road to West Boundary)	Collector

APPENDIX C

Henderson County Functional Classification List

STREET	LOCATION	FUNCTIONAL CLASS.
Adams Lane	US 41 to KY 812	Urban Collector Street
Audubon Parkway	Pennyrile Pkwy to City Boundary	Urban Freeway
Audubon Parkway	City Bondary to East Boundary	Rural Principal Arterial
KY 1078	US 60 to South Boundary	Rural Minor Collector
KY 1299	KY 285 to KY 425	Urban Collector Street
KY 1299	KY 425 to KY 416	Rural Minor Collector
KY 136	US 41 to South Boundary	Rural Minor Collector
KY 145	US 60 to South Boundary	Rural Minor Collector
KY 266	KY 136 to US 41	Rural Minor Collector
KY 268	KY 136 to KY 1574	Rural Minor Collector
KY 283	US 41 to South Boundary	Rural Minor Collector
KY 285	KY 136 to KY 425	Urban Minor Arterial
KY 351	US 60 to Larue Road	Urban Minor Arterial
KY 351	Larue Rd. to KY 416	Rural Major Collector
KY 359	West Boundary to KY 136	Rural Major Collector
KY 416	US 41A to Audubon Pkwy	Rural Minor Collector
KY 416	Audubon Pkwy to KY 351	Rural Major Collector
KY 416	KY 351 to Birk City Rd.	Rural Minor Collector
KY 425	US 60 to Pennyrile Pkwy	Urban Principal Arterial
KY 811	US 60 to US 60	Rural Minor Collector
KY 812	Atkinson St. to Audubon Pkwy	Urban Minor Arterial
KY 812	Audubon Pkwy to KY 1078	Rural Minor Collector
Larue Road	KY 351 to KY 1539	Urban Collector Street
Madison Street	KY 285 to US 41	Urban Collector Street
Pennyrile Parkway	KY 425 to South Boundary	Rural Principal Arterial
Sand Lane	US 60 to KY 285	Urban Minor Arterial
US 41	Ohio River to US 60	Urban Principal Arterial
US 41	US 60 to KY 351	Urban Freeway
US 41	KY 351 to KY 425	Urban Minor Arterial
US 41	KY 425 to South Boundary	Rural Major Collector
US 41A	US 60 to KY 425	Urban Minor Arterial
US 41A	KY 425 to South Boundary	Rural Minor Arterial
US 60	West Boundary to Jarobe Ln.	Rural Principal Arterial
US 60	Jarobe Ln. to US 41	Urban Principal Arterial
US 60	US 41 to Wathen Ln.	Urban Minor Arterial
US 60	Wathen Ln. to East Boundary	Rural Minor Arterial
Washington Street	Hicks St. to US 41	Urban Collector Street