

Unsignalized directional openings between signalized intersections provide convenient access to abutting properties and reduce U-turns and left-turns at signalized intersections. The following guidelines have been proposed for the provision of unsignalized directional median openings [1].

1. The median is of sufficient width to enable the design as a directional opening.
2. The left-turn bays at the adjacent signalized intersection are of greater importance than a midblock opening. A midblock opening must not compromise the design or operations of a signalized intersection. The steps in assessing the potential for a midblock opening are:

- * Determine the length of the turn bay at each signalized intersection for both peak and off-peak conditions;
- * Ascertain the length available for a midblock opening;
- * Determine the length(s) of the proposed midblock left-turn/U-turn bays. The length for deceleration plus storage of the left-turning vehicles for both peak and off-peak traffic conditions is determined. The longer of the two is used as the minimum turn bay length at the signalized intersections as well as for the proposed

midblock opening; and
 * If the length available is longer than the length needed, a midblock opening can be provided without compromising the function of the signalized intersections.

Suggested spacing guidelines for median openings are listed in Table A-5.

Overlapping separators (see Figure A-3) are an essential feature of a directional median opening designed to accommodate left turns and to actively discourage other movements.

A minimum separator width (face-to-face of curbs) of 3 ft. is used by the Florida Department of Transportation which makes extensive use of this type of median opening. With a 14 ft. turn lane, this requires a median 20 ft. wide. A separator width of at least 6 ft., a 26 ft. median, is desirable in order to enhance visibility of the separators and improve aesthetics.

These median openings can be signalized such that left-turn traffic lanes (green arrow for left turns/U-turns) can be coordinated

Table A-5		
Median Opening Spacing in Feet		
Roadway Classification	In Current and Projected Urban Areas	In Rural Areas
Principal Arterial	1,320 to 2,640 feet 1,320 to 660 feet (directional)	2,640 feet (full) when posted speed is over 45 mph 1,320 feet (full) when posted speed is under 45 mph
Minor Arterial	1,320 feet (full) 660 feet (directional)	1,320 feet (full) at all speeds
Collector	Medians generally not used	Medians generally not used

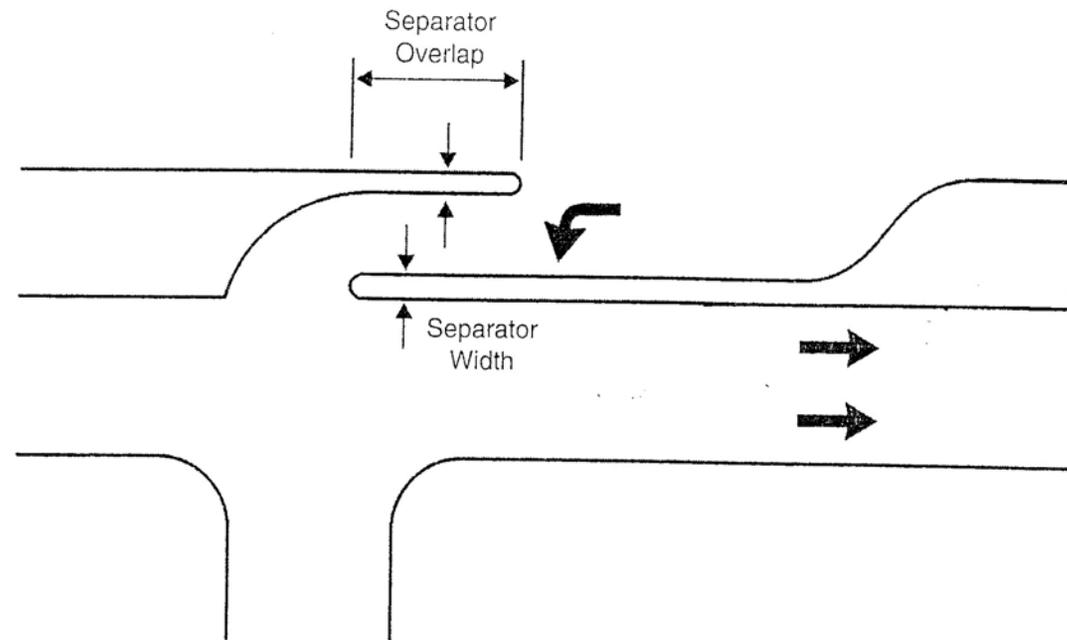
and do not conflict with traffic progression on the major roadway. Only “stragglers” between platoons will be affected; these vehicles would otherwise be stopped at the next downstream signalized intersection.

B. Median Width

Medians should be as wide as feasible but of a dimension that is in balance with other design components of the roadway cross section. The general range of median widths is from a minimum of 4 ft. for the “narrow barrier” up to 40 ft. or more which

permits each roadway to be independently designed.

The minimum median width depends on the intended function (separate opposing traffic stream, provide refuge for pedestrians, provide space for a dual left-turn bay,



Separator Overlap at an Unsignalized Median Opening for Left Turns

Figure A-3

construct a directional median opening, and so on). Recommended minimum median widths are given in Table A-6.

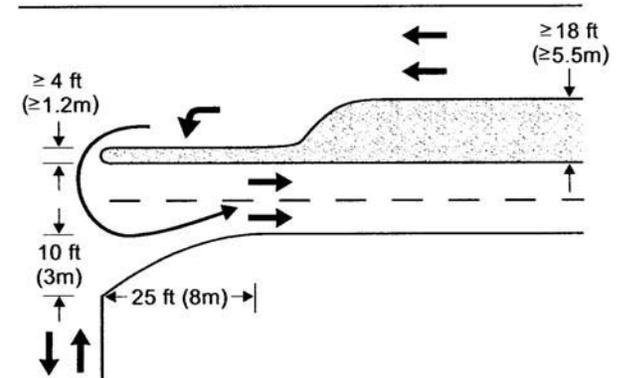
Construction of a nontraversable median will affect left turns and may require the provision of opportunities for U-turns – especially for trucks and other large vehicles. If U-turns are to be permitted the combination of median width and pavement width should be sufficient to accommodate

the turn of the design vehicle. U-turn areas should be designed in accordance with the policies established by the American Association of State Highways and Transportation Officials (AASHTO) [4].

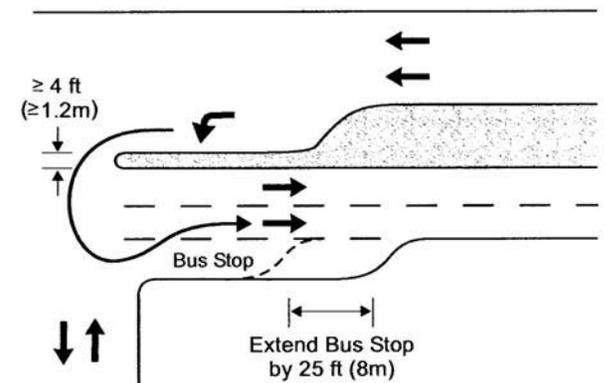
If the combined width is insufficient to accommodate the design vehicle the pavement edge can be flared or widened for a short distance. Figure A-4 illustrates examples of widened pavement.

Schematic of a “Flare” to Facilitate a U-Turn by a Passenger Car on a Four-Lane Divided Roadway Having (a) Curb and Gutter, and (b) Curb and Bus Stop

Figure A-4



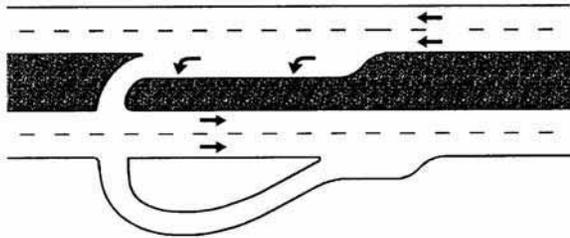
Flare to Allow Design P-Vehicle to Make U-Turn on 4-Lane Divided Roadway Having Curb and Gutter



Design for P-Vehicle U-Turn on 4-Lane Divided Roadway at a Bus Stop

Table A-6		
Median Widths		
Median Function	Minimum Width Feet (metres)	Desirable Width Feet (metres)
Separation of Opposing Traffic Streams	4 (1.2)	10 (3.1)
Pedestrian Refuge and Room for Signs and Appurtenances	6 (1.8)	14 (4.3)
Storage of Left-Turning Vehicles:		
Single Left-Turn Bay	14 (4.8)	18 (5.5)
Dual Left-Turn Bay	25 (7.6)	30 (9.1)
Protection for Passenger Vehicles Crossing or Turning Left onto the Mainlane	25 (7.6)	30 (9.1)
Design Directional Openings for Selected Ingress or Egress Movements Only	18 (5.5)	30 (9.1)

Source: *Transportation and Land Development*, 2nd ed. [2]



**Schematic Illustration of a “Bulb-Out”
for U-Turns by Large Vehicles
Figure A-5**

U-turns by large vehicles can be provided by a “turn-out” illustrated in Figure A-5. The U-turn can be signaled, if necessary, without interference with traffic progression because only one direction of traffic is affected.

C. Auxiliary Lanes

The importance of auxiliary lanes can be summarized as follows:

- * High-speed differentials produce high crash rate potentials
- * All traditional driveway designs result in a high-speed differential
- * Turn lanes are the only means of limiting the speed differential between turning vehicles and through traffic

Auxiliary lanes for left-turns and right-turns improve safety, increase capacity, reduce delay, save fuel, and reduce vehicle emissions. They allow turning vehicles to

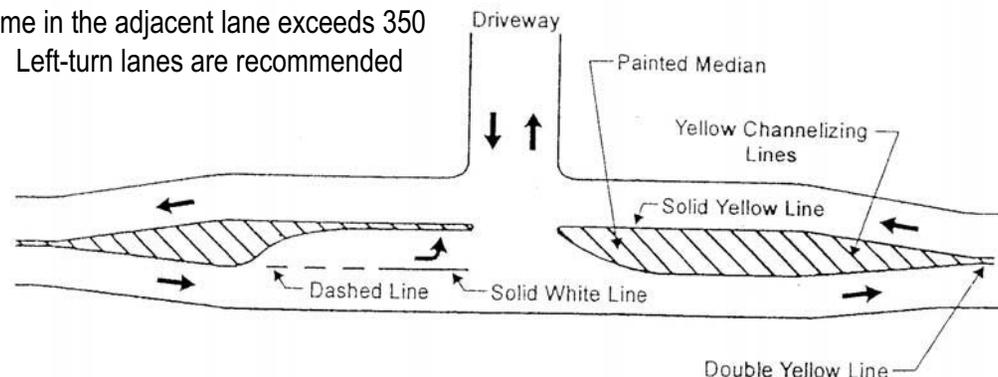
leave the through traffic lanes, thereby minimizing interference with through traffic plus providing storage for vehicles waiting to complete the turn maneuver. Capacity is increased by eliminating excessively long gaps between through vehicles passing through an intersection. In absence of turn lanes, vehicles in the platoon following a turning vehicle are “kicked out” of the progression band of a traffic signal system timed for efficient traffic progression. Hence, in addition to efficient signal timing, auxiliary lanes are essential for obtaining traffic progression through a signal system.

The need for auxiliary lanes (left-turn and right-turn) has been found to be more related to the volume of traffic on the roadway than the turn volume. Right-turn lanes are recommended when the total volume in the adjacent lane exceeds 350 vph. Left-turn lanes are recommended

when the sum of opposing volume and advancing volume in the left-lane exceeds 350 vph. From a safety factor it is recommended that left-turn lanes be provided at all median openings or divided roadways.

On undivided roadways it is recommended that isolated left-turn lanes be provided on two- and four-lane roads where through and left-turning volumes create or will create an operational safety problem.

The peak hour volumes per lane in urban areas can approach capacity and even a small number of left-turning vehicles will produce high delays and a high probability of conflicts with following through vehicles. A schematic of an isolated left-turn lane is presented in Figure A-6.



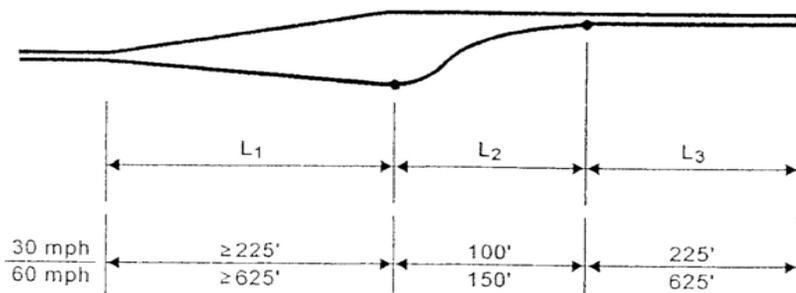
**Isolated Left-Turn Lane
Figure A-6**

Table A-7

Isolated Left-Turn Lane Design Elements

Roadway Speed (mph)	L ₁ Transition Taper Length (ft)	L ₂ Bay Taper Length (ft)	L ₃ Full Width Left-Turn Lane Length (ft)*
30	≥225	100	≥225
40	≥375	100	≥325
50	≥525	150	≥475
60	≥675	150	≥625

*Includes 50 ft. of storage



Design guidelines for isolated left-turn lanes include:

- * Length
- * The full width turn-lane must have a minimum length sufficient to accommodate storage of turning vehicles
- * Painted channelization is preferred on high-speed roads
- * Retroreflectorized pavement markers are often used to supplement the painted

channelization to improve nighttime visibility

- * The shoulder should be retained whenever possible – especially on higher-speed (≥ 45 mph) roadways

D. Driveway Design

Driveway geometrics must be suitable to accommodate the selected design vehicle. It is recommended that the design vehicle be

the largest vehicle that will use the driveway at least once per day. AASHTO states that “Driveways are, in effect, at-grade intersections and should be designed consistent with the intended use.”

Driveway design elements include:

- * Width
- * Return Radius
- * Driveway Throat Length
- * Approach Angle

Driveway widths and return radius are interrelated, i.e., as the radius is increased the driveway throat width can be decreased. The reverse is also true.

A common practice is to specify minimum and maximum return radii in one table and to specify minimum and maximum throat width in a different table. A better practice is a specific combination return radii and throat width be designated for different conditions of operation. Different designs are needed for the following:

One-way Operation

- * Passenger car and sport utility vehicles (SUV’s)
- * Single unit truck
- * Large vehicle (WB-67, motor home, etc.)

Two-way Operation

- * Simultaneous exit and entry by passenger cars
- * A single unit truck must wait to enter when an exiting passenger car is present in the driveway throat
- * Simultaneous exit and entry by single unit trucks
- * Simultaneous entry and exit by WB-67, motor home or other large vehicles

1. Driveway Throat Widths

No driveway should have a width less than 20 feet. Driveways of greater than 54 feet should be strongly discouraged unless they contain a raised median to separate traffic lanes. Driveways that serve one-way traffic should be from 20 to 30 feet wide. Driveway widths should be measured from the face-of-curb to the face-of-curb at the point of tangency. Any medians contained in the driveway are above and beyond the minimum widths in the table. Minimum acceptable and maximum acceptable widths for various levels of traffic and directions of access are shown in Table A-8.

The basic driveway widths assume adequate curb return radii. Table A-9 presents equivalent radii and throat width for a passenger car.

Table A-8						
Basic Driveway Widths						
Driveway Traffic Category	Average Daily Traffic Using Driveway	Peak Hour Traffic Using Driveway	With Two-Way Access		With One-Way Access	
			Minimum Width	Maximum Width	Minimum Width	Maximum Width
Residential	0-100	0-10	20 feet	30 feet	NA	NA
Low Volume Commercial/Industrial	< 1500	< 150	28 feet**	42 feet***	20 feet*	20 feet*
Medium Volume Commercial/Industrial	1500 – 4,000	150-400	42 feet***	54 feet****	20 feet*	30 feet**
High Volume Commercial/Industrial	>4000	>400	42 feet***	To be Determine Through a Traffic Study	Generally Not Applicable	Generally Not Applicable

*One-lane driveways
 **Driveway striped for two lanes
 ***Driveway striped for three lanes
 ****Driveway striped for four lanes

Table A-9				
Recommended Passenger Car Design for Two-Way Driveways				
	One Lane In and One Lane Out		One Lane In and Two Lanes Out	
	Radius (ft.)	Throat Width (ft.)	Radius (ft.)	Throat Width (ft.)
No Bike Lane, desirable	20	28	20	40
No Bike Lane, minimum	15	28	15	40
Bike Lane, desirable	15	28	15	40
Bike Lane, minimum	10	28	10	40

2. Driveway Throat Lengths

The driveway throat must be of sufficient length to enable the intersection at the access connection and abutting highway, and the on-site circulation to function without interference with each other. Drivers entering the site should first clear the intersection of the highway and access connection before encountering the intersection of the access connection and on-site circulation.

The throat length and cross-section are interrelated; the wider the cross-section, the longer the exit throat length needs to be. This relationship results from the one fact that the weaving, which must occur, becomes more complex and requires a larger length as the number of exit lanes increases. Also, the need to achieve very high exit flow rates becomes more important as the exit volume increases. Therefore, signalized connections should be of sufficient length so that exiting vehicles are of a minimum, constant headway when crossing the curb lane. Table A-10 presents recommended throat length at signalized access drives.

It is recommended that two-way unsignalized access driveways have a throat

length of least 50 ft. This will permit an entering vehicle to clear the curb line, or edge of pavement, when continuation of the entry maneuver is blocked by an unparking vehicle. It will also increase the exit capacity in comparison to a shorter throat length. One-way driveways need to have sufficient throat length to make DO NOT ENTER and WRONG WAY signs meaningful. A minimum throat length of 75 ft. is recommended for one-way driveways.

3. Driveway Profile

The vertical alignment of a driveway must provide a smooth transition between the driveway and the roadway to which access is provided – especially in absence of a right-turn bay. In all cases, the profile must be sufficient to provide adequate vertical clearance between the driveway surface and the vehicle.

Minimum Driveway Throat Length at Signalized Access Drives	
Number of Egress Lanes	Minimum Throat Length (feet)
2	75
3	200
4	300

A long standing criterion has been that that maximum change in grade without a vertical curve should be 3%. With the apron lengths shown in Figure A-7, normal construction practice will provide an appropriate profile. On roadways having a curb and gutter, the entire curb and gutter section should be removed and replaced as an integral part of the driveway apron. This provides structural integrity and helps prevent water seeping through the joint between the gutter and apron. Maximum driveway grades within a distance of twice the apron length or edge of pavement or uncurbed roadways should not exceed 5% on driveways intersecting major arterials, 8% on minor arterials and major collectors, and 15% on minor collectors and local roads.

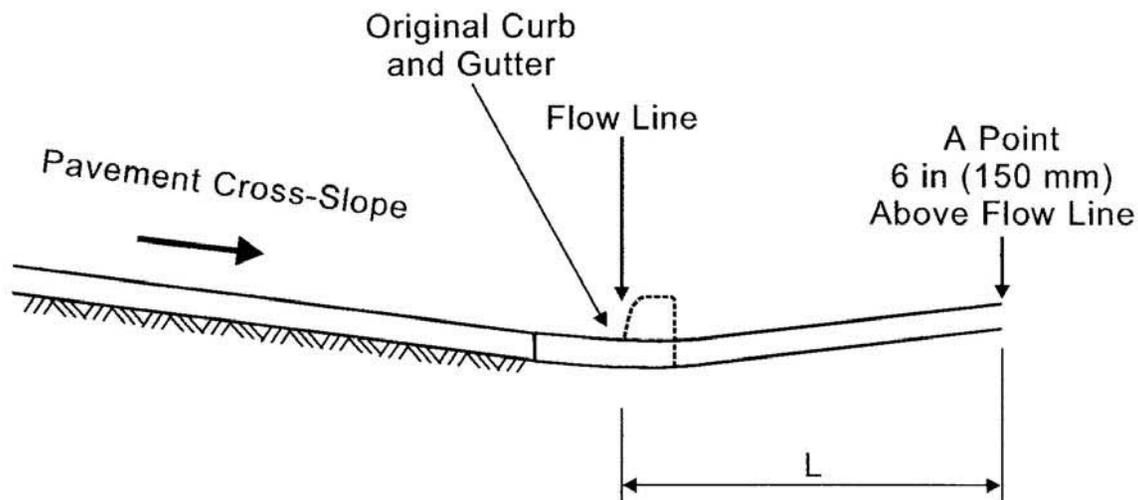
A transition curve needs to be designed into the driveway profile when there is a large change in grade. Figure A-8 illustrates profiles and provides suggested length for transition curves.

Parabolic or circular curves may be used for driveway profiles. It is suggested that the maximum grade on moderate to high volume access connections (public streets and non-residential driveways) be limited to a maximum grade of 10%. It is suggested

that the maximum grade of very low volume driveways (serving no more than two residences) not exceed 20%.

Shoulder slopes commonly vary from 4% (1/2 in./ft.) to 6% (3/4 in./ft.). The shoulder slope should be maintained for the full width, including return radii, of the driveway.

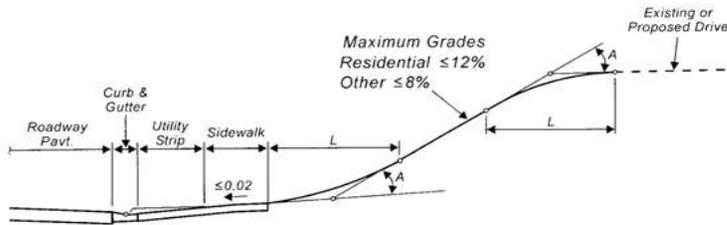
Remove Curb and Gutter and Recast Gutter Pan as an Integral Part of the Apron



Suggested Apron Length	
Street Class	Apron Length, L (feet)
Major Arterial	≥20
Commercial Collector	15
Residential Collector	10-15
Local Residential	10

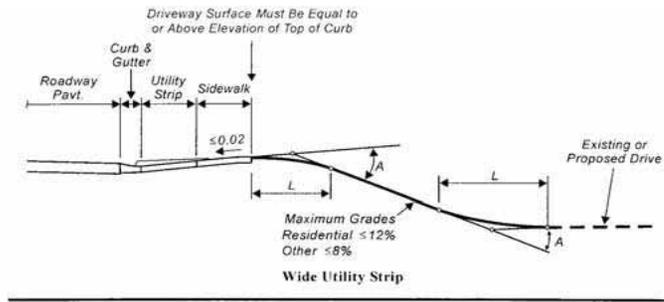
Figure A-7

Urban, Driveway on an Upgrade



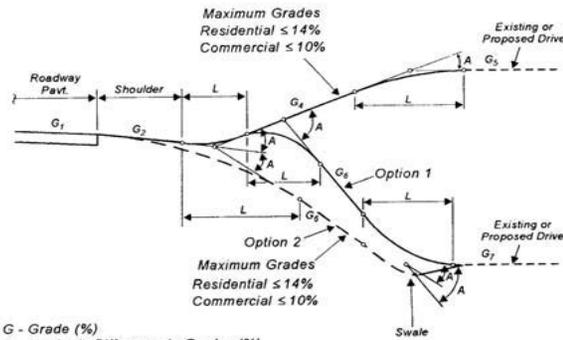
G - Grade (%)
 A - Algebraic Difference in Grades (%)
 L - Transition (See Tabulated Lengths):

Urban, Driveway on a Downgrade



G - Grade (%)
 A - Algebraic Difference in Grades (%)
 L - Transition (See Tabulated Lengths):

Rural Profiles



G - Grade (%)
 A - Algebraic Difference in Grades (%)
 L - Transition (See Tabulated Lengths):

Minimum Length of Design Vertical Curve		
Change in Grade A	Length of Curve, L (feet)	
6%	10	10
8%	15	12
10%	20	15
15%	30	20
20%	40	30

Driveway Profiles
 Figure A-8

E. Site Planning

A distinction should be made between site planning (a detailed analysis of a specific proposed development) and urban transportation planning (evaluation of transportation-land use alternatives). Site planning integrates the building, site circulation and parking, and access to the public roadway system. Transportation planning incorporates the entire roadway system that serves both the associated land uses and the overall traveling public.

1. Interested Parties

Local government, counties, state highway agencies, developers and the general public have common as well as diverse interests regarding site planning.

Local governments have very broad powers to manage urban developments. Site plan review and approval is one of the major tools available to municipalities and counties to protect the public's health, safety and welfare. An appropriately written ordinance can provide for a site plan review and approval process requiring that the development conform in all respects to the approved site plan. Any departure from the approved plan would require re-submittal and approval of a revised or new site plan.

The authority of state highway agencies is very limited in comparison with local governments. The basis for requiring a site plan as part of an application for an approach road connection is that the potential safety and operational characteristics of a proposed access cannot be evaluated in isolated from the on-site circulation system. The primary state DOT interest is:

- * Will the location of proposed access have a significant detrimental effect on traffic operation and safety along the state highway?
- * If the development might generate sufficient traffic volumes to meet traffic signal installation warrants, will the access be located so that efficient traffic progression can be maintained along the state highway?
- * Will on-site circulation, access capacity, or other features cause a potential safety or operational problem on the abutting state highway?

The developer's interest in a good site plan are, or at least should be, extensive. While ensuring a successful development is of primary concern, it is important to note that a developer has extensive potential liability in the event of injury or death. An increasing amount of litigation is being directed toward

developers and the consultants involved with the site layout. Therefore, the developer's interests cover an extensive range of issues and questions, including but not limited to the following:

- * Will the adjacent roadway system adequately support the proposed development?
- * Will the access and internal site circulation adequately accommodate the amount and type of traffic to make the development 'successful'?
- * Can the site access and circulation design be modified in response to changing conditions on the abutting roadway network?
- * Is the site circulation system easy for drivers to quickly understand?

2. Site Access Location and Design

Poor site access and circulation design is detrimental to both the public investment in the highway system and the private investment in the developed property adjacent to the highway. Site plan review by a traffic engineer competent in site access and circulation design can uncover problems in the planning stage when they can be resolved. Problems discovered after the development has occurred may be mitigated only at considerable cost. Moreover, a developer owner and consultant involved

with a site development which has circulation problems resulting in a death or injury have a very high risk for lost claims.

Access location, building location and site circulation and parking are highly related. The building footprint and location have a major influence on parking and site circulation and in turn on the access location. Conversely, identification of a specific access location will materially affect how the site may be laid out – especially for small sites.

Access drives located within the functional area of an intersection will interfere with the operation of the intersection and create safety problems. Moreover, the complexity of overlapping conflict areas will interfere with site traffic. Customers attempting to exit the driveways commonly experience difficulty and inconvenience which deters their returning to the site, especially if they have the opportunity to satisfy their desires at a more convenient location.

3. Shared Access and Interparcel Circulation
Adjacent properties abutting major roadways should be encouraged to share a common approach road connection. This will reduce the number of conflict points and separate

the conflict areas. The longer spacing between approach road connections will also facilitate the provision of right-turn deceleration bays. The smoother traffic flow on the abutting street will help reduce vehicular crashes and increase egress capacity.

Joint access and interparcel circulation can be readily implemented in the subdivision approval process. In this regard it is essential that local agencies develop policies and practices pertaining to joint access requirements and design. Close cooperation between local and state agencies is needed in developing these joint access requirements as well as in their implementation.

Once subdivision has already occurred, adjacent property owners may be encouraged to share a common access where it can be shown that customer convenience and safety can be improved. Reconstruction which adds a nontraversable median or median opening modifications also offer opportunities for encouraging joint access agreements.

4. Site Plan Review

The site plan should show all details

necessary to fully define how the site is to be developed. This should include the basic geometry of the site access, circulation, parking and building footprint. Also included should be a detailed drawing of access, circulation and parking elements.

The location, geometrics and traffic control of all intersections within 1/2 mile on highways of statewide and regional importance and 1/4 mile on district level highways should be described and illustrated.

It is suggested that municipal and county ordinances require that the developed site fully comply with the approved site plan prior to issuance of the certificate(s) of occupancy.

5. Traffic Impact Analysis

A traffic impact analysis (TIA), also sometimes called a Traffic Impact Study (TIS), is a specialized study of the impact a certain type and size of development will have on the surrounding transportation system. Depending on the type and size of development, the TIA can range from a cursory inspection of the site, the projected traffic volumes and the adjacent streets to a full-blown alternatives analysis that includes

adjacent streets, regional thoroughfares and transit systems.

The TIA is most effective when it is an integral part of the development impact review process. It specifically concerns the generation, distribution and assignment of traffic to and from a proposed development. The purpose of a TIA is to determine what impact that site-generated traffic will have on the existing and proposed roadway network and what impact the existing and projected traffic on the roadway system will have on the proposed development.

The purpose of the traffic impact analysis and site plan review is to assess the effects that a particular development will have on the surrounding transportation network, to determine what provisions are needed for safe and efficient site access and traffic flow and to address other related issues. The study report should document the purpose, procedures, assumptions, findings, conclusions, and recommendations of the study. There are three common uses for these reports. The first is to provide developers or designers with recommendations regarding site selection, site transportation planning and traffic impacts. The second is to assist public

agencies in reviewing the attributes of proposed developments in conjunction with requests for annexation, land subdivision, zoning changes, building permits, or other development reviews. The third is to establish or negotiate mitigation requirements where off-site impacts require improvements beyond those otherwise needed. In recent years, such reports also have been used by public agencies as the basis of levying impact fees or assessing developer contributions to roadway facility improvements.

F. Why Manage Access?

New and improved major roadways lead to convenient movement and increased traffic volumes. The increased activity is accompanied by an increase in the number of driveways. This results in an increase in the number and severity of conflicts, an increase in traffic crashes, and a decline in the quality of traffic service. This, in turn, generates the demand for additional improvements or the need for a bypass.

With a notable exception of freeways, urban arterials and highways in the developing urban fringe commonly experience a deterioration in their ability to accommodate traffic in a safe and efficient manner as

travel demand increases. This problem results from the requirement that the facility must serve the conflicting functions of providing for land access and through traffic movements.

Traffic engineers have long recognized that the elimination of unexpected events, simplification of conflicts areas, and the separation of decision points simplify the driving task. Since Access Management reduces the complexity of traffic conflicts as well as increases the spacing of events to which the driver must respond, it will result in improved traffic operations and reduced crash frequency.

G. References

1. *Access Management Manual*, TRB Committee on Access Management, Transportation Research Board, National Research Council, 2003.
2. V. G. Stover & F. J. Koepke, *Transportation and Land Development*, Institute of Transportation Engineers, 2002.
3. S/K Transportation Consultants, "Access Management, Location & Design" Participant Notebook for NHI Course No.133078, National Highway Institute, Federal Highway Administration.
4. *A Policy on the Geometric Design of Highways & Streets*, American Association of State Highway & Transportation Officials, 2001.

Review of Access Management Requirements of Government Agencies within the Route 73 Corridor

OVERVIEW

The various local jurisdictions in the Route 73 Corridor have different street development criteria and access spacing standards. Review of zoning and subdivision regulations and unified development codes reveals that these ordinances do not include provisions for corridor preservation.

Various long range transportation plans and local codes make general goal statements such as: increasing the connectivity of the street system, minimize travel times and distances, improve traffic flow, improve traffic safety and improve the visual quality of roadways.

Access management provisions are absent from some codes and where provided are often inappropriate for a major thoroughfare such as NC 73.

The procedures and techniques that might be applied to implement a Route 73 Corridor Plan might be grouped into the following two categories:

1. Right-of-way preservation strategies to protect the right-of-way, coordinate funding between the NCDOT and local governments, and coordinate the public investment with private development.
2. Access management techniques to achieve safe and efficient circulation on NC 73 and within the Route 73 Corridor.

The following are comments based on a review of relative development regulations of the governmental agencies with the NC 73 Corridor.

North Carolina DOT

Policy on Street and Driveway Access to North Carolina Highways – July 2003

1. (p. 27) Sketch shows the concept of upstream functional distance. A table gives distance traveled for various speeds and perception-reaction times. *[Needed are: (a) deceleration distance for various speeds, (b) procedures for determining left-turn and right-turn storage, (c) process for determination of the design distance, and (d) downstream functional distances.]*

2. (p. 35) Introduces the issues of radius at driveway-street connections. *[Does not recognize that radius and throat width are related. Combinations of radius and throat width need to be developed/provided for simultaneous exit/entry of passenger vehicles only, simultaneous exit/entry by passenger vehicles and trucks, and simultaneous exit/entry by trucks. Typical designs for multiple lane driveways are also needed. Also needed: driveway throat lengths for various throat widths (number of entry/exit lanes).]*

3. (p. 41) Provides guidance for minimum separation of driveways on opposite sides of a roadway without a nontraversable median. *[Offset distances are reasonable minimums.]*

4. (p. 42) Specifies driveway grade profiles. *[Criteria provides for a good profile where a shoulder is present. A 1/2-inch per foot cross-slope is 4.17%; maximum ADA sidewalk slope is 2% -- 1/4-inch per foot.]*

5. (p. 43) Requires removal of entire curb and gutter of curb cuts. *[An excellent practice.]*

6. (p. 43) Maximum change in grade between pavement cross-slope and driveway apron slope is 5% without a designed vertical curve. *[An excellent practice.]*

7. (p. 46) Figure illustrating turn lanes. *[A right-turn taper only is not effective. The illustration for “Full Left or Right-turn Lanes” is confusing relative to left-turns; suggest arrows showing the movements be added.]*

8. (pp. 50-51) Driveway width and return radii are dealt with separately. Specifies a 36 ft. maximum width (p. 50); a 20 ft. minimum radius and a 50 ft. maximum radius (p. 51). *[This does not recognize that the throat width and radius are interrelated. Combinations of radius and width for simultaneous exit/entry by passenger vehicles only, passenger vehicle exit and truck entry, etc. need to be developed/provided. Also 36 ft. max. does not provide for suitable design for moderate to high volume driveways – albeit, the case-by-case exception may permit such designs.]*

9. (pg. 51) 1000 ft. minimum separation between centerlines of full movement driveways on major thoroughfares.

[Reasonable for NC 73 but consecutive left-turn lanes may require a longer separation.]

10. (pg. 52) Desirable corner clearance is 100 ft., minimum is 50 ft. *[Corner clearance should be addressed as an access spacing problem. Upstream corner clearance on NC 73 will need to be much longer to avoid a driveway within the length of an auxiliary lane – much less avoiding a driveway within the upstream functional distance. There are no criteria for downstream corner clearance.]*

11. (p. 80) Warrant for Turn Lanes

(a) The figure on pg. 80 identifies warrants for left-turn and right-turns. *[The figure was developed by Harmelink for left-turn warrants on four-lane roadways. It is not applicable to left-turns on two-lane roadways nor to right-turns in any case. Recent research has shown that the gap size and time to execute a left-turn are considerably longer than Harmelink used. Therefore, the probability of a conflict between a left-turning vehicle and a following through vehicles is much higher than Harmelink assumed; or, a turn lane will be warranted at much lower volumes and the storage length, S, will be much longer than given in the figure.]*

(b) The figure on pg. 54 and pg. 87 illustrates auxiliary lanes for left-turns and right-turns. *[The figure shows a taper plus storage. This type of design results in excessive deceleration in the through traffic lane (a safety hazard) and is inconsistent with the design concept shown in the figure on pg. 35. Values consistent with the figure on pg. 35 need to be developed/provided.]*

Cabarrus County

Subdivision Regulations

1. (p. 28) No lots may have direct access to a major thoroughfare or principal arterial. Lots must be served by an internal road system or marginal access. *[An excellent requirement.]*
2. (p. 29) Provides for mitigation *[5% reduction in lot size when right-of-way dedication is required.]*
3. (p. 30) Requires any subdivision in excess of 50 lots or generate an ADT > 500 vpd to construct turn lanes to NCDOT specifications. *[An ADT of 500 vpd might be expected to be about 50 vehicles during the peak traffic hour. This will result in serious interference on a high speed, high volume thoroughfare such as NC 73.]*

City of Concord

Unified Development Ordinance

(p. 10-3) States “that an interconnected street system is necessary” and references Traditional Neighborhood Development Street Design Guidelines, Institute of Transportation Engineers, June 1997. *[Cross-street that intersect a roadway at short spacing intervals is not appropriate on a major thoroughfare such as NC 73.]*

2. (p. 10-6) Driveway separation standard

Street Class	Minimum Driveway Spacing	Minimum Corner Clearance
thoroughfare	400 ft.	250 ft.
collector	120 ft.	120 ft.
local	40 ft.	60 ft.

Exempts single-family and duplex developments on individual lots from the standards *[A corner clearance less than the minimum spacing is not rationale. Right-turn deceleration/storage lanes on a major roadway such as Route 73 will need to be longer than 400 ft.]*

3. (pp. D-5, D-6) Driveway widths

land use	driveway width		flare/radius	
	min	max	min	max
single family	12	32	1	3
multi-family	24	36	10	30
commercial/industrial				
two-way	24	36	5	10
one-way	15	20	5	10
private street	24	48	30	30
street type driveway	24	36	10	30

[A 36 ft. max. width for a 2-way commercial/industrial and 10 ft. max. flare/radius is marginally adequate for simultaneous exit/enter (one lane in/one lane out) for passenger vehicles and is entirely inadequate for trucks. Also, a 36 ft. max and a 10 ft. max radius will not allow for an appropriate design with two exit lanes and one entering lane. Minimum radius needs to be ≥ 15 ft. A 36 ft. max. width for street type driveways does not allow for multi-lane driveways.]

4. (p. D-6) Medians and islands

(a) 6 ft. median width, 50 ft. minimum length. *[Reasonable min. width; excellent min. length.]*

(b) For street type driveways with a median or island, the combined width of pavement of the separated driveway segments shall not exceed 48 ft. *[A 48 ft. maximum will allow for a minimal design of two-lanes in and two-lanes out with radii ≥ 20 ft.; it will not permit a design of two lanes in and three*

lanes out that is often appropriate for very large traffic generators.]

5. (p. D-7) Permits driveway approach to encroach upon the radius at street intersections having the radius of 60 ft. or more. *[This permits encroachment where long curb radii are needed at channelized intersections.]*

6. (p. D-8) Various conditions are stated as to when turn lanes are required. *[These conditions might provide a basis for requiring turn lanes at most, if not all, access connections to a roadway such as NC 73.]*

7. (p. D-18) Shows 15 ft. minimum width for separator island for a street-type driveway with a median. *[A wide separation can confuse drivers and their interpreting the access as two 2-way driveways; 15 ft. (preferably 12 ft.) should be a maximum width. Suggested minimum width 36 ft.]*

Town of Cornelius

Land Development Code

1. Encourages a network of interconnecting streets (p. 7-1) [Does not address interconnections between adjacent parcels.]
2. (a) Curb radii shall be designed to reduce pedestrian crossing time (p. 7-4).
(b) Two-way driveways shall not exceed 24 ft.; 12 ft. for one-way drive (pp. 7-14 & 7-15), except as required by North Carolina DOT [A 24 ft. wide driveway will not provide for simultaneous exit/entry by passenger vehicles unless the return radius is at least 20 ft. The “except as required by NCDOT” permits suitable designs having direct access to Route 73; but may result in inadequately designed driveways on the

supporting circulation system.]

(c) There is no statement as to driveway throat length.

3. Edge of sidewalk is shown at the right-of-way line (pp. 7-8 through 7-12). [Makes sidewalk maintenance difficult without obtaining a temporary easement. A 1 ft. offset from the right-of-way line is recommended.]

Town of Davidson

Planning Ordinance

1. Section 3.2 provides for the establishment of overlay districts.

2. Section 6.4 provides for right-of-way reservation for thoroughfares on the official comprehensive plan map.

3. Section 10.1 E: Two-lane driveways not to exceed 24 ft., one-lane driveways not to exceed 12 ft. *[These widths essentially preclude reasonable design of two-way driveways on major roadways. A 24 ft. width is marginal/minimum for simultaneous exit/entry by passenger vehicles only if the curb return radius is 20 ft.]*

4. Section 11.2.7: Maximum block length is 600 ft. *[Application of this maximum block length may result in access connections that are*

inappropriately short for Route 73.]

Town of Huntersville

Subdivision Ordinance

Provides a functional hierarchy of roadways (p. 7) together with a minimum right-of-way for each (p. 30) and requirements for dedication of right-of-way by the developer pp. 48-50.

p. 50, Section 8.115 Responsibility for State Roads

“No dedication or reservation of right-of-way for a new street or highway within a corridor for a street or highway on a plan established and adopted pursuant to N.C.G.S. 136-66.2 for a street or highway that is included in the Department of Transportation’s “Transportation Improvement Program” will be required by the provisions of this ordinance unless and until the town manager has determined and certified in writing (1) that the dedication or reservation does not result in the deprivation of a reasonable use of the original tract and (2) that the dedication or reservation is either reasonably related to the traffic generated by the proposed subdivision or use of the land remaining in the original tract, or the impact of the dedication or reservation is mitigated by measures provided in this Ordinance. For these purposes the term “original tract” will mean all contiguous land

owned by the applicant. The ability of the applicant to transfer density credits attributable to the dedicated right-of-way to contiguous land owned by the applicant is deemed to be a measure which mitigates the impact of the dedication or reservation.”

pp. 48-49, Access to New Class III Streets (Major Arterials and Commercial Arterials) or extensions limited to public streets or specifically approved street-type entrances.

[No statements as to access connection spacing or driveway design.]

City Kannapolis
Unified Development Ordinance

1. (p. 6-27) Allows subdivision of 5 lots with direct access to a thoroughfare. Subdivision with more than 5 lots must be served by an internal public street. *[The 5 lot exception can result in numerous driveways to a major thoroughfare such as Route 73.]*

2. (p. 6-28) A buffer yard is required to separate residential lots from a major thoroughfare.

3. (p. 8-4)
(a) Maximum driveway widths: 20 ft. for one-way driveways, 36 ft. for two-way. A median

shall be considered in calculation of maximum width. *[Maximum width of 36 ft. is adequate for a two-way drive – one lane in and one lane out with a median; 36 ft. is not adequate for one-lane in and two lanes out or for multiple lanes in/out with a median.]*

(b) Minimum width refers to a table that does not exist.

(c) There is no statement as to driveway

4. p. 10-6 Access Management

Driveway Separation Standards		
Street Class	Separation	Corner Clearance
thoroughfare	400 ft.	250 ft.
collector	120	120
local	40	60
<i>[Corner clearance is a special case of access spacing; a corner clearance less than spacing standard is not rationale; 400 ft. spacing is inadequate on a thoroughfare with speed ≥35 mph. Turn lanes on a major thoroughfare will be longer than 400 ft.]</i>		

5. Section 15 establishes two corridor protection overlay districts that cover permitted uses, off-street parking and loading, signs, building design and site plan

submission. Driveway spacings and design are the same as given elsewhere in the code.

Lincoln County
Subdivision Ordinance

1. (p. 57-58) Subdivision abutting a principal arterial shall provide a collector road (frontage road) parallel to the arterial or provide reverse frontage with no access to the arterial. Planning Board may require frontage road or reverse frontage on a major collector. *[Reverse frontage is an excellent method of providing access to property abutting a major roadway.]*

2. (p. 59) Minimum sidewalk width of 4 ft. *[Sidewalk width needs to be ≥5 ft. to meet ADA requirements]*

Public Involvement Plan

Strategies and Tactics

1. Include and reach all those with a direct interest in, or potential to be impacted by the outcome of the plan.

- * Review existing GIS data (initially compiled by Tom Sawyer Company) and contacts from Community Design Workshops to identify a targeted Stakeholder Mailing List for the public within ½ mile of the Study Corridor.
- * Contact Towns to retrieve contact information for local Homeowner's Associations and business organizations to create a mailing list

2. Encourage participation of the public by providing involvement opportunities throughout the life of the plan.

- * Hold Corridor Plan Regional Meetings in each County (March 23-25) to review the draft plan
- * Conduct small group breakout sessions to engage participants in Corridor Plan Regional Meetings
- * Distribute questionnaire to determine what the public knows, how they feel, etc.

3. Inform the public of meetings and other plan-

related events.

- * Continue initial contacts with major media in the area and maintain a media list for coverage of public involvement events (include Diane Whitaker and Mary Newsome at the Charlotte Observer)
- * Mail/Email meeting notices to committee members, local governments, city leaders, etc. at least one week in advance
- * Request posting of the notices on city websites for public viewing
- * Redesign postcards to be more informative
- * Mail postcards to a more targeted group informing the general public of the upcoming public meetings
- * Submit news release to area print and broadcast media to inform the public of the upcoming meetings
- * Create and post flyers in relevant communities to increase awareness of the project and to promote involvement in the Corridor Plan Regional Meetings (i.e. libraries, shopping centers, convenience stores, neighborhoods, etc.)
- * Create public email list from sign in sheets and contacts provided by Steering Committee members
- * Create and distribute via email a monthly newsletter with project updates (January issue will provide an opportunity for public feedback by including a questionnaire/survey on land use issues)

- * Ask Steering Committee members to suggest speaking opportunities for key planners at selected civic events

4. Educate the public of their role as community citizens and leaders in the planning and decision-making processes.

- * Greet guests and be available to answer questions at each public meeting or event
- * Maintain a sign-in sheet collecting contact information such as email addresses
- * Submit Community Design Workshop and Corridor Plan Regional Meeting synopses and handouts in .pdf version to be posted on city websites for public review (also distribute to local libraries, local governments, and city leaders)

5. Advance the NC 73 Corridor Study as a transportation plan that will enhance the quality of life for the individual communities.

- * Create and submit a backgrounder or feature story to local print media to educate the public on the importance of and need for the plan, as well as possible long-term impacts, and how the public can become involved in the planning and decision-making process
 - * January – showcase preferred scenario
 - * March – report on status up to and prior to Corridor Plan Regional Meetings
 - * May – emphasize upcoming presentations to elected officials

Evaluation

- * Once the public involvement plan has been implemented, it is important to evaluate the effectiveness of each public involvement technique. This will ensure that funds were spent to achieve desired results, will illuminate techniques that were more effective than others, and will provide a way to improve future public involvement processes. The following are sample ways to evaluate the effectiveness of the public involvement plan:
- * Distribute a survey at the beginning of every public meeting or event to determine which techniques were most effective in informing the public, and provide an opportunity for suggestions (i.e. what percentage saw a flyer, ad, news article, memo, heard a radio ad, etc.)
- * Collect articles published in area print media
- * Keep a record of those in attendance at public meetings and workshops (take into consideration time and location of meetings)

Comments from Public Workshop (10-2003)

Lincoln County

US 321 to Link Drive:

- * Some want bypass turnaround to easily exit if entered by mistake
- * Some want bypass to remain a 4 lane restricted road to keep traffic flowing
- * Want grass median in center of bypass
- * Suggestion to use old NC 73 as business route and the new NC 73 as a truck route, but there was some concern for safety
- * Some do not like the bypass at all

Link Drive to Reed Creek & Reed Creek to Killian Creek:

- * Like thruway concept
- * Want speed limit at 55mph
- * Safety concern for tractor and farm equipment traveling on the road
- * Concern with right of way and property rights once project has begun
- * Want 2 lane and some 4 lane areas
- * Access management needs to be considered
- * Concern for bikes and sidewalks near Link Drive
- * Suggestion to get right of way and sewer at same time to save money and inconvenience

to property owners

Additional Comments:

- * Like 55 mph speed limit west of Furnace Road and 45 mph east of Furnace Road
- * Bicycle lanes and sidewalks would be attractive
- * Like thruway --- moves traffic quicker, but concern about safety for farm vehicles
- * Concerns about right of way acquisition and property rights
- * Some want to keep 2 lane and some like 4 lane with median
- * Interest in straightening NC 73 near Amity Church Road
- * Population estimates are conservative so access management will be important
- * Concern about taking property rights and condemnation --- how much right of way?
- * Acquire land for sewer and water right of way at same time
- * Make speed limit as fast as possible --- 45 mph is too slow
- * Need some sort of access management
- * Like to see road remain 2 lanes

Killian Creek to Duke Power Lines:

Group 1:

- * Prefers a combination of network and linked centers
- * Not sure if they want 4 or 6 lanes
- * Want it to be bike and pedestrian-friendly

Group 2:

- * Prefers network to preserve right of way for property owners
- * Concerned about accidents
- * Feel that traffic will quickly overwhelm NC 16 and NC 73
- * Truck traffic is a major concern
- * Want more street lights
- * Some feel there is a lack of Denver community to participate in this project
- * There is currently no networking to help divert traffic
- * Want future coordination with developers

Additional Comments:

- * Support for upgrading Hagers Ferry Road
- * Would prefer a 2 lane road between NC 16 and Club Drive and a 4 lane road from Club Drive east to the river

Duke Power Lines to Huntersville Town Limits:

- * Prefers the thruway concept
- * Some concern about right of way for property owners
- * Some want to make Sam Furr Road to Catawba Avenue 6 lanes (with a minimum of 4 lanes) divided by 20' median to allow directional crossovers
- * Want to maximize access management

General Comments:

- * NC 73 will not be able to handle projected traffic --- look at bypasses instead
- * Development/developers need to help fund project
- * Anticipate an even worse case scenario for population/traffic growth – projections possibly too conservative
- * Concern that widening NC 73 will take over too many houses --- would it be more reasonable to build a network road around NC 73?
- * Need better evacuation routes in case of disasters with the Nuclear Plant
- * Some interest in transit to reduce traffic

Mecklenburg County

Duke Power Lines to Huntersville Town Limits:

- * Preferred the thruway concept – want traffic efficiently channeled in and out of neighborhoods --- takes development off of NC 73
- * Want 45 mph speed limit
- * Do not want sidewalks
- * Possible parallel access roads that perform properly as opposed to multiple driveways along NC 73
- * Want proper placement of signals --- we do not want to see red lights BUT, how do we access the road without red lights?

- * Want 4 lanes with a median
- * Want frontage road on south side of NC 73
- * Red light needed at Beatties Ford Road
- * Want bikeways
- * Plan for bus transit, but not a replica of Shelby on US 74

Huntersville Town Limits to Catawba Avenue:

Group 1:

- * Like thruway/network --- like idea of feeder roads
- * Liked idea of bikeway with buffer between road and bikeway
- * Like sidewalk idea (maybe one thruway for pedestrian and bikes)
- * Need convenient pedestrian crossways at Sam Furr Road and Catawba Avenue
- * Too many signals now (should not be spaced any closer than every ½ mile)
- * Need left and right turn lanes
- * Want landscaping in medians
- * Want additional transit stops at Gilead and NC 73 to help reduce traffic --- take eastbound traffic off at Gilead

Group 2:

- * There are too many driveways on NC 73 – need dividers for legal U-turns
- * Would have to realign Gilead if diverting traffic from NC 73

- * Need more left turn lanes for better subdivision and development access

Additional Comments:

- * Want network road that runs from NC 73 and Catawba Avenue to NC 73 east of 115 (parallel and south of West Moreland)
- * Want Stumptown Road connector (possibly linked at Ramah Church Road)
- * Want network connections at neighborhoods north of Sam Furr Road to connect to 21 and 115
- * Truck traffic could shift to I-485 when it is opened
- * Need aggressive access management around David Kenney Farm Road at NC 73 and Catawba Avenue
- * May be good idea to make Gilead Road extend further west than Beatties Ford Road and intersect with NC 73 closer to the river

Catawba Avenue to Ramah Creek:

Group 1:

- * Want network plan --- want high volumes of traffic diverted from NC 73
- * Want good signage to go north or south
- * Sprawl will occur if choosing network concept - once secondary roads are improved, more development will occur
- * Want bike lanes and pedestrian access in some areas

- * Want better access management in developed areas
- * Want interchange at West Moreland
- * Want restricted left turns with medians on NC 73

Group 2:

- * Network concept preferred --- 4 lanes with turning lanes
- * If the road is widened to 6 lanes, more houses will be taken
- * Know that change on NC 73 is inevitable
- * Removal of walls and berms is of concern
- * Concern about noise levels and beautification
- * Want berms and nice front entrances to developments fixed or replaced after the construction is complete --- want Homeowners Associations compensated for loss
- * Main concern is access management
- * Timing of signals at NC 115 is an issue --- turn red sooner causing traffic stalls (there are also 3 lights within 200 yards of each other)
- * Would be nice to have pedestrian and bike crossways
- * Want a connection between the Hamptons and Caldwell developments to avoid NC 73 by routing some traffic onto NC 115
- * Want sidewalk between Hampton Ridge and Northcross
- * Want curb with 18 foot medians

- * Want 45 mph speed limit

Group 3:

- * Network concept preferred --- 2 roads east and west
- * Heavy truck traffic is a major issue --- hoping I-485 will absorb this traffic
- * If NC 73 is 8 lanes, the widening will take over the first row of houses for many subdivisions
- * Speed limit should be 35 mph through area because of neighborhoods
- * Want 4 lanes with left turn lanes and legal U-turns
- * Do not want medians because right of way absorbs sound, pollution, etc.
- * Pedestrian friendly community so they want sidewalks to travel to shops and the library that are near many developments
- * All signals should be timed so you do not get stopped at each one
- * Need stacking lanes on I-77 and NC 73 exit ramp
- * Want interconnectivity between developments and subdivisions
- * Want buffering on outside by homes (i.e. sound barriers)
- * Want good access management
- * It takes less than 5 minutes to get to interstate from 3 neighborhoods

Ramah Creek to West Branch of Rocky River:

Group 1:

- * Want parkway --- some like linked centers, some like network
- * Speed should be 45 mph
- * Liked linked centers because community still linked to highway
- * Want road to relate to community that is already there
- * Want road to be sensitive to the community in regards to the number of lanes that may be required to widen NC 73
- * Widening NC 73 is too intrusive --- property owners do not want to be limited for having property adjacent to the highway
- * Want all lanes to be closer together through node areas
- * Want limited access within the developments

Group 2:

- * Favored network/thruway concept
- * Want quick access to areas
- * There was anonymity on necessary access management
- * Maintain existing alignment --- character of property adjacent to NC 73 is pretty and will be disrupted with widening
- * Want 4 lanes at least 12 feet lanes but not excessively wide
- * Want swell curb with storm drainage --- not squared curbs

- * There was concern about land use issues regardless of the scenario chosen
- * There may be some value in having a satellite center with its own set of roads
- * Want planted medians and bikeways on hardened shoulders
- * Want sidewalks along park areas with pedestrian crossways

Group 3:

- * If 1 center turn lanes not enough, then 4 lanes for more capacity
- * Concern of taking too much land
- * How are the roads going to look and how can the buildings relate to the road?
- * Concern about congestion
- * Do not want to pay for everyone else's open space
- * Left turn lanes into nodes
- * No medians
- * Town nodes slow traffic
- * Road is currently dangerous (slow traffic to 45 mph)
- * Linked center with network with fewer nodes

Additional Comments:

- * Liverpool and Shops on the Green are good examples of off-site directional signs to support business being off of the corridor
- * Coordinate curb cuts with the Department

of Transportation

- * Think Taconic or Saw Mill in New York, or Rock Creek in D.C.
- * Controlling access is critical to maintaining useful roads
- * Do not need main street in this area (already one in Huntersville)
- * Want to preserve the artery
- * 2 lanes if possible, if network will disperse enough traffic
- * Could need 6 lanes
- * There is a National Register home near Shiloh Church Road at NC 73
- * Across the street on the south side of NC 73 is the Bradford Store
- * About ¼ mile to the west is the Rocky River Baptist Church that dates back to 1834
- * Need access to I-485 from Davidson/Concord Road
- * All believed access management was important regardless of scenario chosen
- * Want limited access to NC 73 with driveway spacing being every ½ mile to 1 mile
- * Concern about land use controls required under the network approach

General Comments:

- * Worst part of traffic is through-truck traffic --- do not want to accommodate trucks, but instead, want to accommodate the people who live in the area
- * Thruway does not have to look like Harris

Boulevard --- there are other nice thruways throughout the country

- * What will happen with the Sub Station if the road is widened?
- * Dangerous intersection between NC 73 and Davidson/Concord Road (want a signal of slower speed limit through area)
- * What is the timeframe for the road being improved?
- * Does the fact that NC 73 is an evacuation route for the nuclear station, not make this project a priority?
- * Needs to be a signal at Beatties Ford Road and NC 73 --- there is no left turn lane and it backs up traffic

The following comments were made at the Lincoln County Public Meeting:

- * Huntersville Town Limits to Catawba Avenue:
- * There is a bad intersection at Sam Furr Road and Catawba Avenue (1 turn lane is sufficient?)
- * Make Sam Furr Road around Birkdale to 115 a 6 lane road with directional crossovers
- * Maximize access management immediately
- * Specify full build-out right of way and build as necessary
- * Fix bottlenecks

Cabarrus County

Ramah Creek and West Branch Rocky

River:

- * Liked the idea of grass medians in rural areas
- * Need left turn lanes in urban/neighborhood centers
- * Want to limit signal lights to major intersections
- * Liked linked centers for urban areas and network for rural areas
- * Want it to be pedestrian-friendly at neighborhood centers

West Branch Rocky River to Coddle Creek

Reservoir:

- * Want rural areas to stay as rural as possible
- * Want to make sure there is better coordination with new development --- require developers to improve road before development is complete
- * Preferred the network concept in rural areas, but fear that secondary roads will not be fixed quick enough to handle traffic diversions
- * Need to fix secondary roads before NC 73 (i.e. Harris and Poplar Tent)
- * Want a bypass on secondary roads for biker safety
- * Existing problems with pedestrian crossings
- * Liked village concept to accommodate pedestrians
- * Need better lighting and shoulders to accommodate pulling to the side of the road

- * Want to slow development/growth to improve roads first
- * Concern about existing turning problems --- need more turn lanes
- * Curious as to how much right of way on NC 73 will be needed to accommodate the widening
- * Want network roads to be 2 lane divided with turn lanes
- * Odell School Road backs up for 2 miles north of NC 73 (need turn lanes)
- * Deed says right of way is 60 feet (for property on NC 73 just east of Odell School Road)
- * Bridge on dam across reservoir has culverts and would be difficult to widen
- * Road salt issue?
- * How will airport expansion affect traffic from NC 73?

Coddle Creek Reservoir to I-85:

- * Curious as to how much development/traffic can be handled through dam area
- * There are a high number of driveways that need access to the road --- possible solution group driveways?
- * There are lots of vehicle accidents --- the speed limit should be 55 mph or lower
- * Preferred network concept
- * NC 73 was just widened 4 feet on each side (just last week)
- * Not safe for bikers
- * Want to keep NC 73 2 lanes from LaForest

Lane to the west side Bypass

- * Like idea of using Untz Road as a network road
- * Safety is a big issue --- farm vehicles and animals use road

Comments from Public Workshop (03-2004)

Lincoln County

NC 73 Bypass Segment:

- * Think money will be better spent on a new NC 73 --- can later improve older NC 73 for access to towns
- * Concerned about parking area in front of business at Link Drive on NC 73 --- should look at widening to the north side of NC 73
- * Concerned about losing house on NC 73 --- houses are only 60' off of the roadway
- * Suggested bypass to run from just west of the railroad tracks across NC 27 and Low Bridge Road, further east (continuing south of the proposed NC 73 bypass)
- * Add marker/symbol for cemetery between Oakwood Circle and Link Drive
- * With the proposed unsignalized right turn intersection at Link Drive, there is concern about not being able to turn left out of the subdivision

Ironton Segment (Alternative A):

- * Like this alternative better
- * Try to avoid Century Farm across from Reinhardt Circle

- * Houses and development are on the right side of NC 73, in between beginning and end of Reinhardt Circle
- * Suggested to run Alternative A from NC 27 to Alternative B past Leepers Creek --- to be considered in environmental/preliminary engineering phase
- * There is a zoning question regarding the industrial land use on the left side of NC 73 across from Reinhardt Circle
- * The land between Furnace Road and NC 73 is subdivided into 27 lots
- * Comment made that the vacant area on the right side of NC 73 across from Amity Church Road is being sold for residential
- * Suggested to include historic site on left side of NC 73 between Lambs Way and Beth Haven Church Road
- * Add a marker/symbol for historic site across from proposed unsignalized right turn intersection at Reinhardt Circle
- * Worried about protecting area around Beth Haven Church Road and NC 73 (3 historic sites in the area)
- * Lower speed limits cause more congestion. Is the new speed trap area designed to promote the need for this new highway? The new highway is a good idea, but people need to get to work in the meantime.
- * Why not run the road along the power lines?

Ironton Segment (Alternative B):

- * Like this route better --- want a bypass of entire length
- * Too many proposed signalized intersections between Reinhardt Circle and connection to NC 73 (someone else mentioned that these should not be changed)
- * Disruption of farm land between Old Plank Road and NC 73
- * What about farming operations? Impact?
- * Suggested realignment to continue straight from Old Plank Road until farm land is bypassed
- * Should bring Alternative B road further south to begin at Reinhardt Circle and connect past Leepers Creek
- * Concern about impacts to Sharon Baptist Church to the east of Rudisill Lane on the left side of NC 73 (heading east)
- * Re-route Alternative B at Old Plank Road to connect past the high school (it would go behind Ingleside Home and Magnolia Grove)
- * Re-route Alternative B just northeast of Old Plank Road (at the creek) to connect at Schronce Road
- * A comment was made to emphasize the small body of water between Old Plank Road and NC 73 (just northwest of the creek)

Anderson Creek Segment:

- * Possible extension of bypass through Old Plank Road connecting to NC 73 at Schronce Road (someone else argued the opposite)
- * Concern about what the speed limit will be
- * Suggestion to identify the fishing ponds between Old Plank Road and NC 73
- * Like the interchange at North/South Ingleside Farm Road and NC 73
- * Bypass should be routed to the east of the high school
- * Suggested bypass to run parallel with Old Plank Road south of NC 73 (until it turns southeast), crossing South Ingleside Farm Road and connecting with NC 73 at Little Egypt Road
- * Suggested bypass to run north of Old Plank Road over the creek and southeast, crossing South Ingleside Farm Road and connecting with NC 73 at Little Egypt Road

West Lake Norman Segment:

- * Avoid schools at Little Egypt Road --- possible alternative would be re-routing NC 73 south of existing NC 73 and the schools at the signalized intersection west of the schools, connecting with Little Egypt Road at Hunters Bluff
- * Comment that there are 3 schools in the area --- too many kids have died at East

Lincoln High School; 4 lanes most likely will only add to that problem

- * Suggested alternate route from Little Egypt Road (south of NC 73), across Sifford Road and Killian Farm Road, connecting at NC 73 just west of the railroad tracks
- * Requested a study on Route 16 North
- * Potential routes to bypass: 1) running from NC 73 west of Killian Creek south of commercial and employment center, industrial and vacant land use, connecting at NC 73 at railroad tracks (but don't go too far south), 2) running from NC 73 west of Killian Creek through commercial and employment center and south of Little Egypt Road, Sifford Road and Killian Farm Road to connect at NC 73 at the railroad tracks
- * Comment that it would be very expensive to widen Pilot Knob Road from NC 73 to Old NC 16
- * Possible unsignalized intersection with left turn lane needed on NC 73, just west of Club Drive
- * The potential signalized intersection with left turn lane on NC 73 at Club Drive will be overburdened
- * Are there going to be sound buffer walls to minimize impact to the neighborhoods from the noise of the new roads? Look at I-485 --- they are all around the areas with dense housing/residential.
- * What about protecting Johnson Creek which

runs down into Mountain Island Lake? Also, some of the land (light brown) has Catawba Lands Conservancy protection (i.e. Killian property)

- * I don't agree with the connection at Club Drive. It would seem much more prudent to connect at some point closer to the railroad track at McGuire Nuclear Plant to access traffic at Killian Farm, Caswell, and Sifford Roads. In addition, running NC 73 traffic through Old Hwy. 16 intersection seems impossible. That portion should be re-routed.
- * Golf course off of Club Drive should be marked/identified
- * Turn 2-lane bridge over Catawba River into 3 lanes
- * This section, in addition to the continuing section at 16 and 73, is not an easy change to make as you have it now. Hwy. 16 was re-routed. It would seem this section should be as well.

Mecklenburg County

Ramah Creek Segment:

- * Should be a 4 lane rural boulevard between Ramah Creek and Mayes Road on NC 73
- * Should be a 4 lane rural, suburban, or urban boulevard (determining as part of area plan) between Mayes Road and just east of the Shearer Road extension
- * Should be a 4 lane rural boulevard just east of the Shearer Road extension and just east of

McAuley Road

- * Have either the connector road from NC 73 to Ramah Church Road, or Ramah Church Road from NC 73, but not both
- * Likes the suggestion of no more entrances on NC 73 at the future low density residential area east of the Shearer Road extension
- * There is a gas main within the proposed future low density residential area east of the Shearer Road extension
- * For the natural landscape buffer on NC 73 between the Shearer Road extension and McAuley Road, offset it to be 24' wide --- coordinate with utilities before they put it in
- * The future low density residential area on NC 73 east of the Shearer Road extension will be a 500-700 d.u. development --- should additional signalized intersections be considered here? Possibly close the existing access point and move east to become new signalized intersection
- * A highly intensive district park use (i.e. recreation center, soccer fields, etc.) planned for area between Ramah Church Road and the unsignalized right turn intersection on NC 73 --- concerned about left turn access on NC 73 --- need access to Ramah Church Road as well

Catawba Road Segment:

- * Consider a light or directional crossover between the unsignalized right turn intersection and the potential signalized

intersection with left turn lane

- * Either re-route Beatties Ford Road through the future low density residential area between McGuire Nuclear Station Road and Hager Road, or re-route Beatties Ford Road further south --- divert traffic away from nuclear plant --- concern about security
- * Utilize directional crossovers on NC 73 between Hagers Ferry Road and Cramur Drive
- * Concern about traffic being closer to medium single family property and not being able to turn left at the unsignalized right turn intersections to the left of NC 73, past Blythe Park

Gilead Road Segment:

- * Possibly 6 lanes between McCoy Road and Reese Boulevard on Gilead Road?
- * Steven's Ridge development has 500 units (high density) to the east of Gilead Road, north of Bud Henderson Road (Gilead Ridge development right across street)
- * The southwestern side of Gilead Road is currently curbed --- the eastern side of Gilead Road is currently rural with no curb
- * Possible Cook Farm talks with county about park (north of Hugh Torance Parkway and east of Ervin Cook Road)
- * Gilead Road has been realigned to cross the Vance Road extension and connect with Bud Henderson Road
- * Ultimate signal location at Vance/Gilead/Bud

Henderson --- reconfigure intersection to N/S and E/W standard 4 leg

- * Need to add a marker for Torrence House historic site to the north of Gilead Road between McDowell and Torrence Creeks
- * Proposed straighter alignment between multi-family and medium single family residential areas on Gilead Road (southeast of Ranson Road)
- * Need to add a marker for the school in the vacant land use area to the east of Ranson Road

Ramah Church Road Segment:

- * Comment that it's not a large scale plan for the Stumptown Road extension to Ramah Church Road
- * Sam Furr Segment:
 - * There is an existing unsignalized intersection directly to the west of Birkdale Commons Parkway --- keep left turn in (3 others agreed)
 - * Who is planning the grade separation at NC 73/115/railroad tracks?
 - * Need directional crossovers
 - * After starting construction, please complete in a timely manner
 - * Be aware of all the homes backing on the highway (southeast of Northcross Center)
 - * Connecting streets need to be opened before Sam Furr construction begins
 - * Communities want the proposed 4 lane urban boulevard between US 21 and just

past NC 115 to minimize impact on existing homeowners

- * Should the section between US 21 and just past NC 115 be 6 lanes instead of 4 lanes?
- * Consider completely eliminating the proposed middle unsignalized right turn intersection to the east of Northcross Center --- has public local support (19-20 houses) --- can use other entrances/exits

Westmoreland Road Segment:

- * The dotted line representing “other roads not part of NC 73 Plan” connecting Westmoreland Road to Northcross Drive should be included as a solid line, meaning it is part of the NC 73 Plan
- * New interchange would be counterproductive
- * Need more roads that cross I-77 without an interchange

Sam Furr: I-77/US21 Alternative A

Segment:

- * Good attempt at creative thinking, but this option has much too great of an impact on a very large number of homeowners
- * Does the intersection on NC 73 on the east side of I-77 (heading east) have to be there?
- * The NC 73 corridor plan road running along the east side of Northcross Center

to US 21/Statesville Road near the medium single family residential area is not very residential-friendly

- * Comment that this alternative is a bad one

Sam Furr: I-77/US 21 Alternative B

Segment:

- * The lights between US 21/Statesville Road and Northcross Center on NC 73 are too close

Sam Furr: I-77/US 21 Alternative C

Segment:

- * This option appears to have the best possible traffic flow, while at the same time minimizing the impact to home/land owners, and allowing for future traffic volume growth

Sam Furr: I-77/US 21 Alternative D

Segment:

- * Like it --- nice and simple
- * This alternative is best

Cabarrus County

- * Rocky River Segment:
- * Possible median needed heading east on NC 73 right at the needed mixed use village area plan (approaching the unsignalized intersection with left turn lane)
- * Developers of Moss Creek have bond or financial guarantee for signal on NC 73 approaching your recommended

unsignalized intersection with left turn lane --- is this necessary? Take a look at it. They have multiple access points on Harris Road and Odell School Road.

- * Concern about mailboxes
- * Concern about night trucking along NC 73
- * Concern that the right-of-way for the recommended rural parkway is too wide
- * Noise study is needed in this area
- * There are approximately 5,300 homes in this area

Coddle Creek Segment:

- * Concern about amount of right-of-way needed across the reservoir
- * There is no median on NC 73 between Kannapolis; it is too far to get to next median break (between Laforest Way and Riding Trail Lane)
- * Possibly switch the unsignalized right turn intersection at Laforest Way with the signalized intersection with left turn lane at Riding Trail Lane
- * Right-of-way between Laforest Way and Riding Trail Lane is approximately 35 feet from centerline to property line
- * Concern with where consolidated driveway would be between Laforest Way and Riding Trail Lane
- * Preference for alternate alignment of Untz Road extension to Kannapolis Parkway (which will coordinate with Goodman Road bridge)

- * Request to not get too close to the I-85 interchange when extending Untz Road to Kannapolis Parkway
- * Liked the proposed Untz Road extension to Kannapolis Parkway, but suggested that it end across from Corl Road (like the original)
- * Want to keep signalized intersections at least ½ mile from the I-85 interchange (I-485 study --- ask Tim Gibbs or Bill Finger)
- * Suggestion for a road connecting Cessna Road to the business development east of Coddle Creek on NC 73 (through Untz Road)

West Kannapolis Segment:

- * Consider moving the signalized intersection with left turn lane on NC 73 west of I-85 interchange further west
- * Be careful with signalized intersections at Untz Road and Kannapolis Parkway and NC 73 and I-85 --- to close to interchanges