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DAVIDSON CONCORD ROAD / NC 73 AREA PLAN

ROAD NETWORK - INTERSECTIONS

Davidson-Concord Road and US 73

According to a 2006 analysis, this signalized intersection operated at level-of-service (LOS) C in during the AM peak period, and at LOS B in the PM (Traffic Impact Analysis for Davidson East, Kimley-Horn and Associates, June 2006). The predominant turning movement is between the eastern leg of US 73 and Davidson-Concord Road (southbound left turns in the AM, and eastbound right turns in the PM).

Davidson Concord Road and Concord Road/East Rocky River Road

This unorthodox intersection incorporates a triangular island with three stop signs. Northbound left-turning traffic on Davidson-Concord Road must stop at Concord Road, while right turns split off and stop at East Rocky River Road. Westbound East Rocky River Road traffic wanting to turn left must split off to the left before stopping at Davidson-Concord Road, while traffic continuing straight through on Concord Road does not have to stop. No eastbound traffic on Concord Road is required to stop, whether continuing straight through on Concord Road or turning right down Davidson-Concord Road.

Based on a 2006 study, there are currently no capacity problems at this intersection. All the stop-controlled approaches operated at LOS B in the PM peak period, while in the AM one operates at LOS A and the other two at LOS C (Traffic Impact Analysis for Davidson East, Kimley-Horn and Associates, June 2006). However, the unusually complex configuration could increase crash potential, and does require the highest volume turning movement (northbound lefts in the AM peak) to stop rather than flow freely.

Davidson-Concord Road and Barnhardt Road

The stop-controlled eastbound approach of Barnhardt Road currently operates at LOS C in both the AM and PM peak periods (DRAFT Traffic Impact Analysis for Bailey Road High School, Kublins Transportation Group, July 2007). There are no separate turn lanes on any of the four single-lane approaches.

Davidson-Concord Road and Robert Walker Drive

The stop-controlled approaches of Robert Walker Drive currently operate at LOS C or better in both the AM and PM peak periods (DRAFT Traffic Impact Analysis for Bailey Road High School, Kublins Transportation Group, July 2007). All four approaches have shared through/right lanes with dedicated left turn lanes. There are pedestrian crossings marked across the northern leg of Davidson-Concord Road and the eastern leg of Robert Walker Drive.

NC 73 and Ramah Church Road

The stop-controlled northbound approach of Ramah Church Road operated at LOS F during both AM and PM peak periods in 2006 (Traffic Impact Analysis for Davidson East, Kimley-Horn and Associates, June 2006). The major turning movements are eastbound right turns in the morning peak, and northbound right turns during the afternoon.

NC 73 and Mayes Road/Black Farms Rd.

Although no capacity analysis was performed for this intersection, by comparison with the analysis of Ramah Church Road (which has a similar ADT), it can be deduced that the stop-controlled southbound approach of Mayes Road is operating at or near LOS F. No count data is available for Black Farms Road.

This intersection is in a somewhat hazardous location, due to the sharply curving alignment of NC 73 immediately to the east. Visibility is less than desirable given the high speeds and traffic volumes on NC 73.

Bailey Road and NC 115

This signalized intersection currently operates at an overall LOS of C in the AM peak period, and LOS D during the PM peak. All four approaches have shared through/right lanes with dedicated left turn lanes. The proximity of the Norfolk Southern railroad tracks to the east of this intersection complicate the operation of the signal system, and have a negative effect on safety and capacity.

Pedestrian & Bicycle Elements

A paved greenway extends from Davidson-Concord Road at Rocky River West Branch South Prong, northwest along the eastern bank of this stream. This portion of the Southeast Greenway crosses Robert Walker Drive and terminates in the vicinity of Hudson Place. An overland connector along Patrick Johnston Lane, Pine Street, and Avinger Lane provides connectivity with another existing segment extending eastward to South Street.

The other major greenway facility begins on the south side of Concord Road, at the Davidson city limits. It continues along this side of the road until crossing just south of Apollinaire Drive. In the vicinity of Poetry Lane, the separate pathway transitions to a paved 10-foot section of a 20-foot wide paved shoulder, separated by diagonal striping from the northbound travel lane of Davidson-Concord Road. The path currently ends at Robert Walker Drive, although various neighborhood streets have been designated as an overland connector to the south and east.

Other greenways and overland connectors are planned, along with additional sidewalk. Most of these projects are programmed for implementation in conjunction with new subdivisions and associated roadway improvements. Bailey Road is critical link in this future network, due to the access it provides to schools, parks, and destinations to the west. Other proposed facilities will connect east and south to Bradford District Park, although a key element of this connection will be a safe – possibly grade-separated – crossing of NC 73. Planned greenways will also connect Davidson and points north and south to Fisher Farm along the West Branch of Rocky River and its tributaries, and an east-west greenway will follow Ramah Creek to provide access to the south side of Bradford District Park.



1 Intersection Between Concord Rd. and E. Rocky River Rd.



2 Intersection Between Davidson-Concord Rd. and Robert Walker Dr.



3 Intersection Between Davidson-Concord Rd. and Barnhardt Rd.



4 Intersection Between Barnhardt Rd., Mayes Rd. and Bailey Rd. Extension

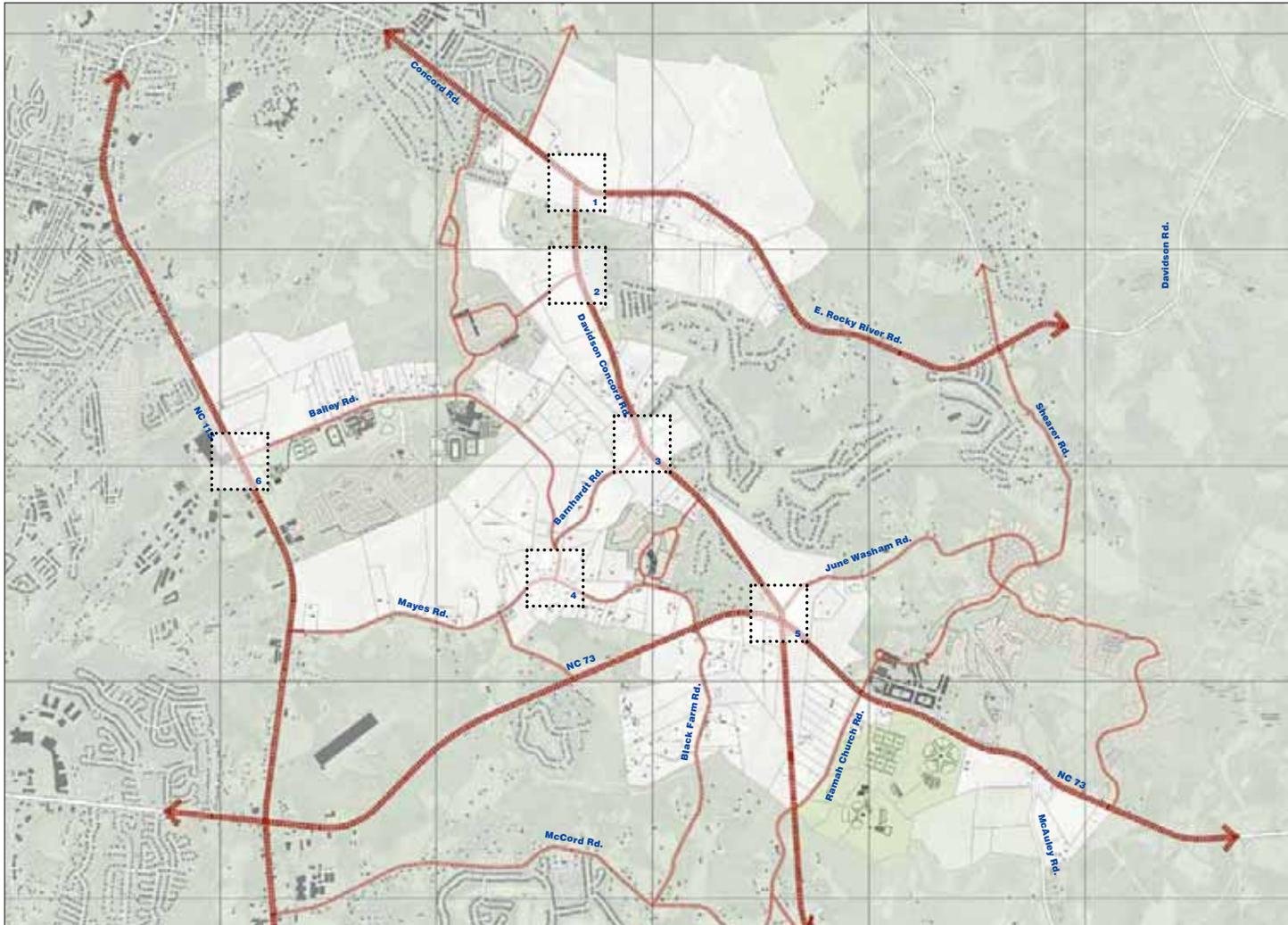


5 Intersection Between Davidson-Concord Rd., June Washam Rd. and Sam Furr Rd.



6 Intersection Between NC 115 and Bailey Rd.

Appendix II - TRANSPORTATION NETWORK INTERSECTIONS ASSESSMENT



This summary of existing transportation conditions for the Davidson-Concord Rd/NC 73 Small Area Plan covers the major roadway facilities in the study area, as well as pedestrian and bicycle elements. Roadway information is organized by segment, followed by key intersections. The roadway section addresses the following elements:

- Cross-section
- Geometrics/alignment
- Adjacent development
- Function
- Daily traffic volumes and growth (where available)
- Thoroughfare plan status
- Crash data (2004 -2007)

The discussion of intersections covers:

- Traffic control
- Approach geometry
- Predominant turning movements (where available)
- Level-of-service (where available)

Although bicycle and pedestrian features associated with the above roadway and intersection locations are addressed in their discussions, a separate summary of pedestrian and bicycle facilities is provided, including both on-road and off-road elements.

TRANSPORTATION ASSESSMENT - ROADWAY SEGMENTS



Davidson Concord Road



NC 73



Davidson-Concord Road (SR 2693)

Davidson-Concord Road between Sam Furr Road (NC 73) and East Rocky River Road (SR-2420) is a two-lane facility through rolling, primarily rural terrain. Suburban development is progressing mainly from north to south along the corridor, with most subdivision development north of Robert Walker Drive. The speed limit is 45 miles per hour, with a reduction in the vicinity of the more developed intersections and pedestrian/bicycle crossings to the north. Passing is prohibited along the entire length of this corridor.

An unusual paved shoulder (approximately 20 feet in width) is present on the eastern side of Davidson-Concord Road in the vicinity of Poetry Lane. The outer half of this pavement serves as a bicycle/pedestrian path, separated from the travel lane by a 10-foot section of diagonal striping. North and south of this segment, a narrow grass strip separates the path from the roadway. The southern terminus of this path is currently at Robert Walker Drive. There is a pedestrian crosswalk across the northern leg of Davidson-Concord Road at this location. To the north, the path crosses Davidson Concord Road immediately south of Appolinaire Drive before continuing west along the southern edge of Concord Road. There is also a separate greenway crossing south of Robert Walker Drive, at Rocky River West Branch South Prong. Left-turn lanes with painted transition medians exist at the offset intersections with Westmoreland

Farm Road and Appolinaire Drive; at Poetry Lane; at Robert Walker Drive; and at Davidson Park Drive. Throughout the remainder of the alignment, the travelway is a typical 2-lane ribbon pavement cross-section with no paved shoulders.

Average daily traffic (ADT) volumes for 2006 range from 6,500 vehicles per day (vpd) just south of East Rocky River Road, to 7,900 vpd just north of NC 73. Since 2000, traffic volumes at the north end of the corridor have grown from 4,400 vpd, an average annual rate of 6.7%. Comparable data are not available for the southern end of the corridor.

Analysis of 2004 – 2007 crash data does not reveal any significant concerns. There were 10 crashes reported during this period, with no fatalities. The corresponding crash rate of 67.0 per 100 million vehicle-miles of travel (VMT) is substantially lower than average rates for two-lane rural secondary routes, which range from 370 crashes/100 million VMT on a statewide basis to 129 crashes/100 million VMT for Mecklenburg County. (Note: Crash rates for urban facilities are significantly higher than for corresponding rural facilities.) There are no obvious or unusual patterns to the reported crashes, except that all of the crashes occurred in the southernmost mile of the facility, between NC 73 and Parting Oaks Lane. The crashes are typical to a rural two-lane road, mostly involving vehicles turning into or out

of driveways or intersections, triggering angle or rear-end collisions.

Although Davidson-Concord Road provides access to adjoining development and local streets, its principal function has been as the main route into Davidson from the west and southwest. The adopted Mecklenburg-Union County Metropolitan Planning Organization (MUMPO) Thoroughfare Plan classifies Davidson-Concord Road as a major thoroughfare. It also indicates long-range plans to create a major north-south arterial by connecting the extension of Prosperity Church Road to the southern end of Davidson-Concord Road, then extending Davidson Concord Road northward towards Mooresville. Current thinking is that this facility would ultimately be a multilane arterial, and planning is already underway for the Prosperity Church Road extension.

Sam Furr Road (NC 73)

In the vicinity of the Davidson-Concord Road intersection, NC 73 is a two-lane roadway with a posted speed of 55 mph and 2006 ADTs in ranging from 20,000 to 22,000 vehicles per day.

Analysis of 2004 – 2007 crash data from Mayes Road to Ramah Church Road reveals no unusual safety problems. Twenty-four crashes were reported during this period, with one fatality at Mayes/Black Farms Roads. The corresponding crash rate of 45.8 per 100 million vehicle-miles of travel (VMT) is substantially lower than average rates for two-lane rural NC routes, which range from 191 crashes/100 million VMT on a statewide basis to 146 crashes/100 million VMT for Mecklenburg County. There are no obvious or unusual patterns to the reported crashes, although a disproportionately large number were associated with the Mayes/Black Farms intersection, and these crashes tended to be the most severe in terms of damage and injuries. This is probably due to visibility problems caused by the horizontal curve in NC 73's alignment immediately to the east. Overall, the reported crashes are consistent with a rural two-lane road, mostly involving vehicles turning into or out of driveways or intersections (especially at Ramah Church, Mayes/Black Farms, and Davidson-Concord Roads), triggering angle or rear-end collisions. Even though this location has the highest number of potential vehicle conflicts, crashes at the Davidson-Concord intersection

tend to be less frequent and less severe due to the presence of a traffic signal. Apart from intersection related crashes (approximately two-thirds of the total), the remainder appear to involve running off the road, animal crossings, and passing maneuvers.

NC 73 is an important regional facility. Along with NC 150 to the north, it provides the only continuous east-west connection for the entire area between I-40 on the north and I-85 to the south. Given the direct, 12-mile connection it provides between I-85 and I-77 and the fact that it skirts the southern shores of Lake Norman (a 10-mile long barrier to east-west travel), NC 73 serves a combination of trip types, all of which are growing significantly in volume:

- Local traffic between Concord/Kannapolis and Huntersville/Cornelius/Davidson;
- External trips destined for Lake Norman, Charlotte Motor Speedway, and other attractions;
- Through trips.

NC 73 is designated a major thoroughfare in the adopted MUMPO Thoroughfare Plan, with the expectation that the road will be widened and upgraded. Public hearing maps have already been presented as part of the Categorical Exclusion analysis of Transportation Improvement Project R-2632A, the widening of Sam Furr Road to a four-lane divided facility from NC 115 through the Davidson-Concord Road intersection.

TRANSPORTATION ASSESSMENT - ROADWAY SEGMENTS



East Rocky River Road

East Rocky River Road (SR 2420)

East Rocky River Road is a two-lane road with a posted speed of 40 mph. The cross-section is typical ribbon pavement without paved shoulders. Its alignment is rolling and moderately curvy, and surrounding land use is transitioning from rural/ scattered residential to suburban.

At the road's western terminus with Davidson-Concord Road, the 2006 ADT was 3,400 vpd. Traffic grew from 2,500 vpd in 2000, an average annual increase of 5.3%.

No significant safety issues were identified in analyzing 2004 – 2007 crash data between Davidson-Concord Road and Shearer Road. There were only three crashes reported during this period, with no fatalities. The resulting crash rate of 27.1 per 100 million vehicle-miles of travel (VMT) is substantially lower than average rates for two-lane rural secondary routes, which range from 370 crashes/100 million VMT on a statewide basis to 129 crashes/100 million VMT for Mecklenburg County. There are no obvious or unusual patterns in the reported crashes, although they all occurred immediately east of the intersection with Davidson-Concord Road, and involved sideswipes or running off the road.

East Rocky River Road serves as a collector for adjoining development and local roads, and in combination with NC 3 it provides a secondary east-west connection between Davidson and western Kannapolis/Cabarrus County. It is designated a major thoroughfare in the adopted MUMPO Thoroughfare Plan.



Concord Road

Concord Road (SR 2693)

Although it appears to be an the natural extension of East Rocky River Road, Concord Road is actually the continuation of Davidson-Concord Road as it turns northwestward through the intersection. This configuration reflects major traffic flows in and out of downtown Davidson.

The two-lane ribbon pavement cross-section transitions to an urban curb-and-gutter treatment at the Davidson town limits. East of this point, the road has no paved shoulders, and a paved path runs along the south side of the roadway, separated by a very narrow grass strip. Within the town limits, Concord Road has striped bike lanes and sidewalks on both sides.

No traffic counts are available for the segment of road outside of Davidson, but volumes can be assumed lower than the 2006 ADT of 10,000 vpd recorded just east of Grey Road.

Review of 2004 – 2007 crash data between Davidson-Concord Road and Kimberly Road revealed no crashes.

Concord Road is designated a major thoroughfare in the adopted MUMPO Thoroughfare Plan.



Ramah Church Road

Ramah Church Road (SR-2427)

Ramah Church Road is a two-lane facility with a posted speed limit of 45 miles per hour. Development along the northern end of this facility is rural with scattered residential development, becoming more suburban towards the south and west. The cross-section is typical ribbon pavement with no paved shoulders. The 2006 ADT at the northern end of Ramah Church Road was 2,100 vpd, up from 1,800 vpd in 2004.

Ramah Church Road provides access to NC 73 and NC 115 for adjacent development and for local streets that connect to it. The adopted MUMPO Thoroughfare Plan identifies this road as a minor thoroughfare.



Bailey Road

Other Minor Roads

Bailey Road is a two-lane east-west road that serves the new Bailey Middle School, and will serve an adjacent new high school to its east. These two facilities and a park west of the middle school occupy almost the entire southern frontage of Bailey Road east of the at-grade railroad crossing. Sidewalk extends along this frontage, with curb-and-gutter in front of the middle school property. Turn lanes with painted transition medians have been installed at the middle school driveways.

Bailey Road is identified in the adopted MUMPO Thoroughfare Plan as a major thoroughfare, ultimately connecting from Davidson-Concord Road west to Catawba Road via Westmoreland Road. However, the original alignment/concept has changed, and the link from existing Bailey Road east to Davidson-Concord Road will be accomplished through a southwesterly connection with Barnhardt Road. A secondary connection to the northeast, to Robert Walker Drive via Bailey Springs Road, recently opened as part of the new Bailey Springs subdivision.

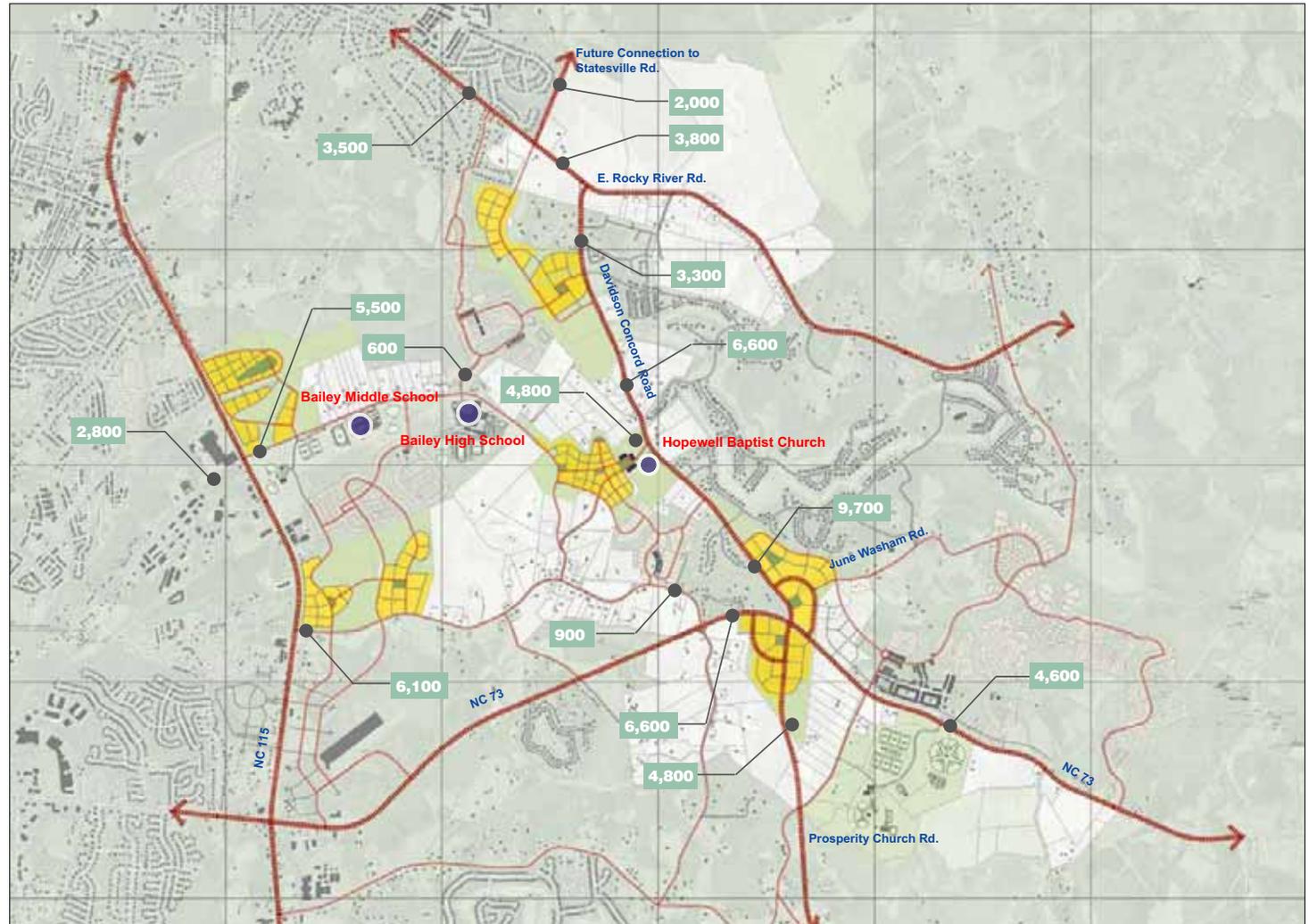
Barnhardt Road is a two-lane ribbon pavement local road between Davidson-Concord Road and Mayes Road. It has a moderately curvy, rolling alignment through rural land with scattered residential development. Although currently not on the MUMPO Thoroughfare Plan, it is proposed to serve as part of a linkage extending Bailey Road east to Davidson-Concord Road.



Barnhardt Road

Mayes Road provides an east-west connection between NC 115 and Sam Furr Road near the Davidson-Concord Road intersection. It has a two-lane ribbon pavement cross-section, with moderately curving vertical and horizontal alignments, and a severely humped at-grade railroad crossing immediately east of its intersection with NC 115. The 2006 ADT on Mayes Road was 1,900 vpd, up from just 820 vpd in 2000.

NODE-GENERATED TRIPS



- Min Total = 32,500 (50% BO, -25% reduct)
- Max Total = 73,600 (50% BO, -15% reduct)
- Assumed = 36,000 (50% BO, -15%; except NC 115 Development south of Mayes, -25%)
- Significant inter-nodal trips (~ 5% -10%)

NOTE: Represents only trips generated by nodal development. Does not include existing traffic or background growth.

Appendix II - TRANSPORTATION NETWORK NODE-GENERATED TRIPS

Transportation issues play a key role in assessing – and ultimately realizing – any of the various land use scenarios generated as part of the *Davidson-Concord Rd/NC 73 Small Area Plan*. The following discussion covers observations and recommendations relating to major roadway facilities in the study area, especially as they affect the development nodes. It also describes the methodologies and assumptions used, as well as their inherent limitations.

Build-out development assumptions were used to estimate trip generation at each of the following nodes:

- NC 73
- Hopewell
- Westmoreland
- NC 115

Using the forecast totals for residential units and commercial square footage (divided into office and retail categories) at each node, a variety of assumptions and methodologies were tested in estimating the total number of vehicle-trips added to the roadway network by the proposed nodal development. The directional distribution of these trips and their subsequent assignment to roadways in the surrounding network were based on:

- Observed traffic patterns;
- Forecasts from the regional travel demand model; and
- Engineering judgment, given relative estimated travel times, the paths most likely to be selected by drivers.

The following daily vehicle-trip generation categories and rates from ITE Trip Generation, 7th Edition were assumed:

- Residential (Village Center): Condo/Townhome = $EXP(0.85 \cdot LN(dwelling\ units) + 2.55)$
- Residential (Village General/Edge): SF Detached = $EXP(0.92 \cdot LN(dwelling\ units) + 2.71)$
- Office: General Office Bldg = $EXP(0.77 \cdot LN(square\ feet/1000) + 3.65)$
- Retail: Shopping Center = $EXP(0.65 \cdot LN(square\ feet/1000) + 5.83)$

Recognizing that ITE rates tend to overestimate vehicle trips in a mixed-use, pedestrian-oriented environment, a series of adjustments were made to account for internal trip capture and travel mode shifts away from the automobile. Vehicle-trips were reduced by 10%, 15%, and 25% to represent different levels of effectiveness. In addition, calculations were also performed for a 50% build-out scenario.

Under this range of scenarios, maximum and minimum trip generation levels were identified:

- Total daily vehicle trips (minimum) = 32,500
Assumes 50% build out, with 25% reduction due to internal capture and mode shifts.
- Total daily vehicle trips (minimum) = 73,600
Assumes 100% build out, with 0% reduction due to internal capture and mode shifts.

For the purposes of this analysis, an intermediate level of trip generation is assumed:

- Total daily vehicle trips (assumed) = 61,000
Assumes 100% build out, with 15% reduction due to internal capture and mode shifts, except for the southernmost portion of NC 115 development, where a 25% reduction is used to reflect effect of rail transit station.

The distribution and assignment of trips to the network was a fairly straightforward process. Recognizing the potential for trips between nodes, 5-10% of trips were treated as inter-nodal trips, ending at the first or second node encountered, rather than being treated as a longer trip extending beyond the limited study area. This assumption has the effect of shortening trips and reducing traffic volumes and vehicle-miles of travel. A significant portion of residential trips were also targeted for the two schools on Bailey Road.

The diagram on the left summarizes the new vehicle trips added to the network each day, based on the above assumptions. In making recommendations for future transportation improvements, these traffic volumes are considered, along with:

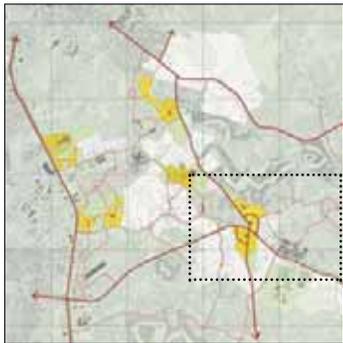
- Current traffic volumes;
- Background traffic growth separate from that attributed to nodal development;
- Changes in traffic patterns due to planned projects;
- Pedestrian and bicycle needs;
- Potential transit service;
- Safety; and
- Environmental and community impacts.

Of all these considerations, the most critical at this stage are the growth in background traffic and traffic shifts caused by future transportation projects. The potential magnitude of these unknowns, combined with the difficulty of accurately predicting them, produce significant uncertainty in the analysis. The regional travel demand model provides some guidance in this regard, although it is unclear whether the land use assumptions embodied in the regional model are entirely consistent with those made for this study. However, in terms of the ultimate growth in traffic along the corridors of interest, certain conclusions can be drawn with a high degree of confidence. The critical unknown is more likely to be how soon traffic reaches certain thresholds, rather than what maximum volumes are eventually reached. Since the answer to this question depends on so many variables outside the scope or influence of this study (such as the timing of other transportation improvements, the pace and nature of surrounding development, overall economic climate, and even the price of fuel), it is important to develop a set of flexible, strategic recommendations that can be implemented incrementally, if (and as) needed.

The following four sections discuss transportation issues and recommendations relating to each of the identified development nodes. Several general guidelines that apply in all cases are summarized here for added emphasis:

- On important arterials such as NC 73, Davidson-Concord Road, and Prosperity Church Road, there should be no access within at least 600 feet of any signalized intersection, to reduce conflicts with turning or queuing and vehicles, and to minimize weaving and merge/diverge conflicts. This also applies to most other roadways at any intersections with such arterials.
- Within each development node, designs should be sensitive to the needs of bus transit, with provision for stops and turn-outs at safe and convenient locations that minimize conflicts between modes.
- Bicycle and pedestrian accommodations should be built into all roadway designs, in addition to (but coordinated with) any separate facility plans.

DAVIDSON CONCORD ROAD / NC 73 AREA PLAN
 TRAFFIC NODES - NC 73



- Access Management**
-  *Quadrant Road Intersection*
-  *Full-movement intersection. May be signalized, STOP-controlled on minor approach, or 4-way STOP-controlled.*
-  *600' zone from major intersection should be access-free. Right-in / Right-out only if necessary.*

Appendix II - TRANSPORTATION NETWORK TRAFFIC NODES - NC 73

This node is divided into two sections, one north of NC 73, and one to the south which has the potential to be further subdivided by the proposed connection between Prosperity Church Road and Davidson-Concord Road. The intersection of Davidson Concord Road and NC 73 poses substantial challenges, not only to traffic flow along these two important arterials, but also to the development of this particular node.

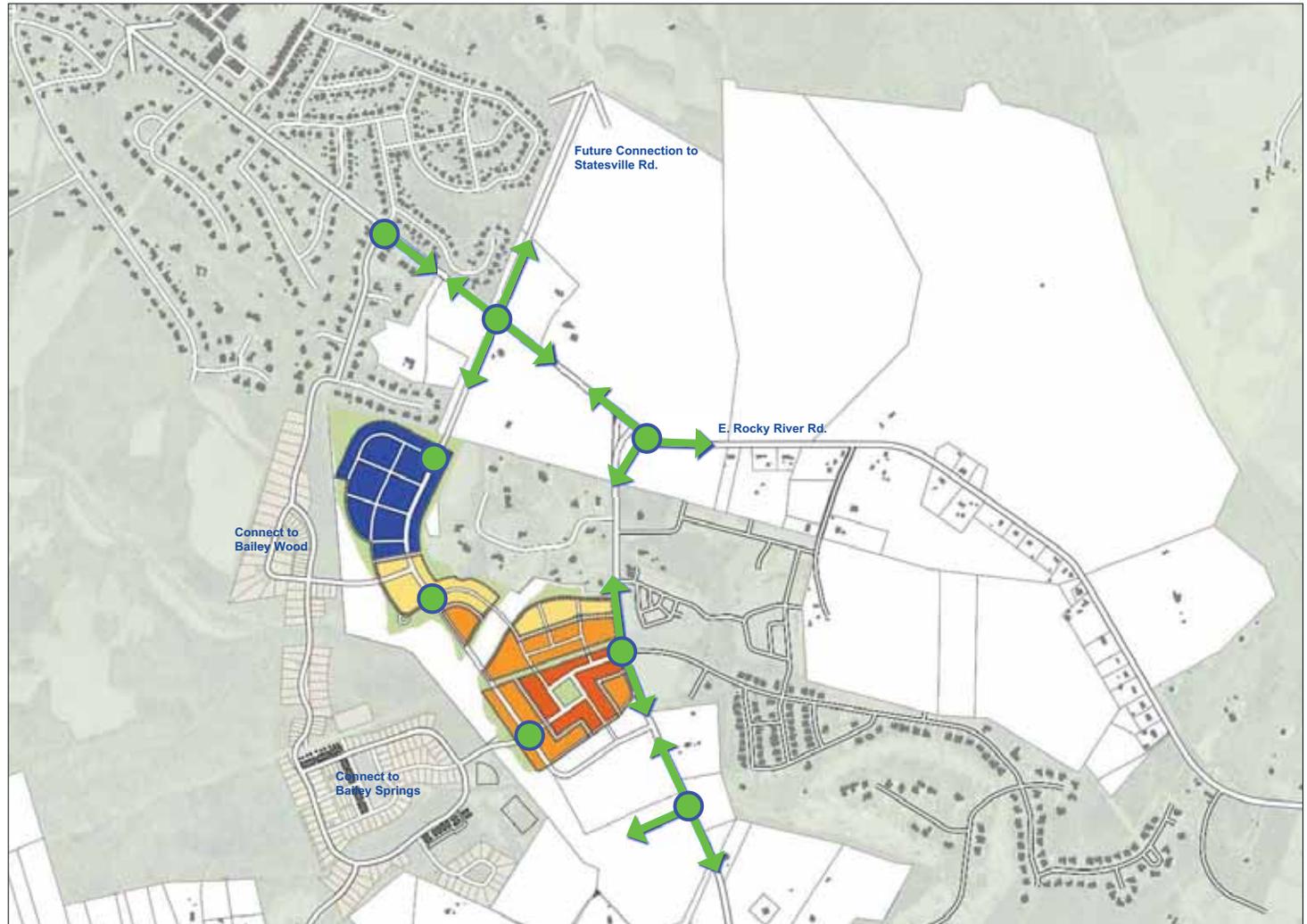
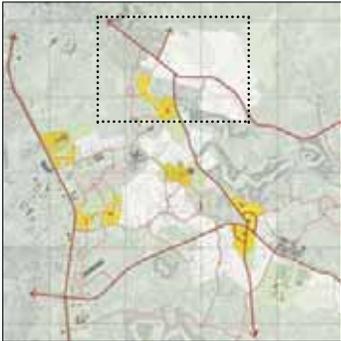
Based on analysis performed for this study, review of other studies and project level traffic forecasts, and consideration of various runs of the regional travel demand model, it is reasonable to assume that by the year 2030, traffic volumes at this intersection will exceed 40,000 vpd on NC 70; 20,000 vpd on Davidson-Concord Road; and 30,000 vpd on Prosperity Church Road. In fact, volumes could be as high as 50,000, 25,000, and 35,000 vehicles per day, respectively.

Given the uncertainty of these forecasts, and the length of time anticipated before they would be likely to occur, it is reasonable to plan for initial and interim conditions in such a way that – to the degree possible – the ultimate design is not compromised or precluded. While there have been discussions of constructing an interchange at this location, an appropriate at-grade intersection, coupled with strict access management, should provide adequate traffic capacity for the foreseeable future. Construction of an interchange in the near term would be excessive in terms of cost, traffic capacity, and impacts on surrounding land uses. However, one drawback to an at-grade intersection is the barrier it would create to pedestrian and bicycle travel between different sections of this development node. (Efforts to address this challenge are discussed in detail in a later section of this report.)

Regardless of the intersection (or interchange) design ultimately constructed, several important recommendations can be made to help preserve the traffic capacity, maintain access, and insure safety. These recommendations, along with supporting observations, are listed below:

- This portion of NC 73 is planned as a divided, four-lane facility, with at least one left-turn lane in each direction at the Davidson-Concord Road intersection. A dedicated right-turn lane may also be warranted, especially from the westbound approach.
 - For NC 73, there should be no median breaks, traffic signals, or full-movement intersections any closer than the intersections with Ramah Church Road and Mayes/Black Farm Road. (The only exception would be for a quadrant road installed as part of a quadrant intersection or interchange, as described later in this report.) A limited number of right-in/right-out access points are permissible.
 - Given the traffic forecasts discussed previously, both Davidson-Concord and Prosperity Church Roads will require two travel lanes in each direction, and each intersection approach will require at least one left-turn lane. A dedicated right-turn lane may be warranted at some locations. This suggests the need for a median-divided four-lane facility at least as far north as Parting Oaks Lane.
 - North of NC 73, the first intersection on Davidson-Concord Road should be with a re-aligned June Washam Road, at least 600 feet north of NC 73. This intersection must remain a “T” intersection, allowing for higher throughput and better coordination with the NC 73 signal. It will probably warrant signalization at some point.
 - The next full movement intersection (also likely to warrant signalization in the future) should be at Scanlan Way/Davidson East Connection. A right-in/right-out only intersection may be permitted between Scanlan Way and June Washam Road.
 - The first full-movement/signalized intersection on Prosperity Church Road should be at least 1000’ south of NC 73, approximately halfway to an anticipated signal at Ramah Church Road. The actual distance depends on design speeds, intersection designs, and signal timings. Higher speeds would require greater spacing, while “T” intersections and simpler signal plans (with fewer phases) could allow closer spacing. Right-in/right-out access points could be permitted at appropriate locations.
 - To the extent possible, turning traffic should be encouraged to divert from the Davidson-Concord/NC 73 intersection via alternative routes, such as Ramah Church Road, the Davidson East Connector, and even Black Farms Road. However, such traffic shifts may worsen conditions at other locations.
- At present, it is not possible to identify long- or medium-range intersection improvements on NC 73 at either Ramah Church Road or at Mayes Road/Black Farms Road. Too many of the variables critical to determining the appropriate improvements are unknown, and are highly dependent on decisions yet to be made regarding the intersection/interchange design at Davidson-Concord Road and NC 73, as well as related land use and site plans. Based on what is known, however, the following observations can be made:
 - o The main factors affecting the treatment of these intersections are NCDOT’s planned improvements to NC 73, and its designation as a corridor of major regional/statewide importance. NCDOT’s priorities have emphasized maximizing traffic throughput and safety, balanced against land use and conditions on intersecting streets. For example:
 - The cross-section proposed for this segment of NC 73 consists of at least four lanes with a median, probably with a posted speed of 45 mph (although 35 mph may be possible).
 - Signalized intersections would typically be spaced at least 1200 feet apart, with no intervening median breaks. Closer spacing could be possible for “T” intersection with phasing schemes that promote efficient signal coordination and progression, especially if they make up part of a “quadrant” intersection/interchange that reduces turning conflicts at the primary junction. At signalized intersections, the minimization of through traffic delay would be a priority, possibly leading to dual left-turns, dedicated right-turn lanes, and minimal pedestrian crossing times.
 - Right-in/right-out access would be permitted at appropriate locations, and under certain circumstances, a median break for a “left-over” (left turns allowed from, but not onto, NC 73) may be considered.
 - Since large trucks will comprise a large share of traffic on NC 73, their physical and operational characteristics will determine much of the design geometry along the corridor.
 - o It appears likely that the portion of Ramah Church Road between NC 73 and Prosperity Church Road will require widening at some point, probably to a 4-lane divided section. At the very least (and possibly as an interim measure), additional lanes will be needed at the intersections on each end of this segment, and left-turn lanes – either individual, as part of a median, or in the form of a continuous ceter lane – will be needed to prevent turning traffic from obstructing through traffic. This conclusion is based on the following considerations:
 - 2030 traffic volume from the MUMPO model;
 - Pending development in the surrounding area; and
 - The likelihood that traffic between the eastern leg of NC 73 and the southern leg of Prosperity Church Road will use Ramah Church Road. (The magnitude of this movement depends mainly on whether or not NC 73’s junction with Davidson-Concord Road is designed to utilize Ramah Church Road for this purpose.)
 - o Likewise, the portion of Ramah Church Road extending north of NC 73 into Davidson East will need to be four/five lanes at least until the first interior intersection to accommodate turning traffic and vehicle queues.
 - o It is not clear if or when signalization will be necessary at the Mayes Road/Black Farms Road intersection with NC 73. Volumes do not appear to warrant signalization in the near term, but side-street delays could become excessive as traffic volumes on NC 73 increase. In addition, this intersection has a less than desirable crash history due to poor sight distance caused by the horizontal curvature of NC 73 immediately to the east, and would also be expected to worsen with increased traffic. Alternate solutions include restricting cross-street movement at the intersection, possible by maintaining the median through the intersection. The feasibility of other options depends, however, on additional connectivity within the local street network that would allow traffic to access NC 73, Davidson-Concord Road, and Prosperity Church Road via other routes.

TRAFFIC NODES - WESTMORELAND



Access Management

-  Full-movement intersection. May be signalized, STOP-controlled on minor approach, or 4-way STOP-controlled.
-  600' zone from major intersection should be access-free. Right-in / Right-out only if necessary.

TRAFFIC NODES - WESTMORELAND



Westmoreland Alternative A



Westmoreland Alternative B

This node is accessed mainly via two north-south routes: existing Davidson-Concord Road, and a proposed facility ("Western Street") that starts at a point on Davidson-Concord Road between Beaver Dam historic site and the Southeast Greenway. This new road follows an alignment west and north from there, reconnecting with Davidson-Concord Road in the vicinity of the Davidson Town Limits, where it would ultimately extend northwest to Statesville Road. Since a substantial volume of traffic will also use at least one of these facilities a through route between NC 73 and central Davidson, it is important to identify which of these roads should carry primarily through-trips, and which should provide access to local traffic. This decision will affect the design of both facilities, as well as planning for the node itself. Whichever facility is widened will serve as part of a regional north-south arterial connecting North Charlotte with Iredell County via Prosperity Church and Davidson-Concord Roads. The other will serve as a more local collector-type road, providing access to the Westmoreland Node. For the purposes of this discussion, it is assumed that Davidson-Concord Road retains its role as the primary arterial, while Western Street acts as a lower-speed, lower-capacity collector street.

In the near term, the differences between Davidson-Concord Road and "Western Street" may not be dramatic, and both could probably retain two-lane cross-sections for some time, provided intersections are appropriately designed and access is strictly managed. However, planning should reflect that anticipated long-range growth in traffic will ultimately require Davidson-Concord Road to be widened to four travel lanes. With Davidson-Concord Road as the principal traffic route, the two critical intersections in this vicinity are:

- The southern terminus of "Western Street" at Davidson-Concord Road; and
- The northern intersection of "Western Street" and Davidson-Concord Road.

Other important intersections include:

- East Rocky River Road and Davidson-Concord Road; and
- Robert Walker Drive and Davidson-Concord Road.

Other minor intersections or driveways are anticipated. These would not be expected to require signalization, and should, where feasible, be "T" intersections or right-in/right-out only.

Due to the high percentages of turning traffic anticipated on Davidson-Concord Road, left-turn lanes with adequate storage bays will be critical. Otherwise, vehicles waiting to turn will obstruct through traffic, drastically reducing the capacity of the roadway and inducing long delays. This problem is particularly severe on two-lane facilities, since it completely blocks through traffic in one direction. Given the nature of this development, the desire to facilitate pedestrian and bicycle trips, and the spacing of driveways and intersections, center medians are recommended for Davidson-Concord Road in this vicinity, regardless of the number of through lanes. Because of the proximity of intersections, there is not adequate distance for the lane tapers needed to transition into and out of additional lanes. Rather than constructing a continuous center left-turn lane (or two-way left-turn lane), a median-divided cross-section is recommended. Not only does this design improve traffic operations, help manage access, and enhance appearance, it provides a safer environment for motorized vehicles, bicycles, and – especially – pedestrians.

As traffic volumes increase on both Robert Walker Drive and Davidson-Concord Road, it is likely that this intersection will require signalization, whether Davidson-Concord Road is widened or not. Dedicated left-turn lanes already exist on all approaches, and would be maintained. Existing bicycle and pedestrian elements should be expanded and enhanced on all approaches.

Regarding the intersection of Davidson-Concord and East Rocky River Roads, some improvements will be necessary as volumes of traffic, pedestrians, and bicyclists all continue to increase. Converting this intersection into a modern roundabout would address most safety and capacity problems, at least in the short- and medium-term. In the longer term, especially following completion of the Prosperity Church Road extension, traffic volumes may exceed desirable levels for a one-lane roundabout. Alternatively, adding lanes to Davidson-Concord Road would also require a two-lane roundabout. This configuration may not be desirable, due to increased complexity and potential driver confusion, as well as drawbacks in terms of pedestrian and bicycle travel. The only other options involve various realignments of the intersection, with changes to STOP conditions or conversion to traffic signals. The most likely geometric change would include smoothing out Davidson-Concord Road, and angling East Rocky River Road to create a more symmetrical "T" intersection. In the case of a STOP-control, East Rocky River Road would be the minor (stopped) movement, while Davidson-Concord Road would be the continuous through movement. Under either STOP or signal control, a southbound left-turn lane would be required on Davidson-Concord Road, and a northbound deceleration/right-turn lane would be desirable. Separate left- and right-turn lanes on East Rocky River Road would probably also be warranted.

The unorthodox bicycle treatment in the vicinity of Poetry Lane – where the separate pathway transitions to a paved 10-foot section of a 20-foot wide paved shoulder, separated by diagonal striping from the northbound travel lane of Davidson-Concord Road – should be converted to a more consistent and conventional multi-use path separated from the roadway.

DAVIDSON CONCORD ROAD / NC 73 AREA PLAN

TRAFFIC NODES - HOPEWELL

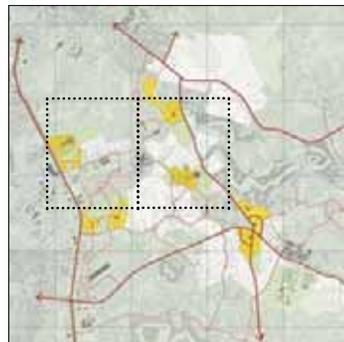
The Hopewell development node is located just west of Davidson-Concord Road, spanning Barnhardt Road north and west to Bailey Road extension. The junction of Barnhardt and Davidson-Concord Roads is the only major intersection on Davidson Concord Road between "Western Street" and the Davidson East Connector. It is anticipated that this intersection will eventually require signalization, and may require a turn lane.

To the south of Barnhardt Road, the spacing of Parting Oaks Lane, Davidson Park Drive, and Scanlon Way limit the location of any future driveways or intersections, due to requirements for left turn lanes, vehicle queuing, and lane tapers. One additional, minor access point could be located midway between Barnhardt Road and Parting Oaks Lane. No traffic signals are assumed between Barnhardt Lane and ScanlonWay/East Davison Connector (if even at those locations).

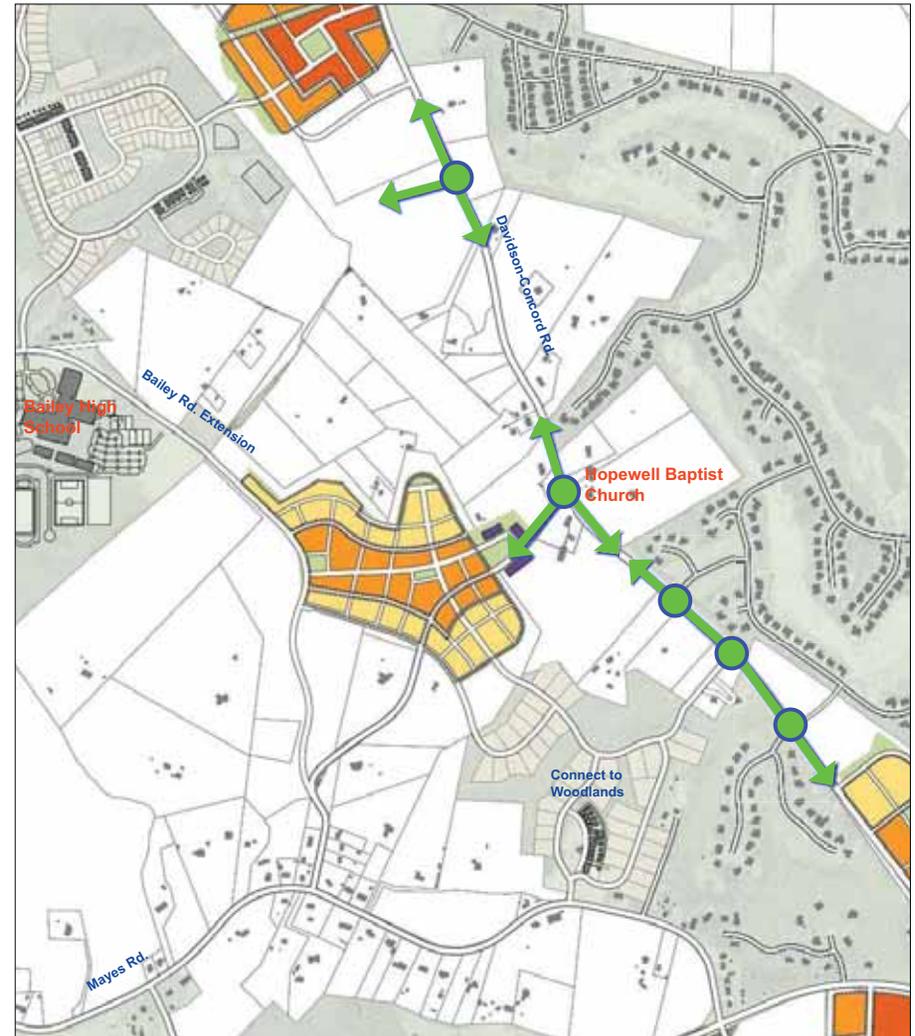
As discussed previously, the forecast growth in traffic requires at the addition of left-turn lanes with adequate vehicle storage lengths at each of these intersections. Because of the spacing of these intersections, the result would essentially be a continuous left-turn lane. The traffic forecasts also support the eventual addition of two through lanes along this segment of Davidson-Concord Road. The addition of a central median, even to a two-lane facility, would be a safer and more attractive solution than the use of a continuous center turn lane. By limiting left turns between designated intersections, a median also helps preserve roadway capacity and maintain access control. This approach could help forestall the need for widening this portion of Davidson-Concord Road to a four-lane divided cross-section.

To the north of Barnhardt Road, the nearest significant intersection along Davidson-Concord Road would be the proposed connection with "WesternStreet," a distance of about 2,500 feet. The segment between these two intersections is, and should remain, the least developed portion of the corridor. As such, it can probably maintain a two-lane cross-section the longest, especially with stringent access management. Right-of way should be reserved, however, for the ultimate addition of two additional through lanes. When the segments of Davidson-Concord Road to its north and south are widened, turn-lanes will be required at each intersection, and the transition to a relatively short two-lane section (and then immediately back again) will be somewhat awkward. The actual length of road that would remain two-lanes would be considerable shorter than 2,500 feet. However, there should be little left-turning traffic along this portion of Davidson-Concord Road, and pedestrian crossing volumes should also be minimal. Therefore, left-turn lanes should not be needed, and it may also be desirable to do without a median, allowing for a narrower cross-section and right-of-way.

No special needs or recommendations are identified for Barnhardt Road, other than the provision of adequate turn lanes at the intersection with Davidson-Concord Road, and reasonable management of access. A northbound left-turn lane on Davidson-Concord Road will eventually be required, and separate turn lanes on Barnhardt Road will probably be needed. Pedestrian and bicycle improvements will also be need to be addressed at this intersection.



- Access Management**
-  Full-movement intersection. May be signalized, STOP-controlled on minor approach, or 4-way STOP-controlled.
 -  600' zone from major intersection should be access-free. Right-in / Right-out only if necessary.
 -  Roadway alignment revised to increase spacing with railroad tracks and NC 115, due to safety and operational/capacity issues.



Appendix II - TRANSPORTATION NETWORK

TRAFFIC NODES - NC 115



All of the development associated with this node is immediately east of NC 115 and the railroad tracks that parallel it. New development is proposed in two main locations, one portion north of Bailey Road, the remainder along (and mostly north of) Mayes Road.

Starting at the north, Bailey Road is significantly affected by the proposed development. A new middle school has already added substantial traffic to Bailey Road, and a planned high school will further exacerbate the situation. Currently, the queue of vehicles waiting to pick-up or drop-off children at the middle school frequently blocks traffic on Bailey Road, and impatient drivers have been observed giving up and turning around in the road or in neighborhood driveways. Combined with bus traffic, congestion is quite severe during certain periods of the day, and the addition of a high school will only increase the duration and intensity of the problem. The proximity of railroad tracks to the intersection at NC 115 creates a particularly challenging set of problems. Because the tracks are actually in the intersection (beyond the STOP bars), they add significantly to the time required to clear the intersection, reducing signal efficiency. In addition, every school bus crossing the tracks must stop and open its doors before continuing across. This adds substantial delay to Bailey Road traffic, especially during the AM and PM periods when traffic is heaviest. The addition of commuter rail service could cause the situation to worsen dramatically, since more frequent peak-period train crossings will add still more delay to Bailey Road traffic, causing persistent queues that could back up on NC 115 as well, and which could require several signal cycles to clear.

Long-range transportation plans include the extension of Bailey Road westward to Westmoreland Road, creating a continuous east-west connection from Davidson-Concord Road to Catawba Avenue. The nearest parallel facilities serving these two high-growth areas are well over a mile to the north and south, and the completion of this connection can be expected to add even more traffic to this portion of Bailey Road, as traffic takes a faster route that avoids the congestion of downtown Davidson, Sam Furr Road, and interchanges with I-77.

Because of the problems just described, it is strongly recommended that Bailey Road be widened to a 5-lane section with a two-way left-turn lane, at least as far east as the planned high school/Bailey Springs Drive. Segments of the road where left turns are either not required or not desired (such as in front of the park property) or could have a median instead of a center turn lane. A median should be seriously considered immediately east of the railroad crossing, to help eliminate the temptation to drive around lowered cross arms (consistent with the NC Rail Division's "Sealed Corridor" philosophy). A median here would also help maintain access control along this portion of Bailey Road, a critical consideration in avoiding traffic tie-ups and accidents triggered by long delays at this intersection/crossing. No access should be permitted in the first 600 feet east of the railroad crossing. Ideally, the first access point should be at the existing park entrance. All access to development in the area just east of the railroad tracks should be via this (or similar) roads.

The presence of the two schools and a large park on Bailey Road means that considerable effort should be taken to address pedestrian and bicycle traffic in along this corridor, especially at intersections. This includes crosswalk designs (markings, signs and signals, pavement treatment, curb bump-outs, etc.), sidewalks, multi-purpose trails, and bike lanes, as appropriate.

To the south, Mayes Road faces similar issues in providing access for proposed development to the north and south. However, traffic volumes will remain lower on Mayes Road than on Bailey Road, since Mayes Road is much shorter, and does not directly serve two schools. Nevertheless, the same provisions for access control apply immediately east of the railroad crossing. Being a lower volume "T" intersection, railroad-related delays and queuing should not be as severe a problem at NC 115 as they are at Bailey Road. However, the vertical alignment of the Mayes Road approach is extremely undesirable from both safety and capacity standpoints, and may require substantial regrading in the future. This places extra emphasis on the need to eliminate/avoid points of access within at least 600 feet of the crossing.

A two-lane cross-section should be adequate for most of the remainder of Mayes Road, especially in areas where an urban/village grid network is provided. The presence of a median would be a design consideration that could be determined on a basis other than traffic safety or capacity, providing access is appropriately managed. Pedestrian oriented features (such as curb bump-outs and distinctive paving treatment at intersection crosswalks) could be considered in the roadway design, due to high volumes of pedestrian traffic oriented towards the rail station to the south.

A proposed collector paralleling NC 115 would connect the park access road on the north with the planned transit area to the south. This important collector provides all access to development between itself and the railroad, as well as serving much of the development to its immediate east. This facility would have similar design characteristics to Mayes Road within the nodal development area.