Gilead Road/US-21
Transportation and Land Use Vision
Small Area Plan

PREPARED FOR
Town of Huntersville,
North Carolina

FUNDED BY
Town of Huntersville,
North Carolina

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Table of Contents

EXECUTIVE SUMMARY 1
PROCESS 5
URBAN DESIGN ANALYSIS 7
FRAMEWORKS 12
URBAN DESIGN PLAN 19
TRANSPORTATION 22
NEXT STEPS AND GUIDING PRINCIPLES 33
Executive Summary

Purpose

The Town of Huntersville has experienced explosive growth since 1990. During this time, the Town’s population has increased by over 1000% from approximately 3,000 to approximately 35,000 people. The growth and the development that accompanied it has forever altered the Town’s bucolic and rural landscape. In 1996, the Town responded to these changes by adopting policies that focus development in those areas where transportation corridors converge. This strategy was designed to preserve the rural landscape, and the heritage of the Town while accommodating growth. In addition, the Town established a vision for a well-connected, pedestrian-friendly, mixed-use community. The Town’s Community Plan, and Zoning and Subdivision Ordinance was overhauled to support this growth pattern. While Huntersville aggressively adapted their policies and codes to encourage a new pattern of development. Much of the county and state-owned infrastructure (i.e., freeway interchanges, state highways and arterial) does not support such a development pattern.

The purpose of this Plan, therefore, is to provide transportation infrastructure and land redevelopment recommendations that are mutually supportive, and in alignment with the community’s vision for its future.

Background

This Plan – The Gilead Road/US-21 Transportation and Land Use Vision Small Area Plan (SAP) – is a companion document to the Sam Furr Road (NC-73)/US-21 Transportation and Land Use Small Area Plan, and is intended to compliment and reinforce this plan’s purpose and recommendations. The study area extends from Huntersville Business Park on the west to just beyond the ___
Huntersville Post Office to the east. This Small Area Plan was developed simultaneously with the SAP for the NC 73 (Sam Purr Road)/US 21 corridor. The two areas, while distinct, share many of the same traffic and land use challenges.

Process
In the Spring of 2005, Urban Design Associates (UDA) was retained by the Town of Huntersville to develop a transportation and land use plan for the Gilead Road/US-21 study area.

UDA was the lead firm responsible for the planning process and the urban design plan. Joining the UDA team as transportation and traffic sub-consultants was Glatting Jackson Kercher Align Lopez Rinehart, Inc. (Glatting Jackson).

A representative and diverse Steering Committee, made up of residents, property owners, merchants, community and civic groups, along with Town, County and State government officials, was appointed by the Town and charged with overseeing and directing the planning process.

The purpose of this Plan is to establish a framework and to offer recommendations for the creation of transportation networks and land use patterns in the Study Area that are mutually supportive and consistent with the Town’s vision.

The planning process had three phases:
- **Phase I:** Understanding Data Collection and Analysis
- **Phase II:** Exploring Design Charrette and Trying Out Design Ideas
- **Phase III:** Deciding Creation of a Final Plan

Each phase was organized around a team visit to Huntersville.

The first visit, in Phase I, involved collection of hard data, such as land use, traffic and transit data, and historic data, as well as the collection of soft data from interviews, focus groups, and an initial public meeting with residents, property owners, business persons, major institutions, government officials, and other stakeholders (April 2005).

The second visit, in Phase II, was a four-day design charrette in Huntersville to explore and test design alternatives. The charrette culminated in a public presentation (June 2005).

The third and fourth visits, in Phase III, included a draft and final presentation of the Plan to the Steering Committee, Town Board and the public.

Vision for Gilead Road Small Area Plan Study Area
The planning process was highly participatory, engaging the citizens and stakeholders from the study area. An overall vision for the Gilead Road Study Area emerged from the process.

According to this vision, the Study Area will mature over time into an appropriate entrance to the historic downtown of Huntersville. The area will transition from a suburban commercial area to an urban mixed-use area with a network of streets and blocks that promote high-quality urban development. New street links, greenways, and bridges will enhance the existing and emerging transportation network. These links will facilitate local traffic movements and serve to relieve the traffic burden on the primary arterial in the study area: Gilead Road and US 21. Residential areas will be stabilized with new greenway connections and new traffic signals that improve access to neighborhoods. Freeway ramps will be modified to distribute traffic, thereby relieving pressure on the US 21/Gilead Road intersection.
The Plan recommends maintaining the town-like qualities of Gilead Road by maintaining front yards and the tree canopy.

ILLUSTRATIVE MASTER PLAN

The Plan contains recommendations that improve connectivity and create mixed-use areas where transportation corridors converge.

SPECIFIC KEY RECOMMENDATIONS

1. Modify the I-77 ramps to include direct access to US-21
2. Maintain Gilead Road as a two lane road, with structures setback from the street in order to preserve the existing tree canopy
3. Redevelop Huntersville Square with new streets and blocks
4. Extend Torrence Greenway under I-77 north of Gilead Road
Specific Key Recommendation

1. Modify the I-77 ramps to include direct access to US-21.
2. Maintain Gilead as a two lane road, with structures setback from the street in order to preserve the existing tree canopy.
3. Redevelop Huntersville Square with new streets and blocks.
4. Extend the Torrence Greenway under I-77 north of Gilead Road.

Implementation

Implementation of the Plan and Vision will occur over time, and will involve a multitude of stakeholders. Upon completion, Huntersville will have completed a major step towards realizing its vision of a mixed-use, vibrant suburban community. As envisioned by the Plan, Gilead Road will serve a dual role as a transportation corridor and a signature gateway into the historic Huntersville downtown. While the market will ultimately determine the order and pace of private property development, the Plan recommends that the necessary public investments be made to facilitate the proposed transportation improvements in the study area.
Phase 1
During Phase 1 of the project, the UDA team met with focus groups to learn first-hand their perceptions of community issues, the strengths and weaknesses of the Study Area, and their visions for the future. The focus groups included residents, major employers, service institutions (churches, schools, social services), building owners and real estate brokers, merchants, Town Staff, the Mayor, and members of the Town Board. A public meeting was held on June 1, 2005 at the Town Hall. All participants at the focus groups and the public meeting were asked the same three questions:

• What are the strengths, or good things, about Gilead Road?
• What are the weaknesses, or bad things, about Gilead Road?
• What is your vision for the future of Gilead Road?

In addition, each participant was asked to place colored dots on a map identifying good places (green dots), bad places (red dots), and places where things can improve (blue dots).

The images and charts on the following pages summarize the responses to the three questions and the dot exercise.

Prior to the design charrette in June 2005, a one-day working session was held with key members of the client group at UDA’s office in Pittsburgh to review the data analysis and drawings produced by UDA and Glatting Jackson.

An important element of that working meeting was a brainstorming exercise to produce a list of urban design and development principles emerging from the analysis work. Over 50 ideas were generated. UDA staff then edited, condensed, and combined them into a set of guiding principles. At the design charrette in June 2005 the list was further refined by UDA and the Steering Committee to the nine key principles listed in the summary box to the left.

Phase 2
The second phase of the planning process included an intense four-day working session in Huntersville in which the design and development principles developed in the first phase were translated into a series of design alternatives. The focus groups and steering committee were re-convened throughout the Charrette and design ideas were presented and refined. On Thursday evening a public meeting was held at the Town Hall where design alternatives were presented. Attendees were invited to comment on what they liked and disliked about the alternatives.

Phase 3
The third phase included developing a preferred plan and an implementation plan which identifies sources and uses of funds and phasing. This report was presented to Town Board and adopted in January, 2006.
STRENGTHS
• Heart of Huntersville - gateway to the downtown
• Rosedale - exemplar of mixed use and highway commercial
• Greenway opportunities
• Mix of uses: retail, healthcare and hospital, and office park

WEAKNESSES
• Third lane of 77 terminates at exit 23 (Gilead Road)
• Congestion and backups
• The Freeway divides the community
• Proximity of US 21 to Interstate 77
• Poor access management
• Signal timing is poor
• Lack of pedestrian safety

VISIONS
• Lower development intensity than along NC 73 (Sam Furr Road)
• Announcement of arrival to downtown
• Improved connectivity
• Improved intersections
• Greenway connections
Urban Design Analysis

After the data gathering from the initial trip to Huntersville in June 2005 was completed, the consultant team prepared an analysis of the physical conditions of the study area, as well as a summary of citizen input on the current strengths and weaknesses of Huntersville and visions for its future. The following section includes the analysis drawings assembled from hard data, in the form of UDA X-Rays®, followed by a summary of the soft data from interviews, focus group meetings, and the public meeting.

The portrait, shown on the following page, describes the existing conditions of the study area. The Study Area is the primary entrance to downtown Huntersville, and is located in the central part of Huntersville at Exit 23 off of I-77. The study area contains a diverse mix of uses including retail, healthcare, and office. The Charlotte Area Transit System (CATS) has a commuter rail service planned along the existing Norfolk Southern rail line, located east of the study area.
Previous Studies

This Plan is firmly rooted in several Plans and efforts that proceed it and builds upon many of the ideas and initiatives that emerged in these previous efforts.

In 1996 the Town of Huntersville adopted aggressive development codes and policies that fundamentally changed the way the Town would develop. The codes embraced a Smart Growth policy of focusing development in specific areas of the Town. These policies follow a vision of a community containing mixed use nodes where transportation corridors converge and preserving the rural character of the town in other areas.

Another important study which laid the groundwork for this plan is the NC 73 Transportation/ Land Use Corridor Plan. This Plan is significant because it is the North Carolina Department of Transportation’s (NCDOT) first study that combined land use and transportation and recognizes the essential link between the two. It is also significant because it adopted a “not one size fits all” approach to corridor design.

In December 2004, the Town completed a new Downtown Master Plan. Several of the recommendations in the Downtown Plan are reinforced in the Gilead Road Small Area Plan.
EXISTING CONDITIONS: The Study Area consists of residential neighborhoods and suburban shopping areas. Rosedale is the only commercial area that is well connected to adjacent neighborhoods.
Connectivity

Continued improvements to the transportation networks and overall connectivity of the study area is critical. Fast growth areas typically ignore issues of connectivity as land gets subdivided. Typically, regional arterial are the only complete network and they provide the only connectivity. Huntersville is an exception to this rule as all development since 1996 is required to connect not just to the arterial but to adjacent developments (existing or future). Furthermore, the Charlotte Mecklenburg Union Planning Organization (MUMPO) has mapped new city wide connections (i.e. thoroughfares) that are to be built as adjacent development comes on line.

Huntersville’s policy of connectivity has served it well. Neighborhoods and commercial centers built after 1996 are connected to each other; for the most part multiple transportation options exist between any two points in the Town. However there is room for improvement; particularly for developments pre–1996.

- Neighborhoods are not connected to daily activities of life.
  While many neighborhoods are connected to each other they are not connected to retail areas, institutions, employment areas or recreation. A subdivision may be adjacent to a retail area, but sometimes there is no direct connection between the two.

- The freeway is a divider.
  With the exception of the primary arterial that cross I-77, there are very few roads that traverse the freeway. As a result, the few existing crossings are heavily burdened not only with interchange traffic but also with local intra-town traffic.

- The pedestrian and greenway network is weak.
  As Huntersville develops, equal attention should be given to these alternate modes of travel. A comprehensive recreational/ greenway and pedestrian network will contribute greatly to the quality of life in the community while reducing the number of overall vehicle trips.

X-Ray Drawings

The consultant team collected and analyzed hard data to better understand the study area, as well as to illustrate to borough residents the myriad assets and natural patterns of the community. A UDA X-Ray drawing isolates a physical element, such as streets, to illustrate patterns and opportunities difficult to perceive when combined with other uses in a single drawing. By studying natural and man-made systems, the underlying patterns, problems and opportunities of a project area are unveiled. Often from these patterns, the beginnings of strategies and solutions emerge.
COMMERCIAL X-RAY
Commercial uses are clustered at high access points such as the freeway interchanges. Commercial development prior to 1996 typifies suburban sprawl, while development post-1996 is built up to the street with parking behind.

RESIDENTIAL X-RAY
The town’s population has grown from 3,000 in 1980 to over 30,000 today. Neighborhoods in Huntersville are either rural, suburban, or new suburban/urban. Neighborhoods have been developed in bands parallel to the freeway with the most diverse and dense neighborhoods located in the two study areas.

FIGURE GROUND X-RAY
Houses in residential neighborhoods reinforce their street patterns. Most commercial buildings do not reinforce the street pattern.

PARKS, OPEN SPACE, AND INSTITUTION X-RAY
Most of Huntersville’s parks and schools are located along the streams and valleys.
Frameworks

The Frameworks are the underlying structure of the Town. The Master Plan recommends the existing street system and park system be developed such that the community is better connected and it functions more effectively and efficiently.

**STREET FRAMEWORKS**

The overall goal of the proposed Street Frameworks is to improve capacity with new linkages and better connectivity. The following recommendations address the capacity needs of the study area calling for the creation of new street network or the connection of existing streets to form an integrated network. The Plan recommends five types of improvements shown on the following page.

1. **Improve Interchange Congestion by Adding New Network**
   The Plan recommends minor modifications to the I-77 ramps in order to add network that distributes traffic. The Plan recommends additional connections to and from the Northbound pair of ramps (on and off ramps) that connect to US-21 and lengthen the ramps at their current locations. The additional links will offer an opportunity for traffic using the congested segment of Gilead Road between the ramps and US-21 to quickly disperse via a number of route choices.

2. **New Well-Connected Local Streets at the Commercial Centers**
   The Plan recommends extending Hillcrest Drive north across Gilead Road, in front of Huntersville Square to connect into Commerce Center Drive.
3. Local Vehicular and Pedestrian Connections
Various short roadway and pedestrian links are recommended between areas that generate local trips. The Plan also recommends connecting roadways that when linked will provide additional capacity to the network. In a number of cases these new links connect to existing roadway stub-outs; in other cases the additional network can be built when the new development comes on line.

4. Widen US-21 for Limited Segments
The Plan recommends widening US-21 to four lanes north and south of Gilead Road for approximately one quarter mile in each direction. A wider road yields large increases in capacity at the critical US-21/Gilead Road Intersection.

5. Bicycle and Recreational Network
In addition to the street connections and improvements listed above, the Plan recommends a bicycle and recreational network that connects neighborhoods to parks and other daily activities of life. Trails may be off-street as in the greenways, bike lanes on-street or signed bike routes.
PROPOSED STREET NETWORK IMPROVEMENTS AND PEDESTRIAN CONNECTIONS

1. Improve interchange congestion by adding new network
2. New local streets connecting the commercial centers
3. Local vehicular and pedestrian connections between commercial areas and neighborhoods
4. Widen US-21 for limited segments, Improve Gilead Road
5. Bicycle and recreational network
The Plan recommends widening Statesville Road to four lanes between Compass Street and Dallas Drive.

TOP Proposed 4 lane section between Dallas Drive and Compass Street
BOTTOM Proposed 2 lane parkway section for US-21 north of Compass Street and one block south of Dallas Drive
The Plan recommends maintaining the existing character of Gilead Road with pedestrian and landscape enhancements.

Proposed street improvements and widening in existing ROW

Concept Plan for Gilead Road / US-21 intersection (with network improvement)
PARK AND OPEN SPACE FRAMEWORK

The Master Plan recommends several additions and improvements to the current inventory of parks and open spaces. Developing a well-integrated and connected park and open space system in Huntersville will be increasingly important to the overall quality of life in the Town. Such a system will provide recreational opportunities, stormwater management opportunities, the creation of unique development addresses and transportation alternatives to surface roadways.

The underlying structure to the Open Space Framework are the Town’s many streams and creeks. Protection of these resources is critical because they are a primary source for Mountain Island Lake, the Town’s public water supply. The Plan recommends developing these streambeds and low lying lands into greenways with a low-impact trail system that connects the neighborhoods.

The Plan also recommends augmenting the greenway system with an on-street bike network containing both striped bike lanes as well as simply marked bike routes. These routes are particularly important where access to greenways is limited.

KEY OPEN SPACE AND PARKS FRAMEWORK RECOMMENDATIONS

1. Extension of Greenway System
2. Multiple access points and trail heads to greenway
3. On-street bike routes and lanes
4. Sidewalks on all new streets
Urban Design Plan

The Town of Huntersville aspires to be a model mixed-use suburban community. It is not the town’s intention to be a bedroom community for Charlotte nor to remain exclusively a rural community. Rather, the Town and its residents seek to develop a community containing a variety of stable neighborhoods that are connected to dense mixed-use centers of commerce, employment, retail, and entertainment.

The recommendations contained in this section help realize this vision for the Gilead Road Study Area. The Plan includes recommendations for how the roadway system and the redevelopment patterns can work together to create several dense mixed-use nodes of activities.
Redevelopment Opportunities

Most properties on Gilead Road were developed pre-1996 and are not in compliance with the existing land development code. In order to stimulate redevelopment of these properties in compliance with current codes and standards, the Plan recommends extending several public streets through existing commercial properties. These street extensions will create additional frontage for urban redevelopment and more efficient rear parking areas. Specifically, Hillcrest Drive can extend north across Gilead Road, in front of Huntersville Square and connect to Commerce Center Drive.

Additional development blocks would be created by the new streets connecting into the proposed I-77 Freeway ramps. The new streets, perpendicular to Statesville Road, will align with existing driveways or property lines in order to form new development blocks. This will serve to restore the type of mixed-use development called for in the Town’s land development codes.
Torrence Greenway Housing

The primary development opportunity west of the freeway exists between Ranson Road and Rosedale. There remains significant vacant land along the Torrence Greenway that can be developed as an extension of the existing neighborhoods. The Plan recommends extending a parkway road south from Ranson Road. New housing along this road should face onto the new greenway creating a safe and usable recreational greenway.

Examples of housing facing on a public greenway
Gilead Road Redevelopment

Gilead Road is the entrance to Downtown Huntersville. The current character of the road is seen as highly desirable, and should be preserved, while still accommodating change and redevelopment. The Plan recommends maintaining the character of the road by maintaining the gracious front yards, and substantial tree canopy along both sides of the road. Redevelopment should follow the current patterns of buildings set back from the road creating generous front yards. New buildings can contain a variety of uses, however their placement on the lot should reflect current patterns.
Transportation

IN THE LAST DECADE, rapid development around the Charlotte region has transformed the areas around the Gilead Road (Exit 23) and Sam Furr Road (Exit 25) interchanges from suburban fringes to important commerce centers of the town of Huntersville. This transformation has triggered a need for change in infrastructure form, particularly roadways, to accommodate a more urban density and mixed-use land use pattern. A roadway pattern that was initially laid out to support a few suburban land use parcels and convey traffic as quickly as possible to rural arterial roadways is now reaching its capacity limits. Today, the interchanges and their surrounding roadway networks are expected to support regular regional commuter traffic as well as traffic attracted by Huntersville’s two thriving retail centers, new residential neighborhoods, offices and other civic uses.

The major issues, transportation strategies, traffic analysis, and conclusion, presented in this section address both the Sam Furr Road and Gilead Road study areas. While this section addresses both these study areas in general terms, specific applications will vary for each.
The Major Issues

Triple Convergence of Traffic

As the main gateways from Huntersville to the rest of the Charlotte region, a number of traffic corridors converge at the Sam Furr Road and Gilead Road interchanges. The roadways passing through both interchange areas carry three converging types of traffic:

1. Regular interchanging traffic between the Interstate and the arterial roadways (Sam Furr Road and Gilead Road)
2. Regional east-west through traffic (with neither origin nor destination at the interchanges) that does not have options to Gilead or Sam Furr Roads
3. Commerce-related local traffic (i.e., residential to shopping) with destinations at the interchange areas.

These three streams of traffic strain the segments of Gilead and Sam Furr Roads between the I-77 ramps and US-21. In both cases, these short roadway segments serve eastbound and westbound traffic, as well as connecting south and northbound interstate traffic.

Triple convergence of traffic at Exit 25 (top) and Exit 23 (bottom)
Network Limitations

Adding to the problem of the converging traffic around Gilead Road and Sam Furr Road is the inherent network limitations of an interchange area. I-77 itself restricts east-west connections across town to a few limited arterials, Gilead Road and Sam Furr Road being two of the most important ones.

Farther east and west from the interchanges, residential subdivisions typical of suburban developments, have developed internal street patterns that are characterized by poor connectivity within and outside these subdivisions. In such cases, all traffic, even local (i.e. home to shopping) trips are forced onto busy arterials. In the Sam Furr area, the Northcross Shopping Center, the North Pointe Executive Park and the residential neighborhoods of Cambridge Grove and Hampton Ridge are all disconnected from the regional roadway system except through a few access points to US-21 and Sam Furr Road. A similar condition exists along Gilead Road, although to a lesser degree.

Access limitations along the interstate ramps and adjacent roadways further restrict the few available route choices available to motorists. In some cases, driveway restrictions along both US-21 and Sam Furr Road encourage more traffic to go through the intersections of US-21/Sam Furr and US-21/Gilead, causing increased congestion.

Poor Walkability

Both the roadway and land use arrangement in the study areas do not encourage walking and bicycling, therefore forcing all trips including potential short walking and bicycling trips, to become vehicle trips. Roads generally lack sidewalks, have few safe crossings for pedestrians, lack bicycle lanes and have large pavement corner radii at the two most important intersections. Developments have all placed parking (not their buildings) adjacent to streets, thereby degrading the roadways’ quality as pedestrian routes. The inherent large blocks (super blocks) also make potential walking and bicycling to and from nearby destinations difficult.
The transportation strategy for NC-73 (Sam Furr Road) and Gilead Road in Huntersville is based on the following major initiatives:

**IMPROVE CAPACITY THROUGH NEW LINKS AND BETTER CONNECTIVITY**

The capacity needs of both the Sam Furr and Gilead corridors should be accommodated by building or connecting more supporting network throughout these roads’ service corridors. Add the new network in four categories.

1. **Major East/West Arterial Links Across I-77**

   Two new links of arterial road, both of them bridging I-77, will accommodate future (2030) travel growth in the region, without widening NC-73 beyond four lanes and Gilead Road beyond its existing two lanes.

   One new link connects Bailey Drive across I-77 to the extension of Northcross Drive in the North Pointe Executive Park. This allows for an additional link between Westmoreland Road in Cornelius and Sam Furr Road, providing an alternate route for traffic to and from the North Pointe Business Park and Birkdale Village and the residential neighborhoods on the east side of I-77.

   The other new network link is located south of the Sam Furr interchange, halfway between Sam Furr Road and Stumptown Road, and connects Northdowns Lane and Northcross Drive. This new link provides an alternative for local trips between the residential areas on the east side of I-77 and the Birkdale Subdivision and Golf Club and other commercial uses along the south side of NC-73.
2. Improve Interchange Congestion by Adding New Network

In both interchange areas, the Plan recommends some minor modifications of the I-77 ramps at both Sam Furr and Gilead Roads, that provide more routes for traffic exiting or entering I-77. Specifically the Plan is to provide additional connections to and from the northbound pair of ramp (on and off ramps) that connect to US-21 and to lengthen the ramps north and south of their current location. The additional links offer an opportunity for traffic using the congested segment of NC-73 and Gilead Road between the interchange ramps and US-21 to quickly disperse via a number of route choices.

3. New, well-connected local streets both at the Sam Furr/US-21 and the Gilead Road/US-21 commercial centers

The new network at both interchange areas extends to the east past US-21. Together with the new east-west Interstate ramps, a network of roads conveys the traffic and disperses them through the numerous route choices within the study area.

At the Sam Furr interchange area, two new north-south links are introduced in the Northcross Shopping Center by converting portions of existing private drive aisles to public streets. The new streets intersect with Sam Furr Road, and connect to existing streets (Holly Point Drive and Rich Hatchett Road) at two new signalized intersections. The new intersections facilitate regular “chopping” of queues along Sam Furr Road offering regular opportunities for otherwise frustrated drivers waiting for a gap to turn to and from developments along the congested Sam Furr Road. Instead of relying on the congested Sam Furr/US-21 intersection to handle all turning vehicles to and from US-21 and Sam Furr Road, a coordinated signal system of the three intersections where clearance times are shared, would provide more efficient traffic operations along Sam Furr Road. Similarly, at the Gilead interchange area, the drive aisle in front of Bay Shore Plaza can be converted to a public street and extended to connect Aralbana Lane to Hillcrest Drive. This new street will offer an alternative route choice for vehicles coming from the neighborhoods on the south side of Gilead Road and the retail uses along Gilead Road without going on US-21.

At both interchange locations, the new network should form the “bone structure” for redeveloping the existing retail uses into village centers. With a dense framework of narrow, two-lane streets, both areas offer the opportunity to create village center blocks that support pedestrian-friendly environments. Together with the new roads (explained above), additional minor links that function as drive aisles should be laid out as public streets (with adequate streetscape and sidewalks) to form the framework for shopping center redevelopment. Generally, a desirable pedestrian environment that allows for adequate traffic movement will have functional block perimeters of between 1,500 to 2,100 feet. This guideline can yield walkable block sizes of between 250 feet to 350 feet by 500 feet to 700 feet. With narrower streets and more walkable blocks, the Town should continue encouraging the development of buildings that address the street and have active ground floor uses.

4. Local vehicular and pedestrian connections

Various short roadway links are recommended between areas that generate local trips (i.e. between residential and retail areas, between residential and civic uses). It is also critical to connect roadway pieces that when linked together provide additional capacity to the regional network. In a number of cases, these new links connect to existing roadway stub-outs in the various neighborhoods. In other cases, the additional network can be built when new development comes on board.

Making connections to existing streets can create concerns (cut-through traffic, safety, congestion) with existing residents. New connections and streets should therefore be designed collaboratively with the neighborhoods and integrate the wide variety of traffic calming and street alignment options available to address neighborhood concerns. In any case, all new local network links should be kept at a neighborhood scale (narrow, low-speed, two-lane roads).
WIDEN US-21 FOR LIMITED SEGMENTS

In addition to the new east-west links connecting the I-77 ramps to US-21, part of the solution for the interchange areas include the widening of US-21 to four lanes in locations essential to the network. Near the Gilead Interchange area, the Plan recommends widening US-21 to four lanes between the new off-ramp to Arahova Lane. At the Sam Furr Interchange area, the Plan recommends widening US-21 to four lanes between Northcross Center Court and Rich Hatchett Road. This limited widening yields a large increase in capacity at the two critical intersections (US-21/Sam Furr and US-21/Gilead). Further, the widening helps accommodate the increase in turning movements to and from US-21 as a result of the interchange modifications (described above) and the expected increase in commercial traffic.

The Plan recommends limiting the size of Sam Furr Road to four lanes, and Gilead Road to two lanes. East of NC-115, Sam Furr Road should remain two-lanes as it goes through a more rural setting. Similarly, south of the new off ramp, between Arahova Lane and Rich Hatchett Road and north of Northcross Center Drive, US-21 should remain two lanes.

Finally, the Plan recommends through street rebuilding measures and development regulations, appropriate streetscape and cross sections are developed for Sam Furr Road and US-21 as it transitions from “town” to “country.”
Traffic Analysis and Conclusions

The Proposed Plan Improves Traffic Flow at Interchange Areas

The traffic circulation changes described on the previous page will improve traffic flow at both the I-77/Sam Furr and I-77/Gilead Road interchanges.

The most often cited measure of traffic performance, the intersection level of service (LOS), is defined by the Highway Capacity Manual. According to the Highway Capacity Manual (HCM 2000, Transportation Research Board), LOS is a measure of the average delay experienced by each vehicle passing through an intersection. For this study, the LOS measured was a composite average value for all vehicles using each intersection. LOS A and B represent insignificant delay and LOS C represents generally acceptable delays. LOS D and E represent an increasing amount of delay and an increasing number of vehicles stopped at an intersection. LOS F means that the intersection is operating with excessive delays.

The following figures summarize the levels of service and the associated vehicular delay for the key intersections at both of the interchange areas.

Comparison of the figures show the magnitude of improvement. The I-77/Sam Furr Ramp terminal improves from peak hour Level of Service (LOS) “F,” with 167 seconds of delay per vehicle to LOS “B,” with 19 seconds of delay. The Sam Furr/US-21 intersection improves from LOS F (266 seconds of delay) to LOS “D” (37 seconds).

The improvement in traffic level of service is likely to be due to two features of the proposed design: 1 The modifications to the I-77 ramps, permitting some of the traffic exiting and entering I-77 to bypass the existing ramp termination at Sam Furr Road and consequently to avoid the “dog leg” movement on the short segment of
Sam Furr Road between the end of the ramp and US-21; the four-laning of US-21 through the US-21/Sam Furr intersection, thereby significantly increasing its vehicular capacity.

Both of these improvements are based on new network and redistributing the traffic volumes.

A similar level of improvement is likely to be provided for the Gilead/I-77 interchange area for the same reasons noted above for the Sam Furr/I-77 interchange.

**Proposed Changes Will Increase Vehicular Capacity**

The Critical Lane Volume (CLV), a summation of all the conflicting traffic movements at an intersection, is a reliable and easily understood measure of the extent to which vehicular volumes consume the capacity of an intersection. The CLV analysis for the key intersections in the two interchange areas (Figures C and D) show that the proposed changes will add to the available spare capacity at all four of the key intersections (i.e., the I-77 off ramps at Sam Furr Road and at Gilead Road and the US-21/Sam Furr and US-21/Gilead intersections.

**Proposed Network Performs Well as a System**

The two measures discussed above - intersection capacity analysis (LOS) and critical lane volume analysis (CLV) - measure the performance of individual intersections, but do not address the interactions between them. Possible interactions of particular concern are backups that could possibly extend from one intersection to the next.

A microsimulation program (the SYNCHRO software) was used to model the entire system of intersections and connecting links at the Sam Furr/I-77 interchange area, and simulated the travel of every vehicle through the system during the a.m. peak hour of traffic. The microsimulation captured all of the interactions between individual intersections, including the possibility of backups ("spillbacks") extending from one intersection to the next. Microsimulation is particularly useful in gauging the impacts of adding closely-spaced intersections along arterial highways, a situation applicable to both the US-21/Sam Furr and the US-21/Gilead areas.

The SYNCHRO microsimulation model demonstrated conclusively that, under the current traffic volumes for the AM Peak Hour (7 to 8 a.m.) the proposed street configuration at the Sam Furr interchange area, with its added streets, intersections and traffic signals, will operate efficiently as a system, with no risk of backups impairing the overall operation. During the entire peak hour modeled, there were no instances of a queue extending from one intersection to the next upstream intersection.

Furthermore, with the addition of network improvements proposed around the Sam Furr interchange, it is expected that this interchange area will continue to operate efficiently in the design year 2030. It is also reasonable to conclude that the proposed network configuration will produce similarly beneficial results during other time periods, as the a.m. peak volumes represent the current worst-case traffic volumes for the Sam Furr interchange.

Typically, the queues on the critical road (Sam Furr Road) extended only to mid-block and occasionally to three-quarters of the block. This pattern of queue lengths well short of the block length is particularly significant for the block of Sam Furr Road between US-

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**LEVEL OF SERVICE (LOS):** The following graphic summarizes the different LOS measures.
The short length of this proposed block and the resulting short traffic signal spacing raised concerns that westbound traffic would back up from the Sam Furr/US-21 intersection, thereby preventing traffic from entering Sam Furr Road from Holly Point Drive. The microsimulation shows conclusively that this concern is unfounded.

The short block and resulting short signalized spacing in the proposed plan simply “chops” the long queues now seen at the Sam Furr/US-21 intersection into several smaller queues, scattered among the entire series of intersections along Sam Furr Road. As a result of this fragmentation of the queue, there are no long queues blocking intersections, and the proposed network of small block and closely spaced intersections can function smoothly.

While no separate microsimulation modeling was done for the Gilead Road interchange area, we believe that the Sam Furr modeling is illustrative of the benefits of additional network for this area, given the similarity between the two interchange areas and that traffic volumes for the Sam Furr interchange area are much higher than those present at the Gilead area.

The only problems associated with queues revealed by the traffic simulation run (see graphic) were two instances of queues in left turn auxiliary lanes at the US-21/Sam Furr intersection (one in the southbound left turn and another in the west bound left turn) extending into the through lanes. In the first instance, only single a vehicle “overflowed” the left turn lane, causing only a 3.6 seconds of delay to through traffic. In the second instance, two vehicles overflowed the left turn lane, resulting on a delay of 7.2 seconds to through traffic.

**With Proposed Network Sam Furr Road Can Remain a Four-Lane Road**

With the existing road system, and the traffic growth projected for the year 2030, Sam Furr Road will require between six and eight through lanes in between the I-77 and US-21 link and six lanes between US-21 and NC-115. With the auxiliary lanes (left turn, possibly dual left turns and right turn deceleration) likely to be needed, the cross section of Sam Furr Road at intersections is likely to be 8-10 lanes, a width of pavement irreconcilably at odds with the intended character of the area.

However, with a proper network of supporting roads, Sam Furr Road through and east of the I-77 interchange area can remain a four-lane road, even with the assumptions of 25-year traffic growth. The ability to maintain a four-lane section stems from the three major network improvements incorporated into this plan and described above:

1. The two proposed new arterial crossings of I-77 (Bailey Road and Northdowns) will remove some 9,000-11,200 daily vehicles from Sam Furr Road in the year 2030. These two new crossings will serve important origin/destination pairs within the Huntersville/Cornelius communities, such as Cornelius-Birkdale, northeast Huntersville-Birkdale, southeast Huntersville-Birkdale, and northwest Huntersville-Northcross.
The proposed new local street connections will remove some 3,700 daily vehicles from Sam Furr between I-77 and US-21, and 3,000 daily vehicles from Sam Furr Road between US-21 and NC 115. Most of this reduction is attributable to short trips between origins/destinations adjacent or nearly adjacent to Sam Furr Road; for example, between Northcross shopping center and its immediately adjacent neighbors; between residences south of Sam Furr Road and shopping and employment destinations north of it.

The proposed modifications to the I-77 ramps will remove 3,800 daily vehicles from Sam Furr Road between the I-77 ramp and US-21. Much of this reduction is due to the elimination of “dog-leg” movements between the I-77 off ramp and US-21 northbound. These volume reductions are found in Table 1 on page 32 of this report.

The combined impact of these traffic reductions due to the proposed network will allow Sam Furr Road to carry year 2030 traffic, at acceptable levels of service, while maintaining a four-lane cross section. Maintaining this four-lane road width is critical for the efficient functioning of the NC-73 and US-21 arterials for both vehicular and pedestrian traffic.

A four lane road width is also critical for accommodating pedestrian crossings at minor intersections (such as the Sam Furr/Holly Point intersection proposed for signalization). With wide cross sections on Sam Furr Road (six or more lanes), the pedestrian crossing time greatly exceeds the needed cross street green time at signals, resulting in both reduced traffic capacity and minimal pedestrian crossing time.

With a four-lane Sam Furr Road, simple two-phase signal operation can be maintained at minor intersections being proposed for signalization. Two-phase control (no protected left-turn phase) maximizes traffic capacity, permits more generous pedestrian crossing times, and is a retail friendly measure.

Important urban design features (framing the street with street trees, enclosing the street with fronting buildings, attractive usable sidewalks), possible with a four-lane street, become unachievable with a six-lane road and its inevitable auxiliary lanes.
## TABLE 1

**YEAR 2030 DAILY TRIPS, SAM FURR ROAD**

<table>
<thead>
<tr>
<th></th>
<th>I-77 TO US 21</th>
<th>US 21 TO NC 115</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROJECTED VOLUME, YEAR 2030 (ADT)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model(^1)</td>
<td>32,600</td>
<td>33,200</td>
</tr>
<tr>
<td>Adjusted(^2)</td>
<td>34,600</td>
<td>40,500</td>
</tr>
<tr>
<td><strong>THROUGH LANES NEEDED ON SAM FURR ROAD (EXISTING NETWORK)</strong></td>
<td>6 lanes</td>
<td>6 lanes</td>
</tr>
<tr>
<td><strong>REDUCTIONS IN VOLUME, YEAR 2030, DUE TO PROPOSED NETWORK</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two New I-77 Crossings(^4)</td>
<td>11,200</td>
<td>9,000</td>
</tr>
<tr>
<td>Local Connections(^5)</td>
<td>3,700</td>
<td>3,000</td>
</tr>
<tr>
<td>I-77 Interchange Modifications(^6)</td>
<td>3,800</td>
<td>nil</td>
</tr>
<tr>
<td>Total Reduction in Traffic on Sam Furr Road</td>
<td>18,700</td>
<td>12,000</td>
</tr>
<tr>
<td><strong>YEAR 2030 VOLUME, ADJUSTED FOR PROPOSED NETWORK</strong></td>
<td>15,900</td>
<td>28,500</td>
</tr>
<tr>
<td><strong>THROUGH LANES NEEDED ON SAM FURR ROAD (PROPOSED NETWORK)</strong></td>
<td>4 lanes</td>
<td>4 lanes</td>
</tr>
</tbody>
</table>

\(^1\) CDOT Year 2030 Projections  
\(^2\) Adjustment by Huntersville staff, 6/30/05, to calibrate base year (2000) model results to ground counts. Average of unadjusted and fully adjusted projections.  
\(^3\) Based on 32,400 ADT capacity for 4-lane road and 48,600 for 6-lane road. Capacities based on Level of Service “E,” saturation flow of 1,700 vehicles per lane per hour, 42% green time for major flow, 55/45% east/west directional split, and “K” factor of .08. “K” factor represents the proportion of the average annual daily traffic (AADT) expected to occur in the design hour. The “K” factor is also known as the design hour factor.  
\(^4\) Based on daily trip generation of 30,000 trips at Birkdale Village’s retail area, 20,000 trips for Birkdale Village’s residential area, 4,400 for North Pointe Executive Park, and 10,000 for Northcross Shopping Center. For these trip generators, fractions ranging from 5 to 20 percent (based on location) would have options to the use of Sam Furr Road, with reductions in travel time, if the new bridges across I-77 were in place. Assuming that 69-75 percent of trips with these new options (depending on origin/destination pair) would choose the shortest path, a total of 11,200 trips would be diverted from Sam Furr Road to the west of I-77. To the east, the estimate is scaled down by 20 percent, yielding 9,000 trips.  
\(^5\) Based on total travel generated by 5 clusters of trip generators along Sam Furr Road. Of the total travel generated by these clusters, portions ranging from 6 to 10 percent were estimated to benefit from improved travel time due to local network connections. Local network connections were assumed to be used by 50-75 percent of those motorists who would benefit from their use. A total of 3,700 trips diverted to local network use were computed, by this methodology, for areas to the west of I-77. To the east of I-77, 80 percent of this amount, or 3,000 daily trips, was assumed.  
\(^6\) From Capacity Analysis, Gilead and Sam Furr interchanges.  
\(^7\) “Adjusted” projected volume year 2030 (line 2) less “total reduction in traffic on Sam Furr Road” (line 7).

**NOTE ON FUTURE YEAR TRAFFIC PROJECTIONS**
Currently available traffic projections (Average Daily Traffic or ADT) for the year 2030 of 32,600 vehicles west of I-77 and 33,200 vehicles to the east of I-77 are subject to a wide range of interpretation. The “base year” (year 2000) traffic predicted by the model underestimates the existing travel. If a reasonable “correction factor,” bringing base year estimates into conformity with actual counts, is applied to the year 2030 forecasts, the year 2030 ADT increases to 34,600 to the west of I-77 and 40,500 to the east.

The uncertainty associated with travel demand forecasts underscores again the importance of Huntersville planning roads on the basis of vision for the Town, rather than on traffic forecasts. In the face of uncertain traffic forecasts, the best approach to accommodate future travel demand in the study areas is the development of a full and well connected road network, rather than widening a single arterial road (i.e., Sam Furr Road) to 7-lane or 9-lane cross sections, which is incompatible with the Town’s long term transportation vision.
Implementation and Preliminary Cost Estimates

The proposed transportation solutions for Sam Farr and Gilead interchanges can be "packaged" into different improvement projects. The following lists rank these project packages based on the potential benefits they would provide to the study areas (1 being the most beneficial). The list provides a preliminary prioritization of projects as well as an understanding of the project's relative cost impacts.

### Gilead Interchange Area Improvements

<table>
<thead>
<tr>
<th>Key</th>
<th>Project</th>
<th>Construction Cost*</th>
<th>ROW Cost</th>
<th>Total Cost</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New ramps</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>New ramps to Gilead Road</td>
<td>2,800,000</td>
<td>2,700,000</td>
<td>5,500,000</td>
<td>Short to Medium Term</td>
</tr>
<tr>
<td></td>
<td>New ramps to US 21</td>
<td>1,800,000</td>
<td>900,000</td>
<td>2,700,000</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>US 21 widening</td>
<td>3,200,000</td>
<td>0</td>
<td>3,200,000</td>
<td>Short to Medium Term</td>
</tr>
<tr>
<td>3</td>
<td>Network around retail center</td>
<td>4,500,000</td>
<td>2,600,000</td>
<td>7,100,000</td>
<td>Short to Medium Term</td>
</tr>
<tr>
<td>4</td>
<td>Neighborhood connections</td>
<td>6,900,000</td>
<td>1,000,000</td>
<td>8,900,000</td>
<td>Short to Long Term</td>
</tr>
</tbody>
</table>

*Figures exclude costs for intersections, traffic signals, design and construction inspection. Figures include estimated landscaping costs.

Construction and ROW Cost: 25,200,000
Preliminary Engineering and Construction Engineering Inspection: 8,020,000
Estimated Project Cost: 34,020,000
Next Steps and Guiding Principles

The small area plan presents an integrated long-term transportation and land use vision for the Gilead Road/US-21 study area. This vision is built upon a framework of well-connected, pedestrian friendly and publicly inviting streets and open space, which in turn will attract high quality mixed-use development. As the main entrance into downtown Huntersville, Gilead Road is both a key transportation corridor, as well as a gateway to and from Huntersville. US 21 is an important north south thoroughfare, providing a local alternative to travel on I-77, and a growing commercial corridor. As with the Sam Furz/US 21 Small Area Plan, the overarching goal of this plan is to integrate land use and transportation planning in a manner which will guide the community in finding a balance between regional transportation needs and development of the study area, while preserving and enhancing the Town’s heritage.

Like any plan, successful implementation will require the commitment and concerted efforts of Town leaders, landowners, residents, County and State government officials, and other interested stakeholders. To achieve the plan’s vision, the following next steps and guiding principles are recommended.

PLANNING

1. Adopt the Plan
The Town Board should adopt this small area Plan as an official planning document, thereby signaling its commitment to the vision and specific recommendations set forth in the Plan. Adoption of this Plan will also serve to provide clear guidance to current and future landowners and developers regarding the manner of development envisioned for this area.

2. Rely on Plan to guide future development
The plan, as a companion to the Subdivision and Zoning Ordinances, should serve as a guiding document for future decisions related to transportation and land use in the study area.

3. Modify existing regulations as needed for consistency with the Plan
Modifications to existing land use regulations should be made on an as needed basis, consistent with the content and recommendations of the plan.
LAND USE

1. Allow rezoning consistent with plan vision
Requests to rezone property should be consistent with the transportation and land use vision and recommendations contained in this plan.

2. Focus development at the Gilead Road/US 21 intersection
To the greatest extend possible, development should be concentrated at the intersection of Gilead Road/US 21 and along the network of streets proposed by this plan.

3. Encourage re-development of the existing retail centers at the intersection of Gilead Road and US 21
The plan calls for the redevelopment of two (2) older retail centers east of US 21, within the framework of a new block structure, with buildings fronting on public streets, with parking situated to the rear and side. This type of development pattern will bring commercial land use on the east side of US 21 into conformity with the Town’s vision as reflected in those centers located along Gilead Road to the west of US 21 and I-77 (e.g. Rosedale) and provide an important connection between the two areas.

TRANSPORTATION

1. Pursue recommended network improvements
The development of new street network (including the proposed new access points from the I-77 off ramps) in the study area is a central component needed to insure the transition of this area to a pedestrian-friendly commercial center with a variety of travel options.

2. Package transportation system improvements for inclusion in the State Transportation Improvement Program (TIP)
The network improvements recommended as part of this plan should be packaged for consideration by the NCDOT as a multi-year TIP project. The implementation of network improvements/ additions over time will allow for the road system to expand in a proportionate manner to allow for future growth and traffic associated with that growth.

3. Investigate alternative non-public revenue sources to fund network improvements
The Town should investigate various alternatives to the financing of transportation improvements solely through public funding. The use of both public and non-public funding would permit the apportionment of capital costs for transportation network improvements, based upon a formula that would assign a share of these costs to those who would benefit directly from these improvements. Alternative sources of transportation system funding would benefit the public in several respects. Road network improvements could be accelerated through the use of private funds, resulting in greater connectivity and increase road capacity. Non-public funding would also reduce the tax burden required to build these network improvements, freeing up public resources for other needs. From a fairness perspective, the use of non-public funding would permit the allocation of a portion of transportation improvement costs to those who would benefit most from these improvements, rather than total reliance upon public funding.

4. Require new street network to conform to plan recommendations
As development occurs within the study area, require the construction and dedication of new public streets in conformance with the transportation framework presented in this plan.

5. Promote Expansion of Bicycle and Pedestrian Routes
The Plan calls for the expansion in the number of bicycle paths and lanes, as well as sidewalk connections between residential and commercial areas within the study area. In tandem with the improved street network and additional greenways, bike and Pedestrian connections are vital components for a truly integrated transportation system, which provides Town residents with a variety of options for a movement between residential areas of business, work and recreation.

OPEN SPACE

1. Extend Torrance Creek Tributary Greenway
The planned extension of the Torrance Creek Tributary #2 from Cedarfields to Rosedale and through to NC 115, should be implemented by the Town. This greenway will provide and important connection between residential, commercial and civic uses located west and east of I-77.

2. Connecting existing greenways and open space
In coordination with the County and under the guidance of the Town Greenway Advisory Committee, the Town should seek to add links to the existing greenway/trails and open space system, with the goal of providing a network of open space that is both comprehensive and an integral part of the Town’s non-vehicular transportation network.