

29H250

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## US-29-Hydraulic-250 Bypass Intersections Study

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This 29H250 Report has been written to detail the findings of the recently completed staff exercise. It may be reviewed or downloaded from our website, and copies are available for review in local libraries and at the TJPDC office. Comments and questions can be e-mailed, mailed, faxed, or called in to the numbers below.

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Figure 1 Diagram of Study Area

## Executive Summary

The US-29-Hydraulic-250 Bypass (29H250) study was conducted by a staff team from the Thomas Jefferson Planning District Commission & Charlottesville-Albemarle Metropolitan Planning Organization, Virginia Department of Transportation, City of Charlottesville, and County of Albemarle. It was initiated by Virginia DOT Commissioner Philip Shucet in response to a request from the MPO, County, and City. The study recognizes that there have been several previous efforts that have looked at the US-29 corridor, most of which were reviewed for the current exercise.

Public input from the United Jefferson Area Mobility Plan (UnJAM 2025) workshops revealed the study area as having increasing traffic problems and significant potential for improvements. During a hands-on UnJAM workshop, City and County policymakers concluded that the US-29 and Hydraulic Road intersection required immediate attention. Policymakers were also concerned about impacts from potential major redevelopment proposals under consideration in both City and County.

The jointly-defined goal is to develop specific intersection design concepts that address vehicular, pedestrian, bicycle, and transit movement for improved mobility, safety, and development opportunities within the US-29, Hydraulic, and 250-Bypass area, while protecting existing tax base, businesses, neighborhoods, and employment.

An active public involvement program solicited direct input to identify concerns and potential solutions. A series of focus groups included various special interests. Targeted publicity encouraged attendance at two hands-on public workshops. After a two-month investigation period, the designs were completed during a nine-day intensive workshop by the 29H250 Staff Technical Team, with assistance from key consultants in alternative street design, urban design, and economic analysis.

Several assumptions were made about pending traffic projects. All traffic analyses assumed that the Hillsdale Drive Extension and Meadow Creek Parkway Phase I would be built. Since it was assumed that improvements would have to be made to the study area whether or not the Western Bypass is built, all improvements are being modeled both with and without the Western Bypass.

The major traffic improvements recommendations include a grade-separated intersection at 29 and Hydraulic Road, constructed with roundabouts at the end of the off-ramps for optimum traffic control. Signalized intersections could also work, although with less capacity, pedestrian access and safety. A new Hydraulic Road alignment is proposed just north of existing Hydraulic to allow full traffic movements during construction.

Proposed improvements on 29 include the widening of 29 to four lanes just south of Hydraulic, and a potential underpass beneath 29 connecting Sperry and Seminole Square. Recommendations for the Angus Road intersection of 29, which was found to be a direct cause of traffic backup on 29 through Hydraulic, include the removal of the traffic light, the closure of the median, the addition of a U-turn opening just south of Angus, and an

underpass (or overpass) crossing 29 at Angus connecting to Hillsdale Drive Extended via Holiday Drive.

Potential 250 Bypass improvements include the removal of the signal at the north-bound off-ramp at 29, adding a lane to the southbound on-ramp, moving the Barracks Road exit westward using a cloverleaf off-ramp, and closing the existing Barracks Road on-ramp. In the short term, the Rugby Road through movement to Hydraulic could be eliminated allowing more green signal time to through movements on the 250 Bypass. Longer-term improvements would include a grade-separated intersection at the 250 Bypass and Hydraulic.

A modification to the existing 29/250 Bypass cloverleaf design was also proposed, to include a collector-distributor road to accommodate the exiting and entering traffic. Further analysis of these options is recommended in the next phase of this project.

These proposals take into consideration mobility needs, land use, and economic development. Redevelopment in this area must go hand in hand with proposed traffic improvements. Mixed-use development can be implemented by creating blocks within existing development and linking neighboring parcels with streets to complete the gaps in the grid, allowing for either big box or neighborhood-scaled development.

Several economic measures of performance were evaluated, which showed that over the past six years the value of land in the study area has been increasing at a faster rate (22.4%) than the rate of improvements (5.2%). Many properties have seen a decrease in the value of their improvements, even as their land values have increased rapidly. The improvement to land (I/L) ratio measures the predicted long-term value of a property in its existing use. The I/L ratio for the retail properties in the study area suggests they could be ripe for redevelopment.

The 29H250 Team has identified several items that will require further investigation, and has outlined those at the conclusion of this report.



Figure 2 View From US 29/250 Bypass bridge looking north

## Goals & Objectives

The general goal of the study was to develop context-sensitive, multi-modal, specific intersection design concepts that addressed various issues. The specific goal of the study was developed based on input from multiple sources, including both City and County elected officials and staff, VDOT, and the Chamber of Commerce. The resulting goal is to develop specific intersection design concepts that address vehicular, pedestrian, bicycle, and transit movement for improved mobility, safety, and development opportunities within the US-29, Hydraulic, and the 250 Bypass area, while protecting existing tax base, businesses, neighborhoods, and employment.

One key objective of the study was to develop a new working method that employed innovative approaches, beginning with the composition of the Technical Team. It was important to get local and VDOT staff working together on a project from the start, rather than complete designs and request support after the fact. The region is fortunate to have forward-thinking leaders that supported this cooperativeness, allowing this approach to serve as a model for future transportation problem solving.

Another objective was to design an efficient, engaging public process. The region does not exist in a vacuum, but functions as a network of residents, businesses, and visitors. Taking this perspective, the entire community was encouraged to be a vital part of the process, with policymakers and the business community taking an advisory role.

A further objective was to complete the study in a short time frame. Because the study was conducted with mostly staff, it was important to set this objective in order to gain needed support as well as meet budget constraints. The final objective was to identify feasible solutions that could be built without shutting down the region's key transportation and business corridor.



*Figure 3 Local citizens gather at public workshop to discuss ideas and potential solutions*

## Introduction

US-29 intersection improvements have long been a local priority – to improve short and long range mobility in the area, as well as to improve through movements, while addressing safety concerns and supporting healthy business environment. With increasing population and business growth, US-29 will continue to be a major thoroughfare to businesses, neighborhoods, schools, and other regions, and could become a more attractive corridor to travel, whether by foot, bike, transit, or vehicle.

Considering public input, technical data, and field observation, the area defined for this study is the 29North/Hydraulic/250 Bypass intersections triangle. This study is a first step in comprehensively addressing needed corridor improvements. With the realization that funding is not readily available for an entire corridor study, these intersections were chosen for first study based on the high daily traffic volumes. Consideration was also given to Albemarle Place, the 1.7 million square foot mixed-use, walkable development that is proposed for the northwestern quadrant of the US-29 and Hydraulic intersection.

This study was conducted by an interagency staff team from the Thomas Jefferson Planning District Commission (TJPDC) & Charlottesville-Albemarle Metropolitan Organization (MPO), Virginia Department of Transportation (VDOT), City of Charlottesville (City), and County of Albemarle (County). Added to the staff team were three consultant firms with expertise in alternative street design, urban design, and economic impacts analysis. Funding for this study was provided by VDOT, with a local match added by the TJPDC and additional staff time provided by each locality and agency. After two months of preparation and analysis, the designs were developed during an intensive nine-day technical workshop.



*Figure 4 29H250 Technical Team at work*

The study also had members of the community serving in advisory capacities. A Study Steering Committee consisting of representatives from the business community was appointed to represent business interests with a focus on the economic impacts analysis. The MPO's CHART Citizens Committee helped design and facilitate the public process.

Numerous studies have taken a look at the US-29 corridor. These prior studies were reviewed and relevant merits of each were identified. Historically, these studies looked

at trying to find the best solution to improve the roadways while paying minor attention to other issues. This study has taken a different approach and has sought to provide an analysis of many issues that are pertinent to feasible design alternatives. To be successful, this US-29-Hydraulic-US-250 Bypass Intersection study not only had to look at the multi-modal needs of the area, but also consider how transportation improvements could support economic development and desired land use.

The Technical Team viewed the public process as a critical component of developing a workable solution. Parties with a direct interest in the study area were invited to focus groups including property owners, business owners and managers, neighborhoods, schools, bike/walk/transit advocates, freight/delivery/shippers, and environmental/cultural advocates. They were allowed to discuss any issues and concerns they felt were relevant to the study area. They were also asked several focused questions that gave the Technical Team a better understanding of those needs.

The City and County Planning Commissions participated in a joint focus group to discuss the current and long-range issues that need to be considered. These commissions provided valuable insight into the current thinking regarding future development in and around the study area.

Since US-29 is not only a local route but also a major regional thoroughfare, representatives of planning district commissions, Chambers of Commerce, and other regional bodies were invited from Lynchburg, Danville, and Culpeper. These representatives expressed great concern on the current state of the US-29 corridor and offered suggestions for improvement.



*Figure 5 Residents and business people worked together at the public workshops*

In addition to the focus groups, two public workshops were held to provide the general public an opportunity to provide input by discussing issues and their concerns. The first public workshop had over eighty participants and was highly interactive, with small groups discussing potential design concepts and subsequently drawing these concepts on

the map. The second public workshop had roughly sixty participants and focused on a presentation to members of City Council and Albemarle Board of Supervisors. The presentation featured a general overview of the importance of linking transportation and land use, including built examples, and a presentation of the design alternatives produced. Discussion in the form of a question and answer and comment session followed. A large number of participants from the second workshop appeared to support the design alternatives that were presented and felt that most of their issues and concerns had been or would be addressed by the Technical Team.

In conducting the economic impacts analysis, the first step was to understand the existing retail development. This required a determination of the demographics and growth trends. Additionally, existing competitive retail supply, land use mix, business mix, and retail sales trends were examined. Economic contributions to the City were analyzed, and included an assessment of general revenues such as utility, meals and lodging revenues, property and sales tax contributions, and business license contributions. Measures of economic performance were evaluated as well and included assessed valuation trends, improvement to land value ratios, floor area ratios, and regional sales tax trends. An analysis of the economic impacts and implications of the road network improvements was performed, with a focus on accessibility during all phases of construction, including post-completion.

To date, practically all discussion about US-29 north of the 250 Bypass has dealt with traffic and its negative impact on the quality of life. No part of an urban area exists in a vacuum; both transit traffic corridors and the development surrounding it must be given equal attention in order for them to work together and create an attractive place to live, work, and visit.

While feasible alternatives were identified, this study does not answer all the questions. Rather, it serves to show that buildable solutions can be developed that address all the issues and meet the stated goal. It can also serve as a model for other intersections of the 29N corridor. Questions and issues which remain to be addressed have been identified and will be investigated and resolved upon further study.



*Figure 6 View at Angus Road looking north along US 29*

## Background & Assumptions

Various studies have been done on the US-29 corridor or portions of it. Beginning in 1990, the Commonwealth Transportation Board (CTB) adopted a resolution calling for a three-phase sequence of improvements to the US-29 corridor based on recommendations by VDOT. From this, first-phase improvements were made which included the widening of US-29 from Hydraulic Road to the South Fork of the Rivanna River. Identified for second phase improvements was the construction of grade-separated intersections along US-29 at the Hydraulic Road, Greenbrier Drive, and Rio Road intersections. Slated for third-phase improvements was the Western Bypass, contingent on traffic and economic conditions. In 1991, the CTB adopted another resolution that included support for the construction of projects in the Charlottesville-Albemarle long-range plan including the Meadow Creek Parkway Phase II, after first and second-phase improvements from the 1990 resolution were realized. To date, only first-phase improvements have been realized. Several studies have been conducted on intersections of the US-29 corridor, but these have not led to preliminary engineering funding. Traffic counts and forecasts agree that the intersection of 29 and Hydraulic and the merge from 29 onto the 250 Bypass West is the one requiring the most immediate attention on the US-29 corridor. The current level of service (LOS) for this intersection is E with an average delay approaching 80 seconds, and in the future modeling projecting a LOS of F with an average delay exceeding 140 seconds assuming no improvements.

In recent years, public input from the first round of long-range United Jefferson Area Mobility Plan (UnJAM 2025) workshops revealed the study area as having both significant traffic problems, as well as significant potential for improvements. Interestingly, attendees of the surrounding rural county UnJAM workshops expressed this sentiment as well. During the second round of UnJAM, City and County policymakers worked together discussing the important issues that should be part of the area's long-range plan. There was consensus that the Hydraulic Road and US-29 intersection required immediate attention and is a project that the City and County could work together on, since the intersection falls on the City-County border.



*Figure 7 UnJAM workshop participants agreed the 29H250 area was a high priority*

The formation of the Three Party Agreement in the early 1990s provided a cooperative venue for such projects. This agreement between the City, County, and the University of Virginia resulted from the Route 29 Bypass Study and remains in effect today

Prior to beginning this study, assumptions related to pending traffic projects had to be established. This study assumes that, whether or not the Western Bypass is constructed, improvements to existing US-29 will be needed. The traffic modeling is being performed for each run both with and without the Western Bypass.

In the modeling, several projects were assumed as built; however the Technical Team included the assumption that Hillsdale Extended and Meadow Creek Parkway Phase I would be constructed prior to the start of major reconstruction at the intersections of US-29, Hydraulic, and US-250. This assumption alleviated some of the need to focus on alternate routes, as Hillsdale and Meadow Creek could handle some of that traffic. It was also established that while considering all previously identified potential alternatives, design efforts would focus on new ideas that were not yet drawn.

At the end of the technical workshop, the Technical Team received news of Best Buy's intent to build a store on the lot adjacent to Angus Road, fronting the US-29 corridor. This unexpected development was briefly addressed, but full analysis was not possible and solutions presented in this study only partially address that area.

### ***Previous Studies***

As part of its preparatory work for the technical workshop, the Technical Team reviewed and discussed in some detail aspects of previous studies.

### ***VDOT Studies***

In 1988, VDOT conducted a Route 29 Bypass Study. The major recommendations of this study include a grade separation at the major intersections of the 29 corridor. This study provided the basis for subsequent studies at US-29 and Hydraulic. Additionally, the Three Party Agreement resulted from this study.

As a continuation of its 1990 study, VDOT was charged in 1994 with proposing design alternatives for the intersections of Hydraulic Road, Greenbrier Drive, and Rio Road along the US-29 corridor. The resulting proposal for the Hydraulic Road/29N intersection was a modified tight urban diamond interchange, with 29 going under Hydraulic. City Council rejected this proposal citing several reasons, most significant the perceived impact on city businesses, the cost, the aesthetics and environmental impacts. The proposal was designed with nearly a sole focus on highway engineering, while neglecting other factors such as land use and economic impacts.

In 1998 VDOT completed a Route 29 Pedestrian Study that identified opportunities and developed community-driven recommendations for further improving the safety, convenience, and quality of pedestrian travel in the 29 corridor. The study area included the segment of the 29 corridor extending from Barracks Road to Airport Road.

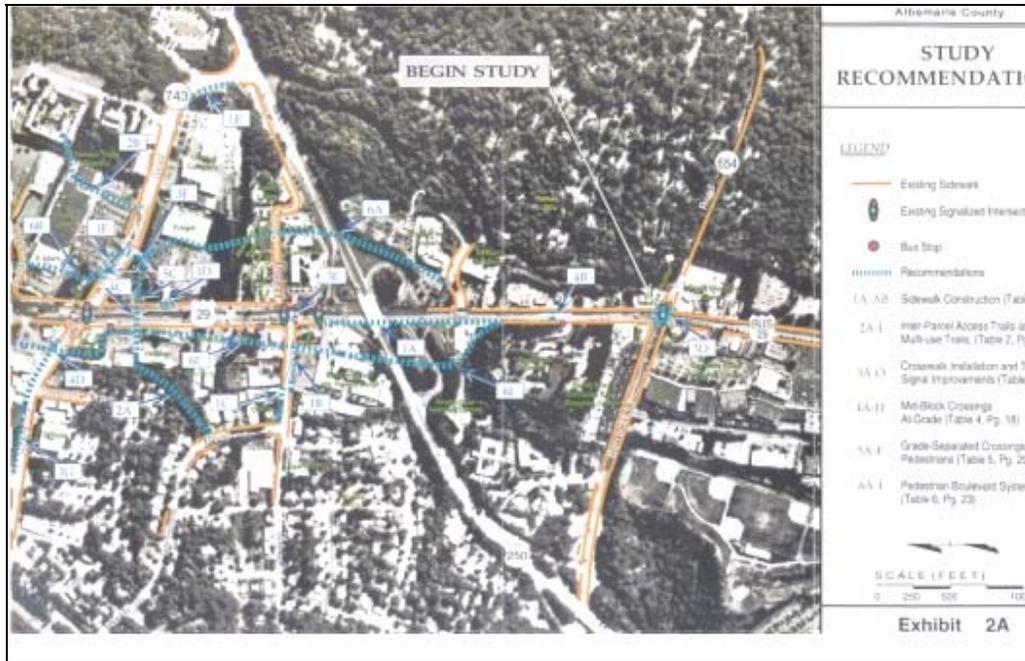


Figure 8 VDOT's 1998 Rt 29 Pedestrian Study contains many buildable improvements

**Piedmont Environmental Council**

Piedmont Environmental Council contracted with Joseph Passonneau & Partners in 1988 to conduct a review of transportation alternatives with special attention to an expressway alternative on 29 North. This study included a proposal for a continuous flyover built above the 29 corridor, beginning just south of Hydraulic Road and extending to the 250 Bypass. While providing better through traffic movements, this proposal would not provide better business access. Business owners felt it would not allow businesses the visibility it counts on to attract through traffic, which would negatively impact revenues.



Figure 9 The Passonneau Study proposed grade separations and a flyover from 29 to the 250 Bypass

### ***Charlottesville Commercial Corridor Study***

The City of Charlottesville's Commercial Corridor Study (Torti Gallas and Partners CHK Inc. 2000) reviewed several of the City's major corridors, including the local portion of US-29 (Emmet Street) ending at the City's northernmost boundary at Hydraulic Road. This study proposed a grade-separated intersection at Hydraulic Road and 29N, with 29 going under. A single roundabout at this intersection was proposed as a more appropriate urban gateway. There were merits to this study, however the resulting design proposal lacked suitable constructability. To make improvements as proposed would require many businesses to close and cause several others to lose access during construction.



*Figure 10 Hydraulic under 29 roundabout in Torti Gallas Study*

The Torti Gallas study included an economic impact analysis, reviewing various factors including the financing of development in the City. A point of discussion focused on the unavailability of financing for traditional development and stated that it is even dimmer for mixed-use developments. The study also noted that the national financial “landscape is beginning to change, as more creative, mixed-use developments have proven to be successful”.

The Torti Gallas study also mentioned the impacts of an “overtaxed transportation system” and identified it “as a key obstacle to attracting more businesses and shoppers”, adding that “this creates a higher level of risk for developers, who are concerned that traffic congestion may limit the ability to attract a market.” This argument has great merit and should be a factor in considering the option of a no-build situation. As a final point, Torti Gallas commented on the “inappropriate zoning in specific corridors”, saying that “the creation of a mixed-use, pedestrian oriented community requires complementary zoning regulations. Not only should they allow the appropriate mix, but also they should specify the urban regulations that will achieve” the desired results.

### ***Southern Environmental Law Center***

The Southern Environmental Law Center (SELC) also funded a study of the area (Glating Jackson Kercher Anglin Lopez Rinehart, Inc. 2001). The resulting design (known as the “Kulash proposal”) from this study illustrated a grade-separated interchange at US-29 and Hydraulic Road, with 29 going under. The design allows for

better access to the businesses in the study area as well as handles through traffic more effectively. While the end result is plausible, the impacts during construction would be significant, causing great financial impact to the businesses in the study area.



*Figure 11 US 29 under Hydraulic Road from the Kulash proposal*

The SELC study does support “a well-connected network of local streets serving the properties along Route 29 and Hydraulic Road” in an effort to “reduce congestion on Route 29 since a network of roads would allow some of the local traffic currently funneled onto the highway to use alternative routes.”

## Process

### ***Team Assembly***

The study was initiated on request of VDOT Commissioner Philip Shucet as a staff design exercise, and included a team of TJPDC/MPO, VDOT, City, and County staff. Harrison Rue, TJPDC/MPO Executive Director, served as Project Director, with Jim Bryan, VDOT Resident Engineer and Don Wells, VDOT Principal Engineer as Deputy Directors. The team had expertise in various areas including transportation and regional planning, engineering, modeling, forecasting, neighborhood development, transit, bike and walk, and economic development. This core Technical Team began meeting in January for eight weeks to organize and develop the work that was to be undertaken in a week-long workshop.

Rounding out the Technical Team for the week-long workshop included consultants with expertise and national experience in alternative street design, urban design, and economic impacts analysis. In response to concerns from the business community, a Study Steering Committee was appointed to ensure that business interests were being considered in the design analysis. This committee was appointed with the help of the Chamber of Commerce, the Charlottesville Area Association of Realtors, and the Thomas Jefferson Partnership for Economic Development. The Study Steering Committee met six times prior to the week-long workshop and provided valuable insight into issues affecting the business community. Additionally, this committee provided review of design alternatives in relation to business impacts and accessibility.

### ***Research & Analysis***

There were several factors that needed to be considered in the traffic analysis prior to the technical workshop. An inventory of current conditions was taken, which included a review of existing plans/studies, traffic counts, vehicle class data, and geometric information. An analysis was done on these inventories in order to determine deficiencies.

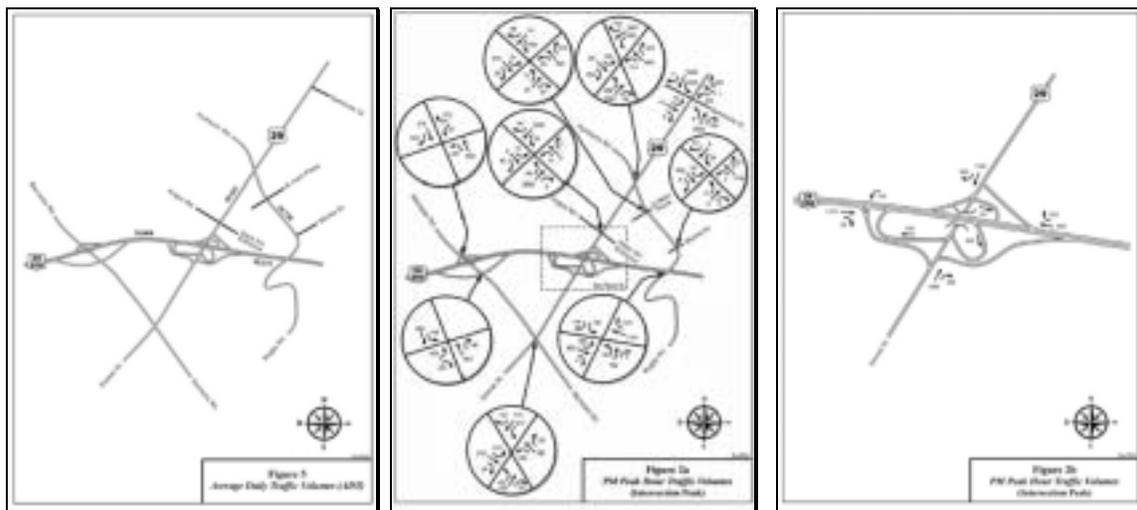


Figure 12 Traffic Counts at various locations in study area (see Appendix for details)

Forecast year modeling for year 2025 was also performed based on recommendations from the MPO's CHART Citizens Advisory Committee and included all funded projects in the Six-Year Improvement Program (Meadow Creek Parkway Phase I, Hillsdale Drive Extended, Fontaine Avenue, Old Ivy Road, Airport Road, Proffitt Road) and the North Grounds Connector. Models were run both with and without the Western Bypass, as well as a no-build condition. Peak travel times were also accessed for year 2025. Vehicle turning movements were analyzed for key locations for existing and future conditions.

While originally limited to the intersections of Hydraulic Road and 250 Bypass intersections of the US-29 corridor, the Technical Team realized early on that the Hydraulic Road and 250 Bypass intersection needed to be included in the study. At the commencement of the study, it was discovered that several other areas would have to be included. Most notably is the intersection of US-29 with Angus Road. After a more thorough analysis, it was quickly realized that the Angus Road intersection with 29 was a key source of traffic back up through the Hydraulic Road and 29 intersection. Also added to the study was an analysis of the Barracks Road exit of westbound 250-Bypass.

**Review Alternatives**

In addition to reviewing previously proposed alternatives, new design ideas presented by various members of the team were reviewed and discussed. This review analyzed the designs in relation to how well they appeared to meet the goals of the study. Following are summations of the designs, along with a brief explanation of the analysis. Some components of several designs were incorporated into the team's recommendations.

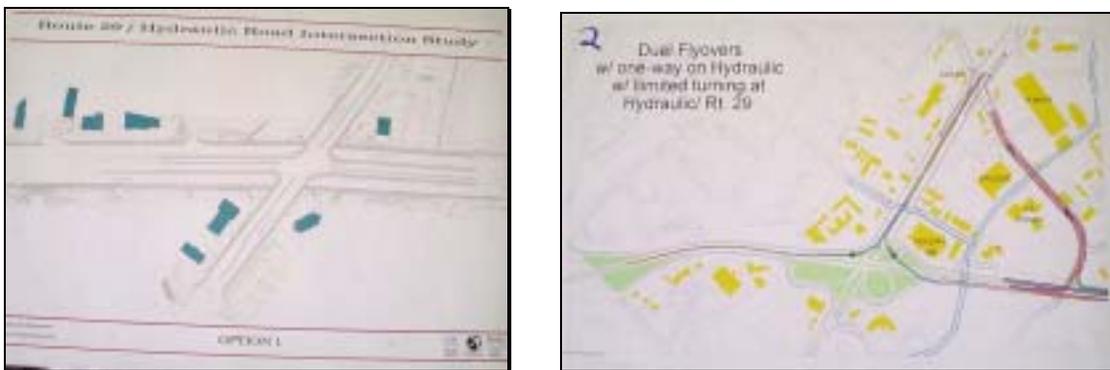


Figure 13 1) Hydraulic over 29 with center ramps, 2) Dual Flyovers

**Design 1**

- Grade-separated interchange at Hydraulic Road and US-29, with Hydraulic over 29
- Ramps in the median of US-29 for east and west turning movements onto Hydraulic Road

Design 1 reduces both local and through traffic congestion and creates Transit Oriented Development (TOD) opportunities. It also improves connections and minimizes impacts to neighborhoods and businesses. While through movements are improved for vehicles in this design, they are significantly improved for pedestrians. Additionally, customer service for businesses would not be increased in this design and it is doubtful that

existing tax base, business, and employment can be protected during construction. There is also some concern over weaving movements on US-29 due to the left-lane exit for right turns.

### ***Design 2***

- Dual flyovers w/ one-way traffic on Hydraulic Road with limited turning movements at Hydraulic and 29
- Ramps in median of US-29 for east and west turning movements onto US-250 Bypass
- Closure of three median crossovers on 29 between Hydraulic and the 250 Bypass
- Elimination of U-turns from Hydraulic Road south to 29 and the 250 Bypass interchange
- Align Angus Road and Holiday Drive
- Extend Hillsdale Drive through to Holiday Drive
- Construct bridge under the 250 Bypass with connection to Morton Drive
- One-way road on the eastern portion of Hydraulic Road
- Add an additional turning lane from both directions of the 250 Bypass onto Hydraulic

Design 2 reduces both local and through traffic congestion, improves connection and minimizes many impacts to neighborhoods and businesses, creates TOD opportunities, protects existing tax base, business, and employment during construction. Providing good vehicular through movement, this design does not provide good pedestrian movement. The flyover design could limit customer access to businesses on US-29 between Hydraulic and the 250 Bypass. There is also concern from businesses and neighborhoods about visual impacts of a flyover.



Figure 14 3) Hydraulic under 29; 4) Continuous flyover from Hydraulic to Barracks w/center ramps

### ***Design 3***

- Grade-separated intersection for Hydraulic Road and US-29, with Hydraulic under and southbound on-ramps to 29 in the median
- Extend Hillsdale Drive through to Holiday Drive at which point it would go under the 250 Bypass, then connecting to Morton Drive
- Align Angus Road and Holiday Drive with an overpass
- Add a second lane to the on-ramp from 29 to the 250 Bypass

- Make the eastern portion of Hydraulic Road from the 250 Bypass to the 29 underpass a northbound one-way road and make US-29 from Hydraulic Road to just south of the 250 Bypass a southbound one-way road (e.g. Hydraulic Road would become northbound US-29 from the 250 Bypass to the connection with 29, and US- 29 would be southbound only from just north of Hydraulic to just south of the 250 Bypass)
- Grade-separate the Hydraulic and 250 Bypass intersection
- Reconfigure the ramps at the US-29/250 Bypass interchange for the southbound US-29 traffic, and shift the 29 northbound ramps to the Hydraulic Road/250 Bypass interchange
- Parallel service road from Brandywine to Kmart
- Parallel service roads (two lanes) on west side of US-29 from the service lane around the bank adjacent to Aunt Sarah's to north of the signal at the Sperry entrance. This includes connections to Hydraulic Road, Zan Road, and the signal at Sperry.

Design 3 improves both vehicular and pedestrian movement, although the latter is to a lower degree. Congestion is also reduced for both local and through traffic, though to a lesser degree for the former. This design does create TOD opportunities and protects existing tax base, business, and employment during construction. Customer service is increased for businesses in this design in the long-term, though not for near-term. This design does not improve connections or minimize impacts to neighborhoods and businesses. There is also concern about requiring vehicles to travel a circuitous route because of new one-way roads.

#### *Design 4*

- Continuous flyover extending from just north of Hydraulic Road to Barracks Road
  - Two lane ramp in median of 29 and 250 bypass for turning west only onto 250 Bypass, and north only onto 29 with merge lane ending just west of Barracks Road exit on 250
- Extend Hillsdale Drive to Holiday Drive

Design 4 improves both vehicular and pedestrian movement satisfactorily. It also adequately increases business customer access, improves connections and minimizes impacts to neighborhoods and businesses, creates TOD opportunities, and protects existing tax base, business, and employment during construction. Congestion is reduced for through traffic in this design, although not for local traffic. The same concerns exist about visual and business access impacts from the flyovers.



Figure 15 5) Single Point Urban Interchange; 6) Collector-distributor road concept

### ***Design 5***

- Single Point Urban Interchange (SPUI) with a signal at the 29 and 250 Bypass interchange

Design 5 adequately improves both vehicular and pedestrian movement at one intersection and improves connection and minimizes impacts to neighborhoods and businesses. This design does not reduce congestion for local or through traffic, create TOD opportunities, or protect existing tax base, business, and employment during construction.

### ***Design 6***

- Several scenarios for Hydraulic Road over US-29, some movements eliminated, 1) a diamond type configuration, 2) a “jug handle” type configuration, and 3) a modified partial cloverleaf.
- Extend the westbound US-29 on-ramp onto the 250 Bypass through Barracks Road. Includes relocating the existing Barracks Road off-ramp to a partial cloverleaf on the west side and shifting the on-ramp from Barracks Road onto 250 Bypass westbound.
- A collector distributor road parallel to the south side of the 250 Bypass to handle the current weave problem at the 29/250 Bypass interchange. This includes some new and adjusted ramps
- Grade-separated interchange at Hydraulic Road and 250 Bypass to include a roundabout on the south side of the 250 Bypass

Design 6 creates TOD opportunities and protects existing tax bases, business, and employment during construction. It adequately improves vehicular and pedestrian movements and reduces both local and through traffic. This design does not improve customer service for businesses or improve connections and minimize impacts for neighborhoods and businesses.

### ***Focus Groups & Meetings***

Realizing the importance of involving people with a direct interest in the study area, a series of focus groups was conducted at the start of the technical workshop. Representatives from various interests were invited to discuss any issues and concerns

they felt were relevant when discussing the study area. The Technical Team worked together to form these groups, and in addition further suggestions were requested from the CHART Citizens Advisory Committee and Study Steering Committee. The following focus groups were interviewed during the sessions and a summary of issues addressed:

***Property Owners***

Participants in this group included property owners of existing and future development, a representative of the University of Virginia's Real Estate Foundation, a representative from the 5-Cs, and a business operator. One issue addressed was the backup situation caused by traffic from 29 getting on the 250 Bypass. The group noted that if the Bypass situation does not improve, at-grade improvements on 29 would not help much. Recommendations included closing the Barracks Road off-ramp and removing the traffic signal at Angus Road.

Another issue addressed was the development of mixed-use communities in the outlying areas of the County. It was suggested that this trend will keep people from traveling into the City so much. With this realization, it was recommended that time be spent on development issues and not just the roadways.

There were also concerns raised about the decisions being made by local policymakers. It was indicated that there have been some bad land use decisions made over the years, favoring developers and non-supportive of planning interests. This group felt that in order for this study to go to the next level, the full support of policymakers is crucial.

The property owners also indicated that to go into the project with the notion to save every building or save every site is impractical, adding that either business access should be adequate or just compensation should occur if not. It was said that roads should be designed where the road should go.

***Business Owners and Managers***

Owners and managers from businesses in and around the study area and representatives from the Chamber of Commerce and the North Charlottesville Business Council made up this group. There was a range of concerns expressed during this session. One business owner was concerned that US-29 will turn into an interstate, causing great impacts on businesses due to the advent of service roads which is seen as the only solution.

Many business owners expressed concern about losing visibility if US-29 goes underground or if retaining walls are too high. Businesses on the eastern side of 29 expressed the need for exposure to the local market, which comes from the 250 Bypass. It was also indicated that the traffic signals need to be coordinated better.

This group pointed out that a large number of guests lodging at hotels along the 29 corridor do a lot of walking because they don't want to get in their cars to travel. Stores along the corridor indicated that they receive significant walk-in traffic. It was also noted that there is a lot of foot traffic from nearby housing developments on Hydraulic Road

crossing 29 to the other side. With this in mind, it was suggested that the roadways need to be more pedestrian-friendly.

### ***Neighborhoods and Schools***

Participants in this session included representatives from area schools and neighborhoods and a local commuter choice advocate. Both City and County school representatives indicated that they each have a lot of buses traveling on US-29 and Hydraulic Road. The County said that their bus garage is at the same location as its high school and that if the ability to go through the intersection of Hydraulic and 29 was lost, it would affect their pick up and delivery times. Both school systems expressed that several schools use the same buses each morning and if a bus gets held up even a few minutes it throws off the other schools' schedules.

This group had some very specific concerns, such as inadequate pedestrian and bike crossings at the intersections of 29 and Angus, and 29 and Hydraulic, further saying that the light at Angus only allows pedestrians and bicyclists 26 seconds to cross. There were questions raised as to the possibility of putting bridges across the Meadow Creek, possibly linked up to the Rivanna Trails. They also added that transit to the schools and shopping would be equally important as well as connections between the eastern and western sides of 29.



*Figure 16 Focus groups and public workshops shared similar concerns*

### ***Bike/Walk/Transit Advocates***

Participants in this session included representatives from area bike, walking, and trails agencies/committees, transit staff, taxi services, visually and mobility impaired advocacies, and the MPO's Community Mobility Committee. Discussion centered on existing obstacles and potential improvements. Obstacles expressed to safe pedestrian and bike travel included the danger of walking or biking near the roadway, the high vehicular speeds, the crossing of major roadways, the inadequate length of timing incorporated into the traffic lights for pedestrian/bicycle crossing, and the large volume of traffic cutting through the parking lots of the shopping centers and stores in the area.

Some of the ideas for improvement include high capacity roads that operate at slow speeds, aesthetically-pleasing traffic calming devices, transit-oriented planning, the

addition of trails and bike paths, pedestrian overpasses, and accessibility for the mobility and visually impaired. It was also suggested that a circular bike/pedestrian route be developed around US-29 with feeder roads into the loop, with the sections developed in a grid pattern.

One interesting observation from this group was that the study area is roughly the same size as the Downtown Mall, however it has been developed in a totally different way so that it is not pedestrian-oriented, but car-oriented.

### ***Freight/Delivery/Shippers***

Participants in this group included representatives from a national shipping company, the US Post Office branch near the study area, and a local freight company. This group did not experience discomfiting levels of congestion in the study area. They realize that it is part of operations and have adjusted their routes and schedules accordingly. However, it was expressed that customer access to the post office could be improved.

### ***Environmental/Cultural Advocates***

Representatives of this group included environmental lawyers, preservation advocates, and the tourism council. Sentiments of this group are that transportation and land use must be developed together and that connectivity should be a major component of that thinking. There were specific mentions of creating a series of north-south roads, thus forming a matrix of roads, as well as a grade-separated intersection at 29 and Hydraulic Road. This group said that the grade separation needs to be done in a way that doesn't overwhelm the business community and increases property values. They added that if improvements to the intersection are done properly, it's going to make the businesses much more profitable and worthwhile and from there, the entire area begins to urbanize, making transit more feasible.

Concerns were also expressed that the traffic signals in and around the study area are not coordinated and that coordination would be a major improvement. Understanding that economic growth and development is important for a city, there was a strong consensus that all the green space in the area should not be developed because even in urban areas it is important to have green space and areas with no roads.

### ***City and County Planning Commissions***

A joint meeting was held with the two commissions in order to hear both views on what issues needed to be considered in the design analysis. The County expressed that one thing they have been wrestling with is the interface between the transportation solution and the urban design solution; they are hoping it would be reflected in the new developments and hope the City would embrace that thought as well.

Connectivity was expressed as an important action that should be part of the overall solution. There was mention of the possibility of infill development in Seminole Square to encourage connectivity between it and Albemarle Place. Additionally, it was expressed that Commonwealth Drive should be developed into a connector road to serve populations on the section of 29 north of Greenbrier Drive.

### ***Regional Interests***

Representatives from the planning district commissions, the Chambers of Commerce, and elected officials from Lynchburg, Danville, and Culpeper participated in this focus group. Viewing US-29 as critical for optimal traffic to and from D.C., the regional representatives focused their concerns mainly on the importance of the Western Bypass getting built. This group expressed that they are willing to consider the proposals that would first improve the local access needs of US-29. It was also expressed that no matter which option was chosen, there would be some businesses and people that are unhappy and therefore the best scenario to improve traffic should be chosen. The Project Director offered to travel to each locality and do a presentation of the proposed improvements. The group appreciated the consideration and thought it would be a good initiative.

### ***Public Workshop***

A public workshop was held before the technical workshop began at which many residents and business owners were presented an overview of the study, followed by a hands-on, interactive process. After the presentation, participants broke up into small groups to discuss concerns. The groups were asked to mark up the maps with their issues and suggestions. At the end of the workshop, each group presented their priority solutions.



*Figure 17 Residents gathered around tables to discuss issues and solutions*

Most notably, all groups believed grade separation at US-29 and Hydraulic was a preferred solution. There were several variations of the separation, with one group suggesting that the two outer lanes of 29 should be maintained for local access. Strong support for expediting construction of the Hillsdale Drive Extension was also expressed.

Four groups indicated that a second on-ramp lane should be built from US-29 to the 250-Bypass westbound. Other wide concerns included the need to make 29 more pedestrian-friendly, with three groups suggesting pedestrian overpasses/underpasses. Six groups

thought traffic lights should be removed from 29, with four specifically expressing Angus Road as one light that should be removed. Four groups thought that parallel bike lanes should be added on US-29, while three groups expressed that parallel roads/service roads should be added on either side of 29.

### ***Technical Workshop***

Outside consultants joined the Technical Team for the nine-day workshop in March, offering expert advice on issues. The first part of the week focused on gaining public input regarding the study area, while simultaneously reviewing the study area with the consultants to point out any essential concerns requiring observation. After the public process was complete, the Technical Team began delving into the issues to be addressed as design alternatives were produced. A review of existing designs took place prior to the discussion of new ideas. The remainder of the workshop included focused discussions and analysis of the existing and projected future problems and potential solutions. The Technical Team frequently divided into sub-teams allowing a highly interactive process.

During the week, local staff and policymakers were invited to drop in to review the progress and ask any questions, with a final presentation given at the end of the workshop to policymakers and executives. Additionally, members of the Technical Team made themselves available for individual meetings of interested parties throughout the week.



*Figure 18 Members of the Technical Team at work*

### ***2<sup>nd</sup> Public Workshop***

After the technical workshop, a second public workshop was held at which over sixty attendees listened to a presentation and engaged in a discussion of the design alternatives. Members of City Council and County Board of Supervisors were invited to sit together to discuss the study area and design alternatives presented. The presentation began with a general overview of strategies to link transportation and land use. The presentation included detailed explanations of the system of proposed improvements, along with examples of built projects.

Discussion in the form of a question and answer and comment session followed. Very detailed feedback was given and many of these concerns have been addressed in this report, the remainder will be addressed upon further study. A large number of

participants from this workshop appeared to support the design alternatives that were presented and felt as if most of their issues and concerns had been or would be addressed by the Technical Team.

## Summary of Transportation Recommendations

While more detailed analysis of the recommended design alternatives is included in the Proposed Transportation Improvements section, the following summarizes those options:

### ***Potential Improvements***

The major recommendation includes a grade-separated intersection at the US-29 and Hydraulic Road intersection. It is recommended that Hydraulic go under 29 with roundabouts on each side of Hydraulic, leaving the option for a future connection from the western roundabout to Holiday Inn. Another viable alternative would be Hydraulic over 29. Either option could also be constructed with signalized intersections rather than roundabouts, although with less capacity, pedestrian access and safety. A new Hydraulic Road alignment is proposed just north of existing Hydraulic to allow for fewer business and traffic impacts during construction. The old Hydraulic would be leveled after construction to provide a flat development area. Additionally, the Rugby Road through movement to Hydraulic would be eliminated allowing more green signal time to through movements on the 250 Bypass.

Improvements on US-29 include the widening of 29 to four lanes for 1000 feet just south of Hydraulic, the possible addition of a signal at Zan Road only after signals at Hydraulic are removed, and an underpass beneath 29 connecting Sperry and Seminole Square. The latter two improvements are recommended to allow better connection between the shopping centers (Seminole Square and pending Albemarle Place) on both sides of 29. The Zan Road signal requires further investigation, and might operate at non-peak hours only.

Potential 250 Bypass improvements include the removal of the signal at the north-bound off-ramp at 29, adding an additional lane on the 250 Bypass from the 29 on-ramp to the new Barracks Road off-ramp, moving the Barracks Road exit westward 1,200 feet using a cloverleaf off-ramp, and closing the existing Barracks Road on-ramp. These improvements will serve to help alleviate the back up of vehicles from 29 to the 250 Bypass.

Recommendations for the Angus Road intersection of 29, which was found to be a direct cause of traffic backup on 29 through Hydraulic, include the removal of the traffic light, the closure of the median, the addition of a U-turn opening just south of Angus, and an underpass or overpass just north of the intersection connecting it with Holiday Drive. These improvements will not only improve the flow of traffic from 29 to the 250 Bypass, but they could also eliminate some of the cut-through traffic existing in the surrounding neighborhoods. *(Note: these recommendations would require more in-depth discussions with residents and adjacent businesses).*

It is assumed that both Hillsdale Drive Extended and Meadow Creek Parkway Phase I will be constructed prior to reconstruction of the 29/Hydraulic Road intersection. This study also acknowledges that the Hillsdale Drive extension will be part of a separate

study managed by the City. It is recommended that Hillsdale be extended to Holiday Drive and that it be realigned with Pepsi Place to create a direct connection. Roundabouts are recommended for Hillsdale Drive at its intersections with Greenbrier Drive, Hydraulic Road, and Holiday Drive.

These improvements are summarized by location as follows:

- Hydraulic Road and US-29
  - Grade-separated with Hydraulic under (or over)
  - Roundabouts on both sides of Hydraulic (or signals)
  - New Hydraulic Road alignment just north of existing Hydraulic
  - Level old Hydraulic to provide flatter development area
  - Widen US-29 to 4 lanes for 1,000 feet south of Hydraulic Road
  - Possible future signal at Zan Road, only after signals at Hydraulic are removed; use limited to off-peak hours only
  - Future connection to Hydraulic roundabout from Holiday Inn
  - Future underpass of 29 (Sperry across 29 to connect w/ Seminole Square)
  - Close Rugby Road through movement to Hydraulic
- 250 Bypass
  - Remove signal at the 250 Bypass northbound off-ramp
  - Add a lane on the 250 Bypass on-ramp from US-29 to the Barracks Road off-ramp
  - Extend merge distance for traffic getting on the 250 Bypass westbound from 29 by closing the Barracks Road off-ramp, adding partial cloverleaf ramps 1200 feet up, and shifting the westbound on-ramp
- Angus Road
  - Remove existing signal
  - Close median opening
  - Add U-Turn opening just south of Angus Road
  - Add underpass or overpass at US- 29 and connect to Angus and Hillsdale Drive Extended
- Hillsdale Drive
  - Extend to Holiday Drive behind Kroger
  - Realign Hillsdale at intersection with Greenbrier, move pond to the east of road alignment

*(Note: This study is only making recommendations for Hillsdale to coordinate with other recommendations, recognizing that it is under separate stud)*

### ***Short-term Improvements***

Immediate, short-term improvements were also identified and include:

- Widen both sides of 29 to four lanes for 1,000-feet south of Hydraulic Road.
- Mark and straighten the crosswalks on both sides of US-29 at the Hydraulic Road intersection, increase the size of the concrete islands, and add pedestrian signals and push buttons.
- Hardwire the signal at Kmart to the Hydraulic Road/29 signals, or have VDOT take over the coordination of this signal so they can tie it into their coordination

- system. This improvement will be part of the Intelligent Transportation System (ITS) that is currently being studied for implementation in the area.
- Close the Rugby Road through movement from south to north into Hydraulic Road to add more time for 250 traffic and to smooth 29/250 merge movements.
  - Remove the signals at Angus Road and at the westbound off-ramp from the 250 Bypass onto 29, close the median opening opposite Angus Road and create a U-turn opening just south of Angus.
  - In consideration of the Best Buy proposed store, instead of the previous improvement, relocate the signal from Angus Road to the off ramp with a four-phase cycle, close the median opening at Angus Road, and provide a U-turn opening just south of Angus Road for southbound drivers. A median opening would then be provided opposite the off ramp into a driveway at the proposed Best Buy. Signals must be incorporated into the VDOT signal coordination system along Route 29 (*Note: This improvement is not recommended, except that it would be preferable to simply adding an additional signal for Best Buy*).
  - Move the sidewalks on US-29 away from the road and plant trees between the sidewalk and the curb line; add trees in the median, improve and relocate bus stops.
  - Add sidewalks to complete the sidewalk network in the study area.
  - Improve pedestrian connections between adjacent neighborhoods and the shopping districts, and provide traffic calming tools in the neighborhoods to minimize effects of cut-through traffic.

### ***Long-Term Improvements***

One long-term solution would provide two on-ramps from US-29 to the 250 Bypass West. This twin ramp would start on Route 29 just south of Hydraulic Road and continue onto the 250 Bypass, extending along the 250 Bypass for just under a mile. These twin ramps could be built by narrowing the median and closing the median openings between Hydraulic Road and the 250 Bypass, or by acquiring the right of way along the west side of US-29.

The removal of the signals at Angus and closure of the driveways along the west side of US-29 would then be required. It would also involve the closure of the on and off ramp at Barracks Road on the north side of the 250 Bypass, in order to provide the additional merging distance required by the double lane merge. This option includes the addition of frontage roads along the 29 corridor from Hydraulic Road to the 250 Bypass, as well as a potential rear service road connecting Angus Road with Hydraulic.

Other potential improvements include a grade-separated interchange at Hydraulic and the 250 Bypass and a collector distributor road parallel to the south side of the 250 Bypass.

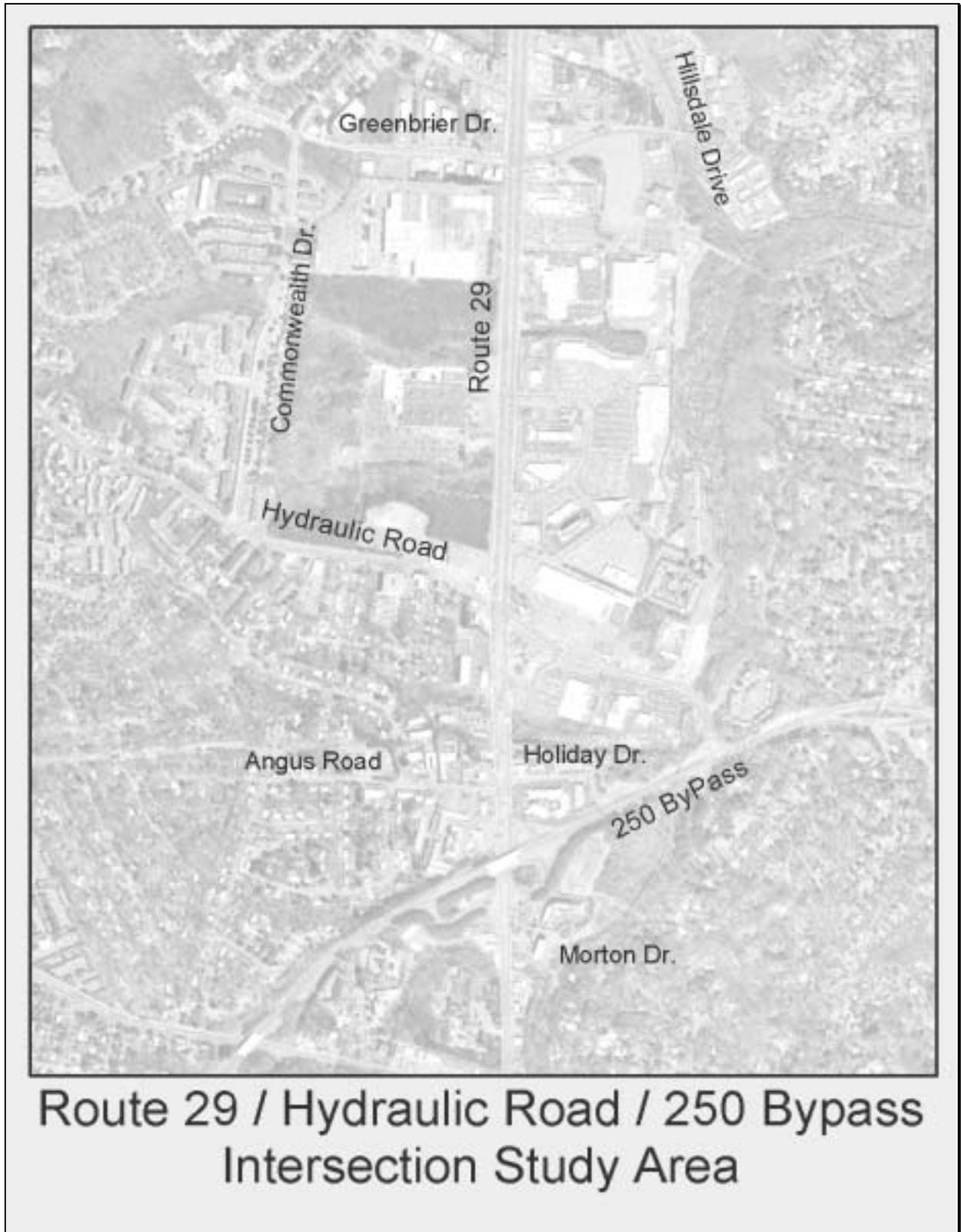


Figure 19 Aerial photograph of study area

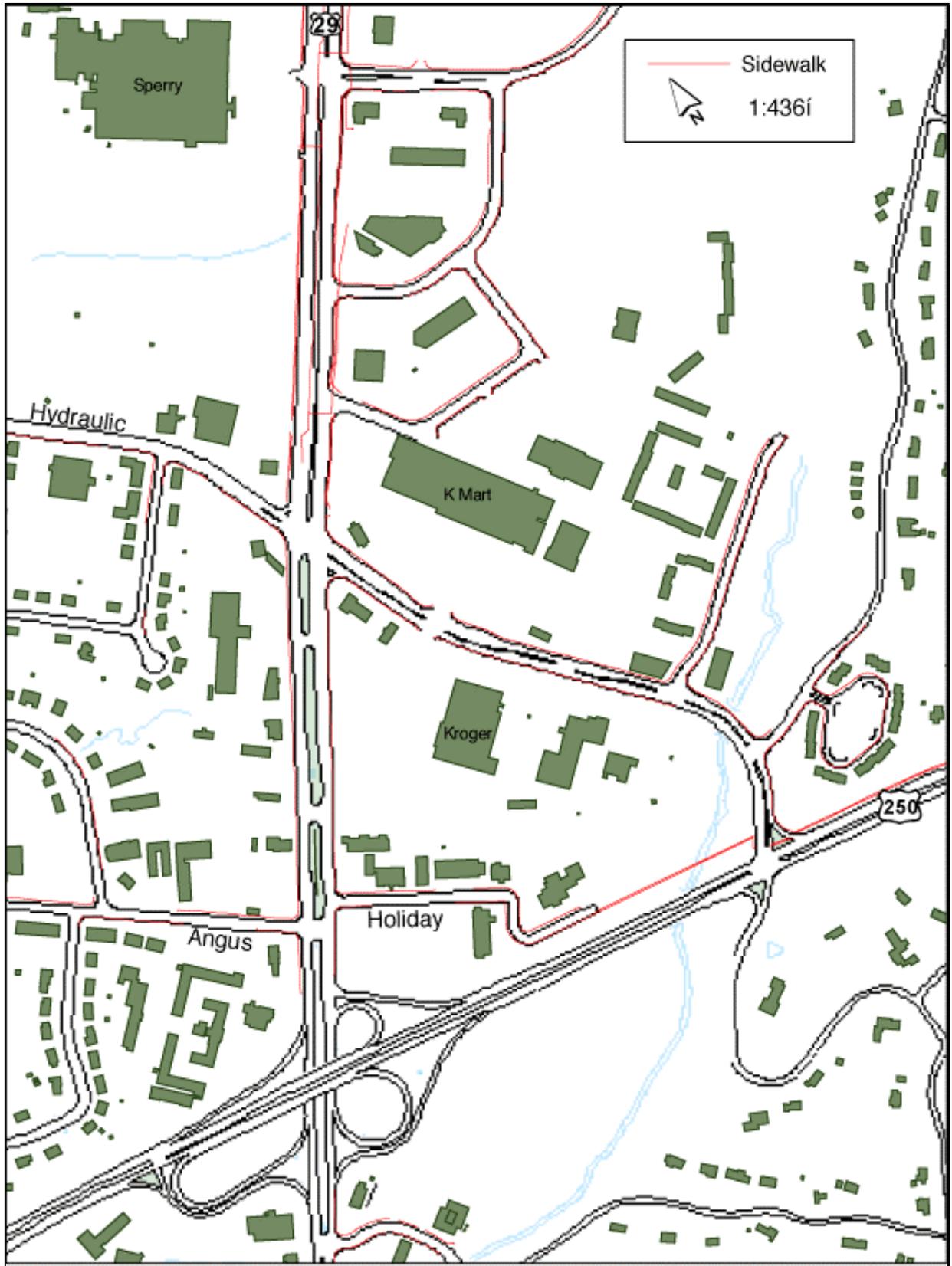


Figure 20 Aerial diagram of Study Area existing conditions

## Proposed Transportation Improvements

US-29 is one of the most important transportation corridors in central Virginia. It serves a number of competing purposes. For local residents, 29 serves a critical transportation role by providing access for many work, shopping and recreational trips. At the regional, state, and national level US-29 is the major north-south transportation corridor through central Virginia and North Carolina. US-29 was designated as a high priority corridor in the Intermodal Surface Transportation Act (ISTEA) in 1991. It also serves as the primary business district for northern parts of the County and much of the City.

### *Existing Conditions*

#### *Roads*

The main study area is saturated at gridlock during weekday peak hours, especially at the end of the week, and can be congested during the weekends. Observation of these intersections clearly shows that no additional traffic can be effectively accommodated during these time periods.

Particular problems exist at the US-29 and Hydraulic Road intersection where traffic backs up southwards on 29 beyond Barracks Road; southeastward from the 29/ Hydraulic Road intersection; from 29 to the 250 Bypass, and eastward along the 250 Bypass where the right turn traffic backing up from Hydraulic extends beyond the right turn lane and partially blocks the through movement on the Bypass.



*Figure 21 Hydraulic Road looking west towards 29 near Kmart*

Another major congestion point on US-29 is caused by the traffic signal at Angus Road. This signal backs up traffic northwards towards Hydraulic Road during many hours of the day. During weekday peak periods and even on weekends traffic is backed up from these signals northwards across Hydraulic Road. It has been determined that this backup occurs due to the Angus Road traffic signal's inability to meet the current traffic demand from 29 onto the 250 Bypass. The signal's close proximity to the 250 Bypass causes it to meter access onto the 250 Bypass. It should be noted that any additional signals between Hydraulic Road and the 250 Bypass would further meter and reduce traffic flow onto the 250 Bypass due to the short distance between these two roads.

Traffic passing through the Angus Road signal and merging with the traffic on the 250 Bypass heading west at times find they are in conflict with the Bypass traffic exiting at

the Barracks Road off-ramp. This merge is only difficult when there is a large volume of traffic on the 250 Bypass. Drivers on the on-ramp may have to wait for the volume of cars to pass before merging because of smaller gaps between vehicles within a large volume of vehicles and vehicles exiting at Barracks Road need to negotiate around the vehicle accelerating from the ramp. When this large volume of traffic clears, the gaps between vehicles will lengthen and merging can occur more easily but must still be done with great caution.



Figure 22 View of 250 Bypass over US 29



Figure 23 View from US 29/250 Bypass bridge looking north on US 29

Another problem on the 250 Bypass eastbound is the left turn movement from the Bypass turning onto Hydraulic Road. This movement backs up along the Bypass and overflows the left turn lane, thus creating a crash potential by blocking the through movements.

There also appears to be quite a lot of cut-through traffic from the downtown area along Rugby Road onto Hydraulic Road. This traffic pattern contributes to congestion at the Hydraulic Road /250 Bypass intersection by using traffic light time that could be allocated to the major movements.

*(Note: This analysis about existing conditions is based on existing traffic counts, team observations and discussion, and will need to be further supported by the traffic modeling that is under way).*

### ***Comment on Traffic Signal Performance***

One issue regarding the operation of traffic signals that is not widely discussed, is that the only true function of traffic signals is to take time from the major road and give it to the minor intersecting road. In doing so, traffic signals transfer vehicle capacity from the major road to the minor road. Unfortunately, signals all too often are installed without any road improvements to compensate for this major reduction in capacity of the major road. Consequently, the road becomes congested as the number of signalized intersections along a road increases.

A second equally important issue is the spacing of signals. A detailed study done by Texas A & M University Professor Virgil Stover showed that the ideal spacing for signalized intersections is a half-mile. He also showed that for every 100-foot reduction from this half-mile spacing, the road capacity was reduced by one percent. Roads around Charlottesville are currently about to suffer further reductions in road capacity because of the planned addition of eleven signals. For instance, signals are planned or proposed for installation at the US-29 intersections at Morton Drive, the proposed Best Buy entrance, Zan Road, and at the US Post Office entrance north of Seminole Square. If any or all of these signals are installed, they will have a significant impact on the capacity of US-29. Signal coordination that is in place along 29 North from Hydraulic Road cannot compensate for this significant increase in the number of signals. The proposed signal at the proposed Best Buy entrance would have a permanent negative impact on the capacity of US-29 by further metering the traffic flow onto the 250 Bypass.

### ***Pedestrians***

There is an almost total absence of pedestrian facilities at the signals within this study area. Although we have found that a few brave pedestrians do cross US 29, there are few crosswalks or markings, no pedestrian push buttons or walk signals (with the exception of Angus Road), and no audible signals for the visually impaired. All of these missing facilities lead to very dangerous pedestrian situations.

The existing sidewalk system is very poor because sidewalks are located next to the curb or with minimal setback, forcing people to walk very close to speeding vehicles. Because the sidewalks are so close to the road, there is no opportunity for trees or other physical barriers to protect the pedestrians or to enhance the visual appearance of the road. As such the road takes on a dismal uninviting appearance. There is also lack of pedestrian connections from the Brandywine neighborhood into the Seminole Square shopping center. The Alliance for Community Choice in Transportation surveyed parents at the Greenbrier Elementary School. Some of the specific concerns expressed by parents included the lack of sidewalks on a number of roads, sidewalks being too close to the street curb, and a lack of safe places to cross the streets.

VDOT's 1998 Route 29 Pedestrian Study also conducted pedestrian counts and found that of all the pedestrian movements counted, approximately one-third of the movements involved crossing 29. Recommendations from this report included the provision for continuous sidewalks, particularly through the 250 Bypass interchange, the addition of

landscaping/buffers or guardrails, the construction of pedestrian overpasses, wider medians with curb cuts for wheelchair and stroller accessibility, and crossing improvements, including crosswalks and pedestrian signals. We learned from focus groups and on-site interviews that people do cross both Hydraulic Road and 29 and would do so more frequently if pedestrian facilities were upgraded.

**Rt 29 Pedestrian Study Summary of Trip Purpose and Mode**

Trip Purpose	Mode of Travel							Total
	Drive	Passenger	Walk	Motorcycle or Moped	Bicycle	Public Transit	Taxi, Other	
<b>Work [1]</b>	765 88.9%	61 7.1%	10 1.2%	4 0.5%	0 0.0%	20 2.3%	1 0.1%	861 41.0%
<b>Non-work [2]</b>	885 75.5%	206 17.6%	61 5.2%	1 0.1%	1 0.1%	11 .9%	7 0.6%	1172 55.8%
<b>No response [3]</b>	40 59.7%	21 31.3%	2 3.0%	0 0.0%	0 0.0%	4 6.0%	0 0.0%	67 3.2%
<b>Total</b>	1690 80.5%	288 13.7%	73 3.5%	5 .2%	1 0.0%	35 1.7%	8 0.4%	2100 100.0%



Figure 24 Most major intersections in the study area are hostile to pedestrians



Figure 25 Transit stops along US 29 are generally lacking amenities and are too close to traffic

### ***Bicycles and Mass Transit***

Participants in the focus groups and UnJAM workshops agreed that there are a number of people biking in the area, but not as much as they would if more designated bicycle lanes existed. At present there are no bicycle lanes or paths along study area streets. Since the scale of development is conducive to better connections by non-motorized travel, bicycle lanes are included in most of the proposed new streets. Bicycle lanes also have the added advantage that they provide a buffer between automobiles and pedestrians, making pedestrian travel safer and more comfortable.

Transit buses are not currently given priority at signals, nor are they given special lanes for express service. There is a general absence of amenities at bus stops, although many stops do have benches. Since most stop shelters are at or in the sidewalk, and the sidewalk is at the edge of the curb, transit riders are forced to wait directly next to vehicle travel lanes.



*Figure 26 Many streets and highways are at capacity, can't fit more cars, and can't be widened. If we think in terms of moving people, not cars, existing streets have plenty of room for more.*



*Figure 27 Saving a lane for buses would increase the capacity of our streets - without widening. People walking and biking fill just a fraction of existing sidewalk and bike lane capacity.*

Bicycle lanes co-exist well with mass transit fixed-route bus service. Bicyclists can transfer to transit buses equipped with bicycle racks without any additional charge for the bicycle on CTS. Bicyclists pay only regular fare. All CTS buses are equipped with bicycle racks. Future bus stop plans include installation of bicycle racks at selected stops and bicycle lockers at the downtown transfer center under development. The appropriate placement of such bicycling amenities at other highly trafficked bicycling/transit interfaces will promote use of mass transit by the bicycling community.

A pedestrian-friendly travel corridor is also a mass transit bus-friendly environment, as pedestrians need safe and appropriate access to where the bus stops on its route, in order to board and get off the bus. Pedestrian friendly features include pedestrian separation from vehicular traffic except at such sanctioned and appropriate interfaces as designated bus route bus stops, bus shelters and appropriate signage at bus stops.

Transit bus service could be made more competitive with travel in the single-occupant vehicle by provision of dedicated travel lanes for express service, similar to HOV lanes, but restricted to such truly high occupancy vehicles as buses. The ability to pre-empt traffic lights at signalized intersections, especially the ability to pre-empt red lights, is a valuable tool for use by transit buses to improve travel times along congested travel corridors.

### ***Proposed Solutions***

During the study, the design team met with various public, private, business, and regional interest groups to gather information on transportation needs in the study area. Based on the information gathered, field observation and discussion, and prudent traffic engineering expertise, the team then developed short, intermediate, and long-term improvement concepts.

### ***Short-Term Improvements***

These recommendations include some improvements that could be made relatively soon and provide relief to existing traffic and pedestrian problems. These improvements include:

- The widening of both sides of US- 29 to four lanes for 1,000-feet south of Hydraulic Road. This widening could increase the northbound/southbound traffic flow up to 25%. A disadvantage of this improvement is that the increase in southbound traffic to the 250 Bypass would still be seriously constrained by the signals at Angus Road and/or another signal at the proposed Best Buy entrance. (The southbound widening needs more analysis, and possibly greater length, because vehicles would have to merge down to three lanes on the down hill side of a vertical curve. This scenario could cause traffic to stop in the widened lane, leading to potential safety problems).

This widening can be implemented by narrowing the median and vehicle lanes. Because of the grade difference between the two sides of 29, a partial retaining wall is highly likely immediately south of Hydraulic Road. Consistent with the design of US-29 north of Hydraulic Road, the left turn movements within the area to be widened would need to be prohibited by closing the median because of the increased danger of vehicles turning left across four lanes. Drivers would then drive north to the Hydraulic Road intersection and make a U-turn during the left turn phase to access properties on the west side of 29, a safer movement than the existing left turn across three lanes. Southbound drivers would make a U-turn at the U-turn opening in the median near Holiday Drive to access properties on the east side of 29.

Improving southbound US-29 will enable more vehicles to cross Hydraulic Road and still be constrained by the signal at Angus Road. This moving of one congestion point to the next intersection is often seen inappropriately as a solution. Unfortunately, all it does is move the congestion to another point or to make the next point of congestion even worse. This problem is further exacerbated when one road, US-29, is required to perform two tasks: to act as a regional road and a local distribution road, tasks which are often mutually exclusive.

- Coordination of the Kmart entrance traffic signals. The timing of these signals currently are not coordinated. As a consequence, many drivers who make a left turn from US-29 to Hydraulic Road are prevented from clearing the intersection because of the signals, and are then in conflict with northbound traffic on 29 when that signal turns green. The simple solution to eliminate this safety conflict is to hardwire the Kmart signals to the Hydraulic Road/US-29 signals or to have VDOT take over the

coordination of the Kmart signals so they can tie it into their coordination system. This is a proposed solution for the interim, acknowledging that ITS is currently being studied for implementation in the area. With ITS, all signals in this area will be coordinated as part of the overall system and could eventually make special accommodations for transit, giving it priority as it approaches a signal.

- Pedestrian improvements at the US-29/Hydraulic Road intersection. Marking and straightening the crosswalks on both sides of US-29 at the Hydraulic Road intersection, increasing the size of the concrete islands (by simply concreting some of the existing painted area) and the addition of pedestrian signals and push buttons would improve pedestrian crossings at this intersection. A second benefit of straightening the crosswalk on the east side of 29 across Hydraulic Road is that the drivers who are making a right turn from Hydraulic Road onto US-29 northbound will now be able to move forward and see around the vehicles on their left. This improvement should enable more vehicles to make a right turn on red, and even increase the through motions during the right turn phase.
- Crosswalk markings at the Kmart signal on Hydraulic Road. This signal already has a four-way pedestrian activated signal, but lacks clearly marked crossways.
- Add sidewalks to complete the sidewalk network in the study area. Locations include:
  - Angus Road
  - From the crosswalks at the Kmart traffic signal on Hydraulic to the storefronts of Kmart and Kroger
  - Section of 29 at the Kroger entry island
  - Section of 29 between through the 250 Bypass interchange
  - Section of Hydraulic Road from Dominion Virginia Power to the 250 Bypass
- Improve median island at the Kmart entrance to include a curb cut for wheelchairs and strollers.



Figure 28 Rt 29 Pedestrian Study identified priority sidewalk connections

- Close the Rugby Road through movement from south to north into Hydraulic Road. This change will eliminate one signal phase at this intersection, enabling more traffic light advancement be given to the 250 Bypass, and therefore improve the movement through this intersection. Since much of the traffic exiting Rugby is cut-through traffic, it could easily be redirected to the 250 Bypass entrance directly to the west, which is grade-separated and allows all movements. The additional time added to the Bypass through movements could also slightly help smooth the flow of traffic on the 250 Bypass West merging with southbound traffic on US-29.

**The Angus Road signal** is metering the traffic (reducing the flow) onto the 250 Bypass. Several options are available to improve this movement.

The optimal solution for the US-29 to 250 Bypass traffic for both regional and local traffic is the removal of the signals at Angus Road and at the westbound off-ramp from the 250 Bypass to 29, the closure of the median opening opposite Angus Road and the creation of a U-turn opening. This option would provide a major increase in capacity for vehicles traveling from US-29 to the 250 Bypass. However, because of the existing merge problems on the 250 Bypass, the merge between these vehicles and those already on the 250 Bypass must be extended considerably. A merge analysis (see table below) showed that the simple way to improve this merge capacity is to close the westbound 250 Bypass off ramp to Barracks Road, replace it with a partial cloverleaf ramp from the 250 Bypass to the west side of Barracks Road, and add an additional lane between the on-ramp at 29 and the off-ramp at Barracks Road.

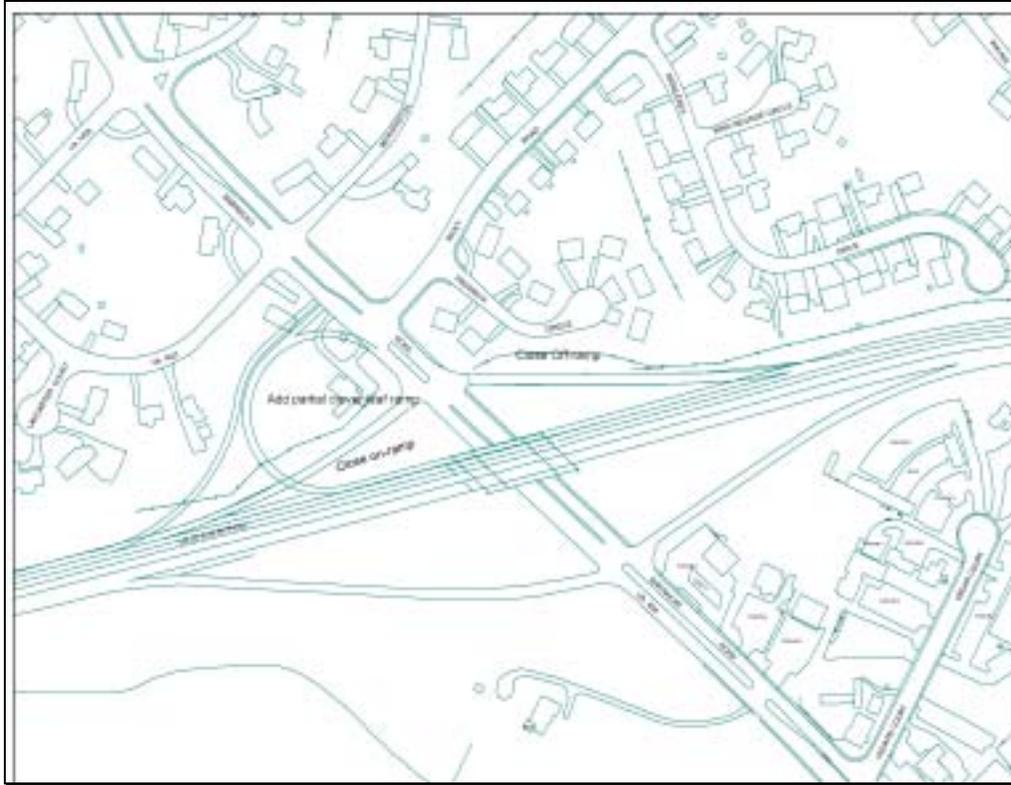


Figure 29 This option shows Barracks Road Cloverleaf with existing ramps closed and moved

The merge analysis was performed for the merge from US-29 to the 250 Bypass and assigned levels of service for the various scenarios. The analysis shows the existing merge is operating satisfactorily except for minor delays. This merge is constrained by the signal at Angus Road. If the signals at Angus Road were removed, then the changes mentioned that would improve the capacity of the merge would be required during normal operating conditions.

	Existing Conditions	Extra lane on 250 Bypass	Partial Clover leaf at Barracks Road
Existing Design of 250 Merge	B	B	B
Year 2025 with Western Bypass	C	E	D
Year 2025 without Western Bypass	C	F	E

**Best Buy at Angus Road.** During the technical workshop, a proposal surfaced to locate a Best Buy store on the southwest corner of 29 and Angus Road. This store would generate considerable traffic throughout the day and could require a transfer of green traffic light time from other phases, particularly the US-29 to Angus Road phase, to enable vehicles to enter and exit Best Buy. This development will restrict the traffic flow from US-29 and

the 250 Bypass. The Technical Team agreed that allowing an additional signal to be placed at the 250 off ramp, and cutting through the US-29 median, as proposed by Best Buy, would cause a completely unacceptable reduction in traffic capacity of both US-29 and the 250 Bypass.



Figure 30 The Angus Road intersection is very close to the 250 Bypass on-ramp

Although all team members agreed that removing the Angus signal and allowing no added signal was strongly preferred, a fall-back option was identified late in the exercise by the consulting engineer that could marginally improve traffic flow. This option would relocate the signal from Angus Road to the off-ramp, close the median opening at Angus Road, and provide a U-turn opening just south of Angus Road for southbound drivers. A median opening would then be provided opposite the off ramp into a new street at the proposed Best Buy, which would curve behind the existing bank and connect to Angus. These signals would then operate on a three-phase cycle that should enable slightly more time to be given to US-29 movements. If the signal is relocated, then these signals must be incorporated into the VDOT signal coordination system along 29. VDOT must also be given the power to coordinate these signals during peak hours to favor the US-29 traffic. Outside peak hours, signal timing and coordination could be modified to favor the local access. This mode of operation would fit with Best Buy's indications that they expect minimal traffic generation during peak periods, if that proves to be true in this location.

**Gateway to the City.** US-29 is a gateway into the City, and the existing median treatment could be improved with more trees and landscaping to soften the roadway appearance. If a minimum of three rows of trees were planted along 29 in the median and on planter strips on both sides, the improvement of aesthetics on US-29 would be enormous. Simple short-term improvements that would create a more impressive entrance to the City can be accomplished in the following ways:

- **Plant street trees** between the sidewalk and the curb line, moving the sidewalks away from the road as needed. Trees along the side of the road also provide shade and visual buffers for pedestrians, and in some circumstances, can help mitigate vehicle

speeds. Two misconceptions arise when the issue of trees along a major road is brought up. A higher rate of accidents involved with trees is assumed and there is a perceived impact on utilities. Research shows that trees actually improve safety and increases the life of asphalt by 70 percent.

- VDOT only requires the trees be located outside of the clear zone, which for US-29 in an urban section is a minimum of 6 feet (from edge of travel way, not curb) for speeds up to 45 MPH. At 45 MPH, the clear zone goes to 10 feet. Speed limits through this complicated section entering the City should be lower, a maximum of 35 MPH, which could both increase capacity and improve merging conditions. This reduction could allow application of a standard four-foot clear zone (from the back of curb and gutter) for tree planting. VDOT also has a pre-approved list of specific trees, which minimize impacts to road and sidewalk structure and underground utilities. If the utilities are installed correctly, tree roots should have no impact on them at all. Modern planting barrier systems (like the Cornell system) will also help control root system impacts.
- **Transit stop improvements** should be implemented along with any landscaping and pedestrian improvements. Agreements with adjacent landowners should be negotiated to move the stops back off the road into landscaped areas or edges of parking lots, creating more comfortable and safer waiting areas, with larger shelters, added amenities, and direct pedestrian connections to businesses.



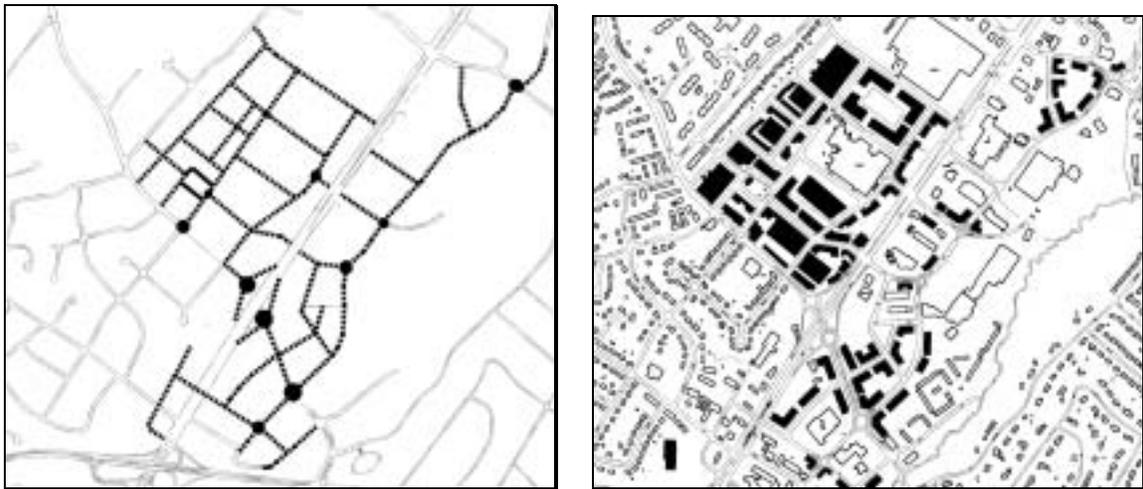
*Figure 31 Pantops Shopping Center includes protected, well-defined pedestrian walkways through the parking lot at left. As shown on the right, more generous transit shelters can increase ridership.*

### **Albemarle Place**

The existing road network is at capacity and cannot handle the large increase in traffic that would be generated by this development. Widening of US-29 to ten lanes is not a feasible solution. At eight lanes, 29 is already a major barrier to the east/west movements. Hydraulic Road would also need to be widened to cater to the additional through and left turn movements. Additional signals at Zan Road, the Post office or elsewhere would significantly downgrade US-29 as a regional facility. It would seem more appropriate to undertake the Hydraulic Road underpass in conjunction with this development.

A signalized intersection at US-29 and Zan Road should only be considered after the removal of the signals at Hydraulic Road, and only for off peak times. Otherwise, it reduces the capacity of 29 at another intersection and reduces the effectiveness of signal coordination along US-29. In addition, during peak periods the signal could queue traffic back on the on-ramp into the roundabout on Hydraulic Road. To avoid this occurrence, the timing at this signal will need to be coordinated with the queue length on the ramp and/or a two-lane ramp used for added storage capacity. In the short term, proposed access to Albemarle Place could be through the signals at Seminole Square and across the front of the Sperry building, if an agreement could be worked out with Sperry Marine.

Some minor changes to the Albemarle Place road network are suggested, similar to the roadways proposed for the Hillsdale extension. Albemarle Place has proposed a four-lane road within its development. Four-lane roads are typically the most dangerous roads due to greater occurrences of rear end crashes involving left turning vehicles being struck from behind by through vehicles. In addition, the lack of refuge for pedestrians limits their ability to safely cross the road. Apparently the four-lane section is being proposed to cope with left turn vehicles. A similar and safer method would be to use small roundabouts at several intersections and to convert the four-lane roads to two lanes with a median to beautify, to help pedestrians cross, and to increase safety and efficiency of turning movements by converting significant left turn movements to all right turn movements.



*Figure 32 The roads proposed at Albemarle Place can be modified to offer the same kind of balanced transportation as the Hillsdale Drive Extended network*

By installing roundabouts where the development connects to Commonwealth and Hydraulic Road, attractive gateways to this development are created. This option would also be cheaper to build and operate than signals while providing intersection control that typically will generate 70 percent fewer crashes.

Minor modifications are also proposed to the internal roadway alignments on the northern “big box” section of Albemarle Place, to outline a more traditional grid in keeping with

the rest of the development. The urban design diagrams (see the Urban Design & Redevelopment section) show how a more regular, block-like street layout could accommodate either big box-style development or lay the groundwork for future neighborhood-scaled mixed-use buildings.

### ***Medium-Term Improvements***

This section includes projects that will take a longer period of time to finance and construct.

**The Meadow Creek Parkway.** In all its phases, the building of the parkway is a very important parallel connector that is expected to provide significant relief to the US-29/Hydraulic Road intersection. Phase I should probably be completed prior to major reconstruction of the 29/Hydraulic intersection.

**Hillsdale Drive Extension.** This study acknowledged that a more detailed design and location study for the City is beginning shortly that will identify the specific alignment and design of Hillsdale extended, but took the liberty of identifying key principles of the proposed road to maximize both traffic flow, safety, and a healthy business environment. This study also embraced the previous Hillsdale Drive Traffic Safety Study (conducted in partnership with the Jefferson Area Board for the Aging and the Senior Center) which identified safety improvements such as median crosswalks and roundabouts on existing Hillsdale Drive.

It is very important that the extension of Hillsdale Drive be designed as straight as possible, preferably similar to the route shown in the design plans, with roundabouts for improved capacity and pedestrian safety. If it is built as a convoluted road with signals, its usefulness as a local connector will be lost and it would be a less attractive alternate route, providing much less relief to the US-29/Hydraulic Road intersection.



*Figure 33 The northern end of Hillsdale Drive Extended could be realigned with a roundabout at the intersection with Greenbrier to improve traffic flow and turning movements*

The proposed cross section for this Hillsdale Drive extension is a two-lane road with bike lanes, on street parking within the retail sections, planter strips and then the sidewalk. An elliptical roundabout has been shown at the intersection of Greenbrier and Hillsdale. The elliptical design would enable the realignment of Hillsdale Drive north of Greenbrier along the edge of the existing pond to provide a relatively straight connection between Hillsdale Extended and Hillsdale Drive. At the suggestion of County staff, this pond could be relocated onto the existing alignment of Hillsdale Drive.

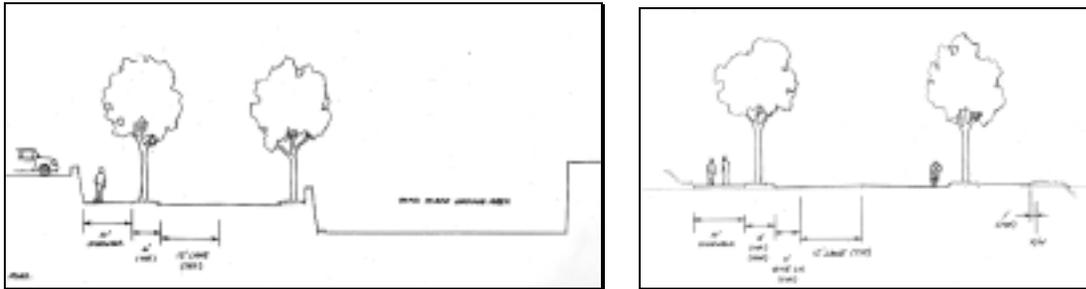


Figure 34 Cross Sections of Hillsdale Drive at the Post Office and Seminole Square

The area between the Pepsi bottling plant and the US Post Office property proves to be particularly difficult because of the limited right of way and the large grade differentiations. After investigation of different options that involved lowering this section of the Hillsdale extension to ground level next to the Pepsi plant or raising it to the ground level of the post office, a split-level design was chosen. This design involves the location of the Hillsdale extension approximately half way between these two grade levels. This would reduce the imposition of the large retaining wall and break it into two smaller walls. It also provided a far better grade on the driveway into the post office. Two cross sections were considered for this section of road. The standard cross section includes two vehicle lanes, bike lanes, planter strips and sidewalks on both sides. The other section includes two vehicle lanes, a six-foot planter strip on the east side, and a stone-faced retaining wall with a six-foot planter strip and ten foot trail on the west side. Roundabouts were suggested for the intersections of Hillsdale Extended with Seminole Court and Zan Road. These would control vehicle speeds, improve pedestrian safety, and improve traffic flow and capacity by avoiding the stopping and delays caused by signaling these intersections.

Since bicycle lanes currently exist on Hillsdale Drive, the Hillsdale extension is sure to be a preferred bicycle route for the neighborhoods in the area and it is likely that bicycle lanes will continue on Hillsdale Drive Extended. Care should be taken to accommodate the Senior Center's regular overflow parking needs, currently served by the on-street spaces along Pepsi Place.

Future traffic demand along Hydraulic Road may require adding a right turn lane (from Hydraulic east into Hillsdale Drive Extended) to the roundabout proposed for the intersection of Hillsdale and Hydraulic. It is recommended that adequate right-of-way be set-aside for this purpose on the northeastern corner. In the short term this land could be landscaped.

**The connection of Commonwealth Road to Rio Road** or at least to Berkmar Drive. This could be an important connector for the west side of US-29 and have significant impact on US-29 capacity by alleviating the need for people on the west side of 29 to be able to shop on the east side of US-29 without going onto 29. This is especially important in reducing the need for added signal timing being allocated for traffic entering US-29 intersections from the west. The recently completed extension of Berkmar Drive has allowed for greatly increased access to businesses along 29 North such as Rio Hill Shopping Center, Kroger, and Lowe's for customers from neighborhoods on the west side of 29, as noted in discussions with business representatives.

**Good quality pedestrian connections** between the Brandywine neighborhood and the Seminole Square shopping center could reduce a number of vehicle trips between these two. Direct connections are also being identified between Hearthwood and the new Hillsdale Extended. An analysis identifying missing sidewalk connections, such as along Hydraulic near the 250 Bypass has been completed. Relocation of the current transit route through the Kmart parking lot to the new Hillsdale extension will certainly make a big improvement in the transit operation along that whole corridor.

**Trip Reduction.** One method that can reduce existing and future vehicle trips is to improve the quality of sidewalks, bike lanes, the safety and accessibility of pedestrian and bicycle crossings, the quality of bus stops and bus service, and ensure that any new street systems are interconnected with the surrounding road network. To help allay the fear of residents in regards to the interconnection between new and surrounding street networks, traffic calming should be part of all the street design standards. The team is currently looking at potential traffic calming solutions for the Meadows neighborhood to minimize cut-through traffic from the proposed neighboring developments.

**New sidewalk standards** were developed during this study that provide for the relocation of sidewalks away from the curb and gutter, as per the national standards, so that sidewalks are a minimum of six feet from the curb line. Not only does this new standard for sidewalks provide a safer and more pleasant environment for pedestrians, especially children, it enables the planting of trees between the sidewalks and the streets. This row of trees will provide shade, enhance the appearance of the street, and help protect pedestrians from errant vehicles. Another design standard that was agreed upon in this study was to use a ten foot wide trail located ten feet from the curb line in areas where high pedestrian and bicycle volumes are expected.

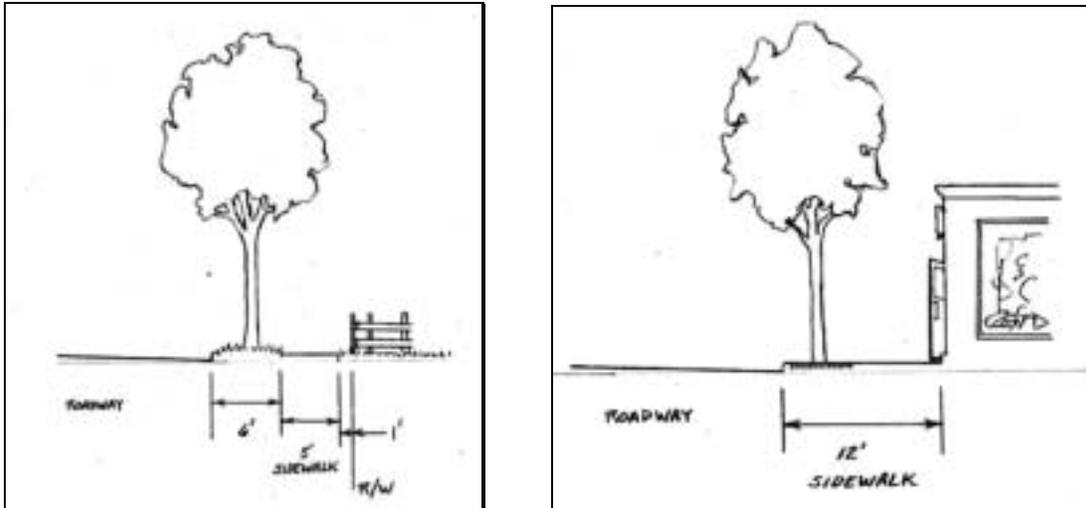


Figure 35 New sidewalk standards for both residential and commercial streets would require a six-foot planter strip for street trees

**Medians.** Center turn lanes, especially where no driveways exist, encourage higher vehicle speeds and do not provide pedestrians with a safe crossing environment. Therefore the study found that wherever possible, a raised median should be used to replace the center turn lane. Alternatively, short sections of medians should be included within the center turn lane. The continuous median or short section median will help to lower vehicle speeds, especially on curves, and will help pedestrians cross the roads while providing space for tree planting to help beautify the street.

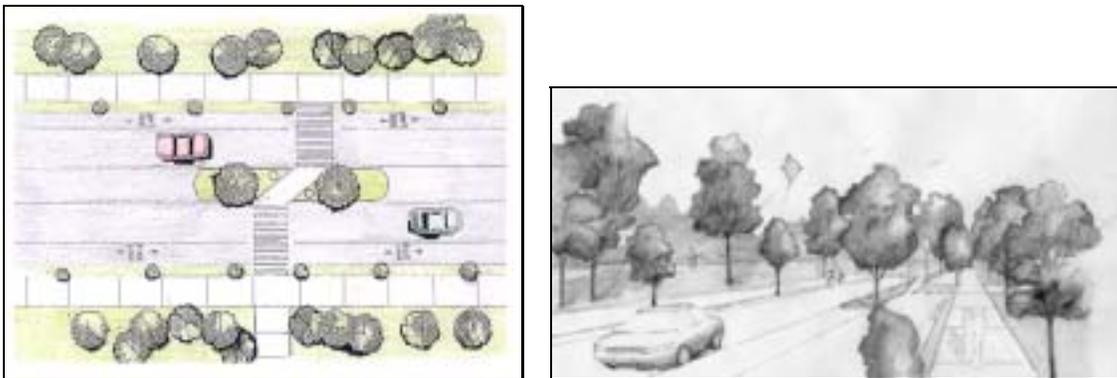


Figure 36 Proposed median crosswalks for the existing three-lane section of Hillsdale Drive

**Grade Separation at US-29 and Hydraulic**

While the above improvements will provide some relief to US-29, they may not keep up with the expected growth in travel demand generated by the proposed developments along 29, both in the study area and farther north. To provide a long-term solution to the congestion at Hydraulic Road and 29, a grade separation is the preferred option.

During this study, the team studied six or more options for this intersection for their impact and constructability. (See also Process-Review Alternatives and Background & Assumptions-Prior Studies sections). Many of these options would provide a quality end result. However, most of these designs would require significant right-of-way

acquisition both during construction (to provide for through traffic to pass around the construction area) and for the final intersection, create unsafe weave movements, restrict or block vehicle access to abutting businesses, and/or prohibit some vehicle movements. The Technical Team spent considerable time in developing designs that minimized the impact to business both during construction and upon completion.

One design that was considered in detail was the Walter Kulash Route 29 underpass, conducted for SELC. It is a good design, accommodating through traffic very well. However, to construct it would require extensive right-of-way and business acquisition on both sides of US-29 and Hydraulic Road, so traffic on both roads could be moved to the side during the construction of the underpass. This option was a favored design that unfortunately had huge constructability and maintenance of traffic issues and tremendous impacts on businesses during the construction period. Based on these issues and impacts, solutions that changed the grade of 29 were set aside as a viable option under current conditions.

Options that included flyovers, or elevated roadways in the median of US-29 were similarly considered. However, these options were set aside due to almost unanimous concerns of the business community that these options would limit business access and create an unattractive image at the entrance to Charlottesville.

Other options considered the raising or lowering of Hydraulic Road. Two problems were encountered with this solution. The first was maintenance of traffic on Hydraulic Road during construction. To solve this issue two methods are available: 1) either temporarily relocate the existing intersection on temporary roads while constructing the new interchange on the existing alignment or, 2) leave the existing roads and intersection in place and build the new interchange on a new alignment. The Technical Team agreed that, by shifting the new grade separated connection alignment slightly to the north, the improvements could be constructed with minimal impacts to the multimodal movements and businesses.

Managing the left turn movements and minimizing the impacts on right of way and businesses meant addressing: 1) the location of the US-29 ramps connecting to Hydraulic Road, and 2) the intersection treatments at the ramp connections to Hydraulic Road. The left turn movements could be accommodated by ramps either on the outside of US-29 or located in the median, with left-lane access. (*Cloverleaf and Single Point Urban Interchange - SPUI type of Interchanges were not considered for this location due to the impacts of right of way and businesses, their poor aesthetic features, and lack of pedestrian accommodation.*) The median location would create a severe weave situation on US-29 and therefore that scenario was eliminated. This left a diamond type configuration for the interchange with two intersections on Hydraulic Road, one on each side of US-29.

The US-29 ramp connections with Hydraulic Road can be addressed two ways: through conventional signalized intersections or modern roundabouts. Both options have their advantages and disadvantages. However, the traffic on Hydraulic Road dictates that the

storage requirements for signalized intersections would require widening of Hydraulic Road to a six-lane section with turn lanes. Such widening would require more right-of-way and impact more businesses. Therefore, the modern roundabout intersection solution was the preferred scenario. It should be noted that the roundabout will require slightly more right of way at the intersections than the normal signalized connection, but this is offset by the need for fewer storage lanes. Lastly, it is critical that any upstream and/or downstream traffic signals near the study area be coordinated in order to avoid queuing into the roundabouts.

The team's last decision was to choose between the traffic options of Hydraulic Road over 29 or Hydraulic Road under 29. Based on the team's analysis, both options would have similar impacts on right of way and adjacent businesses. However, as described in the following paragraphs, the Hydraulic Road underpass would have significantly greater redevelopment opportunities and better pedestrian access.

### ***Hydraulic Road Overpass***

An overpass over US-29 would be easier to construct and have the least impact on traffic during construction. The overpass would involve a long bridge with a steep grade on the east side because of the steep slope on Hydraulic Road east of 29. The overpass could be built to the north side of Hydraulic Road with minimal disruption to traffic and business, and only require the acquisition of the 7-Eleven, Import Car Store, and a part of the Kmart parking lot. The grades on each side would require elevated ramps to accommodate the connections, and a large relatively level area for the two-lane roundabouts on either side of US-29. As a result visibility of the businesses from 29 would be reduced. The bridge would provide local residents with a great view of the entire area from Hydraulic Road, although the grade and length of the approaches may be somewhat of an impediment to many pedestrians.

The overpass could serve as a gateway to the City, although an elevated bridge structure would be an imposing feature of the landscape, even if built to the higher quality aesthetic standards that are now possible. The cost of this facility would be the least of all the options reviewed.

The bridge could be constructed without impacts to the traffic on either US-29 or Hydraulic Road. This would involve the acquisition of the Import Car Store and the 7-Eleven. This would be followed by the construction of the approaches to the bridge and the ramps. Finally the connection would be tied into Hydraulic Road and to 29. Using decorative walls to support the ramp and roadway could reduce the overall area impacted and minimize the Hydraulic Road approach width and provide an aesthetically pleasing gateway. However, the approaches to the overpass from each end of Hydraulic would visually divide the business areas on either side of Hydraulic, especially for the longer descent on the eastern approach.

### ***Hydraulic Road Underpass***

The second option, which is relatively easy to construct, involves building an underpass on US-29 with two-lane roundabouts on either side of 29. By going under 29, the road

grades would be relatively flat. This feature would be advantageous to business and future development if the old portion of Hydraulic Road is lowered to the level of the existing Kmart parking lot. About 80 percent of this project could be constructed with impacts on 7-Eleven and Import Car Store and part of the Kmart parking lot. The west side downgrade would start just west of Swanson Drive. The east side of the underpass is only slightly lower than the existing Kmart parking lot. It would rise slightly after coming under US-29 and would be at-grade with most of the Kmart parking lot. The underpass would be built on the same alignment as the overpass option, but would be much shorter.

Construction sequencing would be such that the underpass would be constructed from west to east, starting with the roundabout on the west side and the removal of 7-Eleven store only. The next stage would involve the minor relocation of two lanes of traffic on US-29 as the first phase of the underpass is constructed. In other words, as the underpass is extended under US-29, the traffic on 29 would be temporarily shifted into the median two lanes at a time.



*Figure 37 Diagram at left shows realignment of Hydraulic with underpass just north of existing Hydraulic to allow for traffic flow during construction. Diagram at right shows eventual redevelopment of the area around the new road system.*

After it has emerged from under US-29, the two-lane roundabout on the east side would be built with the removal of Import Car Store and some disruption to the Kmart parking lot. At this stage, the Hillsdale extension would have been completed. Kmart would have access to the Hillsdale extension as an alternative access to their parking lot while Hydraulic Road was completed. The main disruption to Hydraulic Road traffic would occur as the new road is connected to the old. The main disruption to the US-29 traffic would occur during the temporary shifting of lanes. Then Tiger Fuel Mart on the west

side of US-29 would be closed, and the ramp to 29 constructed. Lastly, the ramp on the eastside of 29 to Hydraulic Road would be constructed. The businesses on the southwest corner (SpeedDee Oil Change and Wine Warehouse) could remain with the ramp passing between it and US-29. However, the potential for the redevelopment of that area would be improved if the grade were lowered at that location.

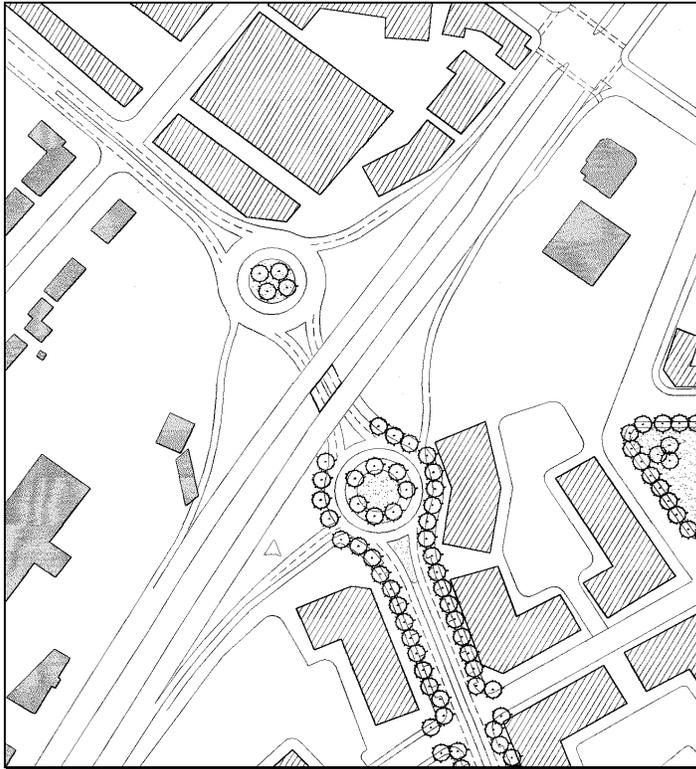


Figure 38 Diagram of 29 & Hydraulic Underpass

Following the completion of the Hydraulic Road grade separation, the section of Hydraulic Road on the east side of 29 could be lowered to create a much larger and flatter developable area that would enable the businesses on both sides of the new Hydraulic Road to supplement each other.

One of the important parts of the discussion regarding this underpass was the aesthetics. The State Street & Highway 101 underpass in Santa Barbara was identified as a good model. A cross section of the proposed underpass is shown below, and includes wide walkways, bike lanes, and good lighting. The use of decorative features on an underpass is highly recommended. Special formwork and sculptural relief are suggested. A large open area should also be created in the median on US-29 to allow light into the underpass, as well as landscaping.

Overall, the Hydraulic Underpass with roundabouts is one of the easiest to construct with the least impact on businesses while providing one of the most aesthetically pleasing and safer interchange layouts. It is likely to be the most feasible option.

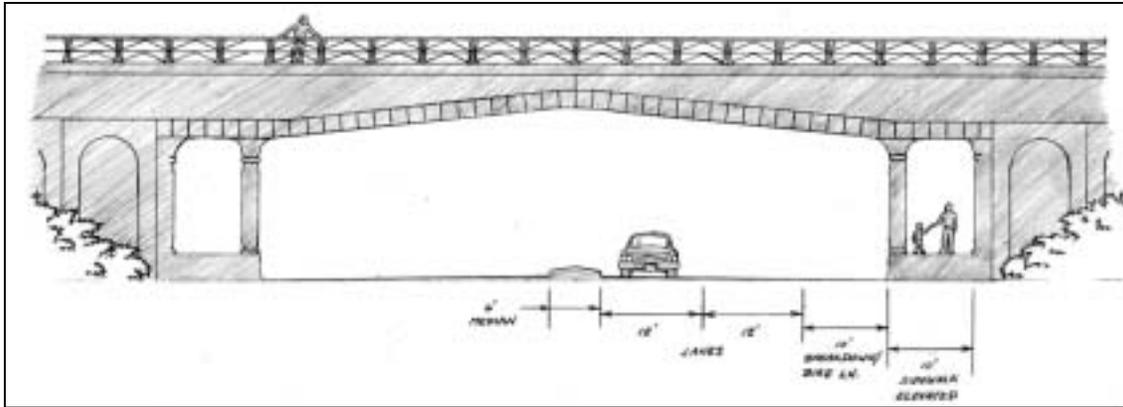


Figure 39 A well-lit spacious underpass would provide safe and efficient movement for vehicles, pedestrians, and bicyclists below US 29



Figure 40 This Santa Barbara underpass carries lots of bicycle, pedestrian, and vehicle traffic



Figure 41 This Santa Barbara roundabout is at an off-ramp that meets a busy 5-way intersection and underpass

**Hydraulic & 250 Bypass.** In addition to the improvements on Hydraulic Road, the existing intersection of Hydraulic Road and the 250 Bypass may need to be grade separated in order to eliminate the traffic queue that occurs during the morning peak

hour. Two options were reviewed for this location and both had the 250 Bypass over Hydraulic Road. The first option proposed eastbound on-ramps from Hydraulic to the 250 Bypass located in the median, with a signal under the overpasses to facilitate the left turn movement. This would resolve some of the delay/queue, however the signal would still queue traffic on Hydraulic Road. It also would create a severe weave movement in both directions on the Bypass. This option is therefore not recommended.

The second option proposed ramps on the outside with a modern roundabout on the south side of the Bypass. The roundabout would provide intersection control for eastbound 250 bypass on/off ramps, Hydraulic Road and Rugby Road (if Rugby allowed to connect). This configuration would continue the theme for Hydraulic Road and minimizes any queuing that would occur. On the westbound side of the 250 Bypass, on and off-ramps would be provided to Hydraulic Road. To accommodate left turns from Rugby Road (if this connection is maintained) to the westbound ramp, a short turn lane would be provided. The off ramp should not be restricted at the connection to Hydraulic Road and should be allowed to free flow. During the PM peak hour traffic, a weave movement occurs on Hydraulic Road at the southern approach to the intersection with Brandywine. This weave involves the heavy volume from the west off-ramp conflicting with the light volume from the east off-ramp that wants to turn right onto Brandywine. By keeping the movements free flowing, the gaps between most vehicles should be sufficient to allow for the merge and turn.

This segment would be built from north to south by first shifting westbound Bypass through traffic to the median and build the westbound bridge and ramps, then move the westbound traffic back. The eastbound traffic would be placed in the median while the eastbound bridge, roundabout and ramps are built. The traffic would be placed on the eastbound bridge and the median re-established to included connecting the abutments walls.

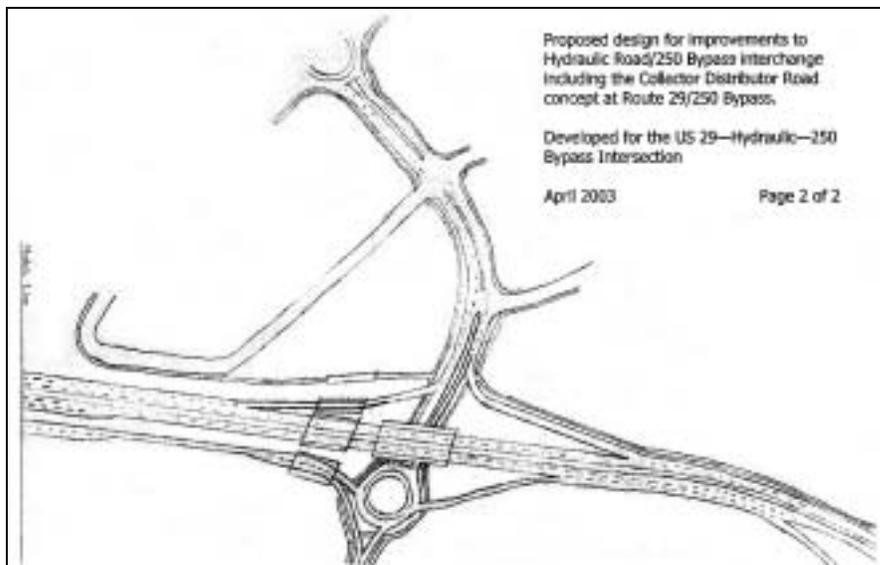


Figure 42 Hydraulic Road/250 Bypass interchange

### **Long-Term Improvements**

To get the highest and best use of potential redevelopment parcels and to maximize fully the multi-modal circulation, there are some long-term solutions that are recommended.

**Angus Road Underpass/Overpass.** This under/overpass would enable people living on the west side of US-29 south of Hydraulic Road to travel via the underpass into the retail commercial areas along the Hillsdale extension without driving on or across 29. Therefore, this under/overpass would greatly increase connectivity and mobility for the people and businesses in this area. Decorative features of this underpass are highly recommended. Special formwork and sculptural relief are also suggested. With the underpass option, a large open area in the median should be created to allow light into the underpass.

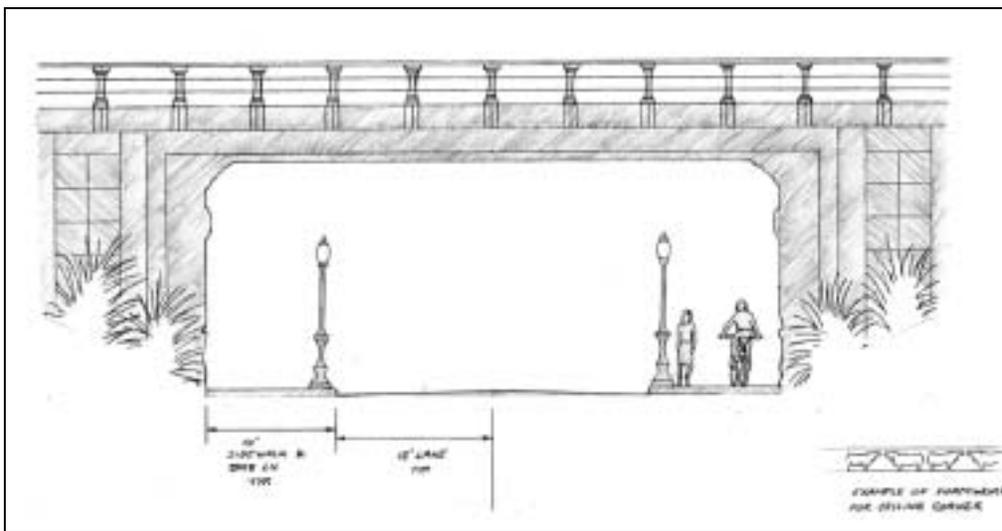


Figure 43 Cross section of Angus Road Underpass

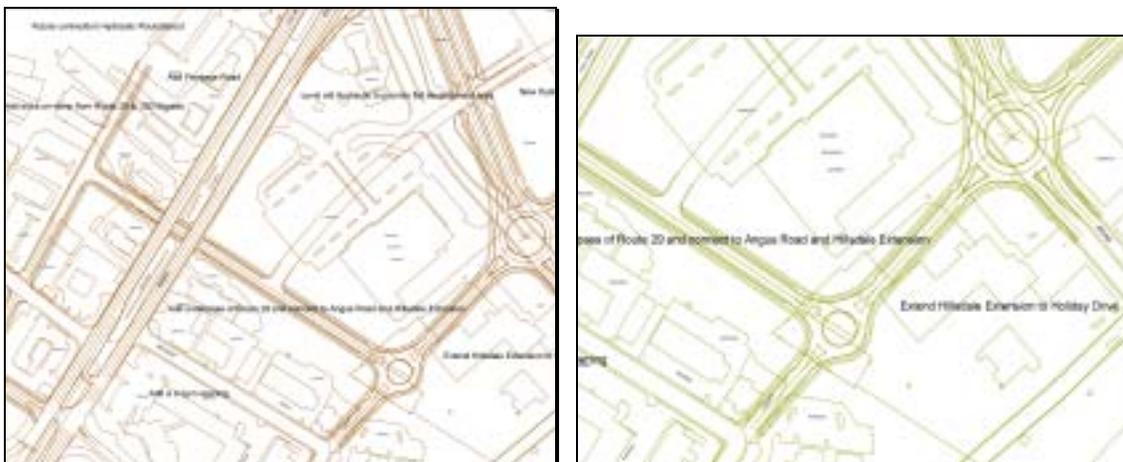


Figure 44 Angus Road Underpass and Hillsdale Drive Extension to Holiday Drive

One benefit of this design is that this underpass could be extended to the Holiday Inn parking lot and then onto the roundabout at Hydraulic Road. This road connection would greatly enhance circulation and business access in this area. The construction of a

frontage service road could also connect the businesses to the underpass and to Hydraulic. If designed well it could eliminate any concerns for the removal of all signals between Hydraulic Road and the 250 Bypass and so eliminate the biggest constraint on traffic traveling from US-29 South to the 250 Bypass. This underpass may have significant grade issues, as well as environmental issues to be determined, since it would be built in an existing gully.

If a road underpass is not feasible, then an overpass should be considered or at a minimum smaller pedestrian/bike underpass to improve mobility. While noted as a long-term improvement, this recommendation could become feasible in a shorter time frame if any redevelopment proposals for the area emerge and this improvement is included as part of those negotiations.

**Hillsdale Drive Extension from Hydraulic Road to Holiday Drive.** As the triangle area bounded by 29, Hydraulic, and the 250 Bypass redevelops, Hillsdale should be extended from Hydraulic Road to Holiday Drive to support businesses in this access-deficient area. This road would also connect to the Angus Road underpass. It is important that if the Best Buy store south of Angus Road proceeds, its access road should line up with the cross road at the end of this US-29 underpass.

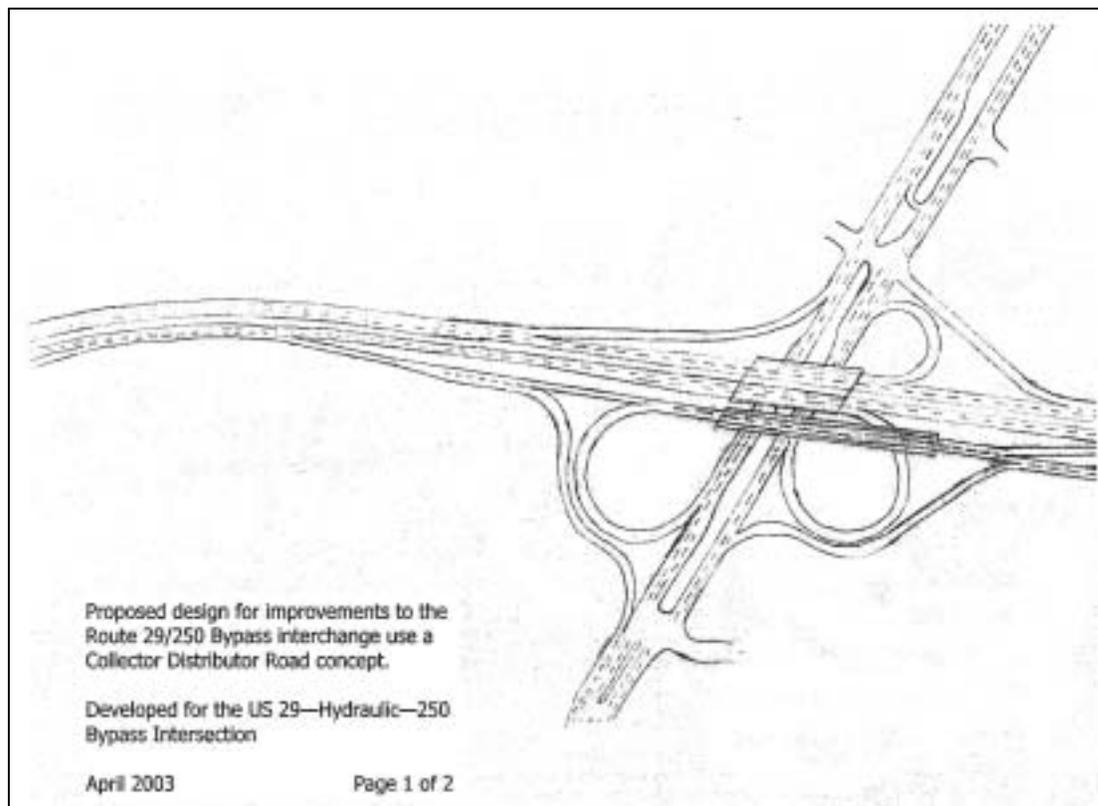
**US-29 Parallel Roads.** To increase the mobility of people living on the west side of US-29, and to enable traveling north and south without having to use 29, a road parallel to, and west of 29, should be considered. Such a road could take the form of a two lane terrain sensitive road, with one lane roundabouts as the primary form of traffic control to control vehicle speeds, enable safe pedestrian crossings and to beautify the roadways. This type of road could be used as a model for the construction of a terrain sensitive grid network of streets to facilitate both north/south and east/west travel.

**Seminole Court Underpass.** An underpass from Seminole Court Road under US-29 to the front of the Sperry building to a roundabout would provide a high-quality connection from the east and west sides of 29. It would connect Albemarle Place to Seminole Square as well as provide pedestrians, bicyclists, transit, and vehicles safe access across US-29. This underpass could be built now with a T intersection using a roundabout as shown if the necessary arrangements could be made. If the integrity of 29 is to be preserved, this underpass is far more desirable than new signals at Zan Road and the Post Office.

**US-29 and 250 Bypass.** Several scenarios for additional improvements to the interchange of US-29 and 250 Bypass were also reviewed. These include various flyovers which would take the through traffic up from 29 and carry it above the 250 Bypass in a curve and connect in the median of the bypass near Barracks Road. This option is very costly and creates a highly elevated multi-lane structure that could detract from the urban commercial area at the gateway to the City.

Another option was to replace the existing partial cloverleaf type interchange with a Single Point Urban Interchange (SPUI). This option is technically viable, however it would limit pedestrian access.

Maintaining the existing cloverleaf design was also reviewed, with a modification to include a collector-distributor road to accommodate the exiting and entering traffic on a parallel side road with a reduced speed to minimize the weave impacts. This too is a viable option, however it would require additional right-of-way on the south side of the 250 Bypass. Further analysis of these options is recommended in the next phase of this project.



*Figure 45 29/250 interchange improvements including a collector-distributor road just south of the existing interchange leading to the Hydraulic/250 intersection*

A final long-term option for US-29 is to provide two on-ramps from US-29 to the 250 Bypass. This twin ramp would start on 29 just south of Hydraulic Road and continue onto the 250 Bypass, and extend along the 250 Bypass for just under a mile. These twin ramps could be built by narrowing the median and closing the median openings between Hydraulic Road and the 250 Bypass, or by acquiring the right of way along the west side of 29.

The removal of the signals at Angus and closure of the driveways along the west side of US-29 would then be possible. It would also involve the closure of the existing on and off-ramps at Barracks Road on the north side of the 250 Bypass. This option would have significant impacts on existing US-29 businesses, and would require both a frontage

service road and a new road at the rear of the properties tying in with Hydraulic and (potentially) with an Angus Road underpass.

### **Priority Transit System**

Implementation of a Bus Rapid Transit (BRT) or Light Rail (LRT) system is a long-term solution that should be planned in coordination with the 29H250 project. Since utilizing the median of US-29 is a likely option to consider, more specific consideration should be given to requirements for potential systems in future phases of the project.

The City is very interested in examining what contribution a Bus Rapid Transit [BRT] system might make to improving the movement of people within the Charlottesville-Albemarle area in the future. The City has applied to the Virginia Department of Rail and Public Transportation for funding in FY04 to conduct a BRT feasibility study for this locality.



*Figure 46 Light Rail or Bus Rapid Transit could run along the median, like this Eugene, Oregon BRT system in development*

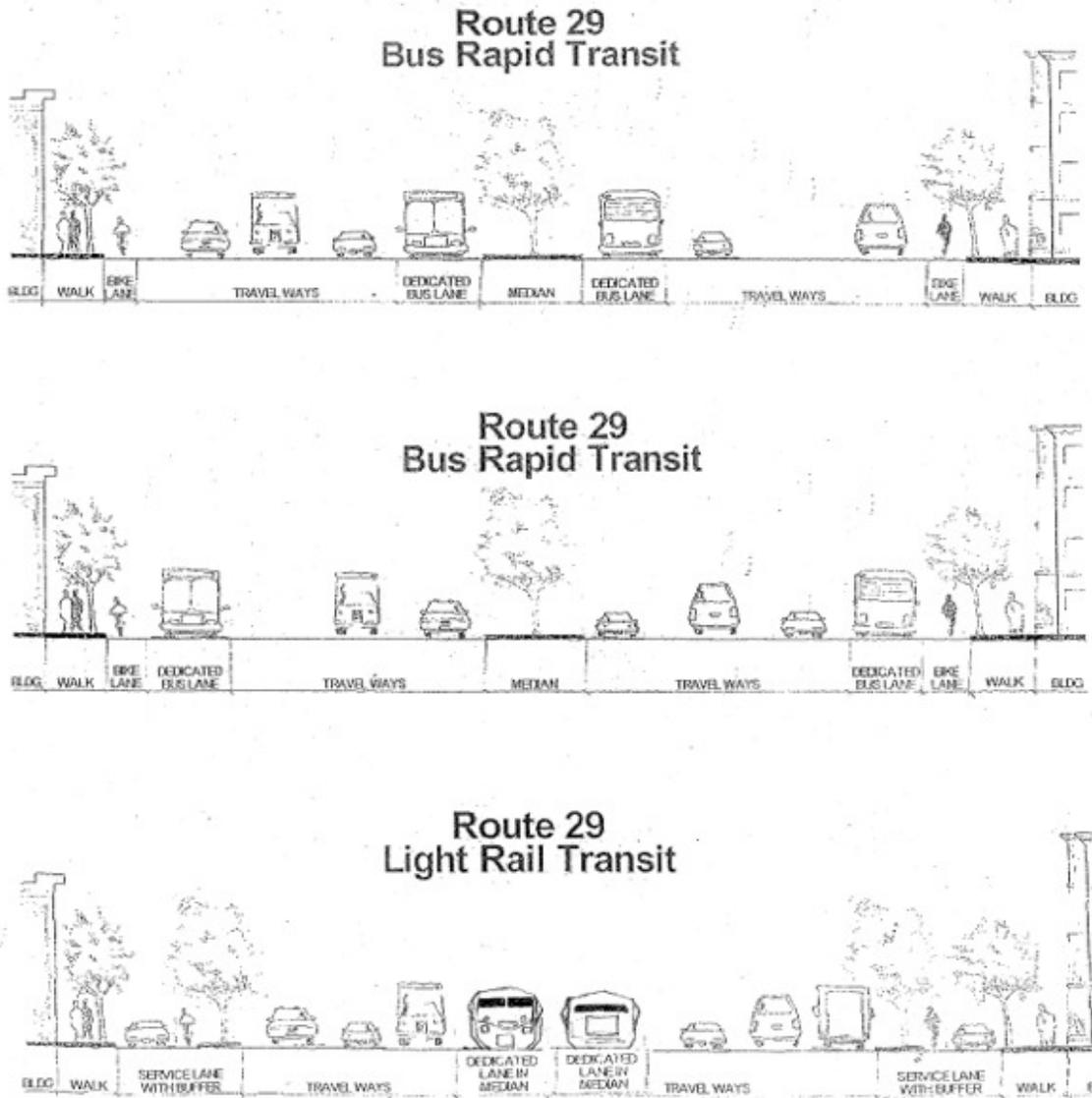


Figure 47 BRT or LRT could run in or along the median or at curb, depending on location

## Why Modern Roundabouts Rather Than Signals?

As outlined in the Proposed Transportation Improvements section, two kinds of modern roundabouts are being considered. The one-lane roundabouts are appropriate for the parallel connector roads like Hillsdale Drive Extended and the new internal roads through the Albemarle Place development. Larger two-lane roundabouts are proposed for the intersections of the 29 to Hydraulic off-ramps, as well as for the Hillsdale/Hydraulic intersection and the intersection of Hydraulic with the entrance to Albemarle Place. It should be noted that while the roundabouts would provide significant benefits over signalized intersections at these locations, all intersections could be built with signals instead of roundabouts, although with less capacity, safety, and more delay. The signalized intersections would also typically require wider roads than roundabouts, to allow for added lanes to stack vehicles waiting to turn.



*Figure 48 This Fort Pierce, FL roundabout replaced a signal at a four-lane state highway, creating a community focal point, while still moving traffic*

**Modern Roundabouts are not traffic circles.** The older traffic circles that many drivers are familiar with tend to be larger, operate at higher speeds, provide little protection for pedestrians or bicyclists, and are less safe for all users. Many have even been modified to add signals. Modern roundabouts are carefully designed to provide a tightly controlled environment that balances the flow of all vehicles and turning movements, while greatly improving safety, capacity, and pedestrian access. This is accomplished by very specific geometric design details that channel all vehicle and pedestrian movements to the best location, while reducing conflict points.

Roundabouts are not new to Central Virginia, although many more are being proposed for problem intersections. Last fall, a staff team from VDOT, County, City, and TJPDC worked with JABA and the Senior Center to develop safer pedestrian crossings for existing sections of Hillsdale Drive. After an extensive public involvement and education campaign, both roundabouts and median crosswalks were identified as the community's preferred solutions. The Technical Team's engineering consultant, Michael Wallwork, is one of the country's top roundabout designers, and has recently been on teams to design roundabouts at the Airport entrance, at the entrance to Scottsville, and for a Route 50 project. Mr. Wallwork also trained local and VDOT staff to use aaSIDRA, the software used for analysis of signals vs. roundabouts. This analysis can be found in the Appendix.

**Roundabouts have greater capacity and less delay** than signalized intersections. The aaSIDRA analysis software – approved by Federal Highways Administration and 49 out of 50 state DOTs – is a very precise tool for measuring levels of service, capacity, length of delays, and lane requirements. SIDRA typically shows that a two-lane road with roundabouts will provide higher capacity, smoother traffic flow, higher level of service (LOS) and less delay than a four-lane road with signals. This is partly due to a more constant flow, with no need to stop all movement to allow left turns in one direction. The same is true of two-lane roundabouts; a two-lane roundabout with four-lane approach roads (with medians) would require a six-lane signalized road for equal capacity.

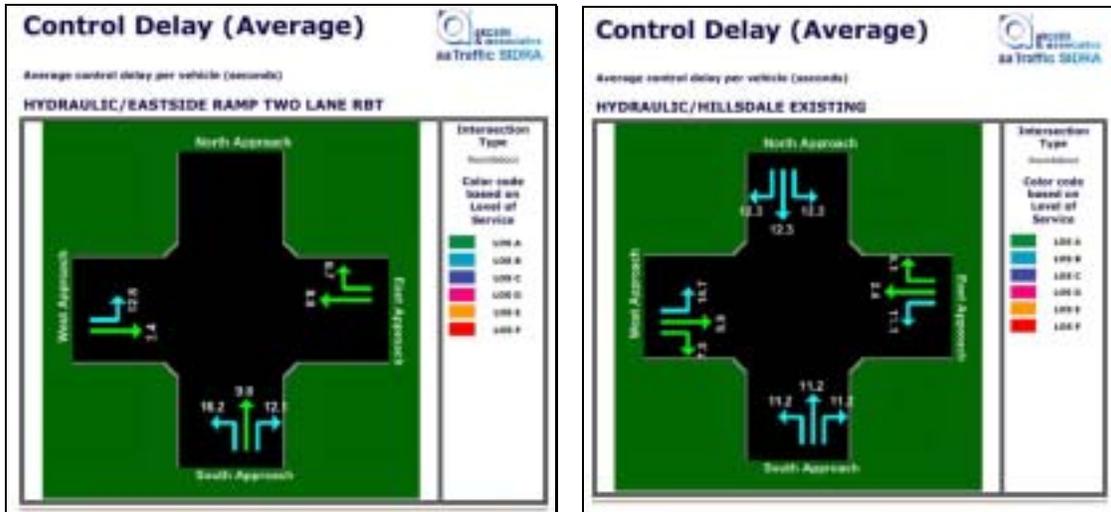


Figure 49 SIDRA analysis shows capacity, delay, and levels of service for roundabouts

<b>HYDRAULIC/WEST RAMP TWO LANE</b>											
Roundabout											
<b>Vehicle Movements</b>											
Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost (\$/h)	
<b>East Approach</b>											
22	L	126	683	0.184	12.8	LOS B	0	1.42	30.4	25	
21	T	543	2945	0.184	3.4	LOS A	0	0.62	36.7	81	
<b>Approach</b>		<b>669</b>	<b>3628</b>	<b>0.184</b>	<b>5.2</b>	<b>LOS A</b>		<b>0.77</b>	<b>35.3</b>	<b>105</b>	
<b>North Approach</b>											
42	L	467	1130	0.412	15.4	LOS B	64	1.66	28.7	91	
41	T	1	9	0.222	6.4	LOS A	28	1.17	33.4	0	
43	R	167	768	0.216	8.7	LOS A	28	1.42	32.2	27	
<b>Approach</b>		<b>634</b>	<b>1907</b>	<b>0.412</b>	<b>13.6</b>	<b>LOS B</b>	<b>64</b>	<b>1.59</b>	<b>29.5</b>	<b>119</b>	
<b>West Approach</b>											
11	T	550	1259	0.437	8.7	LOS A	80	1.41	32.0	90	
13	R	293	671	0.437	8.8	LOS A	80	1.40	31.8	48	
<b>Approach</b>		<b>843</b>	<b>1930</b>	<b>0.437</b>	<b>8.7</b>	<b>LOS A</b>	<b>80</b>	<b>1.41</b>	<b>31.9</b>	<b>138</b>	
<b>All Vehicles</b>		<b>2146</b>	<b>7465</b>	<b>0.437</b>	<b>9.1</b>	<b>LOS A</b>	<b>80</b>	<b>1.26</b>	<b>32.1</b>	<b>362</b>	

**Roundabouts are safer** than signalized intersections or stop signs. A recent study by Virginia's Insurance Institute for Highway Safety (IIHS) reviewed before and after crash data for 24 roundabouts in 8 states that had replaced either signals or 3 and 4-way stop signs. The study found highly significant reductions in crashes that include:

- ❑ **39 % reduction for all crash severities combined;**
- ❑ **76 % reduction for all injury crashes;**
- ❑ **90 % reduction for fatal and incapacitating injury crashes.**

“Overall, results are consistent with numerous international studies and suggest that roundabout installation should be strongly promoted as an effective safety treatment for intersections.” (IIHS, Richard Retting et.al., 2000).

**Roundabouts improve pedestrian access and safety** over typical signalized intersections, if properly designed. Required details include:

- ❑ **Median splitter islands** at each approach, allowing pedestrians to cross only one direction of traffic at a time.
- ❑ **Crosswalks set back one car length** (18') from the edge of the roundabout, so drivers are looking directly at pedestrians, rather than looking left at approaching vehicles. Even in busy traffic, the second approaching vehicle will yield to pedestrians while the first is entering the roundabout.



Figure 50 Median splitter islands and set-back crosswalks create safe pedestrian crossings



Figure 51 Signage and lane markings help drivers and pedestrians navigate a roundabout

- ❑ **Clear signs and lane markings** so drivers and pedestrians know where to go, what to expect, and how to get through the intersection.

- ❑ **Landscaped center islands** and lane deflection (no straight shot through) so that approaching vehicles see the changed intersection and have to slow down on approach. A typical design speed is 18 to 23 MPH.



*Figure 52 Bike lanes approaching roundabouts can have their own ramp onto the sidewalk, though most experienced riders will prefer to merge with the slow-moving traffic*

**Roundabouts accommodate trucks and buses.** Good designers use templates to define the required travel path of larger vehicles. A truck apron is usually provided to allow larger vehicles like moving vans to get around, while still maintaining the appropriate geometry to reduce speeds of normal vehicle. This truck apron is usually around the outside edge of the landscaped center island, made of bricks or concrete, with a mountable curb 2 ½ inches above the pavement.



*Figure 53 Well-designed roundabouts meet the needs of truck and bus traffic*

**Roundabouts are good for business.** Many communities have discovered that a well-designed traffic control device can spark revitalization of a declining business district, by reducing speeding traffic, providing a beautiful focal point, and improving customer access.

**Roundabouts require education.** This is relatively easy, since the actual movements are simple. After approaching and yielding to any pedestrian or vehicle already in the roundabout, all any vehicle can do is make a right turn to get in, and another right turn to get out. Clear signage for these movements has already been developed and approved by FHWA. Educational campaigns, videos, and other creative educational tools have also been developed and are available for use.

Fortunately, the likely phasing of improvements would include a roundabout constructed at Airport Road prior to this project, as well as construction of the smaller Hillsdale Extended roundabouts before any of the more complicated, larger intersections are tackled. This phasing would allow drivers to get used to the changed patterns gradually.

## Urban Design & Redevelopment

Development on US-29 north of the 250 Bypass is not typical of the way the Charlottesville region has developed throughout its history. While most of the City follows time-tested patterns of development, which has resulted in successful urban neighborhoods and districts, the 29 corridor is characterized by strip development and suburban sprawl. Although the City is not focusing redevelopment efforts on this area as much as downtown, the results of the workshop may be helpful to redirect future development in ways that it will not contribute to the degradation of the quality of life for area residents.

To date, practically all discussion about US-29 north of the 250 bypass has dealt with traffic and its negative impact on the quality of life. The problems seen on the roads are simply a symptom of the larger problem found in the development pattern of the entire region. Both transit traffic corridors and the development surrounding it must be given equal attention in order for them to work together and create an attractive place to live, work and visit.

However, even though the scope of the problem may seem large and unmanageable, there are small steps that can be taken that are effective and substantial enough to change the development trends providing for the opportunity for an incremental improvement of the corridor. Such steps include road design ideas, new development concepts, and redevelopment opportunities.

### ***Current Conditions***

As development has occurred in the last few decades, there has been very little planning for additional connections between the large development parcels and the surrounding neighborhoods. Therefore, all traffic, whether it be local or through traffic, is funneled into 29 and its operation is limited by the current designs of the intersections at Hydraulic Road, the 250 Bypass, and Angus Road, among others.

Successful commercial areas in Charlottesville range from the downtown mall to the Barracks Road shopping center. Those places are characterized by high-quality pedestrian environments and careful attention to the aesthetic quality of buildings and spaces. These characteristics make them competitive in the market place. Development along the 29 corridor has not significantly changed in recent years, and is less competitive than it could be. Part of the problem is attributable to the perception of the area as less attractive than its competitors. The combination of traffic congestion and lack of attention to aesthetic issues interferes with the ability to attract customers.

Another issue of concern for the study area is the safety and comfort of pedestrians and bicyclists, as there are few adequate facilities for them. Other areas in Charlottesville which have been targeted for redevelopment emphasize pedestrian access and comfort as does the Albemarle Place development. This strategy is seen as the most successful approach for urban infill. Currently, the development along US-29 continues to follow the suburban models which emphasize vehicles and ignores any other aspect of urban

development. In order for the Route 29 corridor to remain competitive in today's market place, it must address the current needs of the customers and refocus towards better pedestrian, bicycle and transit features.

### ***General Strategies for Redevelopment***

The redevelopment of this area must be made a higher priority. The gateway to the City from the north is on the US-29 corridor and has the potential to improve the image of the area. Although it is easier to focus planning activities and public investment in smaller scale urban projects that have an immediate impact on their neighboring districts, the large-scale impact of sprawl cannot be ignored. The effect of thousands of vehicle trips through an area that does not have any physical appeal would have a significant detrimental effect on any other efforts that the area undertakes.

Sprawl is a fairly recent phenomenon in the City and County and is still developing. The full impact of this pattern of development is not yet apparent. However, it may be very beneficial to learn from the experience of other places where this type of development has been occurring for several decades.

The short-term impact of this pattern of development may be profitable, but in the long term its negative impact on a community is very significant. The impact is obvious on the 29 corridor. Excessive traffic delays, dysfunctional intersections, unsafe driving conditions and a complete absence of adequate pedestrian and biking opportunities are a direct result of the poor site planning decisions that are associated with sprawl.

The concern is not new growth, or even the amount of growth that is occurring. Rather, the concern is improper planning and uncoordinated design. The solution is better planning based on principles that have directed the growth and development of successful places. Charlottesville has many examples of this that can serve as a model for the redevelopment of the US-29 corridor. Even though the impacts of sprawl are showing up on our roads, they are the result of short-sighted land use decisions by local governments, under pressure from developers and consumers.



*Figure 54 The existing road network at left would be augmented by a system of new roads at right*

When only one road services all needs, all the time, it will eventually fail. There are very few technical solutions to this problem. In fact, the only true solution to this problem is to

have more than one road serving multiple needs. However, this solution is very difficult to implement given the current land use constraints.

If the City, County and the private land owners choose to continue to approve and build projects that contribute to sprawl, then the traffic conditions will not improve, but worsen. The impacts of sprawl may be acceptable if the economic benefits to the area are sufficient. However, there may be some public dissatisfaction with the impact on the daily quality of life. The 29 corridor is not unusual in the context of current development practices. Most urban areas throughout America are struggling with their outlying areas and the need to accommodate growth in adjoining jurisdictions. The coordination between cities and counties has been a serious challenge in public policy.

While obsolete strip developments are visual eyesores and underutilized, they can be redeveloped through time by creating blocks within the development, and then linking all the neighboring parcels with streets to complete the gaps in the grid. In order to redevelop it properly, it is important to understand the lifecycle of a strip development. Unless these existing areas are constantly enhanced, they will inevitably be out-competed by any new development, which in turn draws the jobs and tax base away from existing development. As this happens, less visited areas may become blighted and have a negative effect on the quality of life in the community and on its tax base. Although this is not happening presently in great quantities, it is recommended that some immediate steps be taken to make the most effective use of land.

The most effective strategy will follow the following general concepts:

- Development of vacant parcels should be laid out on a grid pattern, and then be connected to existing streets whenever possible. The development that occurs on the blocks created by this grid may change through time. For example, the first generation of buildings is suburban in nature, such as the big box retailers and strip center shopping plazas. However, as time goes by, the grid pattern of the streets will be conducive to better infill with urban buildings, public spaces, and pedestrian, bicycle and transit features. Instead of wasting street frontage with parking lots, multi-story buildings which encourage a mix of uses and a pedestrian and bicycle friendly environment could be built near the street. These buildings would create a highly desirable, and more economically productive, community.
- Redevelopment strategies can easily be linked to the significant road projects being proposed, such as the rebuilding of Hydraulic Road. For example, when the right of way is acquired for these road projects, some of the existing buildings which function poorly from an urban design point of view may be removed, creating an opportunity for new development of an urban nature.
- Existing commercial areas may be redeveloped to become more viable from an economic point of view and more successful by their ability to attract the jobs and shoppers necessary to keep the area viable and attractive. Some concepts that will help achieve this outcome include:

- The linkage of existing streets and parking lots to the overall grid pattern;
- Locating streets in front of buildings which will allow for a more urban relationship between the buildings and public spaces;
- Reconfigure parking to maximize the development potential of underused parcels and the selective demolition of one-story buildings that are no longer economically viable. This strategy will also help existing commercial parcels compete more effectively with new development in the region.

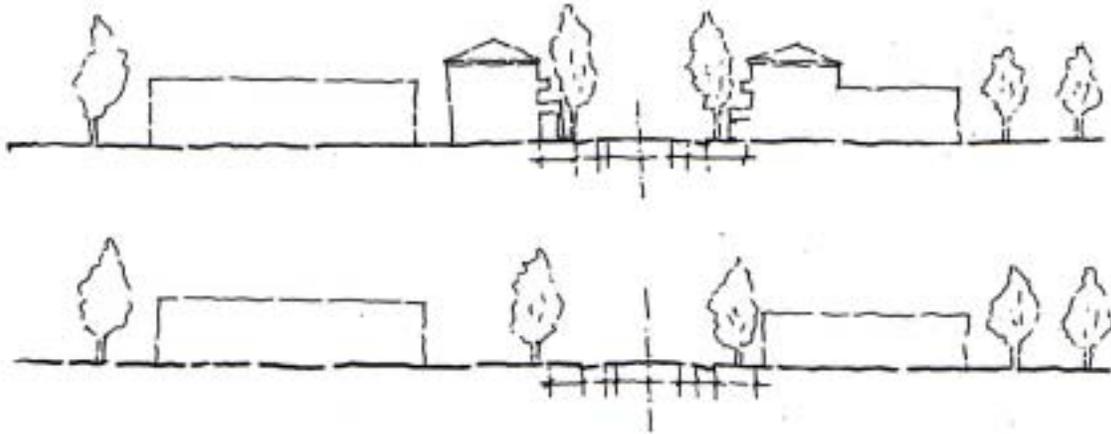


Figure 55 Instead of one-story big box retail set back from the street, multi-story mixed-use buildings could create more active streets and make better use of underutilized property

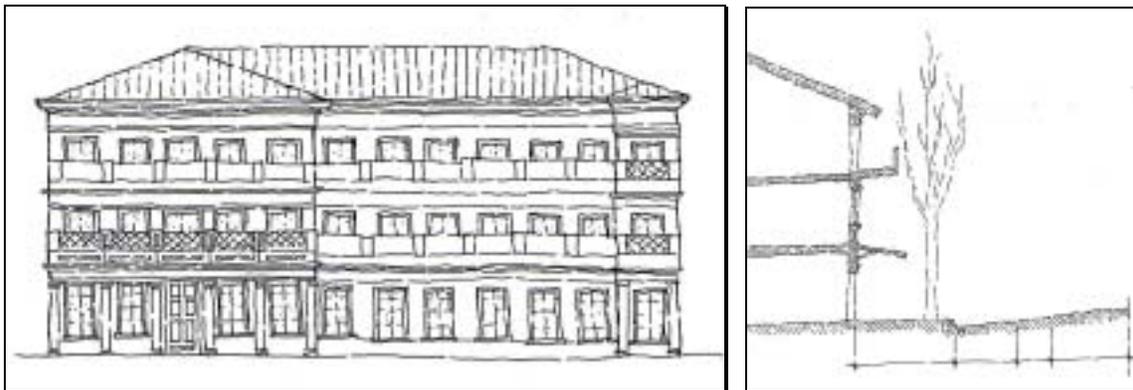


Figure 56 Three-story mixed-use buildings are suggested for redeveloped parcels and infill along new street fronts.

### ***New Development***

The impact of new development on the quality of life of the community needs to be evaluated carefully. Typical impacts include additional traffic, environmental changes, drainage concerns, and the effect on local neighborhoods. But another very significant impact is whether or not the project adds urban quality to the area or simply contributes to sprawl. These impacts have to do with site planning and lay out, architectural design, and the choice of building types. Suburban building types in the middle of parking lots

must be evaluated differently than urban buildings which are sensitive to the existing surroundings and encourage pedestrian and bicycle traffic.

### ***Short-Term Strategies***

- Build Hillsdale Drive Extended.
- Evaluate the existing zoning and land development regulations and revise them as needed to encourage the preferred type of development.
- Review what the impact will be for currently approved and proposed projects on the overall development strategy for the area and revise proposed site plans as needed.
- Improve the operations of US-29 by synchronizing its signals and enhancing the turning movements.
- Build roundabouts at key intersections.

### ***Long-Term Strategies***

- Enhance the trail system by incorporating existing creeks and environmentally sensitive lands to the pedestrian grid.
- Adopt a conceptual alignment of future street networks on parcels identified for development and redevelopment.
- Establish design guidelines that define what the preferred building type is, where different building types should be located, and what the architectural concepts are for future development and redevelopment.
- Continue to review, revise, and establish land development regulations that encourage urban development and discourage unplanned sprawl.
- Analyze the fiscal impact on the City and County of the preferred development and redevelopment.
- Encourage infill of commercial parcels by revising parking requirements and other land development regulations.

Transportation issues cannot be resolved in isolation. Streets and roads are used to move from place to place, and the choice of movement depends on the design of those places. For example, when a destination is compact and has high quality public spaces, such as the downtown mall, the option for people to walk is viable and so many do. There may be a single trip in a vehicle and multiple trips by foot. The street network required for these activities to function properly and effectively is smaller, cheaper, and more attractive than the street network required to function effectively in a suburban strip that caters to vehicular movement.

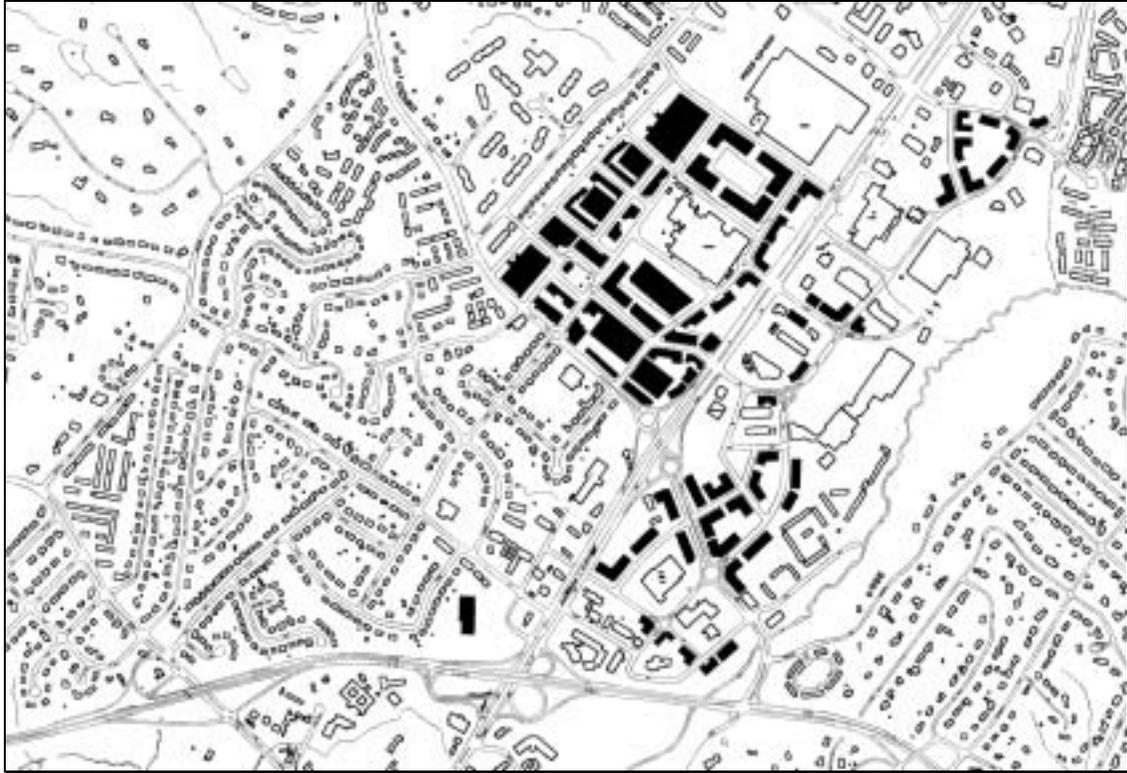
The role of the US-29 corridor in the regional transportation system as a long distance connection is severely affected by the fact that it has also become a road system that caters to the shorter, vehicular trips. Due to the lack of parallel streets, a large number of vehicles making short trips are using 29. Additional turning lanes and additional lanes have been built in to allow for the weaving and stacking needed to negotiate getting on and off 29. All of these factors contribute to the breakdown of its function as a through route.

Making new development landscapes “transit-friendly” may be best achieved by incorporating transit-friendly features into the early design phase of such projects, rather than attempting to “retro-fit” such features into later designs. Transit-friendly design features include such things as operationally safe and reasonable transit access to sites, safe ADA pedestrian access to transit stops, safe bicyclist access to transit stops, bus shelters and lighting at bus stops, context-appropriate signage, and landscaping features that are conducive to bus operations. Such features make using transit more attractive because they promote perceptions of transit as a convenient, safe, and dependable alternative to the private automobile. This in turn contributes to traffic congestion mitigation.

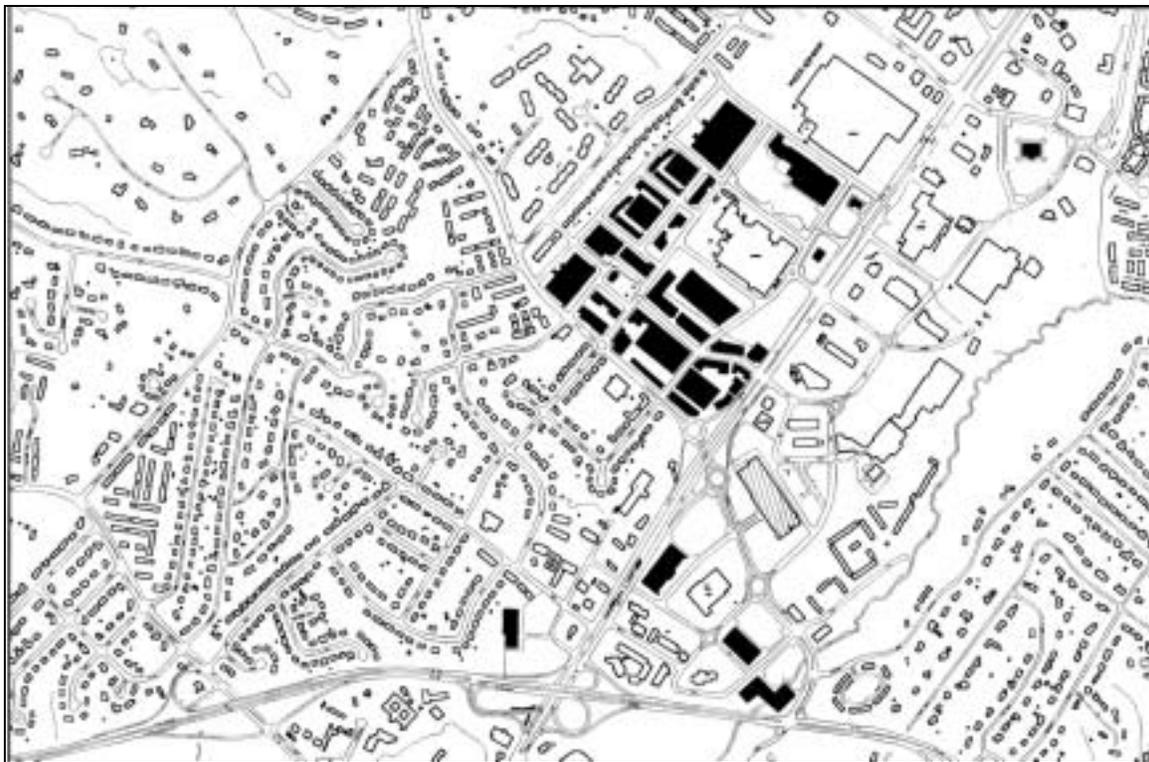
### ***Key Redevelopment Areas***

**Kmart site.** The reconstruction of Hydraulic Road is a significant transportation project that has the potential of redeveloping several blocks of existing commercial properties. The proposed alignment and grade separation of Hydraulic Road brings the street down to the same level as the properties adjacent to it. Unlike the current condition, where access and visibility are severely limited by topography, the proposed street would improve the commercial viability of the Kmart and Kroger sites.

Should both of these retailers remain in place for the long term, cosmetic improvements to the buildings and changes to the parking lots will enhance the future value of the site. Should the sites be redeveloped with additional commercial or mixed use buildings, there is an opportunity to take full advantage of this new segment of Hydraulic Road, and will allow the parcels to start producing increased tax revenues. One development scenario would place new buildings closer to the street, and place the parking lots behind the buildings. This not only immediately improves the visual nature of the area, but would also encourage pedestrian activity by forming small blocks closely linked to the adjacent neighborhoods and districts. This type of development would incrementally transform the current strip conditions into a more urban setting.



*Figure 57 New mixed-use development could follow time-tested patterns and help connect the surrounding neighborhoods together with activity centers, shopping, and services*



*Figure 58 The connected grid of streets could also accommodate big box style development, but with better pedestrian and transit service and improved streetfronts*

**Albemarle Place.** The current plans proposed for this vacant parcel located in the County include two very distinct areas. The southern half of the development is laid out along a grid pattern and includes mixed-use buildings with structured parking located behind. There is a good opportunity to connect this development at Zan Road to the area east of US-29, where most of the City’s strip development is. The northern half of the developer’s proposed site plan is laid out for big box retail. With this, opportunity exists to connect it with Seminole Square through the Sperry property.

One way to improve the current site plan is to design the parcels in the form of a grid that is consistent with the rest of the development, and which could also be linked to the properties across 29 by another connector road. Although big boxes are not the most desirable form of development as they are currently designed, they could eventually evolve into other types of development that are consistent with the general character of the preferred development type.

The typical section of a street within the development should be consistent with the goals expressed during the workshop. For example, there is no need to have four-lane roads, whereas two or three-lane roads with roundabouts would be even more efficient for automobiles and would encourage better pedestrian and bicycle safety and comfort.



*Figure 59 The northern end of Albemarle Place could still fit big box retail with a regular street grid, rather than driveways through parking lots*

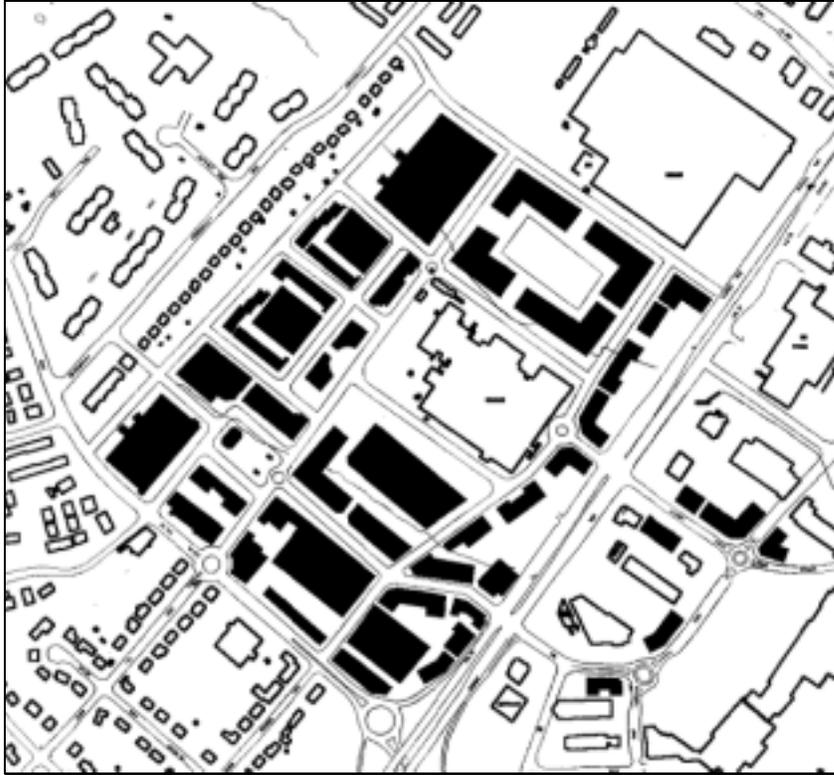


Figure 60 The connected grid could allow for additional infill development as market conditions allow over time

**Seminole Square Shopping Center.** Current development on this site follows the typical strip center development patterns. However, it is fortunate to already have several streets laid out through the parking lots that could be connected to form new north/south streets. This series of connections is generally known as Hillsdale Drive Extended and would not only increase access to the commercial properties, but would also relieve some of the traffic constraints on US-29. The additional connections will also help structure the land into blocks and may someday encourage more valuable infill and redevelopment when existing properties reach the end of their commercial life.





*Figure 61 Underleased shopping centers in the right location can be redeveloped, turning parking lots into active main street business districts*

### ***Aesthetic Considerations of Infrastructure Projects***

Currently throughout America, the only public investment of any consequence that is consistently going on has to do with the building of roads. One of the findings from the focus groups and public workshops is that there is a renewed interest in the appearance of roads and bridges. This is a very important aspect of urban design because roads should be designed as useful and attractive public spaces.

The use of landscape and high quality finishes and materials should be encouraged in every public project that is undertaken. Examples of this are:

- Bridges veneered with stone
- The use of architectural supports rather than just structural supports for bridges
- The use of roundabouts in place of traffic signals. Roundabouts have not only proven to consistently move traffic more efficiently, but are also an easier and more effective way to beautify an intersection. With signals, there are overhead wires and cables, lights, a large surface of asphalt, and the constant stopping motions caused by the signals. With roundabouts, there is less asphalt in the intersection, and a green space to place plants, trees, flowers, or even sculptures or fountains. There are no overhead lights, wires or cables, and traffic is virtually never stopped except at times to give the right of way to cars already in the circle.
- The use of trees in medians and along the sides of roads
- The use of flowers in splitter islands

Special care also needs to be given to the quality of materials at the pedestrian level. Imitation materials should be discouraged and substantial quality finishes should be required in order to enhance the pedestrian experience.

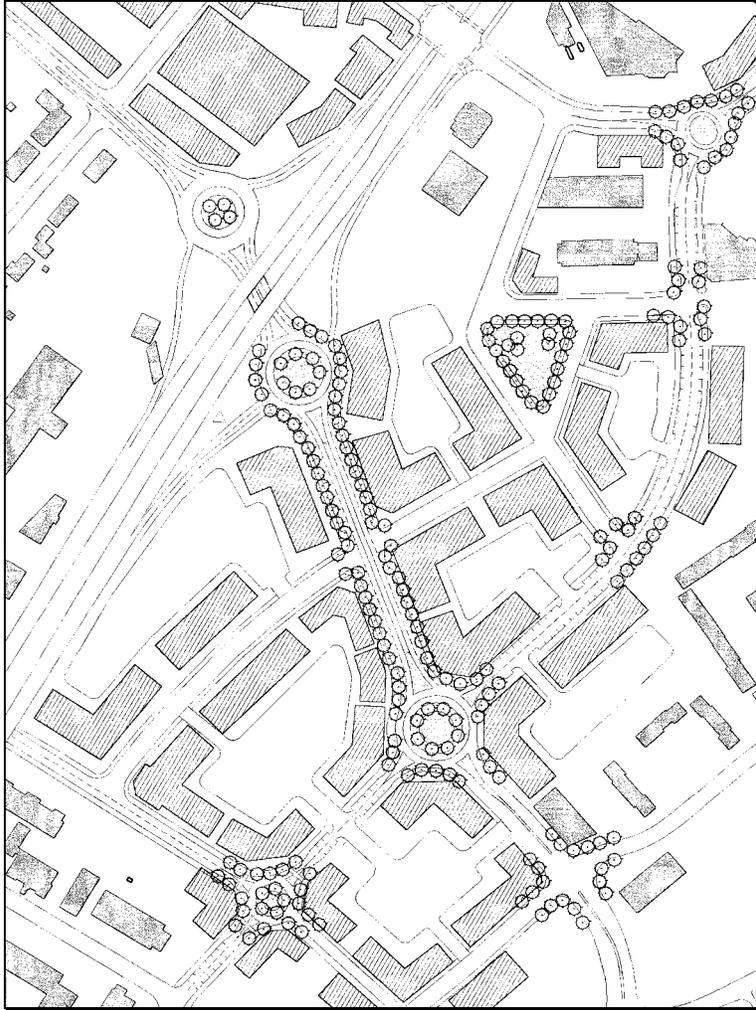
### ***Range of Development Alternatives***

The proposed street pattern allows for a wide range of building types. This range is illustrated by the diagrams that show big box development and more urban, neighborhood-scaled development. While the different types of development are not equal in their quality, the proposed grid of streets is sufficiently flexible to accommodate various market needs and flexible private investment.



*Figure 62 The new street network and intersection improvements could serve existing properties and stores like Kmart and Kroger, plus fit more large retailers (left) or accommodate a gradual redevelopment into a downtown-scaled mixed-use redevelopment area*

Should the City choose to continue development along the big box model, the new grid will accommodate it. This alternative is not very appealing, as it only deals with the single issue of the increased tax base. It would be preferable to increase the tax base with higher quality urban buildings. Such options are available to private investors now or in the future. Development may first be suburban in nature and later evolve into a more urban pattern. It is likely that the longest lasting investment will be the street pattern. That has been the experience in most cities that have a long history, such as Charlottesville.



*Figure 63 The new street network will support compact, use redevelopment*

*mixed-*

Once a street is laid out, it typically lasts for decades, and sometimes centuries. Buildings change, but streets tend to remain in the same place. The role of planning and design is to improve the specific details of the street and the buildings. The urban design recommendations shown on the conceptual drawings include better street design and proposals for better site planning and building design.

## **Economic Analysis**

While it is clear that from the perspective of traffic engineering major changes are desirable in order to reduce congestion, the potential impact of those improvements on the area's retail base should be carefully considered. Likewise, it is important to include the consideration of economic implications—as opposed to merely the transportation effects—of maintaining the status quo and making no changes.

The retail base in question—whether one considers individual businesses or the entire agglomeration—is facing increasing competition from existing and future retail centers both within the City and elsewhere in the County. Demographic trends are changing the center of gravity of the County's retail demand, and the study area may find itself struggling to compete in a changed economic environment.

The main questions then become: What is the importance of the study area to the City's overall retail base and economic health? What is its relationship to the County and what role does it play in the regional retail mix and the larger regional economy? What will happen if it cannot adapt to a new competitive context? Alternatively, what benefits could result from policies that facilitate the area's adaptation? How can competing needs be effectively balanced?

The analysis presented in this report was limited to that which could be performed using existing data. Due to the short time frame of the study, no significant outside sources of data were used. It is expected that in the next phase of this study, more extensive analysis, including analysis of the impact of Albemarle Place and of expected development elsewhere in the County and the US-29 corridor will be completed.

### ***Study Area Boundaries***

The economic analysis considers all of the commercial development in the entire area that is within the City boundary and north of the 250 Bypass since all of these businesses will be impacted, either directly or indirectly, by the proposed transportation improvements under consideration. It has been assumed that County properties in the study area will be lost as a result of the Albemarle Place development and were therefore excluded from most analyses, although consideration was given to the accessibility issues related to the County's two industrial sites, Sperry and the former Comdial plant.



Figure 64 Existing commercial development in study area

**Context**

**Demographic Characteristics and Trends**

Area demographics and growth trends are critical to understanding the retail environment because demand for retail goods is determined in large part by demographics—population size, growth, and characteristics such as age composition and income.

**Population**

Table 1 shows current population and recent growth in the City and the County. The County’s population expanded by 23.7percent in the 1990s, while the City’s population stayed constant.<sup>1</sup>

<b>Table 1: Current Population and Population Growth, 1990-2000</b>				
Jurisdiction	Population		Growth	
	1990	2000	Absolute	Percent
Albemarle County	68,040	84,186	16,146	23.7
Charlottesville	40,341	40,099 <sup>2</sup>	-242	-0.6

Source: US Census

The fact that the area’s population growth is occurring entirely outside the City has important implications for retail patterns. As the area’s geographic center of gravity shifts outside the City, so will demand for retail and services. While specialized retail centers within the City should continue to draw customers from the County and the

<sup>1</sup> Given the volatility of the student population, small changes should not be interpreted as particularly significant.

<sup>2</sup> The 2000 population of the City of Charlottesville was revised downward from the original figure published because a university dormitory that is outside the city limits had originally been counted as part of the City’s population. In Table 3, the correction was made by subtracting the appropriate number from the 18-24 age category.

region, much of the more basic retail will tend to concentrate outside the City in order to serve the County population. The same retail centers will also likely draw customers from the City.

These findings are significant not just because of their fiscal implications for the City, but also because of the possibility that as basic retail moves outside the City, Charlottesville residents will find themselves underserved.

Racial and ethnic diversity is another aspect of the demographic picture. As shown in Table 2, the County is significantly less diverse in racial terms than the City. In particular, African-Americans are much more highly concentrated in the City, making up 22 percent of the population compared to only 10 percent in the County.

Racial/Ethnic Category	Percentage of Total Population	
	Albemarle	Charlottesville
White	85.2%	69.6%
Black or African American	9.7%	22.2%
Asian/Pacific Islander	2.9%	5.0%
Native American	0.2%	0.1%
Other	0.9%	1.0%
Two or more	1.3%	2.1%
Hispanic	2.6%	2.4%

Source: US Census

Finally, the age structure of the population is an important determinant of retail demand, since demand for goods and services varies greatly from one stage of the life cycle to the next. Table 3 shows the age structure of the County and the City. The most significant differences are in the lower age brackets: Albemarle County has a much higher percentage of children under 18, while Charlottesville, not surprisingly, has a larger population (both in absolute and proportional terms) in the traditional university student age bracket of 18-24. The City has a slightly higher proportion of its population in the 25 to 34 category, but the County has a higher proportion of residents between the ages of 35 and 64. The percentage of residents 65 and older is roughly the same in the City and the County.

<b>Table 3: Age Structure of Albemarle County and Charlottesville, 2000</b>				
Age Category	Albemarle		Charlottesville	
	Population	Percentage of Total	Population	Percentage of Total
Under 18	19,683	24.8%	6,835	17.0%
18 to 24	10,708	5.3%	10,258	14.2%
25 to 34	11,129	14.0%	6,566	16.4%
35 to 49	19,937	25.2%	7,274	18.1%
50 to 64	12,809	16.2%	4,618	11.5%
65 and older	9,920	12.5%	4,548	11.3%
Total Population	84,186	100.0%	40,099	100.0%

Source: US Census

### Income

City residents, as a group, have significantly lower incomes than residents of the County as a whole.<sup>3</sup> Median household income in the City was 64 percent of the County level in 1999. Households with incomes over \$60,000 make up 42 percent of the population in the County, but only 23 percent in the City. In contrast, nearly 16 percent of the households in the City earn less than \$10,000, compared to only 6 percent in the County.

Income levels vary by race as well as by geography, with Black and Hispanic householders reporting lower median household incomes than white householders. Income, race, and geography are linked since Blacks are much more concentrated in the City than in the County as a whole.

The City is therefore home to a large concentration of low-income households, and in particular low-income African-American households. This has important implications for retail, both in terms of estimating retail demand and in terms of taking social equity considerations into account. The low-income population of the City needs reasonably priced retail options. Moreover, given patterns of vehicle ownership, these options need to be accessible by transit that extends well into the County. There are over 2,000 households in the City that do not have access to a vehicle, but they are not distributed equally across racial and ethnic groups. While only 9 percent of white households do not own a car, 20 percent of Hispanic households and nearly one-third of African-American households lack access to a vehicle.

The City also has a significant affluent population. As mentioned earlier, 23 percent of the households have incomes over \$60,000. Moreover, there is a large and affluent student population that is not, for the most part, captured in this statistic. University of

<sup>3</sup> These data may be skewed by the fact that Charlottesville has a large student population with incomes that, on paper at least, are low. However, the data make clear that there is also a significant low-income non-student population.

Virginia students come from wealthier families than students at most of their peer institutions, with 77 percent of the families estimated to earn over \$60,000.<sup>4</sup>

Therefore, any retail strategy must seek to capture as much spending as possible from the City's affluent population—as well as drawing in County residents—while ensuring that the low-income, transit-dependent population is still well served.

### ***Existing Competitive Retail Supply***

Retail businesses in the study area compete with a number of other major retail centers:

- The Barracks Road Shopping Center, located in the City about a mile south of the study area, offers 480,000 square feet of retail with a wide range of shops and services, including both local businesses and national chains. Overall the center serves a somewhat higher market niche than the businesses in the study area, but there is a diversity of businesses there that attracts shoppers of varying income levels.
- Roughly two miles north of the study area at the intersection of US-29 and Rio Road there is a concentration of shopping centers. Fashion Square Mall is the largest enclosed shopping center in the area, offering 575,000 square feet of retail, including Sears, JC Penney, and other middle price point tenants. Albemarle Square Shopping Center, across from the Fashion Square Mall, is a diverse shopping area that provides restaurants, a fitness center, health care, specialty shopping, a theater, a library, and transit stops. Just up the road, Rio Hill Shopping Center offers groceries, restaurants, and specialty shops. Smaller centers, such as the Woodbrook Shopping Center, the Berkmar Crossing Center, and the Gardens Shopping Center round out the mix on this section of Route 29.
- 
- Additional “big box” retail along the US-29 Corridor north of the study area includes Lowe's, Wal-Mart/Sam's Club, and other stores.
- The Pantops Shopping Center, located east of the City on US 250, has a Roses and Food Lion as anchor tenants with a series of smaller shops. The recently completed Rivanna Ridge Shopping Center, which includes a Giant supermarket, is also located farther east in the Pantops area.
- Finally, the downtown pedestrian mall has small shops, restaurants, cafes, a skating rink, and a multi-screen theater. This area offers specialty retail in a historic and pedestrian-oriented setting, and is thus quite unique in the regional market such that it probably does not compete directly with most of the businesses in the study area.

### ***Proposed Competitive Retail Supply***

To date, there are several major mixed-use projects proposed in the County. With a proposed total of approximately 2.1 million square feet of new retail space, the projects could have a significant impact on the performance of the existing retail stores in the

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<sup>4</sup> Data from the Cooperative Institutional Research Program (CIRP), 2000. UVA was compared to both public universities generally and other "high selectivity" public universities.

study area. These projects include Albemarle Place, which will be in the northwest quadrant of the 29/Hydraulic intersection and will include approximately 1.9 million square feet of development, including a 143,000 square foot anchor department store, 210,000 square feet of “junior big-box” stores, 260,000 square feet of small-scale retail (including a grocery store), 42,000 square feet of restaurants, a 14-screen cinema, and a hotel. In addition, the development will include 270,000 square feet of office space and 778 residential units to round out the mixed-use character. Plans currently call for a department store as the key anchor in this mixed-use retail area. The other two projects include North Pointe and Hollymead Town Center which would both be located on US-29 near the airport. Combined, these first three projects, as currently proposed, include approximately 2.1 million square feet of new retail space.

While these projects include residential components, the number of housing units is relatively small compared to the amount of retail space being proposed. Albemarle Place will include 778 units. Hollymead Town Center, which is being processed as four separate rezoning proposals, has housing in three of these four sub-proposals for a potential total of 1,200 units. North Pointe currently includes almost 900 housing units. Albemarle Place will include roughly 900,000 square feet of office space, which will generate retail demand on the site, but overall the amount of non-retail development in the three projects is not enough to support the amount of retail space. These developments are clearly being designed to draw retail demand from outside of the area.

A fourth potential project known as “the Brass Inc. Site,” now being proposed is for a location south of the City at the I-64 interchange with 5<sup>th</sup> Street Extended. Discussions as to what could happen at this location are still extremely tentative, however there has already been discussion of at least one more grocery store and perhaps another big box. Due to its proximity to lower-income City and County residences coupled with the likelihood of future transit service along the 5<sup>th</sup> Street Extended corridor, this site has the potential to help serve the needs of low to moderate-income residents.

### ***Existing Conditions in the City***

#### ***Land Use Mix***

The study area comprises 200 acres with approximately 1.5 million total square feet of built space. Although there are a few residential projects in the area, the predominant uses are commercial.

With approximately 660,000 square feet of built space on 78 acres of land, retail/service commercial uses account for roughly 40 percent of the land area, and a slightly higher percentage of the total square footage. This volume of retail is comparable to a medium size power center.

Hotels account for the next largest portion of built space—24 percent of the total, or 370,000 square feet—but this is concentrated on only 10 percent of the land. Residential uses are 10 percent of the total square footage, followed by industrial at 9 percent, public uses (e.g. a post office) at 8 percent, and office/institutional uses (including banks) at 5 percent. 22 percent of the land is vacant. Table 4 summarizes the land uses.

Land Use	Land Area		Built Space	
	Acres	Percent of Total	Gross SF	Percent of Total
Vacant	44	22.4%	0	0.0%
Retail/Restaurant/Movie	78	39.8%	660,003	42.5%
Office/Service/Bank/Institutional	14	7.1%	77,478	5.0%
Public	11	5.6%	127,484	8.2%
Industrial	15	7.7%	136,440	8.8%
Hotel	19	9.7%	370,958	23.9%
Residential	13	6.6%	157,740	10.2%
Other	2	1.0%	23,070	1.5%
<b>Total</b>	<b>196</b>	<b>100.0%</b>	<b>1,553,173</b>	<b>100.0%</b>

Source: City of Charlottesville

### ***Business Mix***

There are approximately 150 businesses in the study area, including large stores (e.g. Kmart, Kroger, Giant), food service establishments (e.g. Aberdeen Barn, Chili's, Krispy Kreme, Kentucky Fried Chicken, Szechuan Restaurant), hotels (e.g. Hampton Inn, Holiday Inn, Comfort Inn), auto sales and service stations (e.g. Import Car Store, Exxon/Tiger Fuel Mart, Express Car Wash, Meineke Muffler,), a cinema, and a variety of other stores and services (e.g. Camera Center, Wine Warehouse, clothing stores, professional offices, banks). Although the retail stores are "anchored" by large regional and national chains including Giant, Office Depot, and Kmart, the Seminole Square area in particular also has a significant number of small locally owned businesses.

However, this area may not effectively capitalize on the benefits of retail agglomeration. Access from the surrounding residential neighborhoods is difficult due to road congestion, and connections between the developments is lacking due to the absence of local streets or even direct connections through the parking lots.

Most of the businesses target the middle price point rather than the upper end of the market. As a result, they represent an important asset for the City's lower-income population, which needs access to reasonably priced goods. This important role of the study area businesses should not be forgotten.

### ***Study Area Retail Sales Trends***

Due to the issues of privacy and competitive disadvantages, data was not available to estimate the total amount of retail sales being generated by the study area. While it is possible to create an estimate based on national or even regional norms based on store type and average sales per square foot, this discussion will not provide much insight into actual store performance over time and to the competitive pressures stores are currently

facing. Therefore, qualitative interviews used to gain some insight into individual store sales trends and a comparison of taxable retail sales in the County overall versus the City were used to understand aspects about overall trends and patterns.

Interviews with a mix of both the larger chain stores and the smaller independents indicate that, although retail performance is mixed, in some cases sales have been increasing. According to City sources, Kmart reports this store to be one of the highest performing outlets in their entire chain. When the retailer comes out of Chapter 11, as they are expected to do later this year, the plan is to upgrade this particular store to a “superstore” which would include groceries. The high volume of sales at this store seems consistent with the City’s demographics. Lower income households with limited mobility are dependent on this store for their general merchandise as most probably find it difficult to access the Wal-Mart further north on US-29.

Looking at the larger retail sales trends using data from the Commonwealth’s Department of Taxation, it appears that even with virtually no population growth, the City captured a significant share of retail sales within the County during much of the 1990s. However, the growing population in the County, combined with higher incomes, and the presence of more households with children, make the County a much more attractive place for future retail growth than the City. This is evident in the fact that the newest retail development serving the Charlottesville area, the new Super Giant at Pantops, is in the County, not the City. Although the data is not available to do a comprehensive test of the impact this store opening had on retail sales in the City, a comparison of the one month retail sales for January 2002 to January 2003 does point to a possible trend that could be of great concern to the City. For this one month, sales were up in the County by 13 percent over the previous year while in the City they were up by only 7 percent.

### ***Economic Contribution to the City***

The condition of businesses in the study area has a direct impact on the City’s economic well-being in that these businesses contribute considerable revenues to the City’s general operating fund through various taxes. This analysis focuses on two revenue sources: property tax and business license fees. Data for sales and use taxes and utility taxes are not readily available. In the case of sales tax, a break down of City-wide sales tax data by geographic area was not available, and confidentiality measures make it difficult to get figures for a specific business or address. However, sales taxes are a significant revenue source for the City and any potential impact on future sales and store performance will certainly have implications for the City’s ongoing financial health.

Additionally, figures on total employment and wages in the study area were not readily available. Any estimations that could have been made using figures on average square feet per employee and prevailing wages in different retail segments are considered inaccurate, and were therefore not calculated. However, the next phase of this study will employ methods and resources in providing accurate data on retail sales, sales tax revenues, employment, and wages.

### ***General Revenue Issues***

Table 5 shows a breakdown of the City's tax revenues in Fiscal Year 2001-2002. The City's total tax revenues in Fiscal Year 2001-2002 were roughly \$55 million. According to the City's Comprehensive Annual Financial Report (CAFR) for the fiscal year ending 2002, tax revenues provide almost 50 percent of the City's total annual revenues. Over 60 percent of this sum—roughly 30 percent of the entire budget—was derived from property taxes, including both real estate and personal property. Sales and utility taxes account for another 14 percent and 12 percent of the City's tax revenues, respectively. This breakdown has changed very little over the past ten years, and property tax, sales and use tax, and utility tax together have consistently accounted for roughly 85 percent of total tax revenues.

Type of Tax	Amount	Share of Total Tax Revenue
Property	\$33,354,871	60.7%
Sales & Use	\$7,825,769	14.2%
Utility	\$6,666,349	12.1%
Meals	\$3,832,968	7.0%
Lodging	\$1,492,003	2.7%
Franchise	\$340,066	0.6%
Bank Stock	\$784,853	1.4%
Wills And Deeds	\$202,493	0.4%
Cigarettes	\$285,047	0.5%
Recordation	\$128,729	0.2%
Other	\$78,237	0.1%
<b>Total</b>	<b>\$54,991,385</b>	<b>100.0%</b>

Source: City of Charlottesville, Strategic Economics

### ***Property Tax Contribution***

In Fiscal Year 2001-2002, the study area generated approximately \$2.4 million in real estate taxes, amounting to 9 percent of the City's total property tax revenues. Of the total assessed valuation in the study area, land values contribute 43 percent while improvements contribute the majority, 57 percent. However, as will be discussed below, the value of land has been rising at a faster rate than the value of improvements, and without major changes it is likely that the ratio of total improvement value to total land value will be reversed.

Table 6 shows assessed property values by land use for Fiscal Year 2001-2002. Retail properties generated the highest amount of absolute property tax revenues in the study area, followed by hotels and office and related uses. However, on a per acre basis retail produced lower revenues than hotels. Within the study area, the Seminole Square

shopping center contributes the most property taxes overall. According to the CAFR, Seminole Square is the 12th largest taxpayer in the City.

**Table 6: Assessed Property Values**

Land Use	Total	Improvements	Land
Retail/Restaurant/Movie	\$62,934,000	\$31,744,000	\$31,190,000
Hotel	\$25,948,300	\$16,980,300	\$8,968,000
Public	\$12,348,300	\$8,771,800	\$3,576,500
Office/Service/Bank/Institutional	\$10,265,500	\$5,710,700	\$4,554,800
Residential	\$8,155,000	\$6,477,100	\$1,677,900
Industrial	\$6,313,700	\$3,579,600	\$2,734,100
Other	\$2,301,900	\$1,663,500	\$638,400
Vacant	\$909,700	\$0	\$909,700
<b>Total</b>	<b>\$129,176,400</b>	<b>\$74,927,000</b>	<b>\$54,249,400</b>

Note: Public property generates no property tax revenues. Assessed values are for reference only.

**Business License Contribution**

There are currently 148 businesses in the study area, about 4 percent of the approximately 3,500 businesses in the City. However, study area businesses contribute a disproportionate share of the City’s business and professional licenses revenues, about 11 percent of the total.

**Measures of Economic Performance**

There are a number of measures to test the economic performance of real estate development. This analysis has employed three measures of performance based on comparisons between the study area and more normative standards. Table 7 shows figures derived from the land use and building figures given above.

**Table 7: Land and Building Values and Measures of Performance and Utilization**

Land Use	Value/Acre	Value/SF	I/L Ratio	FAR
Hotel	\$472,000	\$46	1.9	0.4
Retail/Restaurant/Movie	\$399,871	\$48	1.0	0.2
Office/Service/Bank/Institutional	\$325,342	\$74	1.3	0.1
Public	\$325,136	\$69	2.5	0.3
Industrial	\$182,273	\$26	1.3	0.2
Residential	\$129,069	\$41	3.9	0.3
Vacant	\$20,675	n/a	0.0	0.0
<b>Total</b>	<b>\$276,782</b>	<b>\$48</b>	<b>1.4</b>	<b>0.2</b>

Source: City of Charlottesville, Strategic Economics

### ***Assessed Valuation Trends***

Overall, between 1997 and 2002 the assessed value of improvements (buildings) in the study area increased in value only 5.2 percent (in real terms), compared to a 22.4 percent increase in land values. However, this masks the fact that many properties have actually seen a decrease in the value of their improvements even as their land values have increased rapidly.

The difference is due in large part to the factors that determine the value of land and buildings. Land values are determined primarily by regional factors such as population growth. These factors have been putting upward pressure on all land in the County, although not to the same degree in every location. In the case of buildings, however, values are determined by the physical condition (and the normal rate of depreciation) and by the viability of the building for its intended use. That is, the assessed value of a commercial building is tied to the strength of the industry that it is intended to serve and the performance of the businesses it contains. When hotel occupancies drop, the assessed value of hotel buildings goes down. When shopping center vacancy rates increase, the assessed value of the shopping center is revised downward.

Many of the buildings in the study area contain businesses that did not perform well during the period in question, and Seminole Square has a high vacancy rate. This has important implications since it is unsustainable in the long term for underperforming businesses or shopping centers to pay rapidly increasing property taxes. Ultimately, there will be pressure either to improve performance—for example, by facilitating access and improving the properties—or to redevelop the properties with a new use that is more suited to the land values.

### ***Improvement to Land Value Ratio***

The improvement to land (I/L) ratio offers a simple way to quantify the relationship between the existing use and the land by calculating the relationship between the assessed value of built improvements on any given parcel to the value of the land itself. If the value of the land is higher than the value of the improvements, the property is considered “underutilized” from an economic perspective and is more likely to experience redevelopment through private market forces than properties where improvements are more valuable than the land. While there is no fixed rule about the exact threshold I/L ratio that indicates when a property has become underutilized, in general, if a property has a ratio of 1.2 or above, it is considered valuable enough to remain in its existing use. As the ratio declines, properties have an increasing potential for redevelopment.

The average I/L ratio in the study area overall is 1.4, showing that buildings are generally valuable enough to remain in their current use. However, as Table 7 shows, the average retail ratio is just over 1.0, suggesting that many retail properties could be ripe for reinvestment. This is particularly true of the retail properties south of Hydraulic Road: whereas the major retail buildings in the Seminole Square area have an average I/L ratio of roughly 1.3, those south of Hydraulic Road have a ratio of less than 1.0.

At 1.9, the hotels have the highest I/L ratios of any commercial use in the study area, suggesting that they are a viable and stable use that is unlikely to change in the foreseeable future.

### ***Floor Area Ratios***

Another measure of economic utilization is the floor area ratio, which shows the relationship between the amount of building area (total square footage) on a parcel and the land area. A floor area ratio (FAR) of 1.0 indicates that the number of square feet of built space is equal to the amount of land on the parcel.

Floor area ratio is affected by building height and parking ratios. While higher building heights generally mean higher FARs, a multi-story building can still have a FAR of less than 1.0 if a large amount of surface parking is provided and the building therefore occupies a small portion of the parcel.

FAR is related to I/L ratios; In general, a building with more square footage will be worth more in relation to the land that it sits on. However, there are clearly other factors—such as building type and quality—that affect a building's value, in addition to its size.

In general, the parcels in the study area are characterized by a very low floor area ratio. Overall, the average FAR is 0.2. This figure varies somewhat by land use, but even so the highest FAR is 0.4 for the hotels. This is due in large part to the fact that parking ratios are high and so much of the land is used for parking, but it also reflects the historically low levels of investment and land utilization.

If land values continue to increase, whether due to regional factors (such as those that have driven the recent increases) or local factors, such as traffic and access improvements, the economic incentives to utilize the land more efficiently by building at higher FARs may increase.

### ***Impacts and Implications of the Road Network Improvements***

Without doubt, the study area is an important asset to the City in terms of the tax revenues it contributes to the City and the critical shopping opportunities it provides to residents, especially those who are low to moderate income and have limited access to cars. However, changing trends and conditions in the County, including rapid population growth and the number of proposed new retail centers, indicate that with or without any changes to the 29/Hydraulic Road intersection, the study area will be increasingly vulnerable to significant competition. While other retail concentrations within the City, most notably Barracks Road and the downtown, are not likely to suffer from this increasing competition because they serve a different market niche, the Seminole Square area, including Kmart and Kroger, will be directly impacted by future growth as developers look to add more national chain stores oriented towards the middle price point of the market.

Additionally, future traffic generated by the Albemarle Place development will have significant impacts on the already congested roadways in the study area. The

implications of a do-nothing scenario will have devastating affects on traffic conditions and will likely lead to severe impacts on all businesses in the study area.

During the focus group discussions held as part of this study and subsequent discussions with individual businesses and other key informants, it is clear that study area businesses are highly dependent on their accessibility and visibility to traffic on both 29 and Hydraulic Road as well as on the high traffic volumes on both roads. Therefore, existing businesses are extremely concerned about any intersection improvements that will affect either factor.

At the same time, focus group participants agreed that congestion at the 29/Hydraulic Road/ intersection, and lack of easy access generally, is a major disincentive to people wanting to avail themselves of the various retail, service, and entertainment opportunities in this area. Shoppers either avoid coming to the area at times when they know it will be particularly congested, or they use the short-cut through the Kmart parking lot to avoid the congested intersection.

Problems with access should be seen as broader than just traffic congestion on US-29. Internal circulation within the study area is also a problem, with few amenities for pedestrians, bicyclists, and transit riders. This discourages shoppers who have access to an automobile from choosing alternatives, and it relegates those who don't have the choice to drive to a marginal place in the transportation system.

Lack of access is not just a transportation problem; it is a significant long-term competitiveness issue. Even the property tax assessments reflect the role accessibility plays in real estate values. This is evident in the fact that properties south of Hydraulic Road have lower assessed valuations than those on the north side, partly because their accessibility is so limited. This is particularly true for the parcels off of Holiday Drive.

In addition to the problems with access, businesses are conscious of the fact that although Charlottesville overall is considered a very beautiful place, this particular area is not among the most scenic areas of the City. Therefore, every effort should be made to enhance its aesthetics as another way to help its overall competitiveness.

From an economic perspective, the ideal solution to the Hydraulic Road/ 29 intersection would be to achieve the central goal of increasing access, visibility, and aesthetics while minimizing the number of businesses that would be adversely affected by the improvements. This includes maintaining the existing number of access points into each store, and, if possible, creating more and better access points, increasing the perception of safety in the area, better accommodating pedestrians, bicyclists, and transit and making it easy for drivers to negotiate any future changes without being confused or disoriented.

Although it is difficult to quantify the impact of each individual change to the road network necessary to address congestion, if these overall goals can be met, most businesses in the area seem satisfied that under the best case scenario they will do better than they are doing now, and under a worst case scenario, they will not do any worse.

Ms. Carrie Pugh, Assistant Real Estate Manager for the Kroger Food Store, indicated that her store has already had direct experience with the benefits that can be achieved by enhanced accessibility. The company was very concerned a few years ago when US-29 was widened at the store north of Rio Road. The planned improvements cut off access to the front and the store had to reorient its entrance to the side street, which tied into the new Berkmar connection. While Kroger fought this change at the time, it has turned out to have improved access to their store and has resulted in a significant increase in business.

Because the proposed improvements to the US- 29/Hydraulic Road intersection are really a series of phased actions that will take place over a long period of time, these actions have been divided into three timeframes: short-term, medium-term, and long-term. The economic implications of each group of actions is discussed separately (a full list of the actions associated with each phase is included in the Proposed Transportation Improvements chapter).

### ***Short-Term Improvements***

Most of the short-term improvements will not affect any of the existing access points to businesses in the study area, nor will visibility be impacted. One exception is the median closure on US-29 just south of the Hydraulic intersection, which will prohibit left turns into the Holiday Inn and the National School of Business and Technology for cars going north on 29, and may eliminate left turns into Kroger for cars going south. This will be addressed by better accommodating U-turns so that people may have to travel past their destination, but will find it easy to reverse direction and make a right turn into their ultimate destination.

The removal of the stoplight and the closing of the median at Angus Road will prohibit left turns at that intersection. This will be addressed by providing a U-turn opening just south of Angus Road to allow vehicles access.

Should the Albemarle Place project go forward, the connection across to Zan Road is desirable to enhance the future viability of Seminole Square. These two projects should function as part of a single well-integrated unit so that shoppers can easily move back and forth between the two.

Other improvements, including better signal coordination, enhanced pedestrian and bike mobility and safety, and improved aesthetics will help to increase mobility in the area and make it visually more appealing.

### ***Medium-Term Improvements***

Constructing the grade-separated intersection will have the biggest direct impact on businesses and property in the study area. Five businesses currently operating in the area will have to be acquired, including the Tiger Fuel Mart, 7-Eleven<sup>5</sup>, Spee-Dee Oil Change, Wine Warehouse and Import Car Store. The combined property value (land and

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<sup>5</sup> The 7-Eleven property will likely be acquired by the Albemarle Place project, which would result in the property being acquired for transportation improvements from that project, not the current owner.

improvements) of the four parcels in the City amounts to \$3,428,000, less than 3 percent of the total taxable property value in the study area, and therefore the impact on property tax revenues will be small – around \$70,000. Moreover, the relocation of Hydraulic Road will create new taxable land that can be developed to partially or fully offset this loss. Kmart would lose part of its parking lot during construction. The impacts on Kmart's parking lot appear to be minimal, as the portion of the lot that would be disrupted is currently used mostly for storage of lawn and garden items. It should also be noted that Kmart has an automotive section that is no longer in operation. Assuming that Hillsdale Drive Extension is built prior to these improvements, Kmart would be in a good position to take advantage of new and improved access having a tie-in directly from Hillsdale Extension with a potential relocation of the lawn and garden center and reorientation of the main entrance to the Hillsdale/Hydraulic corner..

The Meadow Creek Parkway and Hillsdale Drive Extension improvements contribute to creating a parallel road network allowing local traffic to avoid US-29 as the main access point into Seminole Square. As long as the alignment for Hillsdale Drive follows the recommendations of this study, it will minimize the impacts to the Pepsi bottling plant and will not interrupt the major retailers at Seminole Square. Increased access and customer traffic should more than compensate for any impacts to existing retail buildings.

### ***Long-Term Improvements***

With the addition of frontage roads along the 29 corridor between Hydraulic Road and the 250 Bypass, the First Union building will have to be taken. All other businesses could remain intact however with reduced accessibility during construction. It is important to note that under current conditions, accessibility is already fairly tortured. Not only is the access right-in and right-out only, but the lane to access those businesses is also the through lane for entry onto the 250 Bypass which as noted, is backed up frequently through Hydraulic Road.

The east/west connections at Angus and from Seminole Square across to the area currently proposed for Albemarle Place will be critical to the long term success of all these properties and should not be excluded from the long-range plan because they are too expensive or seem otherwise superfluous.

### ***Opportunities and Challenges***

The study area is an important asset that benefits the City's tax base and economy through revenue generation and by providing important shopping options for area residents. However, it is facing increased competition due to demographic shifts—primarily higher growth in the County—and the imminent addition of a large amount of retail space elsewhere in the County. With the addition of Albemarle Place, this area will become an important asset to the County providing significant additional revenue.

Given the area's traffic congestion and poor access, in the absence of any changes to the transportation infrastructure the area will not be able to compete effectively with other retail centers. This will have two main negative impacts. First, existing businesses will

find themselves in an unfavorable position. Their sales will likely suffer as customers are drawn to other retail areas, resulting in declining sales and property tax revenues.

Second, and at least as important, is the long-term impact. Without good access, the area's ability to undergo significant and appropriate redevelopment will suffer. The data presented earlier clearly suggest that the area is ripe for redevelopment, but such redevelopment will only occur if investors are confident about the future of the area. In the absence of significant transportation improvements, redevelopment will either not occur or it will occur in a way that does not maximize the benefits of the location. In other words, the real estate market will not be able to function properly to support reinvestment and change.

In short, transportation and access improvements are not just necessary to assist the existing businesses. They are a key ingredient in supporting a long-term vision for the area that facilitates change and creates value for both City and County residents. Moreover, a coordinated approach to both transportation improvements and to broader development issues in the area will benefit both the City and the County.

### ***Issues for Further Consideration***

The proposed improvements have been phased to maintain as much access as possible to all of the major existing businesses. This will be accomplished by constructing the parallel roads before reconstructing the 29 /Hydraulic Road intersection. Every effort should be made to minimize the impacts on retail, while understanding that the improvements are necessary and that the benefits of the long-term health of the area outweighs the short-term costs of slight disruptions.

As the area redevelops in the future, good design will be critical for creating the types of space and places that make it a desirable destination. Although the study area should continue to serve City households with low and moderate incomes, it can do so without being a "low-end" retail center. High standards for development should be formulated and enforced before redevelopment begins to occur. This means careful thought and planning even as the transportation improvements are being designed, since these will have major implications for the ultimate form and character of the area.

Improved pedestrian, bicycle, and transit access is another key issue. Businesses are concerned about access, and automobile traffic is only one issue related to access. The study area's proximity to a large portion of its customer base means that walking, bicycling, and transit are viable options for many shoppers. Adequate support for these modes will help reduce problems related to traffic congestion. Moreover, given the number of City residents who are dependent on alternatives to the automobile, improved access to the study area (and circulation within it) by foot, bicycle, and transit is a matter of equity as well as good policy and competitive strategy.

Another important issue as more significant changes to the road network are made is access to the industrial properties near the future Albemarle Place. These properties will likely be significant employment centers, but their needs are different from the retail,

residential, and office properties in the area. In particular, they need reliable freight access. It is critical to ensure that traffic improvements are carried out in such a way that allows industrial and retail properties to co-exist rather than interfering with one another.

It is likely that over time there will be increasing interest in densifying and intensifying this area and adding new uses, including more housing. Future plans for intensification should take into account the need for more affordable housing in the area, as well as the need to maintain shopping opportunities for moderate-income shoppers.

Densification has both benefits and costs. On the one hand, densification and the addition of more housing can result in additional revenues for the City while creating—if careful attention is paid to design—an area that reduces automobile dependency and transportation costs for the area as a whole as well as for individual households. By providing more opportunities for households, especially lower-income households, to live near the jobs and services they need, the project can help reduce auto dependency and transportation costs, which are excessively high for many households. On the other hand, even if automobile use per capita is reduced, densification will likely attract more traffic to the area. And the structured parking that is necessary for significant densification is very expensive, requiring creative financing strategies.

Careful attention to traffic issues now is critical both for avoiding problems stemming from density and for maximizing the benefits of that density. All scenarios will require significant public investment in infrastructure, but the benefits can well outweigh the costs.

## Environmental Issues

Since most of the work would be taking place through modifications to existing roadways, the environmental issues do not appear to be significant at this stage. The exceptions would be the Hillsdale extension alignment as it crosses near the post office, or if an alignment is chosen behind Seminole Square; an underpass in the gully near Angus; an underpass at Seminole Court Road opposite Sperry; and possibly the Hillsdale extension to Holiday Drive.

Preliminary in nature and appropriate for planning purposes only, the following is a list, in no particular order of importance, of environmental considerations. Within the study area,

- There are no national or state parks, forests, wildlife refuges or management areas, recreation areas, natural areas, or scenic byways.
- There are no open space easements.
- There are no public water supplies.
- A Department of Game and Inland Fisheries Initial Project Assessment involving a two-mile radius of the study area listed the Federally and State Endangered James Spiny mussel. Further coordination with this agency is required to ensure the project scope will not impact this species.
- There are no trout streams listed on the Department of Game and Inland Fisheries Cold Water Stream database.
- It is anticipated that the project would require water quality permits for impacts to intermittent tributaries to Meadow Creek.
- As the project scope develops, a survey for archaeological sites and historic structures will be required.
- The Governor of Virginia recommended that Albemarle County potentially might qualify as an eight-hour ozone non-attainment area due to poor air quality. The United States Environmental Protection Agency has announced that they intend to designate the non-attainment areas associated with the new eight-hour ozone standards in the year 2003 or 2004. Within one year after an area's designation to non-attainment, the Work Program and Transportation Improvement Program for the area would need to be analyzed for air pollution emissions and reviewed for conformity with air quality improvement plans. Thus, the transportation program and plan eventually would be expected to reflect this project. The project appears to be regionally significant and may not be exempt from future regional requirements. If so, then the project completion schedule, final design concept

and scope features would need to be correctly reflected in the transportation program and plan.

- The roundabouts would have net environmental benefits due to less delay, producing a significant reduction in vehicle emissions.
- Federal participation on this project would necessitate the need for an environmental document in order to satisfy the National Environmental Policy Act (NEPA).
- A noise study for potential noise impacts to residential areas along the project corridor will be required.
- All of the structures to be demolished in the vicinity of this project will have to be inspected for asbestos containing materials. The costs of asbestos surveys and asbestos removal, should be figured into the construction cost estimates.
- A hazardous materials study would need to be performed to determine the nature and extent of contamination of several Virginia Department of Environmental Quality listed Petroleum Release Sites and location of any other hazardous material storage for effects on project and/or ROW acquisition.

The following sources were used in the summation of this information: The Virginia Department of Transportation Geographic Information System Integrator, Topographic map quadrangles Charlottesville East and Charlottesville West and The Department of Game and Inland Fisheries Information Service. A more detailed analysis will be required once the project scope becomes more clearly defined.

## Traffic Analysis & Modeling

### *Scope*

#### *Geographic Scope*

The elements of the transportation network being analyzed are US-29 (Emmet Street) from Barracks Road to Seminole Court Road, approximately 1.1 miles; the US-250 Bypass from the Dairy Road overpass through the interchange with Barracks Road, approximately 1.2 miles; and Hydraulic Road, from the US-250 Bypass through the intersection with US-29, approximately 0.5 miles.

#### *Temporal and Geometric Scope*

All traffic scenarios are intended to reflect the average weekday PM peak hour conditions. The future traffic modeling is for the year 2025. The following scenarios are being analyzed.

- **Existing Conditions.** A model of existing conditions is being used to check model assumptions and calibration parameters, which will be then used in the future traffic scenarios. The procedure for calibrating the model involves comparing the traffic flow predicted by the model to observed conditions, and adjusting model parameters repeatedly until the model replicates existing conditions. The calibration parameters are then applied to all the models of future traffic scenarios.
- **Future Conditions with the Western Bypass, (without study recommendations implemented).** The current configuration on US-29 at the 250 Bypass ramp and Angus Road is analyzed as a consolidated signal at the Bypass ramp. The westbound 250 Bypass to southbound 29 movement made at this signal, and the unsignalized, left turn lane on the 250 Bypass, which currently serves this movement, is closed. All signals are assumed to be under VDOT control and in a coordinated system as appropriate. Optimal timing plans for the signals under these traffic conditions were developed using the signal analysis program Synchro 5; however, it should be noted that these timings are for the purposes of the study only and may not represent actual timing plans under future conditions.
- **Future Conditions without the Western Bypass (without study recommendations implemented).** The same assumptions listed above for the scenario of Future Conditions with the Western Bypass apply to this scenario.
- **Future Conditions with the Western Bypass (with study recommendations implemented).** This scenario represents the medium term study recommendations under traffic projections based on the construction of the Western Bypass.
- **Future Conditions without the Western Bypass (with study recommendations implemented).** This scenario represents the medium term study recommendations under traffic projections in the absence of the Western Bypass.

## ***Methodology***

### ***Data Collection***

The foundation of the study rests on data collected which describes the existing conditions of the transportation network within the study area. These data included daily and peak hour traffic counts, traffic signal timings, lane configurations, and other geometric data. Data were collected for both AM and PM peak periods, but this phase of analysis is only focused on PM conditions since the PM peak has the highest volumes.

### ***Traffic Forecasting***

The future traffic scenarios for the year 2025 were developed using a regional travel demand forecasting model. This modeling was done in conjunction with the ongoing modeling effort for the CHART/UnJAM 2025 Plan, and include those projects in the Six-Year Improvement Program (Meadow Creek Parkway Phase I, Hillsdale Drive Extended, Fontaine Avenue, Old Ivy Road, Airport Road, Proffitt Road) and the North Grounds Connector. All traffic forecasts assumed completion of the Hillsdale Extension, Meadow Creek Parkway Phase I and the North Grounds Connector. Separate traffic forecasts were developed both with and without the Western Bypass. VDOT staff used the daily traffic volumes predicted by the model to develop peak hour turning movement volumes which were used in the traffic analyses. It is worthy to note that the traffic volumes in the study predicted for 2025 are similar in magnitude to the predicted trip generation for recently proposed development projects in the study area.

### ***Transportation System Analysis***

The data collected and developed in the previous two steps were assembled into a series of models of the transportation network. The models were developed using the package Transportation Software Integrated System (TSIS) version 5.1, which is developed for the Federal Highway Administration (FHWA) and sanctioned by VDOT. The core component of TSIS is CORSIM, which is a stochastic microsimulation analysis program which can model large complex transportation networks as a system, rather than discrete elements. CORSIM effectively works by simulating individual drivers and their positions, velocities and accelerations as they travel the roads in the model network. The model outputs are based on aggregations of these individual statistics. Examples of CORSIM outputs for a given length of road are vehicles per hour, average travel time, and average speeds. While CORSIM does not directly provide the commonly used Level-of-Service of the *Highway Capacity Manual*, the outputs from CORSIM such as delays and average travel times can be correlated to Level of Service.

The principle advantage to using a stochastic microsimulation model such as CORSIM is that the entire study area can be evaluated as a network. This is particularly important in this study because changes, such as grade separation at one location can have dramatic effects on downstream intersections. CORSIM also simulates the variations in vehicle fleet mix and driver behavior that occur in reality, based on random seed values.

The principle disadvantage to using CORSIM for this study is that roundabouts, which are part of the study recommendations, are not an intersection treatment that CORSIM intrinsically models. In this phase of transportation system analysis, CORSIM outputs

have been supplemented with information from the aaSIDRA analysis program, which the FHWA recommends for roundabout analyses. This information is presented later in this section. Future phases of the study will investigate how to effectively model roundabouts in CORSIM.

### ***Current Status***

Model networks have been developed for each of the scenarios listed above. The model of existing conditions is complete and it satisfactorily replicates observed conditions during the PM peak hour. Application of the calibration parameters and other adjustments factors used in the model of existing conditions to the models of future conditions is currently in process.

### ***Anticipated Results***

Following are the anticipated results of the transportation system analyses, based on the work that has been conducted to date. These anticipated results are organized according to the corridors within the study area.

#### ***US-29***

Currently, observed conditions of US-29 in the study area indicate highly variable flow rates based on day of week. The average PM peak hour weekday conditions are adequate, but there are some short periods of excessive queuing and delays. However on Fridays, conditions are consistently worse, and drivers experience severe congestion for much of the peak hour. While conditions will worsen as traffic volumes increase, it is expected that the conditions on US-29 can be partially mitigated by consolidating the signals at Angus Road and the US-250 westbound off-ramp into a single signal, and coordinating this signal with the other signals on US-29. Modifications to the signal timings may also have a mitigating effect, particularly on the queue lengths. If the study recommendation for the removal of signals on US-29 are implemented, conditions on US-29, from the US-250 Bypass to Seminole Court are expected to be very good, with drivers experiencing little or no congestion.

#### ***US-250***

Currently, average PM peak period traffic conditions on the US-250 Bypass are much better than any of the other thoroughfares in the study area, with drivers often experiencing little or no congestion. The exception is the merging and weaving areas from the interchange with US-29 to the interchange with Route 654 (Barracks Rd.). The conditions at these interchanges and the area between them are expected to worsen significantly under future traffic, especially if the signalized intersection of the US-250 westbound off-ramp and US-29 is modified to be a four-legged intersection. The at grade left turn from US-250 westbound to US-29 southbound is also expected to cause problems in the future, with traffic queuing out of the left turn lane into the adjacent westbound travel lane. This is especially problematic because it forces more traffic into the right travel lane, where it conflicts with traffic entering the Bypass from US-29. It is expected that the short and medium term study recommendations will not completely address these problems and may exacerbate them by removing signals on US-29 which

currently meter the traffic entering the Bypass interchange. Resolving this issue should be a particular focus of the next phase of the study.

### ***Hydraulic Road***

Hydraulic Road currently exhibits bad conditions, with queues typically extending from the intersection with US-29, through the intersection at the Kmart and Kroger shopping centers, and several hundred feet beyond. Queue lengths in excess of 600 feet are commonly observed at the southbound approach to the US-250 intersection. Severe queuing is also observed in the right turn lane on US 250 from drivers attempting to enter Hydraulic Road. These conditions may be mitigated, even under future traffic conditions, with modifications to the signal timings and particularly with changes in signal spacings that may occur with the construction of Hillsdale Drive. The conversion of these signals to roundabouts, and the proposed grade-separation of US 29 and Hydraulic Road is expected to significantly improve conditions on Hydraulic Road.

### **Future Work**

Further traffic modeling and analysis is continuing. More specifically, analysis of the medium term improvements proposed in the study and additional analyses for the long term improvements will be conducted.

### ***Model Networks***

The model networks for the future scenarios need to be adjusted and validated. As stated previously, calibration parameters and other adjustments used in the model of existing conditions must be applied to the future models. Currently, the proposed interchange of US-29 and Hydraulic Road is modeled as a diamond, with signals, rather than roundabouts. While this configuration yields useful information about conditions on US-29, it does not provide a systems level analysis of the roundabout configuration. It is anticipated that the final deliverable will include a CORSIM analysis of the proposed roundabouts, which will demonstrate their interactions with the rest of the system.

### ***Data Analysis***

Once the models are completed, each model scenario will be run at least 30 times, with different random seed values being used to generate the driver and vehicle populations. This will ensure that the results of the modeling initiative are statistically significant. The data from the multiple runs will be analyzed for measures of effectiveness, such as average travel time and delay, and the results will be presented in a supplemental report. Animations of the traffic flow patterns throughout the network will also be available.

### **Roundabouts**

As previously stated, the analyses of the roundabouts proposed for the Hydraulic Road underpass and the intersection of future Hillsdale Drive and Hydraulic Road were conducted using the aaSidra analysis program. The traffic volumes utilized in the analysis were developed based on Year 2025 future traffic volumes with and without the proposed Western Bypass.

### Future Traffic with the Bypass

The analyses showed that the roundabout on Hydraulic Road at the Hillsdale Drive intersection would need to have 2 circulation lanes, a 192-foot inscribe diameter, and 2 lane approaches as depicted to accommodate the future traffic volumes with the Bypass in place. This design would function at a level of service (LOS) B overall and with an LOS C for the southern approach. The reserve capacity of this roundabout is small and will limit the overall capacity of Hydraulic Road beyond 2025 with this type of intersection treatment.



Figure 65 Hillsdale/Hydraulic roundabout

The roundabouts at the US- 29/Hydraulic Road ramps are of similar design to the Hillsdale roundabout with 2 circulation lanes, a 192-foot inscribe diameter, and 2 approach lanes. The difference is each roundabout has only three approaches and three exits to accommodate the ramps proposed from 29. The roundabout designs were evaluated and function at a LOS B overall. The southbound off ramp (north approach) on the west-side roundabout and for the east approach to the eastside roundabout both function at an LOS C. These roundabouts have some spare capacity for beyond 2025 growth and should not limit the capacity of Hydraulic Road.



Figure 66 West-side US-29/Hydraulic Road roundabout

### Future Traffic Without the Bypass

To accommodate the future 2025 traffic without the Western Bypass additional improvements to the roundabouts will be required to maintain a LOS of C overall. These improvements involve the addition of exclusive slip ramps at several of the approaches to allow for the increase in traffic volumes. Even with these improvements several of the approaches will be below acceptable levels. These include both Hillsdale Drive approaches (north and south), and the southbound off-ramp from US-29 to the west-side roundabout. The Hillsdale Drive approaches drop to a LOS D for the north approach and F for the south approach and an overall LOS C. The other area of concern is the southbound 29 off-ramp approach to the west-side roundabout. This approach (from the north) operates at an LOS D and an E for the thru-left turn lane with a 600-foot queue length. The overall roundabout operates at an LOS B. These projected traffic volumes push the limits of the roundabout type of intersection control measures to the extreme, and provide very limited additional capacity beyond the 2025 design year without alternative routes or significant reduction through implementation of transit-oriented development, new transit system investment, and Transportation Demand Management (TDM) strategies.

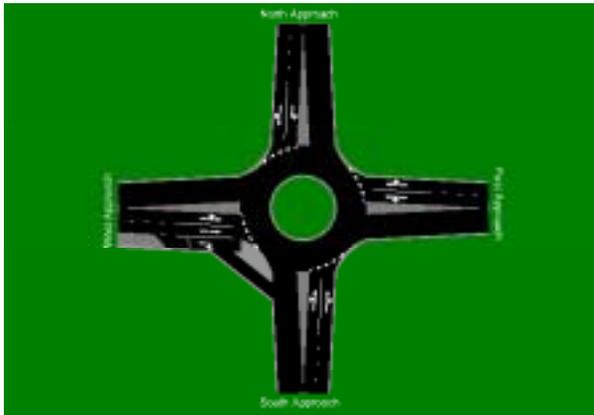


Figure 67 Hillsdale/Hydraulic roundabout

The traffic analysis data for each scenario are attached in the Appendix and the electronic files are available for review. The analysis did not consider any changes to driver behavior in development of this analysis on the basis that drivers currently and in the near future have very limited opportunity to traverse through any roundabouts and therefore will not be familiar with them when constructed at these congested urban locations causing a reduction in capacity. This reduction will lessen as driver awareness improves. Once further data is collected on driver behavior in Virginia these reductions may be applicable. This very conservative approach to roundabout capacity can therefore be adjusted once local roundabouts are constructed such as the Airport or Hillsdale locations.

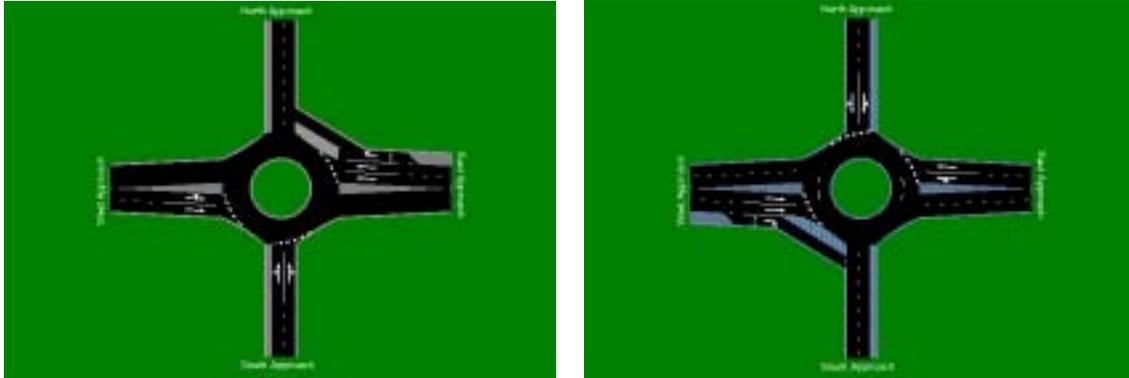


Figure 68 East-side(left) and West-side (right) US-29/Hydraulic Road roundabout

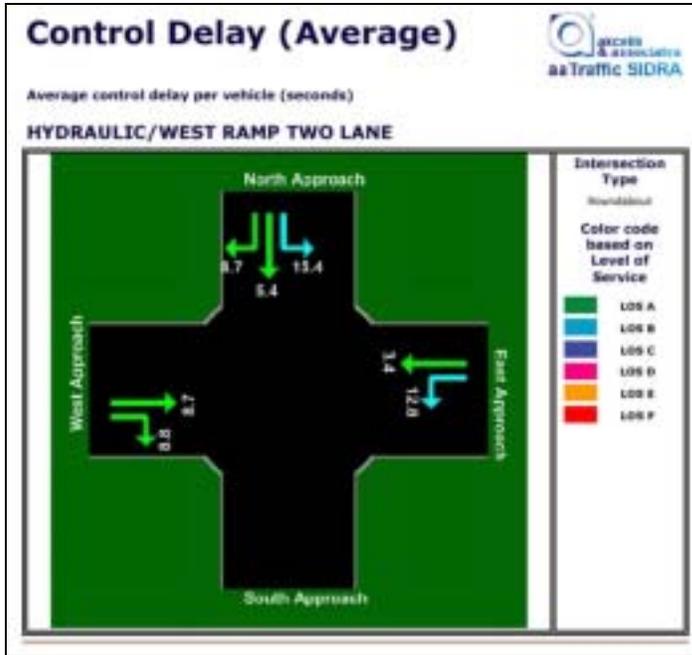
The roundabouts as stated are efficient forms of intersections that function by keeping traffic moving, reducing waiting in queues (and limiting the vehicle storage required at conventional intersections), and reducing vehicle speed. They also are very pedestrian friendly, providing protective areas and limiting crossing distances. However, roundabouts are very sensitive to traffic queues and signals at other intersections. It is recommended that if roundabouts are utilized in this instance, the signals on 29 be spaced far enough away to eliminate any queuing that will back into the roundabouts at the ramps. In addition, the intersection and signal at Hydraulic Road and the 250 Bypass may need to be replaced with an interchange.

To further the viability of the roundabouts on Hydraulic Road, improvements will need to be considered for US-29 south of Hydraulic Road and on the 250 Bypass to reduce the cut-through commuter traffic on Hydraulic Road by making the alternative route (250 to 29) faster and more appealing.

The roundabout at the intersection of Hydraulic Road and the Hillsdale Extension has a level-of-service C and a smaller reserve capacity and it could become the limiting factor in any future traffic growth along Hydraulic Road beyond the year 2025. If this intersection were signalized to perform at level-of-service C, the same as the roundabout, Hydraulic Road would have to be widened from four lanes with median to a six-lane section, probably with additional turn lanes. This widening would provide significantly less pedestrian safety and access than the roundabout. Replacing the roundabouts at the 29 & Hydraulic off ramps with signalized intersections would also require additional lanes if the same level-of-service is required at those intersections. Although the Hydraulic Road/Hillsdale Drive roundabout will have a smaller reserve capacity, its level of service is far higher than signalization at this intersection without additional lane.

<b>Roundabout Summary Table</b>				
with Bypass Constructed				
<b>Location</b>	<b>Approach</b>	<b>Average Delay (s)</b>	<b>Average Level of Service</b>	<b>Length of Queue (ft)</b>
West-side 29/Hydraulic	North	22	C	193
	East	5	A	0
	West	19	B	290
East-side 29/Hydraulic	South	18	B	105
	East	22	C	569
	West	3	A	0
Hillsdale/Hydraulic	North	10	B	82
	South	23	C	66
	East	5	A	138
	West	11	B	269

<b>Roundabout Summary Table</b>				
without Bypass Constructed				
<b>Location</b>	<b>Approach</b>	<b>Average Delay (s)</b>	<b>Average Level of Service</b>	<b>Length of Queue (ft)</b>
West-side 29/Hydraulic	North	51	D	594
	East	5	A	0
	West	21	C	241
East-side 29/Hydraulic	South	25	C	219
	East	18	B	331
	West	3	A	0
Hillsdale/Hydraulic	North	46	D	281
	South	118	F	418
	East	10	A	321
	West	22	C	465



## **Phasing of Improvements**

As with any project, a phasing plan is just as important as the overall plan itself. Phasing has to consider the most logical progression of the project with the least amount of disruption. As mentioned, one assumption included the construction of Hillsdale Extended and probably Meadow Creek Parkway Phase I prior to the commencement of construction for the major portions of this project.

The Team will be looking at phasing options during the coming months, after receiving comments from policymakers. More accurate sequencing will likely require further investigation and more accurate costs, which will have to wait until the next phase.

## **Construction Analysis & Costs**

The cost estimates for all the potential projects identified by this study are provided based on the basic recommendations of this report and are divided into five projects for ease of estimating purposes. All estimates are based on 2003 dollars; no escalation or inflation has been added.

### ***Preliminary Engineering***

VDOT's Cost Estimating System (CES) was used to generate the preliminary engineering estimates. CES arrives at the preliminary engineering (PE) cost based upon a percentage of the construction cost estimate. The percentage used to generate the PE costs varies depending on the size of the project and the anticipated use of outside consultants. Due to the complexity of the proposed designs, it was assumed all engineering would be completed by private consultant firms.

### ***Right-of-Way & Utilities***

The right-of-way and utility estimates were provided by the Culpeper District's Right of Way section. The preparation of the right-of-way and utility cost estimates included physical inspection of the project(s), obtaining current tax record information, including building improvements and land assessments and research for comparable sales. Market value for each parcel was determined based on a per square foot value. The square foot value was applied to the fee simple acquisition area and a percentage for temporary construction easements and utility easements. Damages were determined based on the loss of access, loss of parking, taking of major building improvements, elevations of proposed road(s), which necessitated the total taking of a number of properties.

### ***Construction***

VDOT's Cost Estimating System (CES) was used to generate the construction estimates. CES uses factors such as roadway functional classification, design speed, project length, and typical section to arrive at a construction cost. The cost data is based on historical averages generated from look-up tables embedded within the software. Results from CES are based on "average" projects with standard features. Non-typical roadway elements such as parking lanes, bicycle facilities, landscaping, lighting, retaining walls, etc. need to be estimated separately and added to CES manually.

There were several non-typical design elements discussed and incorporated into the study concept. Among them were: parking lanes, bike lanes, landscaping, planter boxes, sidewalk widths beyond standard 5' width, lighting, and special architectural treatments on the bridge structures. These elements were not accounted for in the cost estimates. It was assumed that many of these elements would require cost participation agreements with the local jurisdictions or the costs would be shared by adjacent land development.

### ***Potential for Costs to Increase***

Several undetermined factors could cause increases to the cost estimates. In particular, the lack of subsurface information in the areas of deep cuts could have a dramatic affect on costs. Issues of poor soils or large quantities of rock excavation could result in much

higher excavation, foundation, and retaining wall costs. Possible environmental issues resulting in mitigation of wetlands, water quality, or stream restoration cannot be determined without more detailed design and study. There is also potential for increases in costs based on the final results of the traffic analysis that could identify the need for capacity improvements beyond what has been proposed.

### ***Potential for Cost Savings***

The major costs components are the retaining wall structures and right of way acquisition. Tremendous savings could be achieved through cooperative efforts between the local jurisdictions, VDOT, and the development community in minimizing the right-of-way costs through donations and proffers. With increasing budget constraints and needed transportation improvements, it is evident that these costs will need to be shared. As property values continue to increase, negotiations with developers focusing on exchanges of right-of-way for delivery of customers is critical. For example, the Hillsdale Drive extension project is currently listed in the Six-Year Transportation Improvement Plan at an approximate cost of \$1.6M. Recent figures reflect an approximate cost of \$20M, with \$15M for right-of-way.

The redevelopment model could also provide a great deal of costs savings. In lieu of retaining walls funded solely by highway construction dollars, developers could construct buildings with deeper foundations with walk-out basements to access parking on the back of the buildings and café style patios along the street frontage. Additional cost savings, albeit minimal, could also be achieved in selling vacated right of way after construction.

The next phase of this study will include focused discussions with property owners and developers regarding these issues. Considering potential outcomes, the cost estimates for this project could dramatically decrease. As with other improved procedural thinking resulting from this project, partnerships with business and property owners are critical in order to move forward with much needed transportation improvements.

### ***Hydraulic Road Interchange***

This estimate includes the construction of a grade-separated tight diamond interchange just north of the US-29 and Hydraulic Road. Hydraulic Road would be a 4-lane divided roadway with curb and gutter and sidewalks. It would be re-constructed from approximately Cedar Hill Road to Michie Drive and pass under 29. US-29 will remain at its present grade and alignment. Extensive use of retaining walls with special architectural treatment was assumed for all cut sections greater than 5 feet. A single lane roundabout at Cedar Hill and dual lane roundabouts at the ramp termini and future Hillsdale Drive were also proposed.

PE: \$ 4,124,000

RW: \$49,829,500

CN: \$35,292,800

TOT: \$89,246,300

***Hillsdale Drive Connector***

This estimate includes the construction of a 2-lane roadway with curb and gutter and sidewalks from Hydraulic Road to Greenbrier Drive. Single lane roundabouts at Zan Road, Seminole Court, and Greenbrier Drive were also proposed.

PE: \$ 897,000

RW: \$14,446,300

CN: \$ 4,237,300

TOT: \$19,580,600

***Angus Road Underpass & Hillsdale Extension***

This estimate includes the construction of an underpass on US-29 to connect Hillsdale Drive Extension to a similar parallel service road on the west side of Route 29 in the vicinity of Angus Road. The Hillsdale Drive Extension connects Hydraulic Road at the future intersection with Hillsdale Drive to Holiday Drive. Both roadways will be 2-lanes with curb and gutter and sidewalks. Route 29 will remain at its present grade and alignment. Extensive use of retaining walls with special architectural treatment was assumed for all cut sections greater than 5 feet. A single lane roundabout at the intersection of the underpass roadway and Hillsdale Drive Extension was also proposed.

PE: \$ 1,645,000

RW: \$34,796,600

CN: \$11,588,000

TOT: \$48,029,600

***Seminole Court Underpass***

This estimate includes the construction of an underpass on Route 29 to connect Seminole Court to a future parallel service road on the west side of Route 29 in front of the Sperry Building. The roadway will be 2-lanes with curb and gutter and sidewalks. Route 29 will remain at its present grade and alignment. Extensive use of retaining walls with special architectural treatment was assumed for all cut sections greater than 5 feet. A single lane roundabout at the intersection of the underpass roadway and the future parallel service road was also proposed.

PE: \$ 1,271,000

RW: \$ 1,226,050

CN: \$ 7,627,800

TOT: \$10,124,850

***Route 250 Bypass/Barracks Road Interchange Improvement***

This estimate includes the construction of connecting the acceleration lane from Route 29 on ramp to the off ramp for Barracks Road along with a new partial cloverleaf at Barracks Road. The Route 250 Bypass will remain at its present grade and alignment. Use of retaining walls was assumed for all cut sections greater than 5 feet.

PE: \$ 865,000

RW: \$ 2,782,100

CN: \$ 4,000,000

TOT: \$ 7,647,100

The Grand Total for all the proposed improvements is:

PE: \$ 8,802,000

RW: \$103,080,550

CN: \$ 62,745,900

TOT: \$174,628,450

Given the complexity of the proposed improvements and the level of design detail available, the above figures should be considered to have a margin of error of +/- 20%.

## Questions Remaining/Further Study

This study is as comprehensive as possible in the limited time frame required by aggressive project deadlines. As expected, a number of questions remain, which will be addressed by further investigation in a future phase of the project.

Following are some of the questions remaining to be answered and issues left to address that will require further study:

- The modeling and analysis are not yet complete, with future year modeling still in process.
- Grading, cross sections, construction cost estimates, and phasing are not yet complete, but are under way.
- Environmental issues relating to proposed conceptual designs have been identified and will be evaluated upon further study.
- More detailed comparison of roundabouts versus signals is required for public acceptance.
- Neighborhood concerns with access, traffic calming, and trail connections.
- Additional evaluation of best alternatives for the 250 Bypass/Hydraulic Road intersection, 29/250 merge and interchange, Angus underpass/overpass, a review of the Barracks Road/250 Bypass interchange, and the 29/Rio Road intersection.
- Coordination and evaluation of designs for improved transit service (accommodation for future Bus Rapid Transit or Light Rail service).
- Build –out traffic analysis and modeling of other mixed-use developments in the County along the US-29 corridor.
- More extensive economic analysis of impacts of Albemarle Place and other expected development in the County and the US-29 corridor.
- Analysis on current employment and wages in the study area and the implications of the proposed improvements on those figures.

## Next Steps

The study team has successfully developed a package of potential solutions that meet most of the goals and objectives, in a remarkably short time frame. Four options have been identified as potential next steps after completion of the study in early May. The Technical Team has reviewed and refined these options. Considering public and policymaker review and feedback, this study hereby recommends the continuation of this study as a Targeted Next Phase as defined below.

The options are:

- A. **No-Build.** Continue with status quo and increasing congestion.
- B. **Short Term Project Implementation.** Refine and implement some of the short-term improvements.
- C. **Targeted Next Phase.** Conduct the next phase of this study, for the same targeted area, that could lead to Preliminary Engineering for potential priority projects.
- D. **Full Corridor Study.** Conduct a fully funded Corridor Study looking at similar improvements at other key intersections along US-29 North.

**A. No-Build.** Although the status quo “Do Nothing” alternative is technically an option, it is recognized as completely unacceptable due to the existing traffic congestion as well as future traffic projections. The natural progression of traffic congestion accounted to increasing population will be exacerbated by the pending development of Albemarle Place on the NW quadrant of the Hydraulic Road and 29 intersection, the proposed redevelopment of the Best Buy site, and future redevelopment of the Dominion Virginia Power site. In not proceeding with the development of a preferred and agreeable plan for this area, taxpayers will be burdened with the full cost of improvements that might be borne in part by developers..

**B. Short Term Project Implementation.** There are several projects on the short-term list that are worthy of consideration for accelerated implementation. Some of these could be worked out and moved forward by the inter-agency staff team. Others will require funding for design and engineering. These options will be described in more detail in the final report.

**C. Targeted Next Phase.** A more thorough next phase would include a more thorough study of the same study area, adding other intersections of the US-29 corridor including Barracks Road exit from the 250 Bypass. This process would further refine the existing conceptual design solutions to include Financial, Environmental, Business, and Traffic and produce new conceptual design solutions for areas not studied in the first phase. It would develop defined phasing plans for the area and scope definitions for projects as well as answer all remaining questions as defined in the Questions Remaining/Further Study section. From this, a complete project analysis would be prepared for consideration of preliminary engineering funding. Given the current state of the economy this is a cost-effective progression. The US-29 corridor is on the verge of

failure as a transportation system, and can no longer be depended on to handle the existing and future traffic volumes. Near-term improvements need to be developed now to avoid gridlock. Furthermore, this project can be a model for the remaining intersections on 29, which should be studied in subsequent years.

**D. Full Corridor Study.** The proposed full study is “based upon the expansion of a recommendation in the Charlottesville Area Transportation (CATS) 2015 Plan to identify improvements to the Route 29 intersections at Hydraulic, Greenbrier, and Rio Roads.” The Scope of a full study has already been agreed upon by the City, County, and MPO. It will include this study area as well as other intersections of the US-29 corridor from Barracks Road to Airport Road. It should be noted that funding for this full study has been requested for several years.



*The 29H250 Technical Team – and the region’s residents, business people, and policymakers – are ready to take this work to the next phase, to answer any remaining questions, and to develop a buildable package of improvements.*



## 29H250 Study Team

### *Project Management*

Project Director: Harrison Rue  
Deputy Directors: Jim Bryan, Don Wells  
Project Coordinator: Rhonda Edmunds

### *Technical Team*

#### *TJPDC/MPO Staff*

Rhonda Edmunds, Program Manager  
Chris Gensic, Regional Planner  
Ryan Mickles, Transportation Planner  
Jason Overstreet, GIS/Mapping  
Harrison Rue, Executive Director

#### *VDOT Staff*

Marshall Barron, District Planning Engineer  
Jim Bryan, Charlottesville Resident Engineer  
John Giometti, Assistant District Location & Design Engineer  
Matt Grimes, Transportation Planning Engineer  
Bill Guiher, Transportation Planning Engineer  
Walter Pribble, Senior Transportation Engineer  
Chuck Proctor, Charlottesville Assistant Resident Engineer  
Don Wells, Principal Transportation Engineer  
*With special assistance from:*  
Rick Crofford, Christine Fainter

#### *City Staff*

Katy Clossin, Economic Development Specialist  
Missy Creasy, Neighborhood Development Services Planner  
Ian Keats, Transportation Planner  
Angela Tucker, Neighborhood Development Services Manager

#### *County Staff*

Michael Barnes, Senior Planner  
David Benish, Chief of Planning  
Glenn Brooks, Senior Engineer  
Jack Kelsey, Chief of Engineering  
Juan Wade, Transportation Planner

#### *Outside Consultants and Staff*

Gerald Autler, Strategic Economics, Inc.  
Dena Belzer, Strategic Economics, Inc.  
Celine Hardin, Trias & Associates  
Kathleen Schlesnick, Trias & Associates  
Ramon Trias, Trias & Associates  
Michael Wallwork, P.E., Alternate Street Designs

*Study Steering Committee*

Community business representatives served on the Study Steering Committee.

*Members:*

Katy Clossin, City of Charlottesville Economic Development Department  
Chuck Lebo, Lebo Commercial Properties, Inc.  
Chris Lee, Piedmont Virginia Companies  
Leigh Middleditch, 5-Cs  
John O'Connell, Summitt Commercial Properties  
David Sutton, Tiger Fuel Company

*CHART Citizens Committee*

The MPO's CHART Citizens' Committee helped plan and facilitate the public process, identified focus group participants and issues, and reviewed design concepts for presentation at the second public workshop.

*Members:*

Stephen Bach	Robert Burke
Michael Crafaik (Vice Chair)	Jerry Deily
Donna Goings	Becky Graves
Mare Hunter	Rachel Lloyd (Chair)
Ann Mallek	Shirley Midyette
Milton Moore	Nick Sjoka
Sandy Snook	Frank Stoner
Howard Trail	Rodney Thomas/Will Reily
Rebecca White	

*University of Virginia PLAC 403 Class*

Mr. Rue's Planning Applications class at UVA School of Architecture has conducted field investigations, interviews with transit riders and employees, and pedestrian counts, and has developed recommendations for improving pedestrian facilities, connections to surrounding neighborhoods, and transit system improvements.

*Members:*

Will Cockrell  
Marcus Hardy  
Michelle Kunec  
Michael McGrew  
Lyle Solla-Yates  
Emily Snyder  
Mary Stuart Young

## **Appendix**

On the following pages are full-size versions of pictures contained in the report as well as other documents relevant to the study area.