ROUTE 20 CORRIDOR STUDY
– PHASE 2–

Prepared for

Rappahannock-Rapidan Regional Commission;
Orange County, VA; and
Town of Orange, VA

Prepared by

VHB *Vanasse Hangen Brustlin, Inc.*

June 2007

Action Sheet

Route 20 Corridor Study – Phase 2

Vanasse Hangen Brustlin, Inc. (VHB) completed the Route 20 Corridor Study – Phase 2 report in June 2007 following the final community meeting sponsored by the VHB Team. The study findings and recommendations were presented to the Orange County and Town of Orange Planning Commissions. VHB attended several additional meetings held by the County and Town including formal public hearings.

Following the development of this report, the Orange County Board of Supervisors approved the final study with the following comments regarding **Table 8** (page 14):

- **Remove recommendation 'H'** – Install bike lane system connecting Prospect Heights Middle School, Orange County High School, and community pool.

- **Remove recommendation 'I'** – Construct single-lane roundabout system: relocate Byrd St, Monrovia Rd, Selma Rd; Close existing Waugh Blvd intersections; Consolidate Byrd St & Butler Pl intersections during roundabout design; Install center turn lane from railroad to roundabout at relocated Byrd St.

- **Remove recommendation 'J'** - Retain/acquire appropriate right-of-way along corridor to allow for potential widening proposals.

- **Remove recommendation 'K'** - Establish 4-leg intersection at Route 669; includes installation of eastbound & westbound left and right-turn lanes; close existing Village Rd (Route 671) intersections on Route 20 & Route 522.

The Orange Town Council took no action following this report, due to the pending multimodal study that will build on Phase 2 of the Route 20 Corridor Study.

Executive Summary

Vanasse Hangen Brustlin, Inc. (VHB) was commissioned by the Rappahannock-Rapidan Regional Commission (RRRC) to conduct Phase 2 of a VA Route 20 corridor study. T3 Design, P.C. and the Clay Christensen Group LLC completed the VHB Team. The purpose was to examine the operations of the existing Route 20 corridor between U.S. Routes 15 in Orange and 522 in Unionville, the need for improvements by the year 2030, and to identify and evaluate a range of reasonable alternatives. The *Route 20 Corridor Study – Phase 1* was completed in mid-2006 and is available through the RRRC in Culpeper, VA or the Orange County Planning Department. The project study limits of the previous study extended from U.S. Route 522 in Unionville to U.S. Route 3 in Wilderness.

Following approval of this study, local decision makers will have the technical data in support of future roadway improvements as well as the potential ramifications of potential roadway improvement measures.

The RRRC is managing this corridor study, which was funded jointly by Orange County and the Virginia Department of Transportation. The mechanism for VDOT funding is through the Rural Transportation Planning Grant Program, administered through VDOT's Transportation & Mobility Planning Division (TMPD).

During this study, there was considerable involvement and feedback from citizens, stakeholders, and public officials. We wish to thank those individuals for participating in this process and hope this study can be used to make informed decisions on future roadway improvement actions on the VA Route 20 corridor. Special acknowledgement should be given to the individuals in the community who were invited to participate as key stakeholders during the project:

Nancy Alexander	*Larry Arbogast*	*Marshall Barron*
Donald Brooks	*George Carter*	*Michael Collins*
Chris Conti	*Sonny Dodson*	*Jeff Dodson*
Jim Fenwick	*Elliott Fox*	*Catherine Gillespie*
Thomas Graves	*Cole Hendrix*	*Dave Hill*
Debbie Kendall	*Will Likins*	*Ronnie Lloyd*
Melissa McDaniel	*Peggy Miles*	*Steve Satterfield*
Walter Smith	*John Stanley*	*David Steigler*
Don Waugh	*VSP Sgt. Michael Woodard*	

Process & Milestones

Kickoff

A Technical Committee was established at the start of the study for oversight of the project. The committee was represented by RRRC, Orange County Planning Department, Town of Orange Planning Department, VDOT, and VHB.

Data Collection

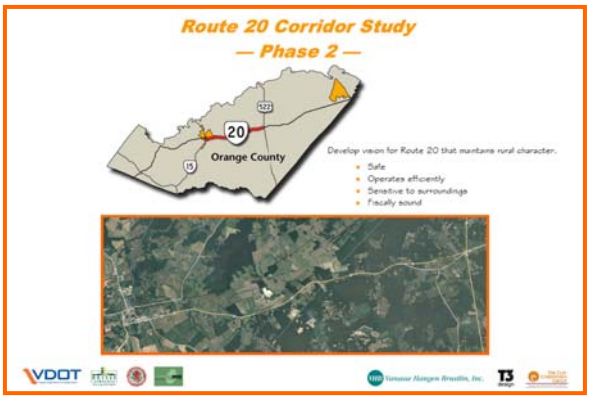
Following a project kickoff meeting, data relevant to the corridor was collected including traffic counts, vehicle crash history, and physical or operational deficiencies observed by local residents.

Existing Conditions

Traffic counts were performed at several intersections in the study area to document AM and PM peak hour conditions. Historical crash data statistics were obtained for the Route 20 corridor for the most recent five (5) years available (2002 – 2006). Vehicle crashes were summarized by year, severity, and frequency.

Public Outreach

The first of two community meetings was held on March 29, 2007. The meeting was held to describe the project purpose and share the results of the existing conditions analysis. Public citizens provided feedback during the meeting, through comment sheets, and through the local media.



Future Conditions

A primary focus of the Phase 2 study was to provide for safer and less congested travel on Route 20 well into the future. Traffic volumes were projected and analyzed to the year 2030 to be consistent with the Phase 1 study.

Public Outreach

Key stakeholders were invited to participate in two (2) interactive sessions where attendees were educated on several transportation engineering principles that had potential application to this corridor study, and conceptual alternatives were developed. The VHB Team then refined the alternatives into draft recommendations. On June 13, 2007, the second community meeting was held to gather comments from attendees on the draft recommendations.

Study Findings & Next Steps

During the course of the study, the overwhelming majority of local input related to safety concerns on Route 20. Over the past few years, the number of annual crashes has increased and there have been two (2) fatal crashes to date in 2007. Written comments VHB received during the study process are included in the Appendix. Several relevant newspaper articles and letters to the editor are also included. Although operational deficiencies were documented as part of the traffic engineering analysis at intersections within Town limits, the number of comments VHB received regarding operational issues was minimal. Comments received from County and Town residents verbally and in writing can be summarized as follows:

- Speed differential is dangerous. Some vehicles travel well below posted speed limit, some travel well above.
- Current speed limits need greater enforcement.
- Jurisdictions should consider lowering speed limits.
- Neighborhood entrances along Route 20 need turn lanes to separate left and right turns from through traffic.
- Route 20 may eventually need to be widened to four (4) lanes if current growth trends continue.

The following page contains a summary of the Route 20 recommendations developed through the collaborative efforts of the Technical Committee, key stakeholders, and the general public(1). These recommendations are described in further detail in Chapter 6. A description of some implementation strategies to be considered by the County and Town is provided in Chapter 7.

(1) *Please refer to the Action Sheet inside the front cover of this report*

Short-Term Recommendations*

- Set Up Targeted Police Enforcement East and West of Airport
- Install Westbound Left-turn lane at Brick Church Rd Adjacent to Airport
- Install Westbound Left-turn lane at Porter Rd (Route 625)
- Install Eastbound Right-turn lane and Westbound Left-turn lane at Kendall Rd (Route 600 E)
- Targeted Police Enforcement near Clifton Rd (Route 628)
- Install Eastbound Left-Turn Lane at Crestview Dr
- Install Eastbound Right-turn lane at Village Rd (Route 671)

Mid-Term Recommendations*

- Bike Lane System Connecting Prospect Heights Middle School, Orange County High School, & Community Pool
- Construct Single-Lane Roundabout System: relocated Byrd St, Monrovia Rd, Selma Rd
  - Close existing Waugh Blvd intersections; Consolidate Byrd St & Butler Pl intersections during roundabout design; Install center turn lane from railroad to roundabout at relocated Byrd St

Long-Term Recommendations*

- Acquire Appropriate Right-of-Way Along Corridor to Allow for Potential Widening Proposals
- Establish 4-leg Intersection at Route 669; Includes Installation of Eastbound & Westbound Left and Right-turn lanes
  - Close Existing Village Rd (Route 671) Intersections on Route 20 & Route 522

** Please refer to the Action Sheet inside the front cover of this report*

1 Introduction

The *1999 Orange County Comprehensive Plan* included a recommendation that a traffic study be performed, given the region's continued growth and development. In 2006, Phase 1 of the Route 20 Corridor Study was published and adopted by the County Board of Supervisors, and is expected to be added as an amendment to the 2005 Comprehensive Plan.

Orange County requested that the *Route 20 Corridor Study – Phase 2* be conducted to examine traffic and land use trends, document operational and physical deficiencies, and identify recommended solutions to improve operations and safety throughout the corridor.

Purpose and Need

The Phase 1 study documented recommendation improvements for Route 20 between U.S. Routes 522 (Unionville) and 3 (Wilderness). The *Route 20 Corridor Study – Phase 2* examines the approximately 9-mile portion between U.S. Routes 15 (Orange) and 522 (Unionville). It is expected that like the Phase 1 final report, this document will become an amendment to the *2005 Orange County Comprehensive Plan*.

Phase 2 Study Area

VHB's project approach was to develop feasible alternatives that would maintain the rural character of Route 20 and be consistent with the regional goals of preventing uncontrolled growth within the two jurisdictions. Approval of this document would assist the region in defining a course of action for the corridor that is consistent with the visions of the County and Town that have been articulated in other published planning documents (comprehensive plans, long-range transportation plans, etc.).

> Provide the citizens of Orange County with the safest and most efficient transportation system that is consistent with environmental protection and sound fiscal policy.
>
> -2005 Orange County Comprehensive Plan

2

Data Collection

Route 20 is a 2-lane, rural corridor with 11-foot travel lanes and 3 to 4-foot paved shoulders in each direction. The terrain is generally flat with adequate sight distances. The posted speed limit varies between Routes 15 and 522 from 25 mph to 55 mph.

Data Collection

Traffic counts were performed at several intersections in the study area to document AM and PM peak hour conditions. VDOT conducted turning movement counts at the intersections within Town limits in November 2006, and VHB conducted counts within County limits in February 2007. All turning movement counts were conducted on typical weekdays from 6:00 AM – 9:00 AM and 4:00 PM – 7:00 PM at the following Route 20 intersections (listed west to east):

1. Caroline Street (Route 15) – *Town*
2. Byrd Street – *Town*
3. Monrovia Road/Blue Ridge Road – *Town*
4. Selma Road – *Town*
5. Lahore Road (Route 629) – *County*
6. Brick Church Road (Route 631) – *County*
7. Porter Road (Route 625) – *County*
8. Mount Sharon Road (Route 600 W) – *County*
9. Kendall Road (Route 600 E) – *County*
10. Village Road (Route 671) – *County*
11. Everona Road (Route 617) – *County*

Route 20 Typical Section

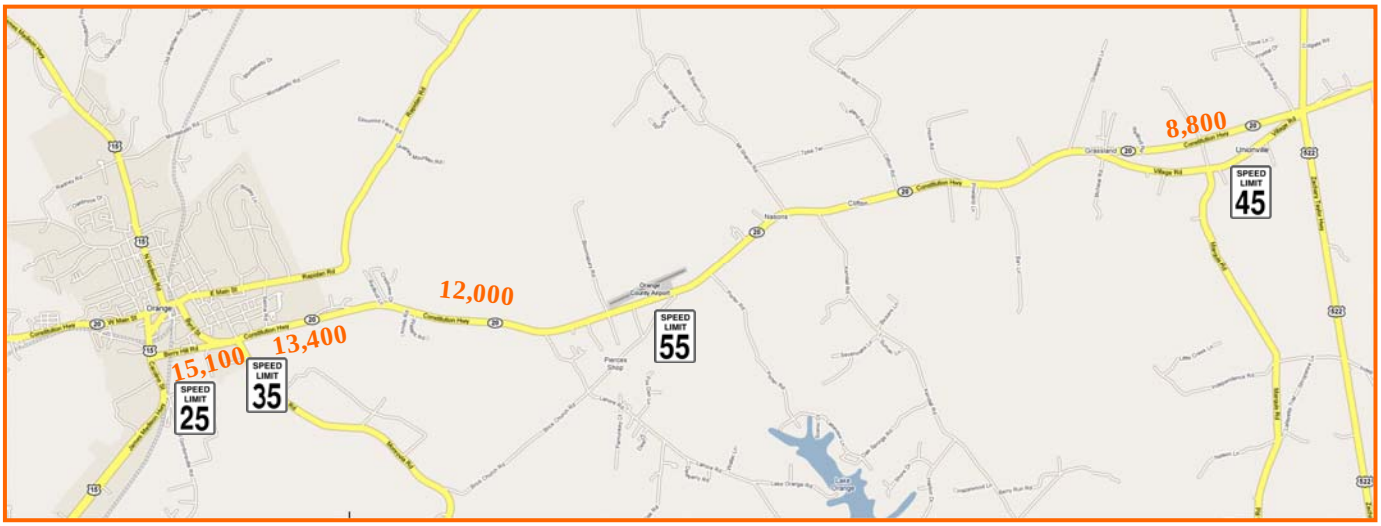
The peak hour turning movement count data is included in the Appendix. Average daily traffic (ADT) data for the study area corridor was provided by VDOT and listed below in **Table 1**.

TABLE 1
2006 Average Daily Traffic (ADT)

From	To	ADT
Caroline Street (Route 15)	Monrovia Road	15,100
Monrovia Road	Town Limits	13,400
Town Limits	Lahore Road (Route 629)	12,000
Lahore Road (Route 629)	Zachary Taylor Highway (Route 522)	8,800

Figure 1 illustrates existing posted speed limits and the ADT. The speed limits of 25, 35, and 55 mph are posted from Caroline Street (Route 15) to the railroad overpass, railroad overpass to Black Run Road, and Black Run Road to Gospel Hill Road respectively. The speed limit is posted 45 mph on both approaches to Zachary Taylor Highway (Route 522).

FIGURE 1
Route 20 Existing Conditions



Vehicle Crash History

Historical crash data statistics were obtained for the Route 20 corridor for the most recent five (5) years available (2002 – 2006). **Figure 2** illustrates crash severity during the five year period, and **Figure 3** summarizes the crashes by type. Tabular reports with further details divided by year are included in the Appendix.

FIGURE 2
Route 20 Corridor Crash Summary (Severity)

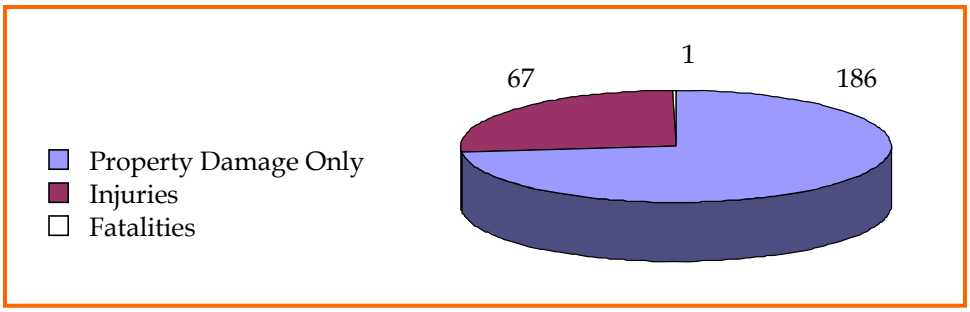
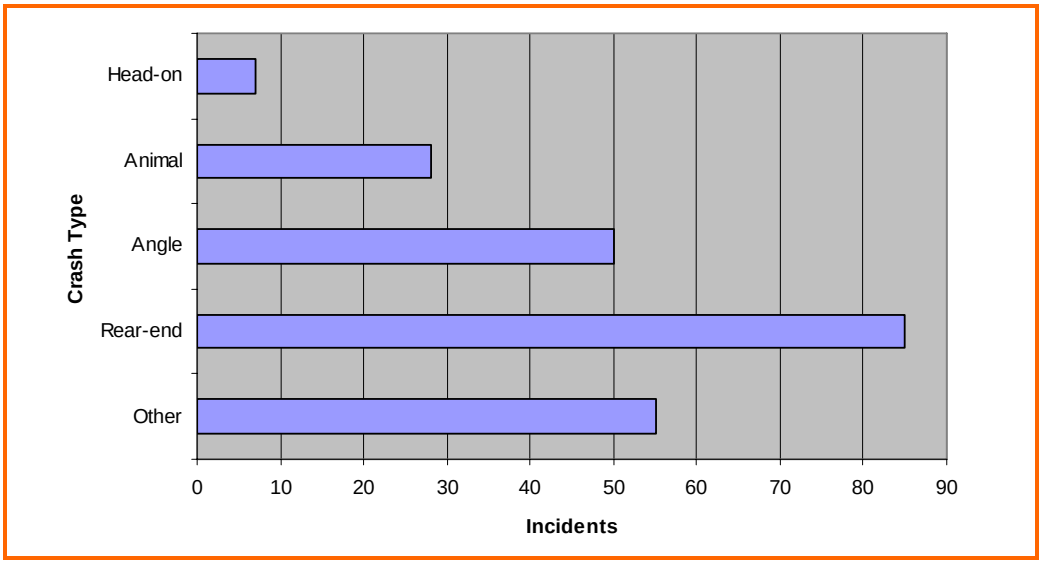


FIGURE 3
Route 20 Corridor Crash Summary (Type)



Two (2) locations were identified by VDOT as critical rate intersections, meaning their crash rate was higher than intersections on similar roads across Virginia: Brick Church Road and Route 522. Although VDOT had not tabulated any 2007 crash data before publication of this study, it should be noted that there have been serious crashes on Route 20 this year leading to two (2) fatalities.

3

Existing Conditions

Operational Analysis

Level of service (LOS) is a letter designation that describes operating conditions which occur on a given roadway segment or intersection. It uses qualitative measures that characterize operational conditions within a traffic stream and their perception by motorists and passengers. The descriptions of LOS characterize these conditions in terms of factors like speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. The evaluation criteria are contained in the *2000 Highway Capacity Manual* and applied by the associated Highway Capacity Software (HCS). The latest version of the Highway Capacity Software, HCS+, was used as the operational analysis tool for this study.

Six levels of service are defined and are given letter designations, from A to F, where LOS A represents the best operating conditions and LOS F the worst. The threshold for the acceptable operations for planning or design purposes for areas that are not densely urbanized is LOS C, because it ensures a more acceptable quality of service to facility users. It should be noted that although LOS C represents acceptable delay, the Town of Orange has established a goal in its comprehensive plan of maintaining LOS A or B.

The LOS designation is reported differently for signalized intersections and unsignalized intersections. For signalized intersections, the HCS+ planning level analysis considers the operations of all traffic entering the intersection and reports a value of "under capacity" or "over capacity" for the overall condition. These two conditions correspond to acceptable or unacceptable LOS in terms of average vehicle delay.

For unsignalized intersections, the analysis assumes that traffic on the main street is not affected by traffic on the side streets. Thus, the LOS designation is for the critical movement exiting the side street or turning left from the main street, and not for the overall intersection. For unsignalized intersections, average control delay is also used (see **Table 2**).

TABLE 2
LOS Criteria for Unsignalized Intersections

Level of Service	Average Total Delay (sec/veh)
A	≤ 10.0
B	> 10.0 and ≤ 15.0
C	> 15.0 and ≤ 25.0
D	> 25.0 and ≤ 35.0
E	> 35.0 and ≤ 50.0
F	> 50.0

2000 Highway Capacity Manual, Special Report 209

Table 3 summarizes the operational analysis results during the peak hour existing conditions at the intersections where traffic counts were performed. All intersections within county limits operate at acceptable levels. Within town limits, the Byrd Street and Monrovia Road intersections both operate poorly (LOS D or worse).

TABLE 3
Existing Peak Hour LOS

Route 20 Intersection	AM Peak Hour	PM Peak Hour
Caroline Street (Route 15)	u*	u*
Byrd Street	C	F
Monrovia Road/Blue Ridge Road	E	D
Selma Road	C	C
Lahore Road (Route 629)	C	C
Brick Church Road (Route 631)	B	B
Porter Road (Route 625)	B	B
Mount Sharon Road (Route 600 W)	B	B
Kendall Road (Route 600 E)	B	B
Village Road (Route 671)	C	B
Everona Road (Route 617)	B	B

**u = under capacity*

4

Future Conditions

A primary focus of the Phase 2 study was to provide for safer and less congested travel on Route 20 well into the future. Traffic volumes were projected and analyzed to the year 2030 to be consistent with the Phase 1 study. This chapter documents the anticipated traffic volumes in 2030 and evaluates the isolated intersections under the future demand.

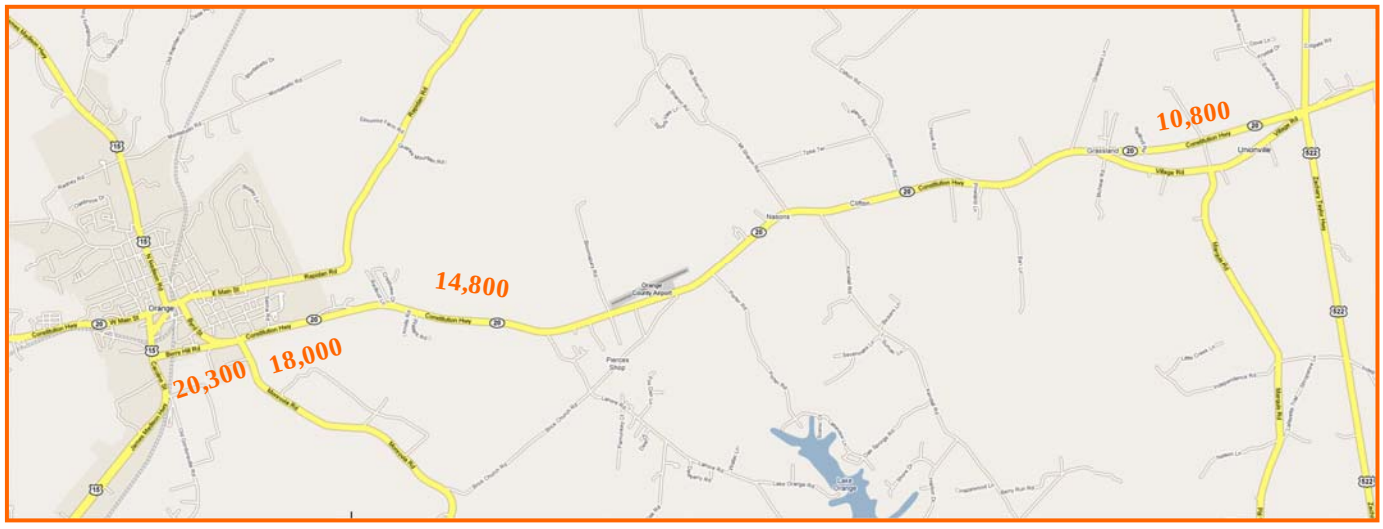
Annual Background Growth

Annual background traffic growth takes into consideration new traffic due to normal growth and development in the area. The County, Town, and VDOT reviewed land use and traffic trends to determine appropriate levels of projected vehicular growth within the study area. Traffic volumes were grown by the following annual rates:

1.5% -- Caroline Street (Route 15) to Lahore Road (Route 629)
1.0% -- Lahore Road (Route 629) to Zachary Taylor Highway (Route 522)

Following standard traffic engineering methodology, the annual growth rates were applied as straight-line trends, not compounded.

FIGURE 4
2030 Average Daily Traffic (ADT)



Operational Analysis

Future operations were analyzed assuming no physical improvements throughout the corridor (driveway closures, widening, signals, etc.). The analysis results are summarized in **Table 5**. All county intersections are projected to continue operating with acceptable delay. However, by the year 2030, all of the analyzed intersections within town limits are projected to operate poorly.

TABLE 5
Future (2030) Peak Hour LOS

Route 20 Intersection	AM	PM
Caroline Street (Route 15)	o*	o*
Byrd Street	D	F
Monrovia Road/Blue Ridge Road	F	F
Selma Road	E	E
Lahore Road (Route 629)	C	C
Brick Church Road (Route 631)	B	B
Porter Road (Route 625)	C	C
Mount Sharon Road (Route 600 W)	C	B
Kendall Road (Route 600 E)	C	B
Village Road (Route 671)	C	C
Everona Road (Route 617)	C	C

**o = over capacity*

5

Issues & Opportunities

Operational and safety deficiencies for existing and future conditions are summarized in Chapters 3 and 4. With the assistance of the community, the VHB Team identified several issues related to traffic and safety concerns. Several transportation planning opportunities were identified and presented to the community as potential strategies to be applied on Route 20.

Issues

1. Commuter traffic delays within Town limits. Public perception of traffic congestion is consistent with the results of the peak hour traffic analysis, particularly during the PM peak hour.
2. Turning movements on and off Route 20. Left turns are especially problematic because they involve crossing conflicting traffic. Within Town limits, the number of left turns contributes to the projected levels of delay and increase the potential for crashes. Driveways inside turn lanes cause confusion and negatively impact safety.

Route 20 @ Monrovia Rd: Multiple driveways (six) inside eastbound right-turn lane

3. Number of driveways. The high number of driveways along the corridor dramatically increases the potential for crashes. Studies have shown that every driveway adds 4 percent to the crash rate on a corridor.

4. Illegal passing. The general consensus among local citizens was that illegal passing was a serious problem in the study area, particularly in the higher speed segments close to Route 522. Although Virginia State Police reported that tickets are issued for illegal passing, the data is not summarized by road and by year, as crashes are. It is therefore difficult to quantify the issue.
5. Speed differentials. Vehicles traveling at widely varying speeds are more likely to crash than vehicles traveling at uniform speeds. High speeds, especially in segments posted below 55 mph were an issue of significant concern. In addition to aggressive versus defensive driving habits by drivers on Route 20, speed differentials are commonly experienced when a vehicle suddenly slows down to turn into a driveway.
6. Evaluation of guardrail. There are segments of the corridor that appear to be in need of guardrail installation. The specific issue identified was the VDOT methodology of evaluating a location for guardrail.

Route 20 @ Village Rd: Eastbound segment may be candidate for guardrail installation by VDOT

7. Regional truck traffic. This issue is primarily related to Route 15, which is outside this project's study area. But it was recognized that recommendations lowering speeds on the corridor would impact all traffic, including regional truck traffic.

Opportunities

1. Access management strategy. This opportunity is managing and planning the spacing and design of driveways, median openings, and traffic signals along the corridor. One specific access management treatment that was proposed by local stakeholders is the consolidation of intersections. Since each driveway along a corridor increases the crash rate by four percent, this action would directly improve safety. Additionally, consolidating multiple access points into clearly defined intersections maintains driver expectancy and reduces speed differentials between vehicles.
2. Right-of-Way preservation. Projected traffic volumes in the Phase 2 study area do not warrant widening Route 20 by the year 2030, but Orange County has an

opportunity to preserve adequate right-of-way throughout the corridor for any future intersection widening proposals.

3. Roundabouts. Modern roundabouts can be a tremendous engineering tool to improve the efficiency of traffic flow, reduce vehicle emissions and fuel consumption, and dramatically improve safety. According to the Insurance Institute for Highway Safety, installation of roundabouts reduced total crashes by 39 percent, injury crashes by 76 percent, and fatal and incapacitating crashes by 89 percent. **Table 6** illustrates the typical performance of roundabouts designed with one and two lanes. For comparison purposes, the projected 2030 entering volume during the peak hours is less than 2,000 vehicles.

TABLE 6
Roundabout Operational Performance

Number of Lanes	Entering Traffic Volume (Peak Hour)
1	2,500 – 2,800
2	3,500 – 4,400

Roundabouts can also become gateways ("Welcome to Town of Orange") and have low maintenance costs compared to traffic signals. The pictures below illustrate potential aesthetic enhancements to a corridor.

University Place, Washington:
Unsignalized intersection converted
into a modern roundabout

4. Center turn lane. Center turn lanes are generally considered an option for three-lane cross sections within the following thresholds:

   a. Vehicle speeds less than 45 mph
   b. Daily traffic volumes less than 17,000 vehicles
   c. Limited right-of-way due to adjacent land development

Today, Route 20 handles 15,000 vehicles per day between Route 15 and Monrovia Road, so installing a center turn lane is a short-term opportunity that may not be appropriate in the year 2030.

Example of urban three lane section with bike lanes

5. Additional left and right-turn lanes. This opportunity is considered an option when VDOT's warrants for turn lanes are met. These warrants are available on VDOT's website (www.virginiadot.org) and included in the Appendix. Left-turn lanes have been shown to reduce crash rates by 40 percent and reduce congestion by 20 percent. These benefits are caused by separating turning vehicles from through vehicles.
6. Bike lanes. It is VDOT's policy to consider bicycle accommodation during roadway projects. It is important that proposed bike lanes fit into the overall of bike plan for the region, such as connecting multiple recreational and institutional areas. The Town of Orange is developing a bike and pedestrian plan as an amendment to its comprehensive plan.

Operational Summary of Opportunities

Physical improvement opportunities identified for the relief of traffic congestion on the corridor were analyzed, as applicable, to document their benefit and assist in the development of reasonable alternatives. As noted in Chapter 4, intersections within County limits are projected to operate with acceptable delay for motorists. Improvements such as left and right-turn lanes will reduce those levels of delay even further with the "acceptable" range (up to 25 seconds per vehicle).

TABLE 7
2030 LOS Comparison

Route 20 Intersection	Unsignalized LOS		Roundabout LOS	
	AM	PM	AM	PM
Byrd Street	D	F	A	A
Monrovia Road	F	F	A	A
Selma Road	E	E	A	A

6

Alternatives Development

Alternatives were developed through the application of specific opportunities that address issues specific to the Route 20 corridor.

Community Involvement Process

Given the daily affect of the Route 20 corridor on the Orange community, the community involvement process was integral to the success of the transportation planning process. The alternatives developed for the Route 20 corridor were the direct result of a collaborative process with the local community—both in the County and Town. The first of two community meetings was held on March 29, 2007, describing the project purpose and sharing the results of the existing conditions analysis. Citizens provided feedback verbally during the meeting, in addition to comment sheets and through the local media in the days and weeks following the meeting.

For more in-depth community perspective, key stakeholders representing diverse professional and personal interests participated in two (2) interactive sessions in June 2007. A list of those invited to participate as key stakeholders can be found in the Executive Summary. The VHB Team again presented key factual data on the corridor, in addition to several transportation engineering principles that had potential application to this corridor study. Stakeholders then developed numerous conceptual alternatives that the VHB Team refined into draft recommendations.

On June 13, 2007, the second community meeting was held to gather comments from attendees on the draft recommendations. Comments largely validated the stakeholder ideas and VHB recommendations.

Recommendations

The Route 20 corridor recommendations are phased into short-, mid-, and long-range improvements (see **Table 8**). When considering funding projects, these recommendations should be considered within the context of each other and not as isolated treatments since some improvements may reduce or eliminate the need for others.

TABLE 8
Route 20 Corridor Recommendations*

Label	Range	Description	Cost ($1,000)
A	Short	Install eastbound left-turn lane at Crestview Dr	90
B	Short	Set up targeted police enforcement west and east of airport	
C	Short	Install westbound left-turn lane at Brick Church Rd (adjacent to airport)	90
D	Short	Install westbound left-turn lane at Porter Rd (Route 625)	90
E	Short	Targeted police enforcement near Clifton Rd (Route 628)	
F	Short	Install eastbound right-turn lane and westbound left-turn lane at Kendall Rd (Route 600 E)	180
G	Short	Install eastbound right-turn lane at Village Rd (Route 671)	90
H	Mid	Install bike lane system connecting Prospect Heights Middle School, Orange County High School, & community pool	NA
I	Mid	Construct single-lane roundabout system: relocated Byrd St, Monrovia Rd, Selma Rd; Close existing Waugh Blvd intersections; Consolidate Byrd St & Butler Pl intersections during roundabout design; Install center turn lane from railroad to roundabout at relocated Byrd St	600
J	Long	Retain/acquire appropriate right-of-way along corridor to allow for potential widening proposals	NA
K	Long	Establish 4-leg intersection at Route 669; includes installation of eastbound & westbound left and right-turn lanes; close existing Village Rd (Route 671) intersections on Route 20 & Route 522	700

** Please refer to the Action Sheet inside the front cover of this report*

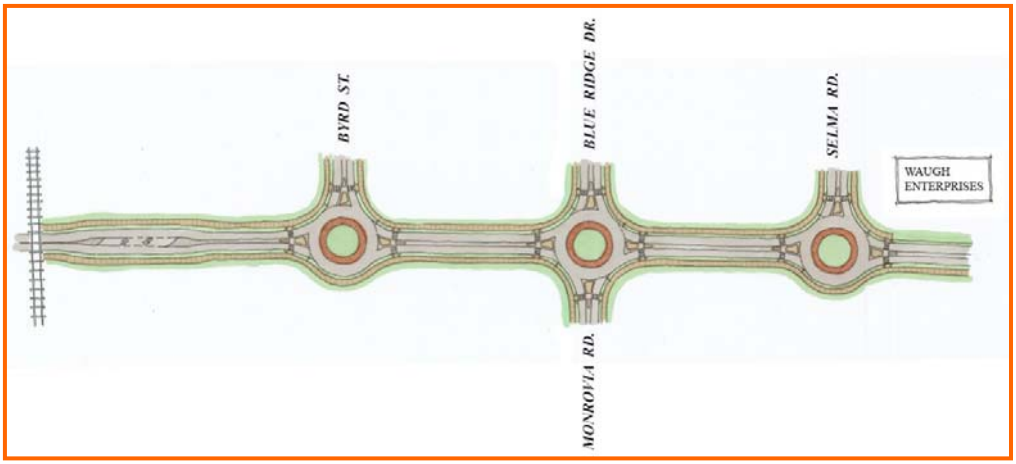
The short-term recommendations regarding police enforcement may require additional staff for both the Town Sheriff's office and the regional Virginia State Police office. State police officials have expressed concern over the lack of manpower available for dedicated traffic enforcement. Specific areas of concern along the corridor were identified during the alternatives development process, assuming resources would be dedicated at some point. Targeted police enforcement would include common violations in Orange County such as illegal passing on a solid yellow line and speeding.

A bike lane system on Route 20 would connect recreational and institutional areas – two government schools and the community pool. The short-term turn lane improvements should be designed with bike lanes in mind. The lanes may not be completely striped and marked as dedicated bike lanes during the construction of turn lanes, but the overall pavement cross section of Route 20 should accommodate the proposed bike lane system.

The proposed roundabout system on Route 20 does not require an all-or-nothing approach. Single roundabouts may be installed at each of the three (3) identified intersections within the town. **Figure 5** illustrates the conceptual plan for these intersections, as well as the short-term opportunity for a center left-turn lane. The roundabout at relocated Byrd Street should be designed to eliminate the existing conflicts between Byrd Street and Route 20.

Each roundabout is projected to improve the 2030 intersection operations from failing conditions to LOS A. VDOT's Roundabout Committee will review and comment on any roundabout feasibility or design studies prepared by the Town of Orange.

FIGURE 5
Route 20 Roundabout System



The upper threshold for a 3-lane cross section is 17,000 vehicles per day compared to a projected volume of 20,000 vehicles per day on Route 20. Therefore, the center turn lane may require conversion to a raised median if projected traffic volumes are realized by the year 2030.

While four travel lanes are not warranted on Route 20, it is recommended that Orange County and the Town of Orange preserve right-of-way on Route 20 in the event that intersection widening proposals are deemed appropriate beyond the year 2030. Simple turn-lane installations at an intersection increase the pavement width beyond a two-lane cross-section.

The recommendations are identified by geographic section in **Figures 6 – 9**, as evaluated during the stakeholder process and presented to the community. **Figure 10** identifies several corridor-wide issues to be considered with the Route 20 recommendations.

Planning Level Cost Estimation

The costs associated with the Route 20 recommendations are planning level estimates and may require modification following preliminary engineering studies and environmental assessments. Each of proposed roundabouts was assumed to cost $200,000, but roundabout design and construction fees can vary significantly depending on physical constraints, landscaping components, and the type of materials used for the truck apron around the center island.

Right-of-way costs associated with roadway projects in a rural area may be an additional 25 percent of the engineering and construction costs. The cost of acquiring right-of-way to allow for future widening will vary according to the value of properties fronting Route 20.

Corridor-Wide VDOT Considerations

If the County believes that a speed limit reduction on Route 20 would be beneficial, then a request must be made to VDOT to conduct a corridor speed study. VDOT generally uses the 85th percentile speed when determining whether or not a speed limit reduction is appropriate.

Specific requests for guardrail evaluation must be made by a locality or individual to VDOT for VDOT-maintained roads such as Route 20. As a rule of thumb, VDOT will install guardrail where a slope is equal to or greater than 3:1; or if clear zones along the roadway are a concern. Curb and gutter is typically recommended on facilities with speed limits of 45 mph or less.

Turn lane warrant studies are a required step before VDOT considers constructing new turn lanes. The primary factor in calculating a turn lane warrant is peak hour traffic. However, safety is VDOT's highest priority so improvements that reduce the likelihood of crashes should be given serious consideration.

FIGURE 6
Route 20 Recommendations (1 of 5)

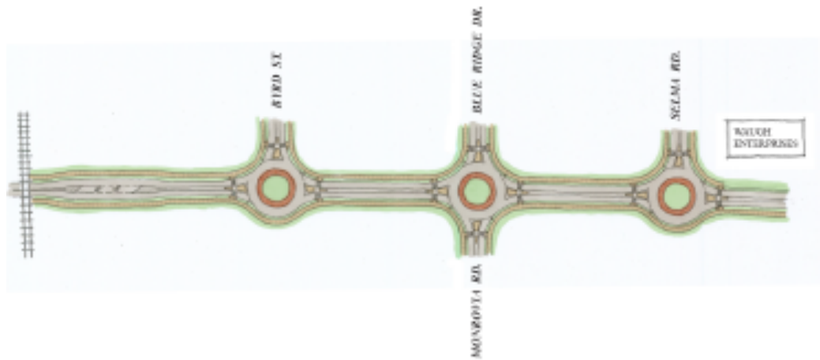
RECOMMENDATIONS

Section 1
Route 15—Town/County Line

- Roundabout
- Center Turn Lane
- Street Closure
- Bike Lane

(X) See Table 8

Conceptual Rendering of Roundabout System



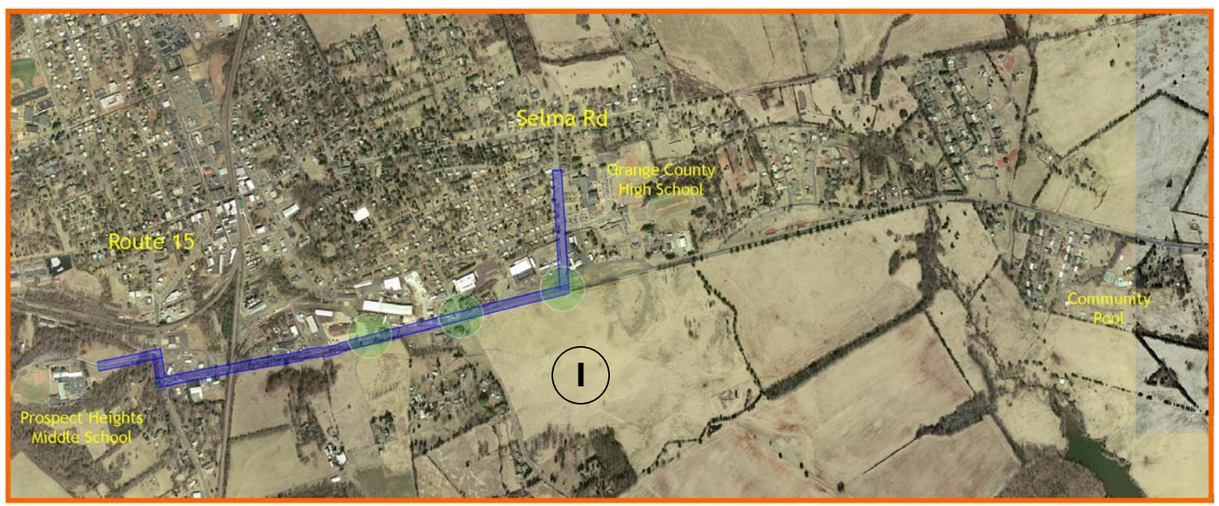


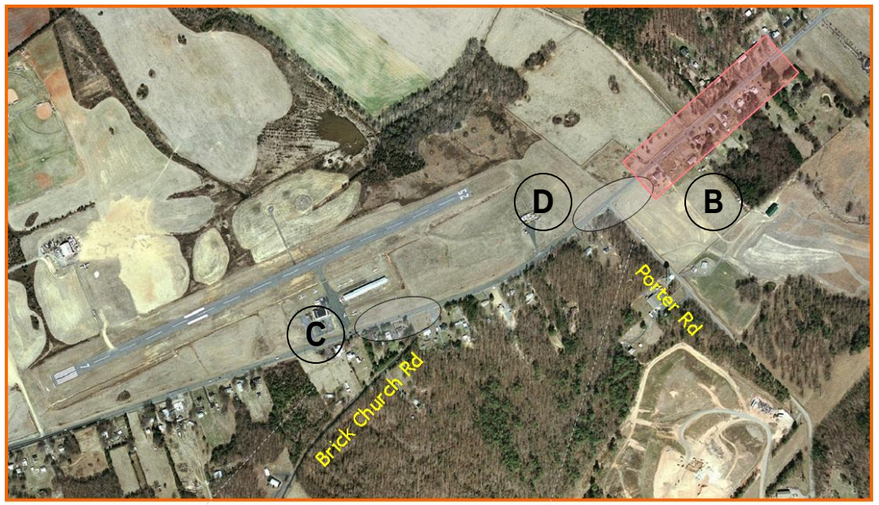
FIGURE 7
Route 20 Recommendations (2 of 5)

RECOMMENDATIONS

Section 2
Town/County Line—Brick Church Rd

Police Enforcement

X See Table 8



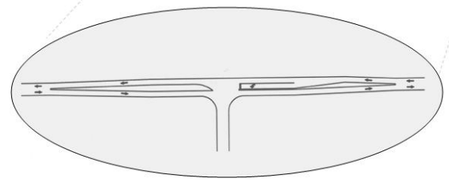


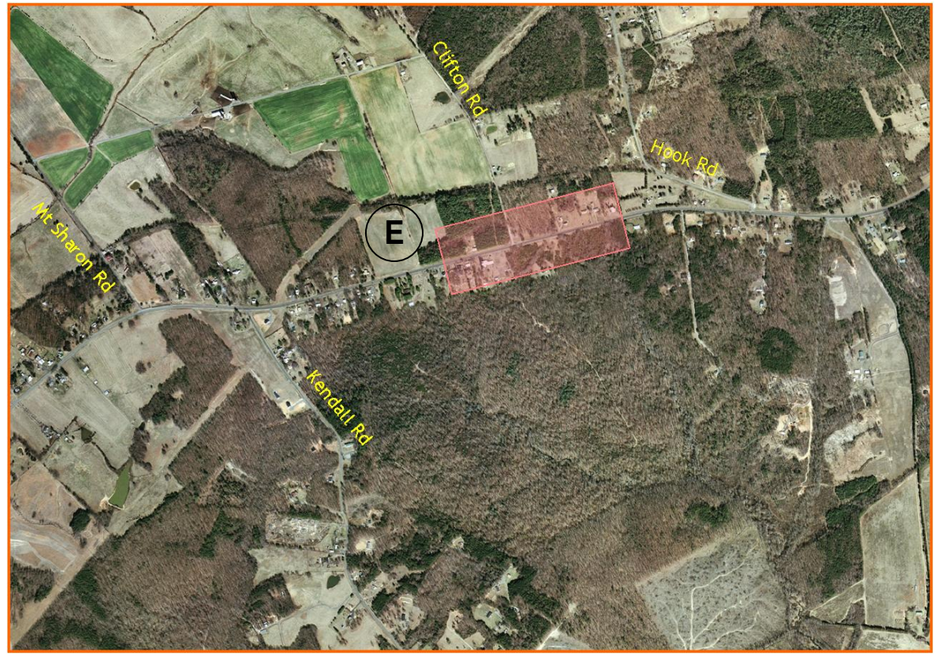
FIGURE 8
Route 20 Recommendations (3 of 5)

RECOMMENDATIONS

Section 3
Brick Church Rd—Hook Rd

Police Enforcement
Turn Lanes

(X) See Table 8



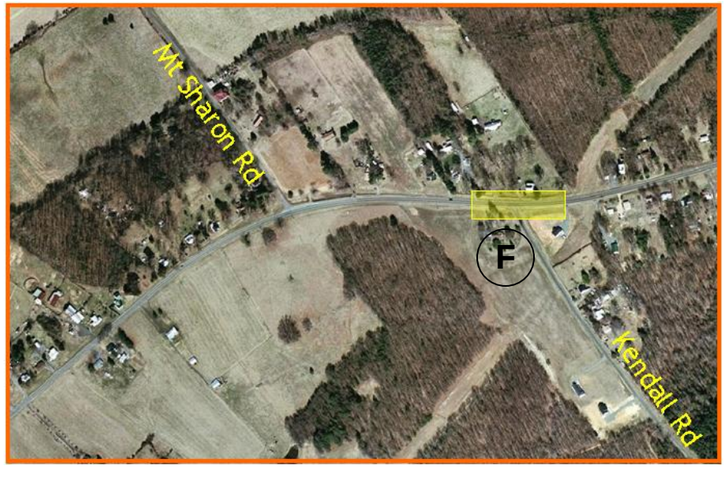


FIGURE 9
Route 20 Recommendations (4 of 5)

RECOMMENDATIONS

Section 4
Hook Rd–Route 522

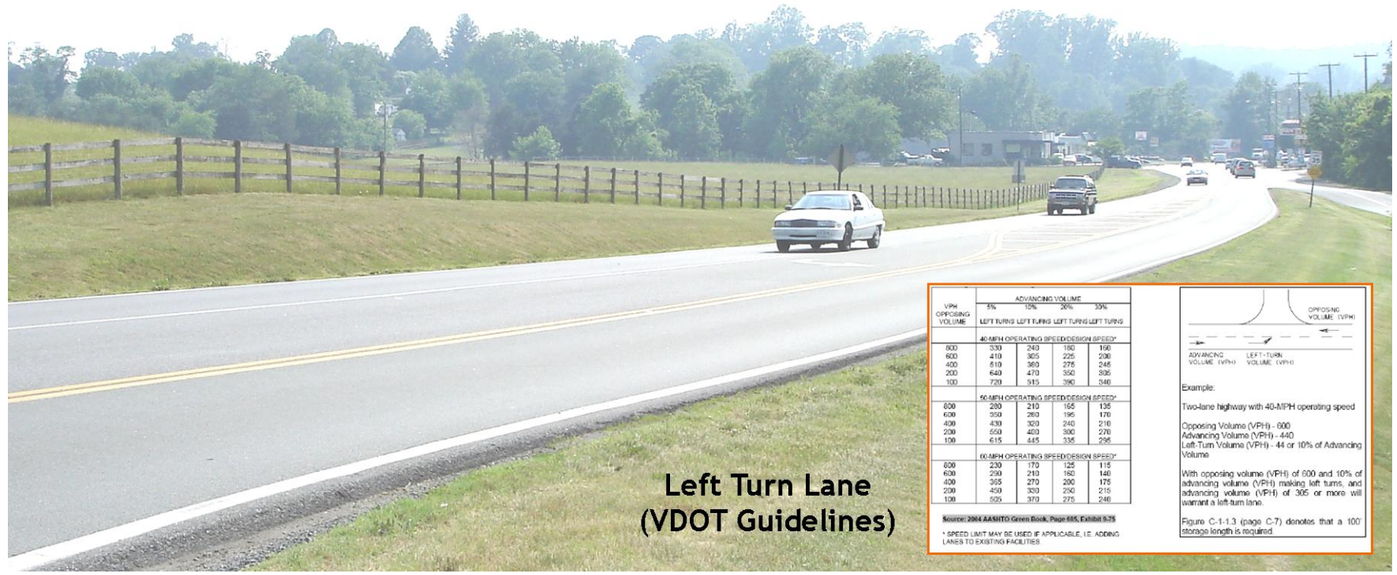
Right Turn Lane

(X) See Table 8

FIGURE 10
Route 20 Recommendations (5 of 5)

GENERAL CORRIDOR-WIDE CONSIDERATIONS

- Orange County Should Preserve Right-of-Way Allowing for Potential Intersection Widening Proposals; Widening and/or Relocation Not Recommended in Phase 2 Study, but Right-of-Way Preservation Will Assist County with recommended intersection improvements.
- Center Turn Lane Between Railroad & Byrd St May Require Conversion to Raised Median by 2030, According to Future Traffic Volumes; Upper Threshold for Center Turn Lane ~17,000 vpd, Compared to Projected 20,000 vpd.
- Speed Study Conducted by VDOT Required for Speed Limit Reduction; 85th Percentile Speed Used as Basis for VDOT's Recommendation.
- VDOT Roundabout Committee will Review & Comment on Future Roundabout Studies Submitted by Town.
- Turn Lane Warrant Studies Required for VDOT-Maintained Roads; Primary Factor is Peak Hour Traffic (see charts to right).
- Guardrail Installation Requests Initiated by Locality; Primary Factor for Approval is Slope Adjacent to Road.



7

Implementation Strategies

VDOT's Local Assistance Division (LAD) develops policy and provides guidance for special funding programs and other programs that impact work performed by localities, and serves as a liaison to local government organizations. The LAD manages special funding programs, urban system changes, provides locally administered project oversight and urban construction coordination, and manages the local assistance payment program.

VDOT's LAD should be used as a resource by Orange County and the Town of Orange to develop implementation strategies for the Route 20 recommendations included in this report. The staff contact, Michael Estes, can be reached at (804) 786-2745.

Some potential funding programs include Transportation Enhancement which includes SAFETEA-LU (Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users), and Revenue Sharing. Depending on the benefits of a specific project, the County and/or Town may have multiple options when identifying funding sources. For example, constructing roundabouts on Route 20 will improve the scenic value of the Town, provide pedestrian facilities, and noticeably improve vehicular and pedestrian safety.

Transportation Enhancement

In 1991, Congress introduced the Transportation Enhancement Program, which required each state to set aside 10 percent of its Surface Transportation Program funds for transportation enhancement projects. This reimbursement program continued with enactment of the Transportation Equity Act for the 21st Century (TEA-21) in 1998 and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) in 2005.

SAFETEA-LU stresses mobility and protection of the environment, community preservation, sustainability and livability. Candidate projects for the Transportation Enhancement program are those that provide opportunities to improve the transportation experience in the County and Town. Enhancement categories that will be considered by VDOT include bike and pedestrian facilities, scenic or historic highways, and landscaping and scenic beautification.

It is important to note that localities may not use traditional highway funds or revenue sharing funds as the local match for this program.

Highway Safety Improvement Program

The Highway Safety Improvement Program (HSIP) was established through SAFETEA-LU with the purpose of reducing highway fatalities and serious injuries. VDOT uses the HSIP to identify high crash locations; analyze hazards, problems, and countermeasures; and prioritize and schedule improvement projects.

VDOT's Traffic Engineering Division serves as the focal point for administering the HSIP, and anticipates providing the required 10 percent local match for Fiscal Year 2007-08 projects. However the County and Town should be willing and able to provide the 10 percent match in the event that VDOT funds are unavailable.

Revenue Sharing

This program could provide additional funding for use by Orange County to construct, maintain, or improve Route 20 with statutory limitations on the amount of state funds authorized per locality. Since the Town does not maintain its portion of Route 20, any request by them must be processed through a County application. The intent of the Revenue Sharing Program is to fund relatively small, immediately needed improvements, but larger projects may be considered.

Locality funds are matched with state funds for qualifying projects. An annual allocation of funds for this program is designated by the Commonwealth Transportation Board (CTB).