HAMPTON ROADS TRANSPORTATION PLANNING ORGANIZATION – VOTING MEMBERS

CHESAPEAKE
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GLOUCESTER COUNTY
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Molly J. Ward

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The Honorable Yvonne B. Miller

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Camelia Ravanbakht  Deputy Executive Director
Rob Case            Principal Transportation Engineer
Samuel S. Belfield  Senior Transportation Engineer
Stephanie L. Shealey Transportation Engineer
Michael Long        Asst. General Services Manager
Christopher Vaigneur Reprographics Coordinator
ABSTRACT
The City of Suffolk requested the Hampton Roads Transportation Planning Organization (HRTPO) staff undertake a study to identify roadway capacity, traffic signal, access management, and safety improvements that will be necessary along Nansemond Parkway (State Route 337) in Suffolk, Virginia within the next ten years. The objectives of this study include an assessment of the corridor and the identification of alternatives to improve traffic flow in the future with anticipated traffic growth and further development of the area. Ten intersections were studied in detail along Nansemond Parkway.

Traffic analysis was performed for four scenarios to determine the extent of improvements that will be necessary to maintain acceptable traffic flow. These scenarios included 2009 Existing, 2009 Optimized, 2019 Planned Improvements and 2019 Planned & Spot Improvements. The study also includes an evaluation of the access management conditions along the length of the corridor and a corridor crash analysis.
<table>
<thead>
<tr>
<th>Contents</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>1</td>
</tr>
<tr>
<td>Study Area</td>
<td>2</td>
</tr>
<tr>
<td><strong>Land Use and Socioeconomic Data</strong></td>
<td>4</td>
</tr>
<tr>
<td>Land Use</td>
<td>4</td>
</tr>
<tr>
<td>Northgate Commerce Park</td>
<td>4</td>
</tr>
<tr>
<td>Socioeconomic Data</td>
<td>5</td>
</tr>
<tr>
<td>Population, Household, and Employment Growth</td>
<td>6</td>
</tr>
<tr>
<td><strong>Roadway Characteristics and Traffic Volumes</strong></td>
<td>7</td>
</tr>
<tr>
<td>Roadway Geometry and Characteristics</td>
<td>7</td>
</tr>
<tr>
<td>Historic Traffic Growth</td>
<td>7</td>
</tr>
<tr>
<td>2009 Existing Traffic Volumes</td>
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<tr>
<td>2019 Projected Traffic Volumes</td>
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<td><strong>Intersection Capacity Analysis</strong></td>
<td>11</td>
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<td>12</td>
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<tr>
<td>Methodology</td>
<td>12</td>
</tr>
<tr>
<td>Results</td>
<td>13</td>
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<td>2009 Existing</td>
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<td>Recommended Alternative</td>
<td>15</td>
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<td>Intersections</td>
<td>20</td>
</tr>
<tr>
<td>Railroad Crossing</td>
<td>23</td>
</tr>
<tr>
<td>School Zones</td>
<td>24</td>
</tr>
<tr>
<td><strong>Sidewalks</strong></td>
<td>24</td>
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<tr>
<td>Crash Data Analysis</td>
<td>25</td>
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<tr>
<td>Shoulder Width</td>
<td>28</td>
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<td>Bennetts Pasture Road Intersection</td>
<td>28</td>
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<td>Access Management Analysis</td>
<td>29</td>
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<tr>
<td>Existing Conditions</td>
<td>29</td>
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<tr>
<td>Driveway and Intersection Spacing</td>
<td>29</td>
</tr>
<tr>
<td>Driveway Width</td>
<td>30</td>
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<td>Practices for Future Development</td>
<td>32</td>
</tr>
<tr>
<td><strong>Conclusions and Recommendations</strong></td>
<td>33</td>
</tr>
<tr>
<td>Planned Improvements</td>
<td>33</td>
</tr>
<tr>
<td>Recommendations</td>
<td>34</td>
</tr>
<tr>
<td>Capacity Improvements</td>
<td>34</td>
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<tr>
<td>Safety &amp; Access Management Improvements</td>
<td>34</td>
</tr>
<tr>
<td><strong>Public Review and Comments</strong></td>
<td>43</td>
</tr>
<tr>
<td><strong>Appendix A</strong>: 2009 Existing (PM Peak) Intersection Synchro Outputs</td>
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<tr>
<td><strong>Appendix B</strong>: 2009 Optimized (PM Peak) Intersection Synchro Outputs</td>
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<tr>
<td><strong>Appendix C</strong>: 2019 Planned Improvements (PM Peak) Intersection Synchro Outputs</td>
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<tr>
<td><strong>Appendix D</strong>: 2019 Planned &amp; Spot Improvements (PM Peak) Intersection Synchro Outputs</td>
<td></td>
</tr>
</tbody>
</table>
Table of Contents

List of Maps
Map 1 - Overview of Area ................................................................. 1
Map 2 - Corridor Overview .............................................................. 2
Map 3 - Intersections Analyzed in Study Area ............................... 3
Map 4 - TAZs Compromising the Nansemond Parkway Study Area... 4
Map 5 – City of Suffolk Northern Suburban/Urban Growth Area ..... 5
Map 6 - 2009 Existing Turning Movement Volumes (PM Peak) ...... 9
Map 7 - 2019 Projected Turning Movement Volumes (PM Peak) .... 10
Map 8 - 2009 Existing PM Peak Level of Service ........................... 16
Map 9 - 2009 Optimized PM Peak Level of Service ...................... 17
Map 10 - 2019 Planned Improvements PM Peak Level of Service .... 18
Map 11 - 2019 Planned & Spot Improvements PM Peak Level of Service .................................................................................. 19
Map 12 - Crash Data by Year and Location for Nansemond Parkway (2006-2008) .................................................................. 26
Map 13 - Planned & Recommended Improvements ...................... 36

List of Figures
Figure 1 - Thirty Year Population, Household, and Employment Growth................................................................................. 6
Figure 2 - Intersection of Rochdale Lane and Nansemond Parkway .. 20
Figure 4 - Intersection of Nansemond Parkway and Driver Lane .... 21
Figure 3 – Left-Turn Lane at Severn Lane and Nansemond River High School Bus Entrance ................................................. 21
Figure 5 - Intersection Geometry - Nansemond Parkway and Kings Highway................................................................. 22
Figure 6 – Westbound Nansemond Parkway at Kings Highway ...... 22
Figure 7 - Confusing Sign at the Right-turn from Northbound Northgate Commerce Parkway ............................................... 23
Figure 8 - Railroad Crossing near Wilroy Road Intersection ............ 23
Figure 9 - Intersection of Bennetts Pasture Road and Nansemond Parkway ................................................................. 28
Figure 10 - Narrow Pavement Shoulder on Nansemond Parkway .... 28
Figure 11 - Nansemond Parkway at Kings Highway .................... 30
Figure 12 – Business South of Nansemond River HS Bus Entrance .... 31
Figure 13 - John C. Holland Enterprises Driveway .......................... 31
Figure 14 – Improvements to Wilroy Road (Intersection 1) ................ 37
Figure 15 - Improvements to Kings Highway (Intersection 8) ......... 37
Figure 16 - Improvements to Sleepy Hole Road and Bennetts Pasture Road (Intersections 5 & 6) ............................................. 38
Figure 17 - Improvements to Rochdale Lane (Intersection 2) ........... 39
Figure 18 - Improvements to Severn Lane (Intersection 3) ............. 39
Figure 19 - Improvements to Nansemond River High School Bus Entrance ........................................................................... 40
Figure 20 - Improvements to Shoulders Hill Road (Intersection 10) ... 40
Figure 21 - School Zone Improvements for Nansemond River High School and Nansemond Parkway Elementary School .......... 41
Figure 22 – Improvement at Business across from Nansemond River High School ........................................................................... 42
Figure 23 – Improvement at John C. Holland Enterprises .......... 42
Figure 24 - Sidewalk for Nansemond River High School ................ 42

List of Tables
Table 1 - 2000-2030 Growth ................................................................ 5
Table 2 - Socioeconomic Data by Transportation Analysis Zones (TAZ) for the Nansemond Parkway Area ............................................. 6
Table 3 - Nansemond Parkway Corridor Roadway Characteristics ..... 7
Table 4 - Historical Weekday Daily Traffic Volumes ......................... 7
Table 5 – Definition of Intersection Levels of Service .......................... 12
Table 6 - Approach/Intersection Delay and Level of Service ............ 13
Table 7 - Network Delay .................................................................. 15
Table 8 - Crashes by Location and Type on Nansemond Parkway (2006-2008) ................................................................. 27
Table 9 - Access Points on Nansemond Parkway ............................ 29
Table 10 - Intersection and Driveway Spacing ................................. 29
INTRODUCTION

The City of Suffolk requested that the Hampton Roads Transportation Planning Organization (HRTPO) staff undertake a study to identify any roadway, traffic signal, access management, and safety improvements that will be necessary along Nansemond Parkway (State Route 337) within the next ten years (Map 1).

The Nansemond Parkway study corridor serves as a major thoroughfare between downtown Suffolk and the Western Branch/Chesapeake Square Mall area and I-664. Nansemond Parkway is an urban minor arterial roadway that is 2-lanes with no median the entire length of the roadway. Weekday traffic volumes vary from 8,400 to 13,000, with the highest volumes found between Kings Hwy and the Chesapeake Corporate Limits.

The area around the corridor is rural in nature, but there has been new commercial and light industrial development in the northeast end of the corridor. In recent years, several neighborhoods have been constructed surrounding Nansemond River High School, which has increased traffic along the corridor. However, new development has shifted from residential to industrial warehousing, as is seen with the construction of Northgate Commerce Park on the north end of the corridor.

When the traffic impact analysis for Northgate Commerce Park was created, the widening of Nansemond Parkway eastbound to I-664 was included as a necessary improvement to handle the traffic from the new development. However, the effect of the vehicles that are expected to travel westbound on Nansemond Parkway from the development was not considered. Traffic from Northgate Commerce Park accounts for approximately 27% of the westbound Nansemond Parkway traffic at Kings Highway, and is approximately 13% of the southbound traffic at Wilroy Road.
**STUDY AREA**

The study area begins at the intersection of Nansemond Parkway and Wilroy Road (A), and continues 5.57 miles to the City of Chesapeake Corporate Limits (B), three-quarters of a mile past Shoulders Hill Road (see Map 2).

Ten intersections are analyzed in this study along the Nansemond Parkway corridor, as shown in Map 3 on page 3, and in the following list:

1. Nansemond Parkway/ Wilroy Road
2. Nansemond Parkway/ Rochdale Lane
3. Nansemond Parkway/ Severn Lane
4. Nansemond Parkway/ Nansemond River High School
5. Nansemond Parkway/ Sleepy Hole Road
6. Nansemond Parkway/ Bennetts Pasture Road
7. Nansemond Parkway/ Driver Lane
8. Nansemond Parkway/ Kings Highway
9. Nansemond Parkway/ Bowen Parkway
10. Nansemond Parkway/ Shoulders Hill Road/ Northgate Commerce Parkway

There are currently three signalized intersections in this corridor with three more anticipated to be signalized by 2019. The existing traffic signals are located at the intersections of Nansemond Parkway with Wilroy Road, Nansemond River High School, and Shoulder’s Hill Road/Northgate Commerce Parkway. Signals are anticipated at the intersections of Nansemond Parkway with Sleepy Hole Road and Bennetts Pasture Road, as well as Bowen Parkway (once construction of Bowen Parkway is complete).
Map 3 - Intersections Analyzed in Study Area

Map Source: Bing ©2009 Microsoft
**LAND USE AND SOCIOECONOMIC DATA**

This section examines the land use and socioeconomic characteristics of the Nansemond Parkway Study Area in order to understand its transportation requirements. Population, households and employment patterns facilitate the characterization of the study area. Since transportation networks influence where people live and work, population, household and employment patterns need to be identified and considered in order to address changing commuting patterns and habits of the study area’s population.

The Hampton Roads Transportation Planning Organization (HRTPO) and area localities have developed population, household, and employment forecasts through the year 2030. This socioeconomic data shows how neighborhoods, work centers and undeveloped land will develop over the next 20 years. For socioeconomic characteristic purposes, the Nansemond Parkway Study Area will be defined by the nine Transportation Analysis Zones (TAZs) shown in Map 4. TAZs are the basic unit of geography used in the regional travel demand model. Socioeconomic forecasting and allocation to the TAZ level is conducted as part of the process of developing the Long-Range Transportation Plan.

**LAND USE**

The City of Suffolk is one of the fastest growing cities on the Southside in Hampton Roads, increasing over 35% in population over the last decade from 60,595 (1998) to 82,302 (2008) according to the U.S. Census Bureau. Two of the fastest growing areas in Suffolk are in the northeast (Bridge Road area) and the central downtown Suffolk area. The Nansemond Parkway study corridor serves as a major connector for many residents between downtown Suffolk and the northeast growth area as well as the Western Branch/Chesapeake Square Mall area and I-664. Nansemond Parkway is one of three primary east/west connectors (Bridge Road and US 58) between I-664 and points westward.

**Map 4 - TAZs Compromising the Nansemond Parkway Study Area**

The area surrounding Nansemond Parkway is comprised of a mixture of suburban, rural conservation/low intensity residential, rural agricultural conservation, and one village community (see Map 5 on page 5). This area is predominantly rural in nature and is slowly being developed to include some commercialized properties and light/heavy industrial developments in the northeast portion of the corridor. The study area also includes some agricultural farmland, several schools along Nansemond Parkway and various low to medium density residential areas.

**Northgate Commerce Park**

On the northeast end of the study corridor, Northgate Commerce Park is under development. The site currently has over 300 acres of land zoned for light industrial, with approximately half of the site built-out (but not necessarily occupied). It is anticipated that this site will be one of the largest generators of traffic in the near future along the study corridor and will be built-out and fully occupied prior to 2019.
Land Use and Socioeconomic Data

Socioeconomic Data

Population, household, and employment forecasts for the next 20 years are found in the Hampton Roads 2030 Long-Range Transportation Plan. Overall, the City of Suffolk is expected to increase in population by 90%, households by 101%, and employment by 104%. As seen in Table 1, the Nansemond Parkway Study area is experiencing a much higher growth, with an increase in population by 195%, households by 208%, and employment by 323%. Detailed socio-economic data by TAZ in the Nansemond Parkway area is shown in Table 2 on page 6.

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Table 1 - 2000-2030 Growth
Source: HRTPO 2030 Long-Range Transportation Plan

Map 5 – City of Suffolk Northern Suburban/Urban Growth Area
Source: City of Suffolk 2026 Comprehensive Plan
Population, Household, and Employment Growth

The population, number of households, and employment in the Nansemond Parkway study corridor is anticipated to grow faster than the city of Suffolk as a whole between 2000 and 2030. **Figure 1** shows the proportion of the population, households, and employment in the study area to the population, households, and employment in the city of Suffolk. In 2000, the study area made up 8% of the city’s population, number of households, and employment. By 2030, the population and households along Nansemond Parkway will be 12% of the number in the whole city, and the employment in the Nansemond Parkway study area will be 16% of the total employment in Suffolk.

**Figure 1 - Thirty Year Population, Household, and Employment Growth**
Source: HRTPO 2030 Long-Range Transportation Plan

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Table 2 - Socioeconomic Data by Transportation Analysis Zones (TAZ) for the Nansemond Parkway Area

TAZ’s with “N/P” in the employment column cannot have their 2000 employment data disclosed due to VEC regulations.

Source: HRTPO 2030 Long-Range Transportation Plan
Roadway Characteristics and Traffic Volumes

Roadway Geometry and Characteristics

Nansemond Parkway is a 45-mph, 2-lane undivided facility along the entire length of the study area (See Table 3). However, there is a continuous left-turn lane that begins between Rochdale Lane and Severn Lane and ends at the Nansemond River High School signalized entrance. Roadway geometry and characteristics for the entire Nansemond Parkway study corridor were obtained from a combination of online aerial photos and field observations by HRTPO staff (Fall 2009). This data was used in the development of the Synchro 7.0 Traffic Signal Coordination / SimTraffic Model for the study corridor for the existing and future traffic conditions.

Historic Traffic Growth

Average Daily Traffic (ADT) volumes were obtained from the Virginia Department of Transportation (VDOT) for count stations along Nansemond Parkway and surrounding side streets (See Table 4). The Average Daily Traffic Signal Coordination / SimTraffic Model for the study corridor for the existing and future traffic conditions.

### Table 3 - Nansemond Parkway Corridor Roadway Characteristics

<table>
<thead>
<tr>
<th>Roadway Name</th>
<th>Length (Mi)</th>
<th>Number of Lanes</th>
<th>Median Divided</th>
<th>Posted Speed Limit (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nansemond Pkwy (Wilroy Rd. to Bennetts Pasture Rd)</td>
<td>1.72</td>
<td>2</td>
<td>No</td>
<td>45</td>
</tr>
<tr>
<td>Nansemond Pkwy (Bennetts Pasture Rd to Kings Hwy)</td>
<td>1.33</td>
<td>2</td>
<td>No</td>
<td>45</td>
</tr>
<tr>
<td>Nansemond Pkwy (Kings Hwy to Shoulders Hill Rd)</td>
<td>1.77</td>
<td>2</td>
<td>No</td>
<td>45</td>
</tr>
<tr>
<td>Nansemond Pkwy (Shoulders Hill Rd to Chesapeake CL)</td>
<td>0.75</td>
<td>2</td>
<td>No</td>
<td>45</td>
</tr>
</tbody>
</table>

Traffic (ADT) ranged between 8,692 and 13,296 vehicles per day in 2008 for Nansemond Parkway. The annual growth rates for a majority of the Nansemond Parkway study corridor has been between 1% and 5% between 1999 and 2008. Shoulders Hill Road has experienced high growth in recent years, averaging about 6% annually since 1994. With the new developments along Northgate Commerce Parkway, the growth rate of Shoulders Hill Road and Nansemond Parkway is expected to increase at an even higher rate.

### Table 4 - Historical Weekday Daily Traffic Volumes

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>337</td>
<td>Nansemond Pkwy</td>
<td>Wilroy Rd</td>
<td>Bennetts Pasture Rd</td>
<td>1.72</td>
<td>7,796</td>
<td>9,197</td>
<td>9,376</td>
<td>11,645</td>
<td>10,584</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.0%</td>
</tr>
<tr>
<td>337</td>
<td>Nansemond Pkwy</td>
<td>Bennetts Pasture Rd</td>
<td>Kings Hwy</td>
<td>1.33</td>
<td>5,576</td>
<td>6,280</td>
<td>8,087</td>
<td>8,692</td>
<td>3.2%</td>
<td>5.1%</td>
<td></td>
<td></td>
<td>1.5%</td>
<td>2.2%</td>
</tr>
<tr>
<td>337</td>
<td>Nansemond Pkwy</td>
<td>Kings Hwy</td>
<td>Shoulders Hill Rd</td>
<td>1.77</td>
<td>8,267</td>
<td>10,726</td>
<td>10,819</td>
<td>11,171</td>
<td>13,119</td>
<td>13,178</td>
<td></td>
<td></td>
<td>1.5%</td>
<td>2.2%</td>
</tr>
<tr>
<td>337</td>
<td>Nansemond Pkwy</td>
<td>Shoulders Hill Rd</td>
<td>Chesapeake CL</td>
<td>0.75</td>
<td>8,270</td>
<td>10,306</td>
<td>11,761</td>
<td>13,017</td>
<td>14,058</td>
<td>13,296</td>
<td></td>
<td></td>
<td>N/A</td>
<td>1.4%</td>
</tr>
<tr>
<td>337</td>
<td>Portsmouth Blvd</td>
<td>Suffolk CL</td>
<td>Jolliff Rd</td>
<td>0.75</td>
<td>8,270</td>
<td>20,372</td>
<td>10,306</td>
<td>10,238</td>
<td>11,761</td>
<td>13,171</td>
<td></td>
<td></td>
<td>-3.0%</td>
<td>1.4%</td>
</tr>
<tr>
<td>337</td>
<td>Portsmouth Blvd</td>
<td>Jolliff Rd</td>
<td>I-664</td>
<td>0.60</td>
<td>8,500</td>
<td>20,372</td>
<td>10,306</td>
<td>10,238</td>
<td>11,761</td>
<td>13,171</td>
<td></td>
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<td>2.7%</td>
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<tr>
<td>627</td>
<td>Bennetts Pasture Rd</td>
<td>Nansemond Pkwy</td>
<td>Kings Hwy</td>
<td>1.36</td>
<td>3,526</td>
<td>3,497</td>
<td>4,883</td>
<td>4,762</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
<td>3.4%</td>
</tr>
<tr>
<td>125</td>
<td>Kings Hwy</td>
<td>Bennetts Pasture Rd</td>
<td>Nansemond Pkwy</td>
<td>0.48</td>
<td>3,339</td>
<td>3,989</td>
<td>2,681</td>
<td>3,447</td>
<td>3,086</td>
<td></td>
<td></td>
<td>-1.8%</td>
<td>-0.5%</td>
<td></td>
</tr>
<tr>
<td>626</td>
<td>Shoulders Hill Rd</td>
<td>Nansemond Pkwy</td>
<td>Pughsville Rd</td>
<td>1.44</td>
<td>3,268</td>
<td>3,072</td>
<td>4,727</td>
<td>6,787</td>
<td>6,940</td>
<td></td>
<td></td>
<td>6.0%</td>
<td>7.9%</td>
<td></td>
</tr>
<tr>
<td>642</td>
<td>Wilroy Rd</td>
<td>Suffolk Bypass</td>
<td>Nansemond Pkwy</td>
<td>1.89</td>
<td>5,705</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Source: HRTPO CMS
2009 EXISTING TRAFFIC VOLUMES

Weekday afternoon peak hour turning movement counts (November-December 2009) were provided by the City of Suffolk Traffic Engineering Division for the intersections of Kings Highway, Driver Lane, Bennetts Pasture Road, Sleepy Hole Road, and Wilroy Road.

These turning movement counts were supplemented with counts and projected counts from recent Traffic Impact Analysis (TIA) studies along Nansemond Parkway, which were also obtained from the City of Suffolk Traffic Engineering Division. The Northgate Commerce Park Master Traffic Impact Study and the Mansfield Farm Traffic Impact Study were used to develop traffic counts for Shoulders Hill Road/Northgate Commerce Parkway, Bowen Parkway, Rochdale Lane, and Severn Lane.

Once all turning movement volumes were entered, the HRTPO staff adjusted and balanced volumes at specific locations along the corridor to ensure reasonable traffic flow from intersection to intersection for the Synchro traffic model. All turning movements for this study were reviewed and approved by the City of Suffolk Traffic Engineering Division. The 2009 existing turning movement volumes for the Nansemond Parkway study corridor for the PM weekday peak hour are provided on Map 6 on page 9.

NORTHGATE COMMERCE PARK

Traffic Patterns for the intersections of Nansemond Parkway/Shoulders Hill Road/Northgate Commerce Parkway and Nansemond Parkway/Bowen Parkway were compiled from the Northgate Commerce Park Master Traffic Impact Study, which was completed in 2007 by the Landmark Design Group.

The Traffic Impact Study collected counts in 2006, and base-line traffic (including two developments scheduled for completion between 2006-2008) to create 2008 volumes. The volumes from the study were grown 2% to create 2009 volumes.

The study grew the background traffic from 2008 to 2015 and added the site traffic to it as well. In order to determine the site traffic, the given 2015 background traffic was subtracted from the build traffic provided. The site traffic was grown at 2% from 2015 to 2019 to get the future site traffic.

2019 PROJECTED TRAFFIC VOLUMES

HRTPO staff projected the 2019 background traffic volumes by increasing the 2009 existing traffic volumes using an annual growth rate of 2% (provided by the City of Suffolk Traffic Engineering Division). Traffic associated with the development of Northgate Commerce Park was added to the background traffic to create the 2019 projected traffic volumes. The HRTPO staff adjusted and balanced the 2019 volumes at specific locations along the corridor to ensure reasonable traffic flow from intersection to intersection for the 2019 future Synchro traffic model. All turn movements were reviewed and approved by the City of Suffolk Traffic Engineering Division. The 2019 projected turning movement volumes for the Nansemond Parkway study corridor for the PM weekday peak hours are provided on Map 7 on page 10.

By 2019, it is anticipated that the afternoon peak hour traffic volumes will increase 40-50% southbound/westbound, and 20-30% northbound/eastbound for a majority of the study corridor. The intersections of Nansemond Parkway with Bowen Parkway and Shoulders Hill Road/Northgate Commerce Parkway are expected to see more substantial growth, close to an 80% increase westbound, and over a 100% increase eastbound.
Map 6 - 2009 Existing Turning Movement Volumes (PM Peak)

Map Source: Bing, ©2009 Microsoft
Roadway Characteristics and Traffic Volumes

Map 7 - 2019 Projected Turning Movement Volumes (PM Peak)
Map Source: Bing, ©2009 Microsoft
CAPACITY ANALYSIS

ANALYSIS SCENARIOS

Several analysis scenarios – 2009 Existing, 2009 Existing Optimized, 2019 Planned Improvements, and 2019 Planned & Spot Improvements – were assessed to determine where capacity improvements are justified. This study focused only on the PM peak hour during a typical weekday for the study corridor, as it is recognized as the heaviest period of travel. While the study network includes the signalized intersection at Nansemond River High School, no volumes were assumed to be entering or exiting the school during the PM peak hour.

2009 Existing

The 2009 Existing scenario includes the Nansemond Parkway study corridor and intersection volumes, geometry, and traffic signal timings as they exist today.

2009 Optimized

The 2009 Optimized scenario includes the Nansemond Parkway study corridor and intersection volumes and geometry as they exist today. The only changes in this scenario are in the traffic signal timings (intersection cycle lengths, splits, and offsets), which were optimized.

2019 Planned Improvements

The first build scenario includes all of the currently planned improvements for the corridor. These improvements were identified by the City of Suffolk and through the Northgate Commerce Park Traffic Impact Analysis.

Nansemond Parkway

- Widen segment from Chesapeake CL to Shoulders Hill Road from 2 to 4 lanes with a raised-curb median.
- Widen segment from Shoulders Hill Road to Bowen Parkway from 2 to 4 lanes with a raised-curb median.
- Modify existing signal timing plans with optimized intersection phasing splits, cycle lengths, and offsets to provide coordination among existing and future traffic signals along Nansemond Parkway.

Intersection 5: Nansemond Parkway/Sleepy Hole Road

- Add a traffic signal.

Intersection 6: Nansemond Parkway/Bennetts Pasture Road

- Add a traffic signal.

Intersection 9: Nansemond Parkway/Bowen Parkway

- Add a traffic signal.

Intersection 10: Nansemond Parkway/Sholders Hill Road/Northgate Commerce Parkway

- Add an additional left-turn lane, through lane, and right-turn lane on westbound Nansemond Parkway.
- Add an additional left-turn lane on Northgate Parkway.
- Add an additional left-turn lane and an additional through lane on eastbound Nansemond Parkway, along with a channelized right-turn onto Northgate Parkway.
- Add a dual left-turn lane and a right-turn lane on Shoulders Hill Road.
2019 Planned & Spot Improvements

This scenario includes all of the planned improvements and the necessary capacity improvements to provide an acceptable level of service. The additional capacity improvements were developed by HRTPO staff based on the results of the Synchro analysis. It also includes an additional left-turn lane at Wilroy Road for vehicles traveling northbound on Nansemond Parkway that is not necessary to achieve an acceptable level of service, but is included to allow this movement to move simultaneously with the southbound Nansemond Parkway right-turn onto Wilroy Road when a train is crossing Nansemond Parkway (just south of the intersection). For details of these improvements, see Figure 14 on page 37 (Wilroy Road) and Figure 16 on page 38 (Sleepy Hole Road & Bennetts Pasture Road), in the “Recommendations” section at the end of the report.

**Intersection 1: Nansemond Parkway/Wilroy Road**
- Add a 360’ right-turn bay on southbound Nansemond Parkway.
- Add a 150’ left-turn bay on Wilroy Road.

**Intersection 5: Nansemond Parkway/Sleepy Hole Road**
- Add a 150’ left-turn bay on northbound Nansemond Parkway.

**Intersection 6: Nansemond Parkway/Bennetts Pasture Road**
- Add a 200’ left-turn bay on northbound Nansemond Parkway.

**Intersection 8: Nansemond Parkway/Kings Highway**
- Signalize the intersection

**METHODODOLOGY**

The study corridor was modeled using Synchro 7.0 Traffic Signal Coordination / SimTraffic Model Software. Synchro uses Highway Capacity Manual methods to calculate control delay (the delay resulting from slowing and stopping on the approaches of an intersection) and Levels of Service. Each scenario was modeled to determine which alternatives will provide the greatest improvements to traffic capacity.

The peak hour intersection Level of Service (LOS) is a measure of the adequacy of the lanes and signalization at an intersection for the particular peak hour. Level of Service is measured on a scale of “A” through “F,” with LOS A representing the best operating conditions and LOS F representing the worst. This measure is based upon the average control delay experienced by vehicles traveling through the intersection during the peak hour. “Control Delay” is the portion of total delay attributed to traffic control measures or devices, such as traffic signals or stop signs, including deceleration and stop time.

### Table 5 – Definition of Intersection Levels of Service

<table>
<thead>
<tr>
<th>Level of Service (LOS)</th>
<th>Average Control Delay (sec/veh)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>≤ 10.0</td>
<td>Progression is extremely favorable and most vehicles do not stop at all.</td>
</tr>
<tr>
<td>B</td>
<td>10.1 - 20.0</td>
<td>Progression is good with more vehicles stopping than at LOS A.</td>
</tr>
<tr>
<td>C</td>
<td>20.1 - 35.0</td>
<td>Progression is fair and individual cycle failures may begin to appear at this level.</td>
</tr>
<tr>
<td>D</td>
<td>35.1 - 55.0</td>
<td>Congestion becomes noticeable. Many vehicles stop and individual cycle failures become more prevalent.</td>
</tr>
<tr>
<td>E</td>
<td>55.1 - 80.0</td>
<td>Individual cycle failures are frequent.</td>
</tr>
<tr>
<td>F</td>
<td>&gt; 80.0</td>
<td>Arriving traffic volumes exceed the capacity of the intersection. Significant cycle failures occur.</td>
</tr>
</tbody>
</table>

Source: Highway Capacity Manual 2000

1 Highway Capacity Manual, Transportation Research Board, 2000
Level of Service A is considered the best operating condition with control delays of less than 10 seconds per vehicle at signalized intersections. Level of Service F is considered the worst operating condition with control delays of greater than 80 seconds per vehicle at signalized intersections. Table 5 lists the range of control delay values that define the Levels of Service. Levels of Service A through D are considered to be acceptable operating conditions, while Levels of Service E and F (indicated in red in upcoming maps and tables) are generally considered to be unacceptable operating conditions. LOS D (indicated in yellow) is the “warning” level condition where favorable conditions are on the verge of becoming unfavorable.

The City of Suffolk 2026 Comprehensive Plan notes that the segment of Nansemond Parkway from the Chesapeake CL to Kings Highway currently operates at LOS D, and recommends the widening of Nansemond Parkway (which currently ends at Bowen Parkway) all the way to Kings Highway. The additional widening was not included in this study as an alternative due to discussions with the City of Suffolk as to what improvements were feasible in the next ten years.

This study focused only on the PM peak hour during a typical weekday. It is important to note that although morning, off-peak, weekend, and special events traffic conditions are not included in this analysis, they should be considered in order to optimize traffic flow throughout the day.

### Results

Synchro was used to produce optimal signal timings and phasing for each intersection in the study corridor for each scenario considered. These timings and phasings maximized the LOS and minimized control delay for each intersection. The detailed Synchro reports can be found in the separate technical appendices document.

The intersection control delay and Levels of Service for each scenario can be found in Table 6. The LOS results are also provided by individual turn movement in Maps 9 through 12 on pages 16-19.

### 2009 Existing

With a few exceptions, the Nansemond Parkway corridor is able to handle the current demand. At the unsignalized intersections of Bennetts Pasture Road (Intersection 6) and Kings Highway (Intersection 8), the vehicles on the minor approaches have trouble finding gaps due to the traffic on Nansemond Parkway, resulting in LOS E for the Bennetts Pasture Road approach and LOS F for the Kings Highway approach. With the current traffic signal timing, at Shoulders Hill Road (Intersection 10) the westbound Nansemond Parkway approach and the southbound Shoulders Hill Road approach are LOS E and F, respectively. However, the overall intersection is

<table>
<thead>
<tr>
<th>Approach/Intersection Delay (sec/veh) and Level of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>2009 Existing</td>
</tr>
<tr>
<td>2009 Optimized</td>
</tr>
<tr>
<td>2019 Planned</td>
</tr>
<tr>
<td>Improvements</td>
</tr>
<tr>
<td>2019 Planned</td>
</tr>
<tr>
<td>&amp; Spot Improvements</td>
</tr>
</tbody>
</table>

Table 6 - Approach/Intersection Delay (sec/veh) and Level of Service

City of Suffolk 2026 Comprehensive Plan notes that the segment of Nansemond Parkway from the Chesapeake CL to Kings Highway currently operates at LOS D, and recommends the widening of Nansemond Parkway (which currently ends at Bowen Parkway) all the way to Kings Highway. The additional widening was not included in this study as an alternative due to discussions with the City of Suffolk as to what improvements were feasible in the next ten years.

This study focused only on the PM peak hour during a typical weekday. It is important to note that although morning, off-peak, weekend, and special events traffic conditions, are not included in this analysis, they should be considered in order to optimize traffic flow throughout the day.

### Results

Synchro was used to produce optimal signal timings and phasing for each intersection in the study corridor for each scenario considered. These timings and phasings maximized the LOS and minimized control delay for each intersection. The detailed Synchro reports can be found in the separate technical appendices document.

The intersection control delay and Levels of Service for each scenario can be found in Table 6. The LOS results are also provided by individual turn movement in Maps 9 through 12 on pages 16-19.

### 2009 Existing

With a few exceptions, the Nansemond Parkway corridor is able to handle the current demand. At the unsignalized intersections of Bennetts Pasture Road (Intersection 6) and Kings Highway (Intersection 8), the vehicles on the minor approaches have trouble finding gaps due to the traffic on Nansemond Parkway, resulting in LOS E for the Bennetts Pasture Road approach and LOS F for the Kings Highway approach. With the current traffic signal timing, at Shoulders Hill Road (Intersection 10) the westbound Nansemond Parkway approach and the southbound Shoulders Hill Road approach are LOS E and F, respectively. However, the overall intersection is
still functioning at LOS D.

2009 Optimized

Optimizing traffic signals along the study corridor provided very little delay savings as the current signal timings were close to optimal. In 2009, only two intersections were signalized (1- Wilroy Road and 10- Shoulders Hill Road). Wilroy Road is currently functioning at LOS C, with 21.4 seconds of vehicle delay, which can only be reduced 2.5 seconds per vehicle through signal optimization. Likewise, Shoulders Hill Road could be optimized to reduce overall vehicle delay by 4.9 seconds per vehicle, and allow the westbound Nansemond Parkway movement to be compliant with minimum LOS requirements. However, the Shoulders Hill Road intersection is scheduled for geometric improvements in 2010, and would need to be optimized for the new configuration at the end of construction.

2019 Planned Improvements

Congestion along the corridor severely worsens by 2019. The planned capacity improvements from Bowen Parkway to the Chesapeake line will provide acceptable capacity for vehicles at Bowen Parkway and Shoulders Hill Road (Intersections 9 and 10, respectively). However, the traffic signal at Wilroy Road (Intersection 1) is not able to handle the demand with the current geometric configurations as well, and the unsignalized intersections of Severn Lane (Intersection 3) and Kings Highway (Intersection 8) both have movements with LOS F. The most severe congestion occurs on the Kings Highway approach, where vehicles have a 577 second (9.6 minute) delay. The planned signals at Sleepy Hole Road and Bennetts Pasture Road (Intersections 5 and 6) are not enough to mitigate the congestion.

2019 Planned & Spot Improvements

The additional spot improvements improve all but three approaches and all intersections to a minimum level of service C. The Wilroy Road intersection (Intersection 1) needs a right-turn lane on southbound Nansemond Parkway in order to satisfy the demand, and a left-turn lane on eastbound Wilroy Road was added to allow movement during train crossings. The additional turn lanes reduce the delay on southbound Nansemond Parkway from 69.8 seconds per vehicle to 11.1 seconds per vehicle (LOS E to LOS B), and reduce the delay on Wilroy Road from 98.2 seconds per vehicle to 20.8 seconds per vehicles (LOS F to LOS C). This reduces the overall intersection level of service from LOS E to LOS B.

Severn Lane (Intersection 3) remains at LOS F in the final scenario because there is already a separate right and left-turn lane at the intersection. The delay is due to a lack of gaps for left-turning vehicles. However, the volumes on this approach (23 vehicles in the PM peak hour) do not warrant a traffic signal.

Coordinating the signals at Sleepy Hole Road (Intersection 5) and Bennetts Pasture Road (Intersection 6) made adding a left-turn land on northbound Nansemond Parkway at both intersections necessary in order to reduce the intersection delay at the Bennetts Pasture Road intersection to an acceptable level without worsening the Sleepy Hole Road delay. With the left-turn bays, the overall intersection delay at Bennetts Pasture Road was cut in half, from 40.4 seconds per vehicle to 21.1 second per vehicle, even though the Bennetts Pasture Road approach is still at LOS D. Overall, the Sleepy Hole Road intersection was improved from LOS C to LOS B with the spot improvements.

The Kings Highway approach (Intersection 8) has a control delay of 577.2 seconds per vehicle, or 9.62 minutes per vehicle, as an unsignalized intersection due to the volume of traffic on Nansemond Parkway not providing many acceptable gaps for turning traffic. Signalizing this intersection greatly improves the delay to 17.2 seconds per vehicle (LOS B) on Kings Highway, while only dropping the Nansemond Parkway approaches from LOS A to LOS B.
Network Delay

The overall network delay for each scenario is shown in Table 7, measured in terms of both seconds per vehicle in the network as well as in total vehicle-hours of delay over the entire network. The 2009 Optimized scenario does not improve the network very much, only reducing the delay by 1 second per vehicle, or 4 vehicle-hours. With only the planned improvements considered, vehicles in 2019 will experience almost 2.5 times as much delay, 27 seconds per vehicle, or 170 total vehicle-hours. The planned and spot improvements on this corridor bring the total network delay closer to the present conditions, with 12 seconds per vehicle of delay, or 77 vehicle-hours.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Network Delay</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(s/veh)</td>
</tr>
<tr>
<td>2009 Existing</td>
<td>12</td>
</tr>
<tr>
<td>2009 Optimized</td>
<td>11</td>
</tr>
<tr>
<td>2019 Planned Improvements</td>
<td>27</td>
</tr>
<tr>
<td>2019 Planned &amp; Spot Improvements</td>
<td>12</td>
</tr>
</tbody>
</table>

Table 7 - Network Delay

RECOMMENDED ALTERNATIVE

The improvements found in the Planned Improvements & Spot Improvements are necessary to provide an acceptable level of service for the traffic expected on Nansemond Parkway by 2019.

The improvements already planned for the Bowen Parkway and Shoulders Hill Road/Northgate Commerce Parkway are sufficient to handle the expected vehicle demand at those intersections in 2019, however, additional improvements along other sections of the study corridor will also be needed. The volume of traffic southbound on Nansemond Parkway turning right onto Wilroy Road requires a right-turn bay. The left-turn bay on Wilroy Road is not necessary for capacity, but will allow the left-turning vehicles (the major movement on the approach) to continue when a train is passing. The volume of vehicles on Nansemond Parkway at the Kings Highway intersection will eliminate gaps large enough for vehicles to turn from Kings Highway, making a new signal necessary. Also, while signalizing the Sleepy Hole and Bennetts Pasture Road intersections will help mitigate congestion, left-turn bays are needed on northbound Nansemond Parkway at both of the intersections.

Due to close intersection spacing, it is recommended that the signals at Sleepy Hole Road and Bennetts Pasture Road be coordinated. During school hours, the signal at Nansemond River High School should also be coordinated with the signals at Sleepy Hole Road and Bennetts Pasture Road.
Map 8 - 2009 Existing PM Peak Level of Service
Map Source: Bing, ©2009 Microsoft
Map 9 - 2009 Optimized PM Peak Level of Service
Map Source: Bing, ©2009 Microsoft
Capacity Analysis

Map 10 - 2019 Planned Improvements PM Peak Level of Service

Map Source: Bing, ©2009 Microsoft
Map 11 - 2019 Planned & Spot Improvements PM Peak Level of Service

Map Source: Bing, ©2009 Microsoft
SAFETY AND ACCESS MANAGEMENT ANALYSIS

SAFETY ANALYSIS

Intersections

Intersection 2 - Rochdale Lane (Mansfield Farm Subdivision)

The intersection of Nansemond Parkway and Rochdale Lane is a right-in, right-out intersection, as seen in Figure 2. There is a 12’ striped median to discourage left-turning vehicles traveling northeast on Nansemond Parkway to Rochdale Lane, or from Rochdale Lane to northeast Nansemond Parkway. The current design of the raised-curb island attempts to prevent left-turning vehicles traveling northeast on Nansemond Parkway and does not prevent left-turns from Rochdale Lane, even though there is a right-turn only sign on the approach. The left-turn from Rochdale Lane is prohibited due to the lack of sight distance for northbound vehicles. The raised-curb island should be reconfigured to safely allow only right-in and right-out only turn movements for Rochdale Lane. The asphalt cutout in the raised-curb island should also be realigned to provide a straight pathway for pedestrians. For details of the suggested improvement, see Figure 17 on page 39, in the “Recommendations” section.

Additionally, the entry sign and landscaped entrance for the Mansfield Farm neighborhood gives motorists the impression that it is the main entrance, which invites turn movements from both approaches along Nansemond Parkway. This could be confusing and potentially dangerous for vehicles traveling northeast on Nansemond Parkway, because their turn into the neighborhood is prohibited at this intersection. In the future, developers should be encouraged to designate the entrance with the best access as the main entrance.

Figure 2 - Intersection of Rochdale Lane and Nansemond Parkway

The current design of the raised-curb island attempts to prevent left-turning vehicles traveling northeast on Nansemond Parkway and does not prevent left-turns from Rochdale Lane, even though they are prohibited.

Aerial Picture Source: Bing, ©2009 Microsoft
Safety and Access Management Analysis

**Intersection 3 through 4 – Severn Lane to Nansemond River High School**

Although the left-turn lane for northbound Nansemond Parkway at Severn Lane is marked as a left-turn only lane, the lane markings continue through the intersection of Nansemond Parkway with Severn Lane (Intersection 3) and the Nansemond River High School Bus Entrance before ending at the Nansemond River High School main entrance (Intersection 4). Figure 3 shows the intersection of Nansemond Parkway and the Nansemond River High School Bus Entrance, where vehicles can improperly use the left-turn lane as a through lane due to the markings continuing through the intersection. There should be a striped median on the downstream side of both intersections for at least 100’ to prevent vehicles from using the left-turn lane as a through lane, as shown in Figure 18 on page 39 and Figure 19 on page 40.

**Intersection 7 - Driver Lane**

The intersection of Nansemond Parkway and Driver Lane is a Y intersection, as seen in Figure 4. From Driver Lane, the vehicle is in a position where it is difficult to see conflicting vehicles heading southbound on Nansemond Parkway. The alignment also creates a sharp turn that is a difficult maneuver for most vehicles. For vehicles traveling southbound on Nansemond Parkway, making a right-turn onto Drive Lane could be problematic due to the small turning radius. Rear-end conflicts are created due to the high speed southbound through vehicles along Nansemond Parkway (45 mph speed limit) with the decelerating right-turn vehicles, which is a safety hazard that could worsen as traffic increases in the future. This right-turn movement could be exacerbated for larger vehicles, particularly trucks. The Driver Village Initiatives Plan recommends realigning the intersection into a 90° intersection.

Figure 4 - Intersection of Nansemond Parkway and Driver Lane

The Y-intersection makes the left-turn from Driver Lane to northbound Nansemond Parkway and the right-turn from southbound Nansemond Parkway to Driver Lane difficult.

Aerial Picture Source: Bing, ©2009 Microsoft

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2 Driver Village Initiatives Plan, Urban Design Associates for City of Suffolk, March 29, 2004

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**Figure 3 – Left-Turn Lane at Severn Lane and Nansemond River High School Bus Entrance**

The left-turn lane does not end at these intersection, allowing vehicles to improperly use the lane as a through lane.

Aerial Picture Source: Bing, ©2009 Microsoft
At this time, HRTPO does not believe there is enough traffic at the intersection to justify an expensive change in the intersection geometry. However, if the number of crashes at this intersection becomes significant in the future, the City of Suffolk should consider creating a dead end on the southern part of Driver Lane and provide access to Driver Lane solely from Kings Highway.

Intersection 8 - Kings Highway

The intersection of Kings Highway and Nansemond Parkway is on a curve, creating a unique geometry, as seen in Figure 5. In the Driver Village Initiatives Plan, speeding from Nansemond Parkway to Kings Highway was identified as a weakness of the intersection. Westbound, the intersection is treated as a Y (Figure 6), where vehicles can veer right onto Kings Highway. The speed limit on Kings Highway is 30 mph while the speed limit on Nansemond Parkway is 45 mph.

Figure 6 – Westbound Nansemond Parkway at Kings Highway

Approaching the intersection of Kings Highway and Nansemond Parkway, there is nothing to suggest that Kings Highway has a lower speed limit. The intersection geometry and route signs convey the message that the roads are equivalent, even though there is a speed limit sign further down Kings Highway that says otherwise.

3 Driver Village Initiatives Plan, Urban Design Associates for City of Suffolk, March 29, 2004
Nansemond Parkway is 45 mph, and the Y intersection does nothing to slow down the vehicles. A right-turn bay should be added to westbound Nansemond Parkway to encourage drivers to slow down as they are veering onto Kings Highway as shown in Figure 15 on page 37.

**Intersection 10 - Shoulders Hill Road/Northgate Commerce Parkway**

There is currently a dedicated left-turn lane, a through lane, and a channelized right-turn lane on northbound Northgate Commerce Parkway. There is a “LANE ENDS MERGE LEFT” sign on Northgate Commerce Parkway intended to tell the right-turning vehicles that they eventually have to merge into the existing eastbound Nansemond Parkway lanes (Figure 7). The current location of the sign indicates that a lane is ending on Northgate Commerce Parkway, not Nansemond Parkway, which could confuse drivers into veering on Northgate Commerce Parkway, and not realizing that they have to merge on Nansemond Parkway. The sign should be removed, and skip marks added to the pavement where the right-turn lane becomes a part of Nansemond Parkway. For details, see Figure 20 on page 40.

**Railroad Crossing**

At the intersection of Nansemond Parkway and Wilroy Road there is an active Commonwealth Rail railroad track that crosses the southern leg (Figure 8). The major vehicular movements at this intersection are the left-turn from Wilroy Road to northbound Nansemond Parkway and the right-turn from southbound Nansemond Parkway to Wilroy Road, neither of which crosses the railroad tracks. However, because all of the approaches are a single lane, the major movements are stopped when the first vehicle in the queue is attempting to proceed southbound on Nansemond Parkway. By 2017, the Suffolk Rail Impact Study predicts that the crossing will be blocked 4.9 minutes per train, for an average total.

**Figure 7 - Confusing Sign at the Right-turn from Northbound Northgate Commerce Parkway**

The placement of the “LANE ENDS MERGE LEFT” sign is confusing to drivers because the right lane is a channelized right-turn lane. The sign is intended for when vehicles are merging onto Nansemond Parkway, and should be removed.

**Figure 8 - Railroad Crossing near Wilroy Road**

The train crossing on the south end of the study corridor only blocks one approach of the intersection, and the majority of vehicles travel between the other two approaches.

*Source: Bing, ©2009 Microsoft*
Safety and Access Management Analysis

The existing school zone is approximately 4,750’ long, with 2,000’ between the schools. Drivers typically expect the school zone to end once they pass a school and thus will resume faster speeds. Furthermore, the high school is in session from 7:35am to 1:15pm, while the elementary school in session from 9:00am to 3:15pm. As a result of the staggered school times, only one school has vehicular activity at a time while the entire school zone is activated. The current situation along Nansemond Parkway poses potential safety hazards if drivers resume faster speeds before arriving at the second school. To gain a higher compliance with the school zone, the existing school zone should be separated into two separate school zones. For details, see Figure 21 on page 41.

**Suffolk Seaboard Coastline Trail**

The proposed Suffolk Seaboard Coastline Trail crosses the Nansemond Parkway study corridor in two locations, north of the Bennetts Pasture Road intersection and at the intersection of Kings Highway and Nansemond Parkway.6

The trail is planned to cross Nansemond Parkway approximately 500’ north of the Bennett’s Pasture Road intersection. The master plan recommends crosswalks, pedestrian signage, and crossing signals for this intersection. Any traffic signal installed to allow pedestrians and bicyclists to safely cross Nansemond Parkway needs to coordinated with the signals at Bennetts Pasture Road and Sleepy Hole Road to ensure that vehicles are not queuing through the trail if stopped at the signal at Bennetts Pasture Road.

The trail also crosses Kings Highway at the intersection with Nansemond Parkway. The traffic signal recommended in this report would need to include a pedestrian timing phase to accommodate the trail.

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4 Suffolk Rail Impact Study, HRTPO, May 2007

5 MUTCD, Section 7B.15, Paragraph 07

6 Suffolk Seaboard Coastline Trail Master Plan,
Sidewalks

There are three neighborhoods which are within a walking distance for Nansemond River High School – Mansfield Farm (145 Residences), Woodlands of Nansemond (136 Residences), and Nansemond River Estates (158 Residences, with ~100 more to build out). Mansfield Farm is also within walking distance of Nansemond Parkway Elementary School. The only sidewalk in this area currently is between the Mansfield Farm subdivision and the traffic signal at Nansemond River High School. However, there is a worn footpath along Sleepy Hole Road, indicating that there are students walking to school from the neighborhoods on Sleepy Hole Road. A sidewalk should be placed between Sleepy Hole Road and Nansemond River High School to increase the safety of the students walking to the high school. For details, see Figure 24 on page 42. The sidewalk and curb cuts near the Nansemond River High School bus entrance should also be realigned to provide a straight crosswalk for pedestrians.

Along with the future construction of the Suffolk Seaboard Coastline Trail, new developments along Nansemond Parkway should include sidewalks that connect the development to the trail and/or any other compatible land uses.

**Crash Data Analysis**

Crash data for the Nansemond Parkway Study Corridor from 2006 to 2008 was provided by the City of Suffolk. The data was sorted into intersections and segments. Crashes at intersections not included in the study were accounted for in the segment summaries, with the exception of crashes at Nansemond Parkway Elementary School and Florence Bowser Elementary School, which were counted separately to ensure that there were no safety issues for the students at these schools. Map 12 on page 26 shows the number of crashes per year at each intersection and along each segment, by severity of crash (property damage only, injuries, and fatalities).

Table 8 on page 27 summarizes the crashes by location (either segment or intersection) and type of collision.
Map 12 - Crash Data by Year and Location for Nansemond Parkway (2006-2008)
*There were 2 Property Damage Only Crashes in 2006 that did not have any identification as to which portion of the corridor they are on*

Map Source: Bing, ©2009 Microsoft
## Table 8 - Crashes by Location and Type on Nansemond Parkway (2006-2008)

<table>
<thead>
<tr>
<th>Location</th>
<th>Unknown</th>
<th>Angle</th>
<th>Backed Into</th>
<th>Bicyclist</th>
<th>Deer</th>
<th>Fixed Object in Road</th>
<th>Fixed Object off Road</th>
<th>Head On</th>
<th>Non Collision</th>
<th>Other</th>
<th>Other Animal</th>
<th>Rear End</th>
<th>Sideswipe - Opposite Direction</th>
<th>Sideswipe - Same Direction</th>
<th>Total</th>
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<td></td>
<td></td>
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<td></td>
</tr>
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<td></td>
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<td>12</td>
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<td><strong>Total at Intersections</strong></td>
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<td>2</td>
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<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>12</td>
<td></td>
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<tr>
<td><strong>Overall Total</strong></td>
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<td>24</td>
<td>4</td>
<td>2</td>
<td>30</td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td>68</td>
<td></td>
<td>203</td>
</tr>
</tbody>
</table>

| Percentage of Overall Crashes               | 2%      | 12%    | 2%          | 1%        | 15%   | 1%                    | 19%                   | 2%      | 4%            | 1%   | 1%          | 33%      | 2%                            | 3%                          | 100   |

- **Segments**
- **Intersections**
Shoulder Width

The Nansemond Parkway study corridor has curb and gutter from Nansemond River High School to Rochdale Lane, and between one to two feet of paved shoulder the rest of the corridor, as seen in Figure 10. Once a vehicle leaves the travel lane, it is immediately subject to hitting a mailbox, power pole, trees, or a ditch. “Fixed object off road” crashes comprised 19% of all crashes along Nansemond Parkway. There have also been two bicycle crashes reported in the past three years, which is high for a rural corridor. Therefore, HRTPO staff recommends adding a wider shoulder width with intermittent shoulder rumble strips (VDOT Standard RS-5). RS-5 Intermittent shoulder rumble strips provide bicyclists with 4’ of paved shoulder outside the rumble strips and locations where they can move from the shoulder onto the roadway in order to complete turns without maneuvering across rumble strips.

Figure 10 - Narrow Pavement Shoulder on Nansemond Parkway
The entire length of Nansemond Parkway has 1-2’ paved shoulders.

Bennetts Pasture Road Intersection

The intersection of Nansemond Parkway and Bennetts Pasture Road (Intersection 6, Figure 9) experiences a much higher number of rear-end crashes than other intersections on the corridor. As seen in Table 8, 17 of the 47 rear-end crashes at intersections along Nansemond Parkway from 2006-2008 were at this intersection. Most likely, the rear-end crashes are more predominant at this location because of the large curve in the Bennetts Pasture Road before the intersection, even with a “STOP SIGN AHEAD” sign prior to the curve. When this intersection is signalized, there should be additional warnings before the curve, such as a traffic signal ahead sign with yellow flashing lights.

Figure 9 - Intersection of Bennetts Pasture Road and Nansemond Parkway
Bennetts Pasture Road has a large curve immediately before arriving at the intersection, which can contribute to rear-end accidents if drivers cannot see the length of the queue as they travel around the curve.

Aerial Picture Source: Bing, ©2009 Microsoft
Safety and Access Management Analysis

**Access Management Analysis**

**Existing Conditions**

Access management is the control of the number, location, and spacing of entryways onto a roadway. These entryways include intersections and driveways. Management of these access points is a critical element in ensuring the future safety and mobility of the Nansemond Parkway study corridor.

Due to increased commercial and residential growth in recent years, Nansemond Parkway has experienced an increase in traffic beyond its originally intended rural roadway design. By original design, there is very little access management in place along the corridor. However, as traffic increases, potential safety problems could arise. Along the corridor, there are 148 driveways and 15 minor roadways (See Table 9). The majority of the access points are for personal residences, which have a minimal impact on traffic flow. Instead, they pose a safety hazard for the residents as they must turn on and off of a fast roadway, creating side and rear-end conflicts.

<table>
<thead>
<tr>
<th>Segment</th>
<th>Number of Driveways</th>
<th>Number of Roadways</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilroy Rd. to Bennetts Pasture Rd.</td>
<td>36</td>
<td>6</td>
</tr>
<tr>
<td>Bennetts Pasture Rd. to Kings Hwy.</td>
<td>59</td>
<td>3</td>
</tr>
<tr>
<td>Kings Hwy. to Shoulders Hill Rd.</td>
<td>32</td>
<td>4</td>
</tr>
<tr>
<td>Shoulders Hill Rd. to Chesapeake Cl.</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>148</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

*Table 10 - Access Points on Nansemond Parkway*

**Driveway and Intersection Spacing**

According to the Virginia Department of Transportation (VDOT) Road Design Manual⁷, minimum spacing between intersections and driveways should be as shown in Table 10. As a 45-‐mph urban minor arterial, there should be no less than 305 feet between driveways, 660 feet between unsignalized intersections, and 1050 feet between signalized intersections.

Many of the roadways and driveways along Nansemond Parkway, particularly for residential access, do not meet the current minimum spacing requirements. In many cases, retrofitting the existing access is not feasible due to the current design and spacing between properties. For future developments, the City of Suffolk should adhere to these intersection and driveway spacing guidelines.

<table>
<thead>
<tr>
<th>Highway Functional Classification</th>
<th>Legal Speed Limit (mph)</th>
<th>Centerline to Centerline Spacing (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Divided</td>
</tr>
<tr>
<td>Urban Arterial</td>
<td>≤ 30 mph</td>
<td>1760</td>
</tr>
<tr>
<td></td>
<td>35 to 45 mph</td>
<td>2640</td>
</tr>
<tr>
<td></td>
<td>≥ 50 mph</td>
<td>2640</td>
</tr>
<tr>
<td>Rural Arterial</td>
<td>≤ 30 mph</td>
<td>2640</td>
</tr>
<tr>
<td></td>
<td>35 to 45 mph</td>
<td>2640</td>
</tr>
<tr>
<td></td>
<td>≥ 50 mph</td>
<td>2640</td>
</tr>
<tr>
<td>Urban Arterial</td>
<td>≤ 30 mph</td>
<td>880</td>
</tr>
<tr>
<td></td>
<td>35 to 45 mph</td>
<td>1050</td>
</tr>
<tr>
<td></td>
<td>≥ 50 mph</td>
<td>1320</td>
</tr>
<tr>
<td>Urban Collector</td>
<td>≤ 30 mph</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td>35 to 45 mph</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td>≥ 50 mph</td>
<td>1050</td>
</tr>
<tr>
<td>Rural Arterial</td>
<td>≤ 30 mph</td>
<td>1050</td>
</tr>
<tr>
<td></td>
<td>35 to 45 mph</td>
<td>1320</td>
</tr>
<tr>
<td></td>
<td>≥ 50 mph</td>
<td>1760</td>
</tr>
<tr>
<td>Rural Collector</td>
<td>≤ 30 mph</td>
<td>880</td>
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<td></td>
<td>35 to 45 mph</td>
<td>1050</td>
</tr>
<tr>
<td></td>
<td>≥ 50 mph</td>
<td>1320</td>
</tr>
</tbody>
</table>

*Table 9 - Intersection and Driveway Spacing*

Source: VDOT, Road Design Manual, Appendices F&G, 2005

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⁷ VDOT, Road Design Manual, Appendices F&G, 2005
Safety and Access Management Analysis

**Sleepy Hole Road/Bennets Pasture Road**

The City of Suffolk has determined that traffic signals are necessary prior to 2019 at Sleepy Hole Road (Intersection 5) and Bennets Pasture Road (Intersection 6), which are approximately 600 feet apart. Furthermore, the planned traffic signal at Sleepy Hole Road will only be approximately 700 feet from the existing signal at Nansemond River High School. Since all three traffic signal locations are within close proximity to each other and below the minimum VDOT signalized intersection spacing guidelines (1050’ as shown in Table 10), it is imperative for the signals to be coordinated for the optimal traffic flow.

**Kings Highway**

At Intersection 8, Kings Highway and Nansemond Parkway, there are two driveways that violate the minimum spacing requirements of 305 feet between a driveway and an intersection (Figure 11). The first driveway is only 35 feet from the painted gore, the other driveway is only 130 feet from the split. Since the driveways were originally intended for a business that is no longer located on this property, both driveways should be closed if rear access to the private residence can be provided from the existing residential driveway located to the north. For details of this improvement, see Figure 15 on page 37.

**Driveway Width**

According to the VDOT Access Management Design Standards for Principle Arterials, all commercial entrances should have width that is sufficient for the particular land use and anticipated traffic flow. The minimum width should be 16 feet for a one-way drive and 30 feet for a two-way drive. The maximum width should be 20 feet for a one-way drive and 40 feet for a two-way drive.

In order to avoid random driveway entry and exit, widths should not be too large. Driveway widths must, however, be wide enough so that vehicular conflicts do not occur as a result of normal vehicle turning paths.

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**Figure 11 - Nansemond Parkway at Kings Highway**

The two driveways at the Kings Highway intersection are for a business that no longer exists. They both should be closed, and access to the private residence provided from the residential driveway that currently borders the property on the north side.

*Aerial Picture Source: Bing, ©2009 Microsoft*
Safety and Access Management Analysis

Business South of Nansemond River HS Bus Entrance

On the east side of Nansemond Road, south of the Nansemond River HS Bus Entrance, there is a 60’ wide driveway (Figure 12). It is recommended that this driveway be narrowed to the VDOT recommended maximum of 40 feet for a two-way drive to reduce conflict points. For details, see Figure 22 on page 42.

John C. Holland Enterprises, Inc.

The entrance to John C. Holland Enterprises (Figure 13) is approximately 90’ wide, which is more than double the acceptable two-way driveway width of 40’. Large trucks are the primary users of this entrance, as it is the location of a construction, demolition, and debris waste landfill. The width of the driveway poses a safety issue, as trucks use the wrong side of the driveway in order to complete the turn onto eastbound Nansemond Parkway, opening the area to the possibility of head on collisions. The driveway should be narrowed, and the eastern opening of the driveway should be retrofitted to have an acceptable truck turning radius. For details, see Figure 23 on page 42.

Figure 12 – Business South of Nansemond River HS Bus Entrance
The business on the east side of Nansemond Parkway, just south of the Nansemond River High School Bus Entrance has a large driveway that allows random entry/exit points.

Aerial Picture Source: Bing, ©2009 Microsoft

Figure 13 - John C. Holland Enterprises Driveway
The driveway for John C. Holland Enterprises is very wide. The angle of the driveway means that trucks turning onto eastbound Nansemond Parkway from the business must make large turns.

Aerial Picture Source: Bing, ©2009 Microsoft
PRACTICES FOR FUTURE DEVELOPMENT

As traffic volumes continue to increase along the Nansemond Parkway study corridor with new growth and development, safe and efficient travel along this route will be achieved through capacity improvements and applying sound access management principles. The combination of effective land use planning and access management can be an instrumental tool for maintaining high service levels along this regional route. It is recommended that the City of Suffolk refer to the VDOT Access Management Regulations and Standards⁹ as a resource guide for access management practices and strategies.

Encouraging shared use entrances can reduce the number of commercial access points along the corridor while still providing reasonable access to adjacent land uses. A shared use entrance may be constructed if both commercial property owners agree; it is critical that they are informed up front of the safety and operational benefits of sharing access. The City should use its development review authority to limit new driveways, encourage consolidation, or redirect access to side streets. These standards and practices should be a condition of future development approval when a commercial development is placed next to a current development.

New residential units with frontage on Nansemond Parkway should be discouraged. If a new residence is necessary on Nansemond Parkway, the property should be designed in order to take advantage of any existing driveways on neighboring properties.

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CONCLUSIONS AND RECOMMENDATIONS

The Nansemond Parkway study corridor serves as a major thoroughfare between downtown Suffolk and the Western Branch/ Chesapeake Square Mall area and I-664. Population, households, and employment in the area surrounding the corridor are all growing at a faster rate than the City of Suffolk as a whole, which leads to substantial traffic growth along Nansemond Parkway.

By 2019, it is anticipated that the afternoon peak hour traffic volumes will increase 40-50% southbound/westbound, and 20-30% northbound/eastbound for a majority of the study corridor. The intersections of Nansemond Parkway with Bowen Parkway and Shoulders Hill Road/Northgate Commerce Parkway are expected to see more substantial growth, close to an 80% increase westbound, and over a 100% increase eastbound.

This study provided a comprehensive review of the intersection capacity, access management and other improvements that will be necessary along Nansemond Parkway in Suffolk, Virginia within the next ten years. This study reviewed the extensive improvements currently planned for the corridor and suggested additional improvements in order for the whole corridor to operate at acceptable levels.

In addition to intersection traffic analysis, this study included an evaluation of the access management conditions along the length of the corridor and presented a methodology for controlling the access of future development.

The planned improvements for Nansemond Parkway only begin to address the transportation needs of the corridor by 2019. The following critical improvements are necessary in order to provide adequate capacity to the roadway for vehicles over the next ten years. As traffic continues to grow along this corridor, additional capacity and safety improvements might be necessary beyond the 10-year horizon. It should be noted that the improvements made to any intersection must be accompanied by signal optimization and retiming. The timings used to make the following recommendations were based on the PM peak movement, and thus should not be the only timings utilized on this corridor.

Summarized below are the planned improvements and recommended improvements from this study. Each improvement is identified on Map 13 on page 36.

PLANNED IMPROVEMENTS

These improvements are currently planned to be constructed by 2019. Additionally, the city plans to add traffic signals at the Sleepy Hole Road and Bennetts Pasture Road Intersections (Intersections 5 & 6).

Nansemond Parkway

1. Widen segment from Chesapeake CL to Bowen parkway from 2 to 4 lanes with a raised curb median.

Intersection 5: Sleepy Hole Road

2. Add a traffic signal.

Intersection 6: Bennetts Pasture Road

3. Add a traffic signal.

Intersection 9: Bowen Parkway

4. Add a traffic signal.

Intersection 10: Shoulders Hill Road/Northgate Commerce Parkway

5. Add an additional left-turn lane, through lane, and right-turn lane on westbound Nansemond Parkway. Add an additional left-turn lane on Northgate Parkway. Add an additional left-turn lane and an additional through lane on eastbound Nansemond Parkway, along
Conclusions and Recommendations

with a channelized right-turn onto Northgate Parkway. Add a dual left-turn lane and a right-turn lane on Shoulders Hill Road.

RECOMMENDATIONS

Capacity Improvements

These improvements were identified through this study as improvements critical to maintain acceptable operating conditions along this corridor.

Intersection 1: Wilroy Road

6. Add a 350’ right-turn bay on southbound Nansemond Parkway in order to provide an acceptable LOS and also allow for the continuous movement of right-turning vehicles when a train is crossing and blocking the southern approach to the intersection. (see Figure 14 on Page 37)

7. Add a 150’ left-turn bay on Wilroy Road to allow for the movement of left-turning vehicles when a train blocks the southern approach to the intersection. (see Figure 14 on Page 37)

Intersection 5: Sleepy Hole Road

8. Add a 150’ left-turn bay on northbound Nansemond Parkway in order to provide an acceptable LOS. (see Figure 16 on Page 38)

Intersection 6: Bennetts Pasture Road

9. Add a 200’ left-turn bay on northbound Nansemond Parkway in order to provide an acceptable LOS. (see Figure 16 on Page 38)

Intersection 8: Kings Highway

10. Signalize the intersection of Nansemond Parkway and Kings Highway. (see Figure 15 on Page 37)

Safety & Access Management Improvements

These improvements were identified by HRTPO staff based on observations of the network characteristics on Nansemond Parkway, and are suggested to improve the safety along the corridor.

Intersection 2: Rochdale Lane

11. Redesign island to further channelize the southbound right-turn from Nansemond Parkway to Rochdale lane, channelize the right-turn from Rochdale Lane to southbound Nansemond Parkway, and provide a straight crosswalk across the intersection. (see Figure 17 on Page 39)

Intersection 3: Severn Lane

12. Convert the left-turn lane on Nansemond Parkway into a striped median for 100’ past Severn Lane to separate the left-turn bays for Severn Lane and Nansemond River High School. (see Figure 18 on Page 39)

Nansemond River High School Bus Entrance

13. Convert the left-turn lane on Nansemond Parkway into a striped median for 100’ past the Nansemond River High School bus entrance to separate the left-turn bays between the two Nansemond River High School entrances. (see Figure 19 on Page 40)

14. Narrow driveway for the business on the southeast side of Nansemond Parkway to 40’ to reduce conflict points for vehicles entering and exiting driveway. (see Figure 22 on Page 42)

Intersection 8: Kings Highway

15. Add a right-turn bay on westbound Nansemond Parkway so that drivers treat the movement as a turning movement instead of a roadway split. This would reduce the speed of vehicles heading towards Kings Highway to what is appropriate for that approach,
Conclusions and Recommendations

instead of vehicles treating it as an extension of Nansemond Parkway. (see Figure 15 on Page 37)

16. Close both driveways if rear access to the private residence can be provided from the existing residential driveway located to the north. (see Figure 15 on Page 37)

John C. Holland Enterprises

17. Narrow driveway to a 40 foot width while providing an acceptable truck turning radius for vehicles exiting property. (see Figure 23 on Page 42)

Intersection 10: Shoulders Hill Road/Northgate Commerce Parkway

18. Remove the existing “LANE ENDS MERGE LEFT” sign from the northbound right-turn lane on Northgate Commerce Parkway and add small skip pavement markings where the lane joins with Nansemond Parkway to alert drivers to the need to merge after completing the turn. (see Figure 20 on Page 40)

School Zones

19. Divide the school zone for Nansemond Parkway Elementary School and Nansemond River High School into two separate zones. The existing school zone speed sign near Nansemond River High School is in proper position, but the existing sign near Nansemond Parkway Elementary School should be located closer to the school (at the beginning of the turn bay into the bus entrance of the school). There should also be two additional school speed limit zone signs added, one for southbound traffic, 100’ north of Nansemond Parkway Elementary School, and one for northbound traffic, 100’ south of Nansemond River High School. (See Figure 21 on Page 41)

Sidewalks

20. Add a sidewalk from Sleepy Hole Road to Nansemond River High School. There are two large neighborhoods on Sleepy Hole Road, and there is currently a worn-footpath on Sleepy Hole Road towards the high school. A sidewalk would improve the safety of the students walking to the high school. (See Figure 24 on Page 42)

21. Realign the sidewalk and move the curb cuts at Nansemond River High School bus entrance to provide a straight crosswalk for pedestrians.

Driveway and Access Improvements

It is recommended that the City of Suffolk refer to the VDOT Access Management Regulations and Standards\(^\text{10}\) as a resource guide for any new developments along Nansemond Parkway.

Roadway Shoulders

The City of Suffolk should consider adding additional width to the paved shoulders along Nansemond Parkway (VDOT Standard RS-5). A wider shoulder should reduce the number of fixed object off road collisions by giving drivers more of a paved surface to avoid obstacles in the roadway (such as wildlife) or correct any driver errors. The wider roadway shoulder should include rumble strips in order to alert the driver that they have reached the side of pavement as well as additional smooth pavement for bicyclists.

Conclusions and Recommendations

Map 13- Planned & Recommended Improvements

Map Source: Bing, ©2009 Microsoft

* Improvement already planned for roadway
Conclusions and Recommendations

Figure 14 – Improvements to Wilroy Road (Intersection 1)
Improvements 6 and 7
Aerial Picture Source: Bing, ©2009 Microsoft

Figure 15 - Improvements to Kings Highway (Intersection 8)
Improvements 10, 15, and 16
Aerial Picture Source: Bing, ©2009 Microsoft

(Improvements are not drawn to scale)
Conclusions and Recommendations

Figure 16 - Improvements to Sleepy Hole Road and Bennetts Pasture Road (Intersections 5 & 6)

*Improvements 8 and 9*
*Aerial Picture Source: Bing, ©2009 Microsoft*

(Improvements are not drawn to scale)
Conclusions and Recommendations

Figure 17 - Improvements to Rochdale Lane (Intersection 2)
Improvement 11
Aerial Picture Source: Bing, ©2009 Microsoft

Figure 18 - Improvements to Severn Lane (Intersection 3)
Improvement 12
Aerial Picture Source: Bing, ©2009 Microsoft

(Improvements are not drawn to scale)
Conclusions and Recommendations

Figure 19 - Improvements to Nansemond River High School Bus Entrance
Improvement 13
Aerial Picture Source: Bing, ©2009 Microsoft

Figure 20 - Improvements to Shoulders Hill Road (Intersection 10)
Improvement 18
Aerial Picture Source: Bing, ©2009 Microsoft

(Improvements are not drawn to scale)
Figure 21 - School Zone Improvements for Nansemond River High School and Nansemond Parkway Elementary School
Improvement 19
Aerial Picture Source: ©2009 Google - Imagery

(Improvements are not drawn to scale)
Conclusions and Recommendations

Figure 22 – Improvement at Business across from Nansemond River High School
Improvement 14
Aerial Picture Source: Bing, ©2009 Microsoft

Figure 23 – Improvement at John C. Holland Enterprises
Improvement 17
Aerial Picture Source: Bing, ©2009 Microsoft

Figure 24 – Sidewalk for Nansemond River High School
Improvement 20
Aerial Picture Source: Bing, ©2009 Microsoft

(Improvements are not drawn to scale)
PUBLIC REVIEW AND COMMENTS

Public comments for this report are found in Appendix E.