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1.0 EXISTING CONDITIONS

1.1 TRANSPORTATION SETTING

Ground transportation in the Route 460 study area consists primarily of automobile and truck traffic operating on a local, collector and arterial roadway network. In addition, a privately-owned railroad parallel to the Route 460 alignment allows freight service in the study area.

1.1.1 Norfolk Southern Railroad

The Norfolk Southern Corporation owns and operates a dual track railroad on right of way extending throughout the study area from Suffolk to the Petersburg line. The railroad was built in the 1850s as part of the Norfolk and Petersburg Railroad, and thus was responsible for the early development of the communities near Route 460 (Disputanta, Waverly, Wakefield, Ivor, Zuni and Windsor). Norfolk Southern currently uses the line for freight shipment.

1.1.2 Inter-City Bus Service

There is no scheduled inter-city bus service provided by major carriers along Route 460 within the study area. Greyhound and Trailways provide services at Suffolk and in Petersburg; however connections provided at these locations do not use Route 460.

1.1.3 Aviation

One existing municipal airport exists within the study area at Wakefield. The airport is owned by the Town of Wakefield and provides general aviation services. No regularly scheduled commercial flights depart from the airport.

In 2001, the Virginia Department of Aviation released the Eastern Virginia Airport System Study (EVASS). The Study helped a system of airports to meet eastern Virginia’s air transportation needs in the year 2030 and beyond. The study considered the three major commercial airports operating in eastern Virginia: Richmond International Airport (RIC), Norfolk International Airport (ORF) and the Newport News-Williamsburg International Airport (PHF). Among the alternatives considered in the study was construction of a new airport facility in eastern Virginia. The search area for the new regional airport was within the eastern portion of the Route 460 Location Study Area. No construction plan or schedule resulted from the EVASS, and currently no plan exists for constructing a new regional airport in eastern Virginia.

1.1.4 Existing Highway System

Within the study area, Route 460 is a four lane, undivided arterial with posted speeds of 35 to 55 mph from I-295 in Prince George County to US 58 in Suffolk. This eastern segment of the route was built in the mid 1930s as a two-lane roadway. In the mid 1950s, two concrete outside lanes were added to the existing asphalt lanes, widening Route 460 to four undivided travel lanes. Since the widening, minor roadway improvements including some median turn lanes and new traffic signals have been implemented. Lane widths on Route 460 vary between approximately 10 feet and 11 feet. There is no shoulder adjacent to the travel lanes, and there is no clear zone adjacent to the paved roadway surface. Drainage ditches are parallel to the roadway for much of the alignment within the study area.

There are a few other major roadways within the study area. Figure 1.1-1 depicts the locations of the other primary highway facilities.

- Route 10 is an east-west route located a few miles west of the James River. It is the eastern study area boundary, and intersects with Route 460 in Suffolk and with Interstate 295 in Chesterfield County. Most of Route 10 is 2-lane undivided highway. For most of the study area, the average traffic volumes on Route 10 are less than 5,000 daily vehicles. Traffic counts are
significantly higher at the eastern and western termini of the study area (between Suffolk and Smithfield, and within Hopewell).

- Virginia Route 156 is a north-south route that crosses the study area within Prince George County and the City of Hopewell. North of the study area, Route 156 crosses the James River to Charles City County. South of the study area, Route 156 connects to U.S. Route 301 and Interstate 95. Average daily traffic on Route 156 within Prince George County ranges from 4,500 to 7,000 vehicles. Traffic volumes are higher in the City of Hopewell, ranging from 6,500 to 17,000 daily vehicles.

- Virginia Route 40 connects to Route 10 in Surry County, and passes through Sussex County and the Town of Waverly within the study area. Within the study area, average daily traffic volumes range from 950 vehicles (near Route 10) to 4,500 daily vehicles (in Waverly).

- Virginia Route 31 connects to Route 10 in the town of Surry. Within the study area, it passes through the town of Dendron in Surry County and Wakefield in Sussex County. East of the study area, Route 31 provides a connection to Jamestown Ferry operating between Scotland and Jamestown, on the Virginia Peninsula. Average daily traffic volumes range from 1,800 to 3,200 vehicles within the study area.

- US Route 258 connects Smithfield to Franklin. Within the study area the road crosses Isle of Wight County and the Town of Windsor. Average daily traffic volumes range from 3,800 to 5,300 vehicles.
1.2 EXISTING VOLUMES AND LEVELS OF SERVICE (LOS)

1.2.1 Average Daily Traffic (ADT)

Traffic data collected included 21 peak-hour turn movement counts and 24-hour tube counts on study area roadways. The data was collected between June and August 2003. Vehicle classification counts were also taken during the same timeframe. Existing Average Daily Traffic (ADT) volumes along roadways in the Route 460 study area were supplemented with published count data from VDOT. This information is summarized in Table 1.2-1.

Table 1.2-1
EXISTING AVERAGE DAILY TRAFFIC (ADT) AND TRUCK VOLUMES

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Jurisdiction(s)</th>
<th>ADT</th>
<th>Daily Truck Percentage</th>
<th>Daily Truck ADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-295</td>
<td>VA 156</td>
<td>Prince George County</td>
<td>12,900</td>
<td>30%</td>
<td>3900</td>
</tr>
<tr>
<td>VA 156</td>
<td>VA 625</td>
<td>Prince George County</td>
<td>14,900</td>
<td>30%</td>
<td>4500</td>
</tr>
<tr>
<td>VA 625</td>
<td>VA 602</td>
<td>Prince George County/ Sussex County</td>
<td>9,700</td>
<td>28%</td>
<td>2700</td>
</tr>
<tr>
<td>VA 602</td>
<td>VA 40</td>
<td>Sussex County</td>
<td>8,600</td>
<td>28%</td>
<td>2400</td>
</tr>
<tr>
<td>VA 40</td>
<td>VA 31</td>
<td>Sussex County</td>
<td>12,900</td>
<td>28%</td>
<td>3700</td>
</tr>
<tr>
<td>VA 31</td>
<td>VA 616/ VA 620</td>
<td>Sussex County / Southampton County</td>
<td>9,000</td>
<td>28%</td>
<td>2500</td>
</tr>
<tr>
<td>VA 616/ VA 620</td>
<td>VA 644</td>
<td>Southampton County / Isle of Wight County</td>
<td>6,700</td>
<td>23%</td>
<td>1500</td>
</tr>
<tr>
<td>VA 644</td>
<td>US 258</td>
<td>Isle of Wight County</td>
<td>8,500</td>
<td>23%</td>
<td>2000</td>
</tr>
<tr>
<td>US 258</td>
<td>WCL Suffolk</td>
<td>Isle of Wight County</td>
<td>12,600</td>
<td>23%</td>
<td>2900</td>
</tr>
<tr>
<td>WCL Suffolk</td>
<td>Suffolk bypass</td>
<td>City of Suffolk</td>
<td>16,400</td>
<td>18%</td>
<td>2900</td>
</tr>
</tbody>
</table>

1.2.2 Truck Volumes

Route 460 is an important shipping route and, therefore, carries a large amount of truck traffic (see Table 3.2-1). For corridor analysis, through trucks are measured near the mid-point of travel corridors, away from the effects of local truck shipments in metropolitan areas and major shipping points. Throughout Route 460, truck volumes currently range from approximately 1,500 to near 4,500 trucks per day, approximately 18 to 30 percent of the total traffic on Route 460. By comparison, the national average truck composition for rural arterial highways is ten percent of total traffic (FHWA, Office of Highway Information Management, Highway Statistics Series 1995).

1.2.3 Level of Service (LOS) Methodology

The peak hour intersection level of service (LOS) is a measure of the adequacy of the existing 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.
The engineering profession generally accepts LOS D as a minimally acceptable operating condition for overall operations at signalized intersections in urban areas and LOS C for rural areas. At LOS D, the Highway Capacity Manual 3rd Edition (1997) cites that "the influence of congestion becomes more noticeable" and "individual cycle failures are noticeable." At LOS E, "individual cycle failures are frequent occurrences." A cycle failure denotes when a single cycle length does not serve all queued vehicles on an approach. Note that it is possible that an individual movement or approach would operate at LOS E or F while the overall intersection continues to operate at a better LOS. In most cases, overall LOS is the critical factor in determining whether operations are acceptable at a signalized intersection.

Table 1.2-2 provides a general description of the various LOS categories and delay ranges.

<table>
<thead>
<tr>
<th>LOS</th>
<th>AVERAGE DELAY (SECONDS/ VEHICLE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>≤ 10</td>
</tr>
<tr>
<td>B</td>
<td>10 - 20</td>
</tr>
<tr>
<td>C</td>
<td>20 - 35</td>
</tr>
<tr>
<td>D</td>
<td>35 - 55</td>
</tr>
<tr>
<td>E</td>
<td>55 - 80</td>
</tr>
<tr>
<td>F</td>
<td>≥ 80</td>
</tr>
</tbody>
</table>


The existing roadway network within the study area was modeled using Synchro 6.0 Traffic Signal Coordination Software. Synchro is a tool that analyzes the level of service (LOS) operations at all signalized intersections based on Highway Capacity Manual procedures.

The existing roadway model includes all lanes, turn bays, signal timings and turning movement volumes (AM and PM peak hours) as existed in the field during the data collection period.

Table 1.2-3 summarizes the existing level of service results for signalized intersections in the study area. It is observed that all the signalized intersections currently perform well at level of service C or better.
Table 1.2-3
ROUTE 460 EXISTING SIGNALIZED INTERSECTION LOS RESULTS

<table>
<thead>
<tr>
<th>ID</th>
<th>Intersection</th>
<th>Year 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>AM Peak Hour</td>
</tr>
<tr>
<td>1</td>
<td>Route 460 &amp; Route 630</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>Route 460 &amp; Route 156</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>Route 460 &amp; Route 40</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>Route 460 &amp; Route 31/628</td>
<td>A</td>
</tr>
<tr>
<td>5</td>
<td>Route 460 &amp; Route 616</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>Route 460 &amp; US 258</td>
<td>B</td>
</tr>
<tr>
<td>7</td>
<td>Route 460 &amp; Route 610/603</td>
<td>C</td>
</tr>
<tr>
<td>8</td>
<td>Route 460 &amp; Food Lion Access</td>
<td>A</td>
</tr>
<tr>
<td>9</td>
<td>Route 460 &amp; Shirley Holland Comm Pk</td>
<td>A</td>
</tr>
<tr>
<td>10</td>
<td>Route 460 &amp; Route 604</td>
<td>B</td>
</tr>
<tr>
<td>11</td>
<td>Route 460 &amp; Route 634</td>
<td>B</td>
</tr>
<tr>
<td>12</td>
<td>Route 460 &amp; Robs Road/ Nansemond Suffolk Academy</td>
<td>B</td>
</tr>
</tbody>
</table>

In addition to the signalized intersection analysis, an operational analysis for roadway segments along Route 460 was also conducted. From the west end of the study area to the Town of Windsor, Route 460 is considered a multilane highway by HCM standards. This section is approximately 40 miles in length and includes 5 signalized intersections. This section was further divided into 5 links between major towns. LOS for these links was determined by applying the HCM Multilane Highway methodology.

The primary measure of effectiveness (MOE) of a multilane highway is density (vehicles/mile/lane), while average speed is a secondary MOE. The density and speed of vehicles are affected by traffic volumes, lane width, lateral clearance (shoulder width), grade, access points, median type (divided, undivided, TWLTL), and percent of heavy vehicles. The thresholds of density, as well as average speed are presented in Table 1.2-4. In the engineering profession, LOS D or better is generally considered acceptable operating service for multilane highway segments.

Table 1.2-4
MULTILANE HIGHWAY LEVEL OF SERVICE CRITERIA

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Max Density (veh/mi/lane)</th>
<th>Average Speed (mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>11</td>
<td>55</td>
</tr>
<tr>
<td>B</td>
<td>18</td>
<td>55</td>
</tr>
<tr>
<td>C</td>
<td>26</td>
<td>54.9</td>
</tr>
<tr>
<td>D</td>
<td>35</td>
<td>52.9</td>
</tr>
<tr>
<td>E</td>
<td>41</td>
<td>51.2</td>
</tr>
<tr>
<td>F</td>
<td>&gt;41</td>
<td>&lt;51.2</td>
</tr>
</tbody>
</table>

Due to the increase in the number of signalized intersections on the east end of the corridor, from the Town of Windsor to the eastern limits of the study area, Route 460 is considered an arterial. The level of service of an arterial is primarily based upon the speed at which vehicles traverse the roadway. The speed is influenced by a number of factors such as the type of arterial, free flow speed, signal delay, signal spacing, as well as geometric considerations. Synchro software was used to analyze and report the existing and future (No Build and Build) conditions for these arterials. Based on the speed of the roadway, Route 460 is classified as a Class II type arterial. Table 1.2-5 displays LOS criteria based on average travel speed for a Class II arterial.

Table 1.2-5
LEVEL OF SERVICE CRITERIA FOR CLASS II ARTERIALS

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Average Travel Speed (mi/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>&gt;35</td>
</tr>
<tr>
<td>B</td>
<td>&gt;28-35</td>
</tr>
<tr>
<td>C</td>
<td>&gt;22-28</td>
</tr>
<tr>
<td>D</td>
<td>&gt;17-22</td>
</tr>
<tr>
<td>E</td>
<td>&gt;13-17</td>
</tr>
<tr>
<td>F</td>
<td>≤ 13</td>
</tr>
</tbody>
</table>


The roadway LOS results for existing Route 460 are summarized in Table 1.2-6. The results indicate that the existing Route 460 operates at LOS A in the western rural area and LOS C to D in the eastern end of the corridor from Windsor to Suffolk.

Table 1.2-6
ROUTE 460 EXISTING ROADWAY LOS

<table>
<thead>
<tr>
<th>Roadway Type</th>
<th>From</th>
<th>To</th>
<th>Year 2003 AM Peak Hour</th>
<th>Year 2003 PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multilane Highways</td>
<td>I-295</td>
<td>Disputanta</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Disputanta</td>
<td>Waverly</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Waverly</td>
<td>Wakefield</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Wakefield</td>
<td>Ivor</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Ivor</td>
<td>Windsor</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Urban Streets</td>
<td>West of Windsor</td>
<td>East of Windsor</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>(Arterials)</td>
<td>East of Windsor</td>
<td>Route 58 Bypass</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>
1.3 SAFETY ISSUES AND CRASH DATA ANALYSIS

There are over 1,300 miles of four-lane roadways in Virginia functionally classified as a rural principal arterial. Only five percent of these roads are non-divided four lane roadways similar to Route 460 in the study corridor. The majority of rural principal arterials in Virginia (77 percent) are 4-lane divided roadways with no access control. Roadways with a four-lane undivided cross section usually have higher than average crash rates due to the lack of median control, limitations to access control, and the impact that turning vehicles have on slowing traffic flows and increasing crash potential. In addition, a high percentage of vehicles traveling on Route 460 are trucks. Larger vehicles react slower than standard passenger vehicles, reduce roadway efficiency, and increase accident severity.

Table 1.3-1 provides calculated crash rate comparisons between the various highway types functionally classified as rural principal arterials in Virginia. The data indicates:

- The number of persons killed in the Route 460 corridor (2.2 per 100 MVMT) is greater than other facilities statewide. It is 137 percent greater than the average of four-lane divided roadways with no access control, 157 percent greater than four lane divided roadways with partial access control, and is 220 percent higher than the average of non-Interstate four lane freeways in Virginia.

- The injury crash rate on Route 460 is greater than the other 4-lane rural principal arterials in Virginia. It is 107 percent greater than the average of four-lane divided roadways with no access control, 149 percent greater than four lane divided roadways with partial access control, and is 164 percent higher than the average of non-Interstate four lane freeways in Virginia.

- The total crash rate for Route 460 is similar to the crash rate for a 4-lane divided facility with no access control; however, these rates are significantly higher than the total crash rates for 4-lane divided facilities with partial (121 percent higher) or full access control (143 percent higher).

### Table 1.3-1

<table>
<thead>
<tr>
<th>Crash Rates by Facility Type</th>
<th>Route 460 Study Corridor *</th>
<th>Rural Principal Arterials – Virginia Averages (2001)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>52</td>
<td>1,023</td>
</tr>
<tr>
<td># miles of Facility Type in VA</td>
<td></td>
<td>77</td>
</tr>
<tr>
<td># Persons Killed (per 100 MVMT)</td>
<td>2.2</td>
<td>1.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.4</td>
</tr>
<tr>
<td># Persons Injured (per 100 MVMT)</td>
<td>62.3</td>
<td>58.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41.7</td>
</tr>
<tr>
<td>Total Crash Rate (per 100 MVMT)</td>
<td>77.7</td>
<td>83.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>64.2</td>
</tr>
</tbody>
</table>

* Route 460 in the study area represents approximately 65 percent of the 4-Lane undivided Rural Principal Arterial roadways in Virginia, therefore no comparison is made to the statewide average for undivided 4-Lane facilities.

There were 555 crashes along the corridor from 1999 to 2001. Of the 555 crashes documented by VDOT during the three-year analysis period, 76 crashes involved tractor-trailers (14 percent). However, approximately half of the fatal crashes in the Route 460 corridor involved tractor-trailers. Crashes involving tractor-trailers constituted approximately 28 percent of all property damage related to crashes.
Crash types that occurred include:

- Rear end collisions (29%),
- Collisions with fixed objects off the road (24%),
- Angle accidents (21%),
- Sideswipes (same direction of traffic) (7%),
- Jackknifes, overturned vehicles and ran off the road (7%),
- Deer collisions (6%),
- Sideswipes (opposite direction of traffic) (3%),
- Head-on collisions (1%),
- Fixed object in road (1%), and
- Other miscellaneous crashes (1%).

1.4 TRAVEL DEMAND MODEL – EXISTING CONDITIONS ANALYSIS

Travel demand models are tools used to estimate future traffic conditions. Both the Hampton Roads area and the Richmond – Petersburg area utilize regional travel demand models to facilitate transportation planning in their respective regions. For the Route 460 Location Study the two regional models were combined to provide a tool that would reliably estimate future traffic conditions between Hampton Roads and Richmond – Petersburg. The product of this merger is referred to as the super-regional model. The Route 460 super-regional model integrates two newly validated regional models in the study area. The two original regional models are both traditional four-step models but have different structures and methods. The Richmond model is trip-based, while the Hampton Roads model is tour-based.

The Route 460 super-regional model takes different components of the two regional models. Overall, the super-regional model's structure follows the Richmond model. It consists of trip generation, highway skims for free-flow and congested networks, trip distribution with feedback, transit skims, mode choice, highway assignment, and transit assignment.

Model data integration

The super-regional model traffic analysis zone (TAZ) geography combines the two regional models' TAZ geography and adds a new TAZ geography for the new intermediate area between the two regions. During the process, the original TAZ structures are renumbered. The TAZ structure for the new intermediate area is based on Census 2000 geography. Particularly, it is largely based on Census block groups and for the areas between Route 460 and Route 10, a group of Census blocks. A total of 80 TAZs is created for the new intermediate area.

Socioeconomic data for the two MPO areas are the same as those in the original regional models. The Consultant develops socioeconomic data for the intermediate new areas between the two metropolitan regions, in consultation with local jurisdictions. These socioeconomic data take the same format as the Richmond model data.

Highway networks from the two MPO areas are integrated with a newly created highway network in the new intermediate area, resulting in a unified highway network. The new highway network for the intermediate area is based on Census 2000 geography, TIGER2000, and national highway network files. During the integration process, the nodes are re-numbered in a unified numbering system. External stations are also re-numbered, and some original external stations are deleted because they are no
longer external. Highway network attributes from the two highway networks are streamlined and standardized, and new attributes are created.

**Trip generation**

To the extent possible, the super-regional model maintains the original trip generation processes in the two regional models before integrating them. The new intermediate area is incorporated into the Richmond model trip generation process. The unified trip categories are Home-Based Work (HBW), Home-Based Other (HBO), Non-Home Based (NHB), and External-Internal Trips (IX/XI). This is the same classification used in the Richmond model. The tour-based categories in the original Hampton Roads model are aggregated and converted to the three categories—HBW, HBO, and NHB. Productions and attractions for internal trips are balanced for each region separately and then as a whole.

External trips are estimated quite differently from the original models. IX/XI trips for the Richmond and intermediate areas are estimated as a function of distance to the closest external stations, as are the XI attractions for the Hampton area. IX productions for the Hampton area are estimated from the external trip table in the Hampton Roads model.

A synthetic through trip table is created using the original through trip tables in the two modeling areas and the NCHRP 365 methodology for the new intermediate area. For those external stations that are still external in the new supermodel, we assume that original XX trips are still XX trips in the super-regional model. We extract their through-trip patterns from the original models and keep them in the super-regional model.

**Trip distribution and Highway Skims**

The super-regional model adopts the trip distribution and highway skimming process. This process starts with a free-flow highway skim, and trips by purpose (HBW, HBO, NHB, IX, and XI) are then distributed under the free-flow condition. Time-of-day factors are used to convert person trip tables to OD trip tables. A mode-choice model is used to separate toll and non-toll trips. The initial highway assignment produces a congested network. Congested highway impedances are skimmed and fed back to the distribution. The second round of trip distribution uses the combined impedance of congested and free-flow impedance.

Although the model structure is the same as the Richmond model, a couple of elements come from the Hampton Roads model. These tables are based on facility types and area types. Area types are defined in the same fashion as the two original models (see below). Capacity look-up tables are based on level-of-service E. Except for the interstate and freeway category, volume-delay functions are also borrowed from the Hampton Roads model.

**Transit Skims**

The transit skimming process for the super-regional model is based on the same process used in the Richmond model. Paths between zones in the region are built using a combination of walk and drive access links along with the highway and transit networks. Paths between zone pairs are chosen based on minimum travel time and are built for peak and off-peak periods.

**Mode Choice**

The mode choice model is based on the model used in both the Hampton Roads and Richmond models. The mode choice program has been updated to accommodate the expanded geographical extent and increased number of zones of the super-regional model. Travel times from the highway and transit skims are input along with total person trips from trip distribution in order to estimate the share of person trips that will use each of the available modes of travel in the model. Prior to highway assignment, auto person trips are converted to vehicle trips based on an assumed auto-occupancy.

**Highway Assignment**

The super-regional model uses a composite impedance to assign trips in the highway network, adopting the same formulation as that in the Hampton Road model. This composite impedance takes into account
travel time, distance, and toll. Volume-delay functions also come from the Hampton Road model, except for the interstate and freeway class. HOV and SOV trips are assigned to the highway network using equilibrium traffic assignment.

### 1.4.1 Existing Travel Patterns In The Study Area

#### 1.4.1.1 Origin Destination Study

To measure the amount of existing travel patterns along the Route 460 corridor, an Origin – Destination (OD) survey was conducted at two locations along the corridor in May 2003. A pre-paid postcard was distributed to eastbound travelers at the intersection of Route 460 and Route 156 in Prince George County. The postcard survey was also distributed to westbound travelers at the intersection of Route 460 and King’s Fork Road in Suffolk. The survey requested travel information from respondents regarding the purpose of their current trip, the trip origin, trip destination, and the number of passengers in their vehicle. The results of the origin-destination study identify travel patterns along Route 460, and indicate the corridor’s importance as a local, regional and state transportation facility.

By design, the OD survey locations were selected to analyze “through trips”, and therefore recorded only those trips on Route 460 that crossed either end of the study area. The majority of “internal trips” on Route 460 in the study area were not captured by the OD survey. These internal trips would have started and ended along Route 460 in between the two survey locations. Therefore they could have included both short trips along Route 460, as well as trips as long as approximately 45 miles (the approximate distance between the two survey locations). For safety reasons, the OD survey was not distributed to tractor-trailers.

**Eastbound Travelers**

At the Prince George County survey location, the majority of eastbound trips (80 percent) originated in the Richmond – Petersburg Metropolitan Statistical Area (as defined by the U.S. Census Bureau). An additional 15 percent of trips originated in other parts of Virginia, including southwestern, central and northern Virginia. Five percent of these eastbound trips along Route 460 originated in other states.

The majority of eastbound trips (60 percent) were destined for communities along Route 460 within the study area. An additional 31 percent of trips were destined for the Norfolk – Virginia Beach – Newport News MSA. Six percent of trips were destined outside of Virginia, and a small percentage of eastbound trips (about 2 percent) were destined for other locations in Virginia, primarily the Eastern Shore.

**Westbound Travelers**

At the King’s Fork Road survey location in Suffolk, the majority (91 percent) of westbound trips originated in the Norfolk – Virginia Beach – Newport News Metropolitan Statistical Area. An additional 8 percent of trips originated in other states, while less than 1 percent of westbound trips originated in other parts of Virginia.

The majority of westbound trips (75 percent) were destined for communities along Route 460 within the study area. An additional 15 percent of westbound trips were destined for the Petersburg -Richmond MSA. Over 7 percent of westbound trips were destined for others parts of Virginia and approximately 3 percent of westbound trips were destined for outside of Virginia.

#### 1.4.1.2 Scoping Meetings

To gauge the importance of Route 460 for internal trips within the study area, VDOT surveyed attendees at two public scoping meetings for the project. The meetings were held in Windsor and in Prince George County on August 6 and August 18, 2003. Comment forms distributed at the meetings included questions regarding travel patterns and usage of Route 460. Ninety-three (93) comment sheets were returned after the meetings. Route 460 is clearly an important transportation facility for the survey respondents based upon the following analysis of meeting attendees:
• The majority of survey respondents (58 percent) used Route 460 everyday. Eight-six (86) percent of respondents use Route 460 at least once per week.

• The majority of respondents (70 percent) travel greater than eleven miles one-way on average trips along Route 460. Nineteen percent travel greater than 30 miles one way. Only seven percent of respondents indicated one-way travel distances of less than five miles.

• Trip purposes mentioned by survey respondents covered every major category including: commuting to work (50 percent); shopping (38 percent); shipping goods (13 percent); and school trips (9 percent). Additionally, numerous “other” responses were given including dining/entertainment; visiting friends and family; and attending meetings and church. Several respondents indicated that every trip they make uses Route 460 because their driveway is located along the roadway.
2.0 ALTERNATIVES CONSIDERED

In accordance with NEPA requirements, alternatives considered for the Route 460 Location Study include the No-Build, Mass Transit, Transportation System Management (TSM), and Candidate Build Alternatives (CBAs). Each alternative has been evaluated with respect to its potential impacts and its ability to address the project’s purpose and need.

2.1 NO-BUILD

Consistent with the requirements of the NEPA and related FHWA guidelines, full consideration is given to the environmental consequences of taking no action to meet future travel demand (hereinafter referred to as the “No-Build Alternative”). The No-Build Alternative includes currently programmed committed and funded roadway and transit projects in the Virginia Department of Transportation (VDOT) Six Year Plan and the CLRP developed by the Planning District Commissions. The No-Build Alternative, while having no direct construction costs, would result in other economic, environmental, and quality of life impacts that can be expected from the continuation of roadway system deficiencies. While the No-Build alternative does not meet the project needs for traffic, safety, and roadway infrastructure improvements, it provides a baseline condition with which to compare the improvements and consequences associated with the Candidate Build Alternatives. The following is a list of major projects identified in the CLRP which influence the Route 460 study area:

- City of Suffolk - arterial signal system - Kings Fork Road to west corporate limits;
- Sussex County - dual left turn lanes on VA 604;
- Prince George County - left turn lane signal modification on VA 156;
- Prince George County - left turn lane signal modification on VA 629/Quaker Road.

2.2 MASS TRANSIT ALTERNATIVE

To the extent feasible, the Route 460 Location Study evaluates commuter rail, light rail, express bus, and bus rapid transit within the corridor and the framework of the Rail Study conducted by the Virginia Department of Rail and Public Transportation. The Location Study considers the transit planning done in the area by the local and regional agencies; therefore, the study considers plans by the counties and the City of Suffolk, as well as the Hampton Roads and Crater Planning District Commissions. This is the requirement of all highway projects as mandated by the Federal Highway Administration (FHWA).

The area was previously serviced by rail service until the middle to late 1970s. At present, however, no passenger rail service serves the Route 460 corridor. No regional or local bus service currently exists within the study area. The City of Suffolk does have bus service, but only within downtown Suffolk and the immediate surrounding located outside of the study corridor. A transit service was at one time proposed for welfare-to-work participants within the Tri-Cities Metropolitan Planning Organization, which includes Prince George County. This program was cancelled due to the human resource agency lost its federal designation. Another human resource agency will be established to revive the project (Tri-Cities MPO; 2002). Other areas have very specific programs (usually van service) for specific cohorts of the population (the elderly, those on public assistance, the physically disabled).

According to the Surry County Land Development Plan, there was regional bus service between Richmond and Norfolk as well between Surry to Williamsburg via the town of Surry. These services are no longer available. A previous study by the Southeastern Virginia Planning District Commission conducted a transportation feasibility study for areas in the region, including, the City of Suffolk and Isle of Wight County. This study concluded the need for transit service in these areas was low compared to other areas within Hampton Roads. It should be noted that the Hampton Roads Planning District Commission (PDC) was formed when the separate Southeastern Virginia Planning District Commission and the Peninsula Planning District Commission merged in 1990.

The purpose and need of this Location Study states the alternatives must address the concerns of safety, security, and access along Route 460, thus, the Mass Transit Alternative would have to make a
significant use of Route 460. No mode of transit will reduce the amount of trucks along 460, although it would reduce the amount of automobile traffic. The study area, being a mostly rural one, does not have the population, density, or travel patterns to support a high-end mode such as light rail or commuter rail.

Bus rapid transit (BRT) has been used in urban areas to improve travel in dense areas by limiting the number of bus stops on local bus services. It would not be logical to consider BRT in an area that not only has no local bus service, but no bus service at all.

Regarding Mass Transit options within the Route 460 study area, the most logical choice of mode for the mass transit alternative is a regional express service connecting the cities of Petersburg and Suffolk. This service has the most potential to reduce the traffic volume along Route 460. This service would be beneficial to commuters traveling from town to town along the highway, and to those commuting to or from the Route 460 corridor from outside the study area.

2.3 TRANSPORTATION SYSTEM MANAGEMENT ALTERNATIVE

Transportation System Management (TSM) improvements are low cost system enhancements that improve the efficiency of vehicles traveling along the roadways in the study area. TSM alternatives are often evaluated as potential design options. Such alternatives may include high-occupancy vehicle lanes, ridesharing, signal synchronization, and other actions. Also, where appropriate, mass transit options should be considered even when they are outside FHWA's funding authority. TSM includes a number of strategies to add capacity and improve operational deficiencies of the existing transportation system. These measures include:

- **Intelligent Transportation Systems** – Technology based systems to improve traffic flow by the use of traffic sensors, signal synchronization, closed-circuit television cameras, variable message signs, highway advisory radio, ramp metering, and media communication.

- **Travel Demand Management** – Implementation of measures designed to reduce congestion such as car pooling and High Occupancy Vehicle (HOV) lanes.

- **Access Management** – Reduce traffic impedance cause by turning vehicle by eliminating the number of direct access points along a roadway.

- **Minor Geometric Improvements** – Modification of existing intersections and travel lanes to improve safety and traffic flow.

2.4 CANDIDATE BUILD ALTERNATIVES

Five Conceptual Alternatives (A through E) were presented to the public at two Citizen Information Meetings held in February 2004 in Windsor and Prince George. More than 230 comment forms were submitted to the Route 460 Study Team. The comments included alignment preferences, identification of sensitive environmental resources, and discussion of the impacts of particular alternatives. These comments provided the team with information to perform a more detailed technical analysis and screening of the alternatives.

2.4.1 Technical Analysis and Screening

Following the February 2004 Citizen Information Meetings, the study team continued technical analysis and performed alternative screening. The analysis enabled the team to modify the conceptual alternatives to minimize environmental impacts and maximize benefits. This technical work included the following tasks:

- Completed travel demand forecasts that project the amount of future traffic each conceptual alternative would generate.

- Identified potential displacements (property takings and relocations) for each alternative using 2002 aerial photography of the study area.
Divided each conceptual alternative into segments to identify specific impacts such as displacements, wetlands, agricultural districts, and public facilities.

Determined the portions of each alternative that could be shifted to reduce the wetlands impacts.

Combined different alternatives into hybrid alternatives, to minimize the total environmental impacts. Each hybrid alternative attempted to improve upon the conceptual alternatives by reducing impacts to one or more screening factors.

2.4.2 Three Possible Candidate Build Alternatives Considered for Final Review

With input from interested citizens and federal agency partners along with the results of detailed analyses, the following three CBAs were selected for further review and evaluation (Figure 2.4-1).

2.4.2.1 Candidate Build Alternative 1

Candidate Build Alternative 1 is a combination of Conceptual Alternatives A and C. Candidate Build Alternative 1 follows an alignment south of existing Route 460. The alternative starts along Route 460 in the Kings Fork area of the City of Suffolk. Candidate Build Alternative 1 makes a northerly bend between Waverly and Wakefield to avoid the habitat of a federally protected species. Eight interchanges would provide access to the new limited access roadway. The interchanges would be located at Route 58 Bypass in Suffolk, Route 258 in Windsor, Route 616 south of Ivor, Route 620 south of Wakefield, Route 40 south of Waverly, Route 625 south of Disputanta, and Interstate 295.

2.4.2.2 Candidate Build Alternative 2

Candidate Build Alternative 2 follows the alignment of existing Route 460, but includes northern bypasses around Windsor, Zuni, Ivor, Waverly, Wakefield, and Disputanta. This alternative is similar to Conceptual Alternative B; however, the alternative east of Windsor through Suffolk is located on new alignment (the same new alignment as CBA 1 and 3). Along each bypass, access points are proposed to existing Route 460 and the secondary roads that lead to the towns: Route 258 in Windsor, Route 616 north of Ivor, Route 31 north of Wakefield, Route 40 north of Waverly, and Route 625 north of Disputanta.

2.4.2.3 Candidate Build Alternative 3

Candidate Build Alternative 3 is a combination of Conceptual Alternatives C and D. The alignment follows CBA 2 from Suffolk to Windsor, where it continues north of existing Route 460. At Wakefield and Waverly, the alignment joins the alignment of the bypasses for CBA 2. West of Waverly, the alignment continues north toward the center of the study area north of the Blackwater River (following the alignment of Conceptual Alternative D). Nine interchanges would provide access to the limited access facility. The interchanges would be located at Route 58 Bypass in Suffolk, existing Route 460 near the Suffolk / Isle of Wight County border, Route 258 in Windsor, Route 616 north of Ivor, Route 31 north of Wakefield, Route 40 north of Waverly, and Route 625 north of Disputanta.
Figure 2.4-1
Candidate Build Alternatives

Study Area

**FIGURE 2.4-1**
CANDIDATE BUILD ALTERNATIVES
3.0 FUTURE CONDITIONS

3.1 TRAVEL DEMAND

3.1.1 Average Daily Traffic

The travel demand model developed for this study, described in Section 1.4, was used to estimate the changes in forecasted Average Daily Traffic volumes due to changes in travel patterns and the highway network defined by future No Build conditions and the Candidate Build Alternatives. Without major improvements to Route 460 in the corridor, the percent change in volume from the base year to the No-Build alternative ranges from 28% to 46% along the corridor. Approximately 30% to 60% of the traffic in the 2026 No-Build alternative is traveling completely through the corridor, while the remaining traffic consists of trips beginning or ending within the Route 460 corridor.

With the improvements to Route 460 defined by the CBAs, the model forecasts significant increases in traffic volume on Route 460, as shown in Table 3.1-1. These values represent 24 hour non-directional volumes from the model that has been post-processed using methods described in the National Cooperative Highway Research Program Report 255. The percent change in volume from the base year to the No-Build alternative range from 28% to 46% along the corridor. When comparing the CBAs to the No-Build alternative, the additional percent change in volume ranges from 12% to over 200% depending on the alternative. The lowest growth in the corridor is observed for CBA 2, primarily because it provides the least additional capacity and the lowest reduction in travel time of approximately 11 minutes. It should be mentioned that the daily traffic volumes for CBA 2 between the towns was refined in the needs of volume balancing for the operational analysis. CBA 1 and CBA 3 each provide a travel time savings of approximately 22 minutes; however CBA 1 carries approximately 5% to 15% more traffic than CBA 3.

Table 3.1-1
MODEL FORECAST TRAFFIC VOLUMES

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Existing 2003</th>
<th>No Build</th>
<th>Future Year (2026)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CBA 1</td>
</tr>
<tr>
<td>I-295</td>
<td>VA 156</td>
<td>12,900</td>
<td>17,400</td>
<td>34,200</td>
</tr>
<tr>
<td>VA 156</td>
<td>VA 625</td>
<td>14,900</td>
<td>19,100</td>
<td>31,700</td>
</tr>
<tr>
<td>Disputanta Bypass</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>21,700</td>
</tr>
<tr>
<td>VA 625</td>
<td>VA 602</td>
<td>9,700</td>
<td>13,000</td>
<td>32,800</td>
</tr>
<tr>
<td>VA 602</td>
<td>VA 40</td>
<td>8,600</td>
<td>12,000</td>
<td>32,700</td>
</tr>
<tr>
<td>Waverly Bypass</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>19,700</td>
</tr>
<tr>
<td>VA 40</td>
<td>VA 31</td>
<td>12,900</td>
<td>17,000</td>
<td>29,000</td>
</tr>
<tr>
<td>Wakefield Bypass</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>20,700</td>
</tr>
<tr>
<td>VA 31</td>
<td>VA 616/ VA 620</td>
<td>9,000</td>
<td>12,600</td>
<td>29,400</td>
</tr>
<tr>
<td>Ivor Bypass</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>22,800</td>
</tr>
<tr>
<td>VA 616/ VA 620</td>
<td>VA 644</td>
<td>6,700</td>
<td>9,800</td>
<td>30,900</td>
</tr>
<tr>
<td>Zuni Bypass</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>21,400</td>
</tr>
<tr>
<td>VA 644</td>
<td>US 258</td>
<td>8,500</td>
<td>12,000</td>
<td>30,900</td>
</tr>
<tr>
<td>Windsor Bypass</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>26,100</td>
</tr>
<tr>
<td>US 258</td>
<td>WCL Suffolk</td>
<td>12,600</td>
<td>16,600</td>
<td>38,700</td>
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<tr>
<td>WCL Suffolk</td>
<td>Suffolk bypass</td>
<td>16,400</td>
<td>20,500</td>
<td>38,600</td>
</tr>
</tbody>
</table>

* Seasonal Adjustment from 2003 tube and turn movement counts.
Based upon freight projections at VPA and the Maersk Terminal, as well as truck distribution patterns through the southeastern Virginia, approximately 1600 additional trucks per day are expected to travel Route 460 in the year 2026. These truck volumes are not included in the travel demand model and were therefore added to the east & west through movements along Route 460 for the No Build condition, and to the CBA alignment for the Build conditions. The details of this projection are included in Section 4.2. These 1600 additional trucks were then factored down to determine peak hour truck volumes based on the current ratio of peak hour to daily truck volumes.

3.1.2 Peak Hour Volume

Future No Build and TSM peak hour volumes for Route 460 and its cross streets were projected by factoring the existing peak hour volume by the ratio of the future No Build model ADT to the existing model ADT.

The future peak hour volumes for the CBAs, including the existing Route 460 and its cross streets were also estimated based on model ADT’s. Future Build peak hour volumes for existing Route 460 and its cross streets were projected by factoring the existing peak hour volume by the ratio of the future Build model ADT to the existing model ADT. Peak hour volumes along the new CBA alignment were determined by applying the existing K factor (the ratio of peak hour to daily traffic volumes) to the future Build model ADT. Turn movements at each interchange were determined using the ratio of traffic on the cross street as compared to the CBA alignment.

3.2 FUTURE OPERATIONAL ANALYSIS

The operational analysis for the target year of 2026 includes an evaluation of operating conditions at intersections as well as a corridor-wide analysis of Route 460 and the New Build Alignments. Both AM and PM peak hour scenarios were developed for No Build, TSM and three CBAs. Detailed intersection, arterial, and multilane highway analyses were performed along the existing Route 460 for each of the alternatives. The analyses and results for each of the alternatives are discussed below. In addition, a freeway analysis was performed for each of the CBAs.

3.2.1 No Build and TSM

The No Build analysis includes projected traffic volumes as determined by the 2026 No Build travel demand model, as well as geometric changes identified in the CLRP which influence the Route 460 study area:

- City of Suffolk - arterial signal system - Kings Fork Road to west corporate limits;
- Sussex County - dual left turn lanes on VA 604;
- Prince George County - left turn lane signal modification on VA 156;
- Prince George County - left turn lane signal modification on VA 629/Quaker Road.

The TSM alternative includes minor improvements to the roadway such as:

- Prince George County - add left turn lanes on Route 460 at the intersection of Route 625
- Prince George County - add left turn lanes on Route 460 at the intersection of Route 601 to the north and Route 624 to the south
- Prince George County - add new right- and left- turn lanes on Route 460 at the intersection of Route 618
Table 3.2-1 summarizes the LOS of signalized intersections along the existing Route 460 for No Build conditions. The results show that the performance of most intersections would be acceptable with a LOS C or better, with the exception of the intersection of Route 460 & Route 610/630, which is a five-leg intersection within the Town of Windsor that operates at an unacceptable LOS in the AM peak. This is primarily due to the lack of capacity on the side streets as well as the higher number of signal phases than a typical four-leg intersection.

<table>
<thead>
<tr>
<th>ID</th>
<th>Intersection</th>
<th>Year 2003</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No Build AM Peak</td>
</tr>
<tr>
<td>1</td>
<td>Route 460 &amp; Route 630</td>
<td>B</td>
</tr>
<tr>
<td>2</td>
<td>Route 460 &amp; Route 156</td>
<td>C</td>
</tr>
<tr>
<td>3</td>
<td>Route 460 &amp; Route 40</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>Route 460 &amp; Route 31/628</td>
<td>B</td>
</tr>
<tr>
<td>5</td>
<td>Route 460 &amp; Route 616</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>Route 460 &amp; US 258</td>
<td>B</td>
</tr>
<tr>
<td>7</td>
<td>Route 460 &amp; Route 610/603</td>
<td>E</td>
</tr>
<tr>
<td>8</td>
<td>Route 460 &amp; Food Lion Access</td>
<td>A</td>
</tr>
<tr>
<td>9</td>
<td>Route 460 &amp; Shirley Holland Comm Pk</td>
<td>A</td>
</tr>
<tr>
<td>10</td>
<td>Route 460 &amp; Route 604</td>
<td>B</td>
</tr>
<tr>
<td>11</td>
<td>Route 460 &amp; Route 634</td>
<td>C</td>
</tr>
<tr>
<td>12</td>
<td>Route 460 &amp; Robs Road/ Nansemond Suffolk Academy</td>
<td>C</td>
</tr>
</tbody>
</table>

Roadway level of service along Route 460 for the No Build conditions is presented in Table 3.2-2. The results show that although the rural multilane section will operate at acceptable levels of service, the arterial (eastern) portion of the corridor will operate at unacceptable levels in the year 2026 due to the heavier traffic volumes and the presence of more traffic signals.

<table>
<thead>
<tr>
<th>Roadway Type</th>
<th>From</th>
<th>To</th>
<th>Year 2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>AM Peak Hour</td>
</tr>
<tr>
<td>Multilane Highways</td>
<td>I-295</td>
<td>Disputanta</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Disputanta</td>
<td>Waverly</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Waverly</td>
<td>Wakefield</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Wakefield</td>
<td>Ivor</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Ivor</td>
<td>Windsor</td>
<td>A</td>
</tr>
<tr>
<td>Urban Streets (Arterials)</td>
<td>West of Windsor</td>
<td>East of Windsor</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>East of Windsor</td>
<td>Route 58 Bypass</td>
<td>E</td>
</tr>
</tbody>
</table>
The intersection and roadway LOS for the TSM alternative are presented in Table 3.2-3 and Table 3.2-4, respectively. As the TSM improvements are relatively minor in regards to improving capacity and intersection operations, the analysis shows that intersection LOS does not change from the No Build conditions.

Table 3.2-3
ROUTE 460 TSM ALTERNATIVE SIGNALIZED INTERSECTION LOS

<table>
<thead>
<tr>
<th>ID</th>
<th>Intersection</th>
<th>Year 2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TSM AM Peak Hour</td>
</tr>
<tr>
<td>1</td>
<td>Route 460 &amp; Route 630</td>
<td>B</td>
</tr>
<tr>
<td>2</td>
<td>Route 460 &amp; Route 156</td>
<td>C</td>
</tr>
<tr>
<td>3</td>
<td>Route 460 &amp; Route 40</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>Route 460 &amp; Route 31/628</td>
<td>B</td>
</tr>
<tr>
<td>5</td>
<td>Route 460 &amp; Route 616</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>Route 460 &amp; US 258</td>
<td>B</td>
</tr>
<tr>
<td>7</td>
<td>Route 460 &amp; Route 610/603</td>
<td>E</td>
</tr>
<tr>
<td>8</td>
<td>Route 460 &amp; Food Lion Access</td>
<td>A</td>
</tr>
<tr>
<td>9</td>
<td>Route 460 &amp; Shirley Holland Comm Pk</td>
<td>A</td>
</tr>
<tr>
<td>10</td>
<td>Route 460 &amp; Route 604</td>
<td>B</td>
</tr>
<tr>
<td>11</td>
<td>Route 460 &amp; Route 634</td>
<td>C</td>
</tr>
<tr>
<td>12</td>
<td>Route 460 &amp; Robs Road/ Nansemond Suffolk Academy</td>
<td>C</td>
</tr>
</tbody>
</table>

Table 3.2-4
ROUTE 460 TSM ALTERNATIVE ROADWAY LOS

<table>
<thead>
<tr>
<th>Roadway Type</th>
<th>From</th>
<th>To</th>
<th>Year 2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>AM Peak Hour</td>
</tr>
<tr>
<td>Multilane Highways</td>
<td>I-295</td>
<td>Disputanta</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Disputanta</td>
<td>Waverly</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Waverly</td>
<td>Wakefield</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Wakefield</td>
<td>Ivor</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Ivor</td>
<td>Windsor</td>
<td>A</td>
</tr>
<tr>
<td>Urban Streets</td>
<td>West of Windsor</td>
<td>East of Windsor</td>
<td>E</td>
</tr>
<tr>
<td>(Arterials)</td>
<td>East of Windsor</td>
<td>Route 58 Bypass</td>
<td>E</td>
</tr>
</tbody>
</table>
3.2.2 CBA 1

Several analyses were performed for each Candidate Build Alternative

- Signalized intersection analysis of intersection along Business Route 460 (existing alignment);
- Multilane highway analysis of Business Route 460 from the west end to Windsor;
- Arterial (urban street) analysis of Business Route 460 from Windsor to the east end, and
- Freeway analysis of each Candidate Build Alternative.

The methodology for the signalized intersection, multilane highway, and arterial analyses are described in Section 1.2.3, whereas the freeway methodology is described below, as it only applies to the CBAs.

The primary measure of effectiveness of a freeway section is density (vehicles/mile/lane). The density of vehicles are affected by type of freeway segment, traffic volumes, number of lanes and lane width, facility speed, lateral clearance (shoulder width), grade, interchange density, and percent of heavy vehicles. Since the new alignment of the CBAs in this project were identified as basic freeway segments with the design speed of 55 mph, the thresholds of density for this type of freeway segment are presented in Table 3.2-5. In the engineering profession, LOS D or better is generally considered acceptable operating service for freeway segments.

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Average Density (veh/mi/ln)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 - 11</td>
</tr>
<tr>
<td>B</td>
<td>11 - 18</td>
</tr>
<tr>
<td>C</td>
<td>18 - 26</td>
</tr>
<tr>
<td>D</td>
<td>26 - 35</td>
</tr>
<tr>
<td>E</td>
<td>35 - 45</td>
</tr>
<tr>
<td>F</td>
<td>&gt;45</td>
</tr>
</tbody>
</table>


Table 3.2-6 displays the results of intersection LOS along Business Route 460 for CBA 1. Due to the reduction of traffic volumes along the entire length of the corridor, nearly every intersection operates LOS B or better. The operation of the intersection of Route 460 & Route 610 / 603 is improved to LOS C from LOS E as reported in the No Build and TSM alternatives. In the conceptual design for CBA 1, Route 630 will be relocated and the existing intersection of Route 460 & Route 630 will be removed.

The roadway LOS for Business Route 460 is shown in Table 3.2-7. The multilane highway segments from the west end of the corridor to Windsor operate at LOS A, while the urban arterial portion operates at LOS C to D from Windsor to Suffolk. In contrast to the No Build and TSM alternatives, the operations along the arterial portion of the corridor are improved due to the traffic diversion to the new alignment.
### Table 3.2-6
BUSINESS ROUTE 460 SIGNALIZED INTERSECTION LOS FOR CBA 1

<table>
<thead>
<tr>
<th>ID</th>
<th>Intersection</th>
<th>Year 2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CBA 1 AM Peak Hour</td>
</tr>
<tr>
<td>1</td>
<td>Route 460 &amp; Route 630</td>
<td>N/A</td>
</tr>
<tr>
<td>2</td>
<td>Route 460 &amp; Route 156</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>Route 460 &amp; Route 40</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>Route 460 &amp; Route 31/628</td>
<td>A</td>
</tr>
<tr>
<td>5</td>
<td>Route 460 &amp; Route 616</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>Route 460 &amp; US 258</td>
<td>B</td>
</tr>
<tr>
<td>7</td>
<td>Route 460 &amp; Route 610/603</td>
<td>C</td>
</tr>
<tr>
<td>8</td>
<td>Route 460 &amp; Food Lion Access</td>
<td>A</td>
</tr>
<tr>
<td>9</td>
<td>Route 460 &amp; Shirley Holland Comm Pk</td>
<td>A</td>
</tr>
<tr>
<td>10</td>
<td>Route 460 &amp; Route 604</td>
<td>B</td>
</tr>
<tr>
<td>11</td>
<td>Route 460 &amp; Route 634</td>
<td>B</td>
</tr>
<tr>
<td>12</td>
<td>Route 460 &amp; Robs Road/ Nansemond Suffolk Academy</td>
<td>B</td>
</tr>
</tbody>
</table>

### Table 3.2-7
BUSINESS ROUTE 460 ROADWAY LOS FOR CBA 1

<table>
<thead>
<tr>
<th>Roadway Type</th>
<th>From</th>
<th>To</th>
<th>Year 2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>AM Peak Hour</td>
</tr>
<tr>
<td>Multilane Highways</td>
<td>I-295</td>
<td>Disputanta</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Disputanta</td>
<td>Waverly</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Waverly</td>
<td>Wakefield</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Wakefield</td>
<td>Ivor</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Ivor</td>
<td>Windsor</td>
<td>A</td>
</tr>
<tr>
<td>Urban Streets (Arterials)</td>
<td>West of Windsor</td>
<td>East of Windsor</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>East of Windsor</td>
<td>Route 58 Bypass</td>
<td>C</td>
</tr>
</tbody>
</table>
A freeway operational analysis was performed along the CBA 1 new alignment using Highway Capacity Software’s Freeway analysis methodology. The entire new alignment was divided into 6 segments between each town. The heavier directional peak hour volumes (with its corresponding peak hour truck percentage) were utilized to determine the segment LOS. The results listed in Table 3.2-8 indicate that all freeway sections operate at acceptable levels of service given the projected traffic volumes.

### Table 3.2-8
**NEW ALIGNMENT FREEWAY LOS FOR CBA 1**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Year 2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CBA 1 AM Peak Hour</td>
</tr>
<tr>
<td>I-295</td>
<td>Disputanta</td>
<td>B</td>
</tr>
<tr>
<td>Disputanta</td>
<td>Waverly</td>
<td>B</td>
</tr>
<tr>
<td>Waverly</td>
<td>Wakefield</td>
<td>A</td>
</tr>
<tr>
<td>Wakefield</td>
<td>Ivor</td>
<td>A</td>
</tr>
<tr>
<td>Ivor</td>
<td>Windsor</td>
<td>A</td>
</tr>
<tr>
<td>Windsor</td>
<td>Route 58 Bypass in</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Suffolk</td>
<td></td>
</tr>
</tbody>
</table>

#### 3.2.3 CBA 2
Table 3.2-9 displays the results of intersection LOS along Business Route 460 for CBA 2. Along the west end of the corridor, CBA 2 follows the existing Route 460 alignment. However, even with the increase in traffic volumes, these intersections still maintain acceptable traffic operations (LOS C or better). However, from Waverly (Route 40) to the east, all levels of service improve slightly compared to No Build conditions due to the bypasses around the town centers.

As shown in Table 3.2-10, the portion of the Business Route 460 corridor that operates as a multilane highway operates at LOS A; however the eastern urban arterial still encounters congestion primarily within Windsor with service levels of C to E.

### Table 3.2-9
**BUSINESS ROUTE 460 SIGNALIZED INTERSECTION LOS FOR CBA 2**

<table>
<thead>
<tr>
<th>ID</th>
<th>Intersection</th>
<th>Year 2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CBA 2 AM Peak Hour</td>
</tr>
<tr>
<td>1</td>
<td>Route 460 &amp; Route 630</td>
<td>C</td>
</tr>
<tr>
<td>2</td>
<td>Route 460 &amp; Route 156</td>
<td>C</td>
</tr>
<tr>
<td>3</td>
<td>Route 460 &amp; Route 40</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>Route 460 &amp; Route 31/628</td>
<td>A</td>
</tr>
<tr>
<td>5</td>
<td>Route 460 &amp; Route 616</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>Route 460 &amp; US 258</td>
<td>B</td>
</tr>
<tr>
<td>7</td>
<td>Route 460 &amp; Route 610/603</td>
<td>C</td>
</tr>
<tr>
<td>8</td>
<td>Route 460 &amp; Food Lion Access</td>
<td>A</td>
</tr>
<tr>
<td>9</td>
<td>Route 460 &amp; Shirley Holland Comm Pk</td>
<td>A</td>
</tr>
<tr>
<td>10</td>
<td>Route 460 &amp; Route 604</td>
<td>C</td>
</tr>
<tr>
<td>11</td>
<td>Route 460 &amp; Route 634</td>
<td>B</td>
</tr>
<tr>
<td>12</td>
<td>Route 460 &amp; Robs Road/ Nansemond Suffolk Academy</td>
<td>A</td>
</tr>
</tbody>
</table>
Table 3.2-10  
BUSINESS ROUTE 460 ROADWAY LOS FOR CBA 2

<table>
<thead>
<tr>
<th>Roadway Type</th>
<th>From</th>
<th>To</th>
<th>Year 2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>AM Peak Hour</td>
</tr>
<tr>
<td>Multilane Highways</td>
<td>I-295</td>
<td>Disputanta</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>Disputanta</td>
<td>Waverly</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Waverly</td>
<td>Wakefield</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Wakefield</td>
<td>Ivor</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Ivor</td>
<td>Windsor</td>
<td>A</td>
</tr>
<tr>
<td>Urban Streets (Arterials)</td>
<td>West of Windsor</td>
<td>East of Windsor</td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>East of Windsor</td>
<td>Route 58 Bypass</td>
<td>C</td>
</tr>
</tbody>
</table>

As described earlier in the demand modeling, the ADT projected for CBA 2 is generally less than that of CBA 1 and CBA 3. Hence, the LOS for CBA 2 bypasses would be B or better for both the AM and PM peak hour periods. Table 3.2-11 shows the results of the freeway analysis of CBA 2 bypasses.

Table 3.2-11  
FREEWAY NEW ALIGNMENT LOS FOR CBA 2 BYPASSES

<table>
<thead>
<tr>
<th>Freeway Section</th>
<th>Year 2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CBA 2 AM Peak Hour</td>
</tr>
<tr>
<td>Disputanta Bypass</td>
<td>A</td>
</tr>
<tr>
<td>Waverly Bypass</td>
<td>A</td>
</tr>
<tr>
<td>Wakefield Bypass</td>
<td>A</td>
</tr>
<tr>
<td>Ivor Bypass</td>
<td>A</td>
</tr>
<tr>
<td>Zuni Bypass</td>
<td>A</td>
</tr>
<tr>
<td>Windsor Bypass</td>
<td>B</td>
</tr>
<tr>
<td>East of Windsor to Route 58 Bypass in Suffolk</td>
<td>B</td>
</tr>
</tbody>
</table>
3.2.4 CBA 3

Table 3.2-12 displays the results of intersection LOS along Business Route 460 for CBA 3. Due to the reduction of traffic volumes along the entire length of the corridor, every intersection operates at LOS C or better. The operation of the intersection of Route 460 & Route 610 / 603 is improved to LOS C from LOS E as reported in the No Build and TSM alternatives.

The roadway LOS for Business Route 460 is shown in Table 3.2-13. The multilane highway segments from the west end of the corridor to Windsor operate at LOS A, while the urban arterial portion operates at LOS C to D from Windsor to Suffolk. In contrast to the No Build and TSM alternatives, the operations along the arterial portion of the corridor are improved due to the traffic diversion to the new alignment.

### Table 3.2-12
**BUSINESS ROUTE 460 SIGNALIZED INTERSECTION LOS FOR CBA 3**

<table>
<thead>
<tr>
<th>ID</th>
<th>Intersection</th>
<th>CBA 3 AM Peak Hour</th>
<th>CBA 3 PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Route 460 &amp; Route 630</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>Route 460 &amp; Route 156</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>3</td>
<td>Route 460 &amp; Route 40</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>Route 460 &amp; Route 31/628</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>5</td>
<td>Route 460 &amp; Route 616</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>Route 460 &amp; US 258</td>
<td>B</td>
<td>C</td>
</tr>
<tr>
<td>7</td>
<td>Route 460 &amp; Route 610/603</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>8</td>
<td>Route 460 &amp; Food Lion Access</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>9</td>
<td>Route 460 &amp; Shirley Holland Comm Pk</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>10</td>
<td>Route 460 &amp; Route 604</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>11</td>
<td>Route 460 &amp; Route 634</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>12</td>
<td>Route 460 &amp; Robs Road/ Nansemond Suffolk Academy</td>
<td>A</td>
<td>A</td>
</tr>
</tbody>
</table>

### Table 3.2-13
**BUSINESS ROUTE 460 ROADWAY LOS FOR CBA 3**

<table>
<thead>
<tr>
<th>Roadway Type</th>
<th>From</th>
<th>To</th>
<th>Year 2026</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>AM Peak Hour</td>
</tr>
<tr>
<td>Multilane</td>
<td>I-295</td>
<td>Disputanta</td>
<td>A</td>
</tr>
<tr>
<td>Highways</td>
<td>Disputanta</td>
<td>Waverly</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Waverly</td>
<td>Wakefield</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Wakefield</td>
<td>Ivor</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td>Ivor</td>
<td>Windsor</td>
<td>A</td>
</tr>
<tr>
<td>Urban Streets</td>
<td>West of Windsor</td>
<td>East of Windsor</td>
<td>D</td>
</tr>
<tr>
<td>(Arterials)</td>
<td>East of Windsor</td>
<td>Route 58 Bypass</td>
<td>C</td>
</tr>
</tbody>
</table>
A freeway operational analysis was performed along the CBA 3 new alignment using Highway Capacity Software’s Freeway analysis methodology. The entire new alignment was divided into 6 segments between each town. The heavier directional peak hour volumes (with its corresponding peak hour truck percentage) were utilized to determine the segment LOS. The results listed in Table 3.2-14 indicate that all freeway sections would operate at acceptable levels of service given the projected traffic volumes.

### Table 3.2-14
**FREEWAY NEW ALIGNMENT LOS FOR CBA 3**

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>CBA 3 AM Peak Hour</th>
<th>CBA 3 PM Peak Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-295</td>
<td>Disputanta</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Disputanta</td>
<td>Waverly</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Waverly</td>
<td>Wakefield</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Wakefield</td>
<td>Ivor</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Ivor</td>
<td>Windsor</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>Windsor</td>
<td>Route 58 Bypass in Suffolk</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>
4.0 FREIGHT ANALYSIS

4.1 EXISTING CONDITIONS

Route 460 is a major route for moving freight between the Hampton Roads and Richmond-Petersburg Metropolitan Areas. Through its connection to I-295 near Petersburg, Route 460 also offers long distance commercial traffic an alternative to I-64 and US 58 to access the northeastern and southeastern U.S. markets via I-95 / I-85. The highway is also used for local delivery of freight and goods.

Typically, long-term transportation studies assume an annual traffic growth rate that is the same for both passenger trips and freight (truck) trips. This freight analysis was conducted to determine if a different annual growth rate should be applied to trucks. Trends that affect highway freight movement were reviewed to determine their effect on future highway volume forecasts and capacity analysis results. Activities at the major ports in Hampton Roads as well as the development of new freight generating facilities near the study area affect these trends. Truck volume data was collected from various reports and databases provided by VDOT for Route 460 and other east-west highway routes. This data was supplemented by vehicle classification counts conducted specifically for the Route 460 Location Study in May 2003. In addition, data was obtained for the evaluation of key generators of highway freight, such as the Virginia Port Authority (VPA) and major distributors.

4.1.1 Freight Movement in Virginia

The Federal Highway Administration (FHWA) estimates that the amount of freight moved to, from and within Virginia will reach 904 million tons by the year 2020 (Table 4.1-1). The largest percentage of tonnage and value of shipments are by truck. Shipments by rail (second largest in tonnage) and air (second largest in value) also serve a major role in the movement of freight. Truck traffic in Virginia is expected to grow by 81 percent over the 1998 to 2020 period. This increase is expected to occur in most urbanized areas and throughout the Commonwealth.

The growth in truck traffic will likely affect the capacity levels of Virginia’s highways. According to FHWA, truck traffic moving to and from Virginia accounts for 12 percent of the average annual daily truck traffic (AADTT) on their Freight Analysis Framework (FAF) road network. Approximately 14 percent of truck traffic involved in-state shipments, and 24 percent involved trucks traveling across the state to other markets (U.S. Department of Transportation).
Table 4.1-1

<table>
<thead>
<tr>
<th>VIRGINIA</th>
<th>Tons (Millions)</th>
<th>Value (Billions $)</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Total</td>
<td>530</td>
<td>753</td>
</tr>
<tr>
<td>By Mode</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td>&lt;1</td>
<td>1</td>
</tr>
<tr>
<td>Highway</td>
<td>339</td>
<td>495</td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
<td>13</td>
</tr>
<tr>
<td>Rail</td>
<td>158</td>
<td>209</td>
</tr>
<tr>
<td>Water</td>
<td>24</td>
<td>34</td>
</tr>
<tr>
<td>By Destination/Market</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic</td>
<td>457</td>
<td>647</td>
</tr>
<tr>
<td>International</td>
<td>73</td>
<td>105</td>
</tr>
</tbody>
</table>


Note: Modal numbers may not add to totals due to rounding. The “Other” category includes international shipments that moved via pipeline or by an unspecified mode.

Rail shipments into, out of, or within Virginia accounted for 30 percent of the total tonnage transported in 1998. The main flow of Virginia rail freight follows east and west with the ports of Hampton Roads being a major origin and destination. Most of the freight by water is based on the activity in the ports of Hampton Roads.

4.1.2 Southeastern Virginia Freight Flows

Figure 4.1-1 illustrates the average daily truck traffic for the major US and Interstate highways in southeastern Virginia in the year 2002. State Route 168 is also included because of its significance as a major freight highway, and for its connection to North Carolina. As noted in the figure, average daily truck volumes on Route 460 are comparable to Interstate 64 and Route 58.

Figure 4.1-2 and Figure 4.1-3 provide a comparison of the average daily truck volumes and percentages for Route 460 and all US and Interstate highways in southeastern Virginia. The data represents truck volumes that are more characteristic of long haul or through movement freight. These are considered “gateways” to/from a major freight generator or midpoints between two major metropolitan areas. These volumes tend to be lower than other points along the routes because there is less influence from local trucking.
Figure 4.1-1
2002 AVERAGE DAILY TRUCK VOLUMES AT GATEWAYS

[Diagram showing 2002 average daily truck volumes at gateways with color coding for traffic volumes.]
Figure 4.1-2
2002 AVERAGE DAILY TRUCK VOLUMES AT GATEWAYS

Figure 4.1-3
2002 AVERAGE DAILY TRUCK PERCENTAGES AT GATEWAYS

4.1.2.1 I-64

Interstate 64 carries the largest volume of truck traffic between Hampton Roads and I-295. This route links Hampton Roads to Richmond and destinations to the west. It also connects to Interstate 95 (via I-295) to northern Virginia and destinations to the north. Table 4.1-2 provides the average daily truck volumes and percent trucks for 1990 and 2002. The data shows that percent volumes have declined during the 12-year period for some segments and the absolute number of trucks has declined as well. The greatest increase in truck volumes has occurred in the Newport News/Hampton area. The 2002 truck volumes by segment ranges from just over 2,000 trucks per day west of Williamsburg to near 9,000 trucks per day near US Route 17. As a percent of total vehicles, I-64 ranges from 4 to 7 percent.

Table 4.1-2
I-64 AVERAGE DAILY TRUCK VOLUMES: 1990 AND 2002

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>1990 Trucks</th>
<th>1990 Percent</th>
<th>2002 Trucks</th>
<th>2002 Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-295</td>
<td>Route 33/249</td>
<td>3,250</td>
<td>8%</td>
<td>3,480</td>
<td>6%</td>
</tr>
<tr>
<td>Route 33/249</td>
<td>Route 106</td>
<td>3,220</td>
<td>10%</td>
<td>2,340</td>
<td>6%</td>
</tr>
<tr>
<td>Route 106</td>
<td>Route 155</td>
<td>3,130</td>
<td>10%</td>
<td>2,400</td>
<td>6%</td>
</tr>
<tr>
<td>Route 155</td>
<td>Route 33</td>
<td>3,145</td>
<td>10%</td>
<td>2,340</td>
<td>6%</td>
</tr>
<tr>
<td>Route 33</td>
<td>Route 30</td>
<td>3,230</td>
<td>12%</td>
<td>2,520</td>
<td>6%</td>
</tr>
<tr>
<td>SR 30</td>
<td>Route 607</td>
<td>3,730</td>
<td>10%</td>
<td>2,580</td>
<td>6%</td>
</tr>
<tr>
<td>Route 607</td>
<td>Route 199/646</td>
<td>3,730</td>
<td>10%</td>
<td>2,040</td>
<td>4%</td>
</tr>
<tr>
<td>Route 199/646</td>
<td>Route 143 (Camp Perry Rd)</td>
<td>3,730</td>
<td>10%</td>
<td>2,700</td>
<td>6%</td>
</tr>
<tr>
<td>Route 143 (Camp Perry Rd)</td>
<td>Route 199 (East)</td>
<td>3,820</td>
<td>9%</td>
<td>3,360</td>
<td>6%</td>
</tr>
<tr>
<td>Route 199 (East)</td>
<td>Route 143 (Merrimac Trail)</td>
<td>4,125</td>
<td>8%</td>
<td>4,060</td>
<td>7%</td>
</tr>
<tr>
<td>Route 143 (Merrimac Trail)</td>
<td>Route 143 (Jefferson Ave)</td>
<td>4,125</td>
<td>8%</td>
<td>3,900</td>
<td>5%</td>
</tr>
<tr>
<td>Route 143 (Jefferson Ave)</td>
<td>Route 238</td>
<td>4,125</td>
<td>8%</td>
<td>3,850</td>
<td>5%</td>
</tr>
<tr>
<td>Route 238</td>
<td>Route 105</td>
<td>4,175</td>
<td>7%</td>
<td>4,000</td>
<td>5%</td>
</tr>
<tr>
<td>Route 105</td>
<td>Route 143 (Jefferson Ave)</td>
<td>4,790</td>
<td>8%</td>
<td>3,600</td>
<td>4%</td>
</tr>
<tr>
<td>Route 143 (Jefferson Ave)</td>
<td>Route 171</td>
<td>5,270</td>
<td>7%</td>
<td>6,480</td>
<td>6%</td>
</tr>
<tr>
<td>Route 171</td>
<td>US 17</td>
<td>5,270</td>
<td>7%</td>
<td>7,500</td>
<td>6%</td>
</tr>
<tr>
<td>US 17</td>
<td>Hampton Roads Center Pkwy</td>
<td>5,140</td>
<td>6%</td>
<td>8,940</td>
<td>6%</td>
</tr>
<tr>
<td>Hampton Roads Center Pkwy</td>
<td>Route 134 (Magruder Blvd)</td>
<td>5,140</td>
<td>6%</td>
<td>7,500</td>
<td>6%</td>
</tr>
<tr>
<td>Route 134 (Magruder Blvd)</td>
<td>US 258 (Mercury Blvd)</td>
<td>7,030</td>
<td>7%</td>
<td>8,700</td>
<td>6%</td>
</tr>
<tr>
<td>US 258 (Mercury Blvd)</td>
<td>I-664</td>
<td>6,580</td>
<td>8%</td>
<td>8,700</td>
<td>6%</td>
</tr>
<tr>
<td>I-664</td>
<td>Route 167</td>
<td>6,060</td>
<td>8%</td>
<td>7,320</td>
<td>6%</td>
</tr>
<tr>
<td>Route 167</td>
<td>Route 169</td>
<td>5,890</td>
<td>7%</td>
<td>6,000</td>
<td>6%</td>
</tr>
<tr>
<td>Route 169</td>
<td>WCL Norfolk</td>
<td>5,440</td>
<td>7%</td>
<td>5,700</td>
<td>6%</td>
</tr>
</tbody>
</table>

4.1.2.2 Route 460

Route 460 traffic count data was collected at various locations along the corridor. Table 4.1-3 provides truck volumes and percent trucks at 13 links between and adjacent to the traffic signals on the existing corridor. According to this data, truck percentages are very high throughout the corridor, particularly for an undivided facility with intermittent traffic signals. Truck percentages are greatest in the rural areas in the middle of the corridor, primarily because there is a reduced volume of local trips compared with through trips. Throughout the corridor, the total volume of trucks ranges between 1,500 and 4,500 trucks per day.

Table 4.1-3
2003 TRUCK PERCENTS AND ADT ON ROUTE 460

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Jurisdiction(s)</th>
<th>ADT</th>
<th>Daily Truck Percentage</th>
<th>Daily Truck ADT</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-295</td>
<td>VA 156</td>
<td>Prince George County</td>
<td>12,900</td>
<td>30%</td>
<td>3900</td>
</tr>
<tr>
<td>VA 156</td>
<td>VA 625</td>
<td>Prince George County</td>
<td>14,900</td>
<td>30%</td>
<td>4500</td>
</tr>
<tr>
<td>VA 625</td>
<td>VA 602</td>
<td>Prince George County/ Sussex County</td>
<td>9,700</td>
<td>28%</td>
<td>2700</td>
</tr>
<tr>
<td>VA 602</td>
<td>VA 40</td>
<td>Sussex County</td>
<td>8,600</td>
<td>28%</td>
<td>2400</td>
</tr>
<tr>
<td>VA 40</td>
<td>VA 31</td>
<td>Sussex County</td>
<td>12,900</td>
<td>28%</td>
<td>3700</td>
</tr>
<tr>
<td>VA 31</td>
<td>VA 616/ VA 620</td>
<td>Sussex County / Southampton County</td>
<td>9,000</td>
<td>28%</td>
<td>2500</td>
</tr>
<tr>
<td>VA 616/ VA 620</td>
<td>VA 644</td>
<td>Southampton County / Isle of Wight County</td>
<td>6,700</td>
<td>23%</td>
<td>1500</td>
</tr>
<tr>
<td>VA 644</td>
<td>US 258</td>
<td>Isle of Wight County</td>
<td>8,500</td>
<td>23%</td>
<td>2000</td>
</tr>
<tr>
<td>US 258</td>
<td>WCL Suffolk</td>
<td>Isle of Wight County</td>
<td>12,600</td>
<td>23%</td>
<td>2900</td>
</tr>
<tr>
<td>WCL Suffolk</td>
<td>Suffolk bypass</td>
<td>City of Suffolk</td>
<td>16,400</td>
<td>18%</td>
<td>2900</td>
</tr>
</tbody>
</table>
4.1.2.3 Route 58

Route 58 connects the Ports of Virginia with destinations to the southeast via I-95. Truck volumes range from approximately 1,900 trucks per day near Route 653 in Southampton County to over 4,600 near the Suffolk Bypass. The percent of trucks ranges from 9 to 32 percent with the majority of the route carrying 16 percent. While percentage of trucks has declined along the entire stretch of this US highway the absolute volumes of trucks has increased throughout. (Table 4.1-4)

Table 4.1-4
US 58 AVERAGE DAILY TRUCK VOLUMES: 1990 AND 2002

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>1990 Trucks</th>
<th>1990 Percent</th>
<th>2002 Trucks</th>
<th>2002 Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-95</td>
<td>US 301</td>
<td>2,025</td>
<td>21%</td>
<td>4,320</td>
<td>27%</td>
</tr>
<tr>
<td>US 301</td>
<td>Reese St</td>
<td>1,745</td>
<td>22%</td>
<td>4,160</td>
<td>32%</td>
</tr>
<tr>
<td>Reese St</td>
<td>Davis St</td>
<td>1,745</td>
<td>22%</td>
<td>2,560</td>
<td>16%</td>
</tr>
<tr>
<td>Davis St</td>
<td>East Atlantic St</td>
<td>1,745</td>
<td>22%</td>
<td>2,400</td>
<td>16%</td>
</tr>
<tr>
<td>East Atlantic St</td>
<td>Southampton County Line</td>
<td>1,755</td>
<td>24%</td>
<td>2,560</td>
<td>16%</td>
</tr>
<tr>
<td>Greensville County Line</td>
<td>Route 653</td>
<td>1,755</td>
<td>24%</td>
<td>1,920</td>
<td>16%</td>
</tr>
<tr>
<td>Route 653</td>
<td>Route 35 &amp; US 58 Bus</td>
<td>1,755</td>
<td>24%</td>
<td>2,080</td>
<td>16%</td>
</tr>
<tr>
<td>Route 35 &amp; US 58 Bus</td>
<td>Bus US 58 East Of Courtland</td>
<td>1,725</td>
<td>23%</td>
<td>2,240</td>
<td>16%</td>
</tr>
<tr>
<td>Bus US 58 East Of Courtland</td>
<td>Bus US 58 West of Franklin</td>
<td>2,025</td>
<td>17%</td>
<td>3,200</td>
<td>16%</td>
</tr>
<tr>
<td>Bus US 58 West of Franklin</td>
<td>US 258 South of Franklin</td>
<td>1,800</td>
<td>21%</td>
<td>2,560</td>
<td>16%</td>
</tr>
<tr>
<td>US 258 South of Franklin</td>
<td>WCL Suffolk</td>
<td>2,050</td>
<td>28%</td>
<td>2,560</td>
<td>16%</td>
</tr>
<tr>
<td>Southampton County Line</td>
<td>Route 189, Route 260</td>
<td>2,050</td>
<td>28%</td>
<td>2,720</td>
<td>16%</td>
</tr>
<tr>
<td>Route 189, Route 260</td>
<td>Route 272</td>
<td>1,835</td>
<td>20%</td>
<td>2,720</td>
<td>16%</td>
</tr>
<tr>
<td>Route 272</td>
<td>Route 189</td>
<td>2,290</td>
<td>20%</td>
<td>2,880</td>
<td>16%</td>
</tr>
<tr>
<td>Route 189</td>
<td>US 58 Bus</td>
<td>2,145</td>
<td>21%</td>
<td>3,040</td>
<td>16%</td>
</tr>
<tr>
<td>US 58 Bus</td>
<td>Route 610</td>
<td>2,145</td>
<td>21%</td>
<td>3,520</td>
<td>16%</td>
</tr>
<tr>
<td>Route 610</td>
<td>Route 647</td>
<td>2,555</td>
<td>13%</td>
<td>3,520</td>
<td>16%</td>
</tr>
<tr>
<td>Route 647</td>
<td>Route 643</td>
<td>2,555</td>
<td>13%</td>
<td>3,840</td>
<td>16%</td>
</tr>
<tr>
<td>Route 643</td>
<td>Route 738</td>
<td>2,555</td>
<td>13%</td>
<td>3,680</td>
<td>16%</td>
</tr>
<tr>
<td>Route 738</td>
<td>Cove Point Rd</td>
<td>2,555</td>
<td>13%</td>
<td>4,640</td>
<td>16%</td>
</tr>
<tr>
<td>Cove Point Rd</td>
<td>Bus US 58</td>
<td>2,555</td>
<td>13%</td>
<td>4,480</td>
<td>16%</td>
</tr>
<tr>
<td>Bus US 58</td>
<td>Route 604</td>
<td>2,400</td>
<td>17%</td>
<td>4,640</td>
<td>16%</td>
</tr>
<tr>
<td>Route 604</td>
<td>Route 460</td>
<td>2,400</td>
<td>17%</td>
<td>2,700</td>
<td>9%</td>
</tr>
</tbody>
</table>

4.1.3 Long-Haul Truck Movement

Figure 4.1-4 illustrates the annual volumes and routes for long-haul truckloads. A long-haul truckload represents a fully loaded truck carrying dry van container goods traveling a distance greater than 500 miles. Table 4.1-5, which provides data at selected points, indicates that I-64 carries approximately 67 percent of the long-haul truckloads while Route 460 is less extensively used for this type of freight movement. Comparing this information with the total truck ADT previously discussed suggests that Route 460 is utilized more for regional and intrastate transport of goods rather than a main route for long-haul distances of over 500 miles.

Figure 4.1-4
ANNUAL LONG-HAUL TRUCK LOADS
Table 4.1-5
ANNUAL AND PERCENT TRUCKLOAD ON MAJOR EAST-WEST ROUTES

<table>
<thead>
<tr>
<th>Selected Point Along Route</th>
<th>Annual Truckload</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-64 at New Kent/James City County Line</td>
<td>439,762</td>
<td>67%</td>
</tr>
<tr>
<td>Route 460 at Route 616 (Ivor)</td>
<td>77,666</td>
<td>12%</td>
</tr>
<tr>
<td>Route 58 at Route 653 (Capron)</td>
<td>135,685</td>
<td>21%</td>
</tr>
</tbody>
</table>

Source: Reebie Associates, Transearch Data 1996

4.1.4 Freight Generators

Several existing facilities and a few potential future facilities could increase the amount of freight that is transported on Route 460. Proposed expansions by the Virginia Port Authority (VPA) and the A.P. Moller Group (APM Terminal) in Portsmouth could generate several million additional tons of imports and exports annually. Distribution centers within and near the study area are operated by Food Lion and Ace Hardware in Prince George County, Wal-Mart in Dinwiddie County, Sysco Food and Target in Suffolk, and Dollar Tree in Chesapeake. These facilities all currently use Route 460 as an important link to serve their customers and retail outlets. The future of air freight in Southeast Virginia could also significantly change with the introduction of a new superport aviation facility that could potentially be sited in the Route 460 study area. The following sections discuss the ports, distributors, and superport aviation facility in more detail.

4.1.4.1 Port of Virginia

The major ports facilities in Virginia are owned and marketed by the Virginia Port Authority (VPA), an agency of the Commonwealth of Virginia. VPA owns four general cargo terminals: Norfolk International Terminals, Portsmouth Marine Terminal, Newport News Marine Terminal, and the Virginia Inland Port in Front Royal. The four major port facilities are operated by VPA’s affiliate, Virginia International Terminals, Inc.

According to the VPA, the Port of Virginia (Port) is one of the largest and most successful ports on the east coast. The Port is the third busiest container port on the east coast, and the eighth largest in the U.S. VPA is served by more than 75 steamship lines with sailings to over 250 ports in 100 overseas locations. The Port is within a 1-day drive of over 2/3 of the U.S. population, and 301,000 manufacturing firms.

Figure 4.1-5 shows the growth in Port-related freight in twenty-foot equivalent units (TEUs) between 1993 and 2003. In 2002, the Port handled 1,400,000 TEUs. The only year that had a decline in TEUs from previous years was in 2001.
Of the total container freight shipped to and from the Port, approximately 29 percent is transported by rail. Approximately 12 percent of containers are transported inland by barge, mainly to the Port of Baltimore. The remaining 59 percent of containers are transported by truck. This indicates that in 2002, the Port generated approximately 848,000 truck trips throughout the state, with most originating in Hampton Roads.

Table 4.1-6 below provides the annual TEU volume and percent of truck freight traffic traveling from Hampton Roads by exit point. This does not include the truck volumes with origins and destinations within the Commonwealth.
### Table 4.1-6

<table>
<thead>
<tr>
<th>Highway</th>
<th>Exit Point</th>
<th>Tons (Millions)</th>
<th>Truck Volume</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>US 13</td>
<td>Maryland</td>
<td>1.90</td>
<td>113,772</td>
<td>14.7</td>
</tr>
<tr>
<td>US 301</td>
<td>Maryland</td>
<td>0.59</td>
<td>35,329</td>
<td>4.6</td>
</tr>
<tr>
<td>I-64</td>
<td>West Virginia</td>
<td>1.13</td>
<td>67,665</td>
<td>8.7</td>
</tr>
<tr>
<td>I-81</td>
<td>Tennessee</td>
<td>0.78</td>
<td>46,707</td>
<td>6.0</td>
</tr>
<tr>
<td>I-85</td>
<td>North Carolina</td>
<td>2.86</td>
<td>171,257</td>
<td>22.1</td>
</tr>
<tr>
<td>I-95</td>
<td>North Carolina</td>
<td>1.34</td>
<td>80,240</td>
<td>10.4</td>
</tr>
<tr>
<td>I-95/I-495</td>
<td>Maryland</td>
<td>3.18</td>
<td>190,419</td>
<td>24.6</td>
</tr>
<tr>
<td>Other Highways</td>
<td>Maryland</td>
<td>0.63</td>
<td>37,725</td>
<td>4.9</td>
</tr>
<tr>
<td>Other Highways</td>
<td>North Carolina</td>
<td>0.43</td>
<td>25,749</td>
<td>3.3</td>
</tr>
<tr>
<td>Other Highways</td>
<td>Undefined</td>
<td>0.09</td>
<td>5,389</td>
<td>0.7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>12.93</td>
<td>774,252</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Source: Reebie Associates Transearch database (1998), HRPDC.

Note: Tons converted to truck equivalent based on 16.7 tons per truck (Source: Moffatt & Nichol Engineers representing VPA)

### Table 4.1-7

<table>
<thead>
<tr>
<th>Destination/Origin</th>
<th>Import</th>
<th>Export</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Volume</td>
<td>Percent</td>
<td>Volume</td>
</tr>
<tr>
<td>Virginia</td>
<td>114,177</td>
<td>25%</td>
<td>72,579</td>
</tr>
<tr>
<td>Remainder of US</td>
<td>192,491</td>
<td>75%</td>
<td>212,779</td>
</tr>
<tr>
<td>Total</td>
<td>306,668</td>
<td></td>
<td>285,358</td>
</tr>
</tbody>
</table>

For long range planning (to 2040) the Port assumes an annual growth rate of 4.1 percent. At a forecasted 4.1% growth in containers per year, the volume of containers will more than double every 20 years. The Port plans to expand to meet cargo growth demands and spur economic development in Virginia. Ship lines are moving toward larger ships (10,000+ TEUs), requiring larger cranes, more efficient marine terminals and, efficient intermodal transportation systems (rail/roadway).

As figure 4.1-9 indicates, the projected growth in freight shipped through the Port will result in operations exceeding existing capacity. The VPA’s 2040 Master Plan identifies major capital improvements needed to keep pace with growth. Near term (0-15) improvements for existing facilities exceed $660 million. Long term (15-30) years plans include the proposed a new marine terminal at Craney Island in Portsmouth, which has an initial development cost of approximately $1.3 billion. Phase I of this terminal is projected to open by 2017 with a full build-out by 2035. At full build-out, the VPA estimates that Craney Island will generate 5,000 trucks per day.
4.1.4.2 Proposed A. P. Moller Group Marine Terminal

In addition to the port expansion proposed by the Port of Virginia, A. P. Moller (APM) Group, an international shipping company and owner of the Maersk/Sealand Shipping Line, is advancing plans for development of a new marine terminal in Portsmouth on land south of the proposed VPA Craney Island Marine Terminal. The site offers deep-water channels, a central East Coast location and potential intermodal access (rail and roadway). The future conditions section of the environmental assessment for this terminal, prepared by Vanasse Hangen Brustlin, Inc., indicates that 4,500 trucks per day will leave the facility in 2016.

4.1.4.3 Major Distribution Centers

During October 2003, the study team contacted major distributors within or near the study area to determine their use of Route 460 for the shipment of freight. Telephone interviews were conducted with transportation managers at the distribution or shipping facilities. The managers were interviewed regarding the amount and type of freight operations required by their facility. Additional questions included the size of their facility, the number of years of operation, and estimated annual growth in shipments along Route 460. Most managers mentioned specific comments regarding the use of Route 460 for truck travel. Every manager contacted has experienced problems with their truck fleets using Route 460. Concerns mentioned included the undivided roadway, narrow travel lanes, the lack of left-turn protection, and the impact of delays due to crashes.

Distributors’ use of Route 460 varies by location and industry. Two of the distributors, Food Lion and Cost Plus World Market, are located directly on Route 460 within the study area. Trucks associated with the Food Lion distribution center (both Food Lion and its suppliers) account for approximately 300 trucks per day. Cost Plus World Market, which is also located directly on Route 460, estimates daily truck traffic associated with their facility at approximately 30 trucks per day. Non-distributors including freight haulers coming from the port, and manufacturers such as Chaparral Steel also contribute to the truck traffic on Route 460. Table 4.1-8 depicts the amount of truck traffic generated by the companies that were contacted. Annual growth rates vary for each distributor, however each of the companies that provided growth estimates forecast a larger growth in truck traffic than the 2.1 percent forecast which is being used for total traffic on Route 460 (see Section 3.1.1).
### Table 4.1-8
SELECTED TRUCK TRAFFIC GENERATORS NEAR STUDY AREA

<table>
<thead>
<tr>
<th>Facility</th>
<th>Yrs in Operation</th>
<th>Facility Size</th>
<th>Route 460 Trucks</th>
<th>Estimated Annual Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Lion Distribution Center</td>
<td>11-12 yrs</td>
<td>1.1 M sf</td>
<td>300 / day</td>
<td>5 %</td>
</tr>
<tr>
<td>6500 Enterprise Drive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disputanta, VA 23842</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost Plus World Market</td>
<td>1-2 yrs</td>
<td>500,000 sf</td>
<td>30 / day</td>
<td>NA</td>
</tr>
<tr>
<td>12300 Dominion Way</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windsor, VA 23487</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ace Hardware Retail Service Center</td>
<td>2 yrs</td>
<td>800,000 sf</td>
<td>3-4 / day</td>
<td>7-8%</td>
</tr>
<tr>
<td>7000 Hardware Drive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prince George, VA 23875</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sysco</td>
<td>&lt; 2 yrs</td>
<td></td>
<td>10-15 / day</td>
<td>NA</td>
</tr>
<tr>
<td>7000 Harbour View Blvd</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suffolk, VA 23435</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wal-Mart Distribution Center</td>
<td>11-12 yrs</td>
<td>1.1 M sf</td>
<td>20-25 / day</td>
<td>3%</td>
</tr>
<tr>
<td>21500 Cox Road</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sutherland, VA 23885</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chaparral Steel</td>
<td>5 years</td>
<td>NA</td>
<td>10 per day</td>
<td>&gt; 2%</td>
</tr>
<tr>
<td>25801 Hofheimer Way</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Petersburg, VA 23803</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4.2 ESTIMATE OF FUTURE FREIGHT VOLUMES

#### 4.2.1 Methodology

VPA projects a 2026 total freight volume of approximately 3,000,000 TEUs. This is a growth of approximately 2,000,000 TEUs over today’s freight volumes. Using today’s breakdown of transport mode (truck / rail / other) – this results in approximately 2,000 more trucks per day leaving VPA facilities in 2026 than there are today (about 1,000).

For the Maersk Terminal in Portsmouth (a private facility not affiliated with VPA), the forecasted 4,500 trucks per day leaving the facility in 2016 was not adjusted for the year 2026. This was primarily because there is insufficient data to indicate whether the 2016 figure represents full buildout or whether there is room for expansion beyond this horizon year.

#### 4.2.2 Future Freight Volume Projections

Twenty four percent of the truck volumes generated from VPA and the Maersk Terminal would be traveling along Route 460 based upon the existing distribution of trucks to and from the port facilities located in Hampton Roads. Using this distribution of truck traffic along the roadway network for future freight volumes results in 500 trucks per day from VPA and about 1,100 trucks per day from the Maersk Terminal. The additional 1,600 trucks on Route 460 will increase the total truck volume in this corridor by 36 to 100 percent.
4.3 NEW EASTERN VIRGINIA AIRPORT

As noted in the Table 4.1-1, in terms of annual tonnage, air freight is not as significant as highway and water-borne freight as a source of imports and exports to Virginia. However, a new airport facility near the Route 460 study area could be a significant source of new freight-related traffic generation, including commercial trucks providing services to the facility. In 2001, the Virginia Department of Aviation released the Eastern Virginia Airport System Study (EVASS). The EVASS was an analysis designed to help the Commonwealth identify a system of airports to meet eastern Virginia’s air transportation needs in the year 2030 and beyond. The study considered the three major commercial airports operating in eastern Virginia, Richmond International Airport (RIC), Norfolk International Airport (ORF) and the Newport News-Williamsburg International Airport (PHF).

Three airport system alternatives were examined in the EVASS:

- **One-Airport System:** A single new regional airport would be constructed in Eastern Virginia. The new facility would consolidate existing commercial air carrier service from the three existing regional commercial airports (RIC, ORF, and PHF).

- **Two-Airport System:** The RIC airport would provide commercial aviation services to the Richmond region. The Hampton Roads region would be served by a single regional airport, which could either be an expanded PHF, or a new facility built on a new location. This alternative would result in Norfolk International no longer providing commercial aviation services.

- **Three-Airport System:** A continuation of the development of the region’s three existing commercial air carrier airports at RIC, ORF and PHF locations.

Figure 4.3-1 identifies the potential site locations for new regional airport for the “one-airport” and “two-airport” alternatives described above. The “one airport system search area” is located entirely within the Route 460 Location Study Area. Additionally, Search Area “C” of the “two-airport system” is located within the Route 460 Study Area. The “three-airport system” would have no direct affect on the Route 460 study area because under this alternative there would not be a new airport facility potentially located within the Route 460 study area.
Figure 4.3-1
POTENTIAL SITES OF NEW REGIONAL AIRPORT
As described in the final EVASS report, new airport alignments would require improvements to the ground transportation network, and would affect freight traffic and industrial development within the Route 460. The following sections describe these affects for the one-airport and two-airport system alternatives.

**One-Airport System:**

Route 460 would provide access to the single airport from Richmond, Petersburg, and the south side of Hampton Roads. Travel demand to the new airport would require an improved and relocated Route 460, with an additional travel lane per direction, and access control (freeway design). Additionally, State Routes 10 or 40 could be improved to provide additional access to the new airport site. A new six-mile access road from Route 460 would be provided, with a grade-separated interchange on Route 460. The improvements to Route 460 were assumed to occur prior to 2030. A rail connection to this airport alternative can be provided with a new spur from the Norfolk Southern track located parallel to Route 460.

The single new regional airport could handle all the air cargo traffic currently shared by RIC, ORF, and PHF, depending on whether the existing airports continue to serve in a non-passenger role. Consolidation of air cargo traffic and absence of noise constraints at the new location could promote development of a cargo hub as well. Proximity to an interstate (limited access highway) and multi-modal transportation facility could foster development of a cargo hub. Additionally, a single new Eastern Virginia airport located within the Route 460 study area could lead to additional industrial development. With a single-airport system at a new site, there would be sufficient nearby developable land to accommodate an industrial park. The potential site would need adequate utilities and highway access. A new site would probably offer lower land prices but may be less accessible to existing labor markets. Consolidation of international passenger demand at a single site would increase the chances for the development of an international cargo facility, which would provide an attraction to industries relying on international suppliers or customers.

**Two-Airport System:**

An airport located at search area C would have an access road connected to either Route 460, Route 258, or Route 10/32. The James River Bridge would provide access from the Peninsula, and Route 460 would provide access from Richmond, Petersburg, and the south side of Hampton Roads. In the EVASS, a four-mile access road with four lanes and an intersection at Route 258 was assumed. Route 258 will need to have four lanes from Route 460 to the airport access road. No improvements to Route 460 are required for the projected traffic volume from a new airport at this location.

In a two-airport system, RIC would likely continue to have the largest share of domestic air cargo market from the eastern Virginia region. Additional air cargo could be consolidated at a new regional airport in the eastern part of the study area or at the existing PHF facility. In a two-airport system, the amount of new industrial development would likely be distributed among the two airport facilities, and therefore would not be as intense as development associated with a single airport facility.
5.0 REFERENCES


Virginia Port Authority, Statewide Long-Range Multimodal Transportation Plan Policy Committee Meeting, June 25, 2003.
ATTACHMENT A

Traffic Model Methodology & Results

Traffic & Transportation
Technical Report
(Insert “Traffic Model Methodology and Results” report from Michael Baker Here)
ATTACHMENT B

Diversion of Traffic from Interstate 64
(White Paper)

Traffic & Transportation
Technical Report
Travel Demand Model/I-64 Diversion Summary

One important issue the Route 460 Location Study sought to address is: “Will people traveling on I-64 change their travel behavior and use the improved Route 460 corridor if any of the planned build alternatives are constructed?” People subject to changing their travel behavior are most likely traveling “through” the portion of I-64 extending from the mouth of the James River to just east of the I-64/I-295 interchange. This question can best be answered by examining the travel markets served by I-64 and Route 460. Who uses I-64 and Route 460? How many motorists might change their travel behavior if Route 460 is improved?

Study Approach

The Route 460 Study Team uses a tool called a travel model to measure and forecast travel behavior. This tool forecasts travelers’ decisions given specific travel choices presented to them. Several things can influence roadway travel behavior: travel time or distance to a particular destination, familiarity with a particular travel route, signage, and physical roadway conditions. The travel model assumes that travel cost (time and distance) is the primary decision-making influence, but can be adjusted to account for other influences. A special travel model was developed for this study that covers travel within, and between, the Hampton Roads and Richmond urbanized areas. This model incorporates available planning and survey data that describe land use, roadway locations, and observed travel behavior. The data the travel model provides is in the form of travel patterns and vehicle estimates on specific sections of roadway.

The Team has examined travel choices and behavior on Route 460 and I-64 using the travel model and can describe the travel markets that they serve before and after improvements are constructed in the Route 460 corridor. Specifically, we examined the portion of Route 460 west of Suffolk and east of I-295. We also examined that portion of I-64 west of I-664 and east of I-295. These are what we call the “travel corridors” for these roadways. Using the travel model we can make a number of predictions about future travel in the Route 460 and I-64 corridors.

Preliminary Results

Without major improvements to the Route 460 corridor, we forecast in Year 2026 that most average weekday travel on Route 460 and I-64 begins and ends within their respective travel corridors (i.e. not through traffic). On Route 460, 30%-40% of the 10,000 to 18,000 vehicles are moving completely through the corridor (i.e. through traffic). The other vehicles are beginning or ending their trips within the Route 460 corridor. Most of the through traffic travels between the Hampton Roads region (south of the James River) and locations west using Route 460 and locations north using I-95 via I-295. Motorists also use Route 460 to travel between the Richmond area and Eastern North Carolina via Route 168 and Route 17.

I-64 serves less through travel; approximately 20% of the 55,000 to 65,000 forecasted daily vehicles are moving completely through the corridor. Most of I-64 corridor through traffic travels between locations north (I-95 corridor) and the Hampton Roads region, as well as to locations in Eastern North Carolina via Route 168. While both the Route 460 and I-64 serve vehicles moving between the Hampton Roads region and locations north of Richmond; the number of vehicles served by I-64 for this movement is five-times that served by Route 460.
With major improvements to the Route 460 corridor, we forecast through traffic to increase significantly on Route 460 in Year 2026; 45%-70% of the 30,000 to 40,000 average daily vehicles will travel through the corridor. Most of this additional through traffic is due to an increase in vehicles moving between the Richmond area and Eastern North Carolina via Routes 13, 168, and 17. An improved Route 460 also serves significantly more vehicles moving between the Hampton Roads region and the Richmond area. Through traffic on I-64 remains relatively constant at 10,000 to 11,000 vehicles per day. The study team forecasts that no more than a thousand vehicles per day will divert from I-64 and use the improved Route 460. These diverted vehicles are traveling between locations north of the Richmond area and Eastern North Carolina. Thus, diversion from I-64 to an improved Route 460 is small.

Preliminary results from the base year (2000) Virginia Statewide Travel Model appear to support the through traffic percentage on I-64 as well as the general origin and destination of the (through) I-64 traffic as described in this memorandum. This travel model was developed independent of the Route 460 Location Study and covers all of Virginia. One of the model’s primary uses is to evaluate regional travel patterns.

An important component of the vehicles currently using Route 460 is truck traffic. Many of these trucks are traveling to and from the port facilities located in Hampton Roads. There are two proposed port facilities in the Hampton Roads region that will generate future truck traffic. The Virginia Port Authority plans to open a terminal at Craney Island in Portsmouth, and APM Terminals is planning to open a private shipping terminal, also located in Portsmouth. Taken together, these two facilities are anticipated to add approximately 1,600 additional trucks per day to Route 460.

Traffic forecasts for this location study have the benefit of the best data and tools to date for studying travel behavior between the Richmond and Hampton Roads urbanized areas. However, traffic forecasting is not an exact science and is subject to changing land uses and future employment opportunities that are currently unforeseen. The following table provides preliminary results of the traffic studies, expressed in terms of Average Daily Traffic.
## Preliminary Travel Demand Forecasts
### Average Daily Traffic

<table>
<thead>
<tr>
<th>Location</th>
<th>2003 Counts</th>
<th>2026 No Build</th>
<th>CBA 1</th>
<th>CBA 2</th>
<th>CBA 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>New</td>
<td>460</td>
<td>New</td>
</tr>
<tr>
<td>West of Disputanta</td>
<td>15,000</td>
<td>20,700</td>
<td>33,100</td>
<td>6,700</td>
<td>24,600</td>
</tr>
<tr>
<td>Disputanta to Waverly</td>
<td>9,700</td>
<td>14,600</td>
<td>34,300</td>
<td>1,200</td>
<td>17,900</td>
</tr>
<tr>
<td>Waverly to Wakefield</td>
<td>10,500</td>
<td>15,900</td>
<td>30,600</td>
<td>2,400</td>
<td>20,700</td>
</tr>
<tr>
<td>Wakefield to Windsor</td>
<td>6,700</td>
<td>11,400</td>
<td>32,600</td>
<td>2,600</td>
<td>16,000</td>
</tr>
<tr>
<td>East of Windsor</td>
<td>11,600</td>
<td>17,000</td>
<td>40,400</td>
<td>4,300</td>
<td>35,300</td>
</tr>
</tbody>
</table>