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To Be Determined

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This report was included in the Work Program for Fiscal Year 2008-2009, which was approved by the Commission and the Transportation Planning Organization at their meetings of March 19, 2008.

PREPARED BY:

OCTOBER 2009

Enclosure 3
ABSTRACT

The City of Suffolk requested the Hampton Roads Transportation Planning Organization (HRTPO) staff undertake a study to identify any roadway capacity, traffic signal, access management and other near-term improvements that will be necessary along Bridge Road (U.S. Route 17) in Suffolk, Virginia within the next ten years. The objectives of this study include an assessment of the corridor and the identification of alternatives to improve traffic flow in the future with anticipated traffic growth and further development of the area. Twelve intersections were studied in detail along Bridge Road.

Traffic analysis was performed for seven scenarios to determine the extent of improvements that will be necessary to maintain acceptable traffic flow. These scenarios included 2008 Existing, 2008 Existing Optimized, 2018 No Build, 2018 Spot Improvements, 2018 Spot Improvements plus Six-Lane Widening, 2018 Spot Improvements Expanded plus Six-Lane Widening, and 2018 Spot Improvements Expanded plus Six-Lane Widening and Widening Bridges options. The study includes an evaluation of the access management conditions along the length of the corridor and presents a methodology for controlling the access of future development. It also provides recommendations for near-term improvements to ensure safe and efficient travel along the corridor, such as pavement markings, vegetation obstruction, and signage.
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INTRODUCTION

The City of Suffolk requested that the Hampton Roads Transportation Planning Organization (HRTPO) staff undertake a study to identify any roadway, traffic signal, and access management improvements that will be necessary along Bridge Road (U.S. Route 17) within the next ten years (Map 1).

The Bridge Road study corridor begins on the Hazelwood Bridge at the Isle of Wight County line (A) and continues southeast approximately 7.3 miles to its terminus at the City of Chesapeake Corporate limits (B), just past the intersection of Bridge Road and College Drive (See Map 2 on page 2). A tremendous amount of growth has already occurred along this corridor in recent years and it is anticipated to grow even more in the near future. Some of the major recent developments include the Bennett’s Creek Crossing Shopping Center at Shoulders Hill Road, Governor’s Pointe housing development near Crittenden Road, and the Modeling Analysis Simulation and Technology (MAST) Center near College Drive. Some developments that are underway or planned to be built in the near future include the Nurney Property (age-restricted multi-family housing) near Lee Farm Lane, BelleHarbour (Sentara medical center as well as homes, hotels, office, and shopping) near Plummer Boulevard, and Harbour View (hotels, retail, office, and multi-family residential) near Harbour View Boulevard.

Bridge Road is an urban principle arterial that is primarily a 4-lane median divided roadway except across the Chuckatuck Creek (Hazelwood Bridge) and the Nansemond River (Mills E. Godwin Bridge), where it is 2-lanes undivided. Bridge Road serves as the main connection between Isle of Wight County and I-664 and the City of Chesapeake. Daily traffic volumes along this roadway vary from about 15,000 vehicles near the Isle of Wight County line to nearly 32,000 vehicles near the Western Freeway on the eastern side

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1 Virginia Department of Transportation (VDOT)
Ten signalized intersections of Bridge Road were studied in detail for existing morning and afternoon traffic conditions as well as ten-year projected conditions (2018) – 1) Eclipse Drive, 2) Crittenden Road, 3) Bennetts Pasture Road/Bennetts Creek Lane, 4) Lee Farm Lane, 5) Walden Road/Bennett’s Creek Crossing Shopping Center, 6) Shoulder Hill Road/Knotts Neck Road, 7) Breezeport Way/Bernhowe Manor Lane, 8) Plummer Boulevard, 9) Harbour View Boulevard, and 10) College Drive. In addition, two intersections along Bridge Road (Windward Lane and Townpoint Road) are planned to become signalized within the next three years as development increases in the study area and are included in the future 2018 intersection analysis.
LAND USE AND SOCIOECONOMIC DATA

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

The Hampton Roads Transportation Planning Organization (HRTPO) and area localities have developed population, household, and employment forecasts through the year 2030. This socioeconomic data shows how neighborhoods, work centers and undeveloped land will develop over the next 20 years. For socioeconomic characteristic purposes, the Bridge Road Study Area will be defined by the Northern Suffolk District 53, which is comprised of 19 Transportation Analysis Zones (TAZs) as shown in Map 3. TAZs are the basic unit of geography used in the regional travel demand model. Socioeconomic forecasting and allocation to the TAZ level is conducted as part of the process of developing the Long-Range Transportation Plan.

In reference to land use, the Bridge Road Study Area is included in the Northern Suburban/Urban Growth Area as defined by the City of Suffolk. This is one of two areas (Northern Suburban/Urban Growth Area and Central Suburban/Urban Growth Area) identified by the City of Suffolk as designated areas of growth that provide a focus for development, reduce sprawl pressures in the rest of the City and provide for more efficient and effective delivery of city services.²

² City of Suffolk. 2026 Comprehensive Plan.
LAND USE

The Bridge Road Corridor (U.S. Route 17) is located within the Northern Suburban/Urban Growth Area as identified by the City of Suffolk’s 2026 Comprehensive Plan (Map 4 on page 5). As one of the fastest growing areas in Hampton Roads, the Northern Suburban/Urban Growth Area offers a conglomeration of a rural lifestyle mixed with developed neighborhoods and retail and office centers and benefits from its strategic proximity to the regional transportation network and amenities in a large metropolitan area. The Northern Suburban/Urban Growth Area is focused around major transportation routes, which are critical transportation links for development along the I-664 corridor and its successful high-technology base.

As the predominant eastbound/westbound corridor located in the Northern Suburban/Urban Growth Area, Bridge Road serves as one of the major thoroughfares supporting the Suffolk technology corridor (Map 5). The technology corridor along I-664 in the Northern Suburban/Urban Growth Area has become the nation’s leader in military simulation and modeling. Companies such as Mitre, Raytheon, Lockheed Martin, General Dynamics, and SAIC, as well as the U.S. Joint Forces Command Center and Virginia Modeling and Simulation Center are all located in the Northern Suburban/Urban Growth Area.

Bridge Road also serves as the southern gateway to the newly developed Harbour View Station Town

Map 5 – Suffolk Technology Corridor
Source: City of Suffolk Department of Economic Development Center (Map 6 on page 6). Located north of Bridge Road between Harbour View Boulevard and I-664 in the rapidly growing Northern Suburban/Urban Growth Area section of the City of Suffolk, Harbour View Station Town Center is a planned pedestrian-oriented, mixed-use development consisting of approximately 600,000 square-feet of retail space, including a 16-screen cinema and grocery, approximately 1,000 residential units of rental and condominium housing, 700,000 square-feet of office space, and approximately 750 hotel rooms.

The Harbour View Grande cinema features 16 screens and is surrounded by restaurants and specialty shops.

3 Ibid.
Map 4 – City of Suffolk Development Areas
Source: City of Suffolk 2026 Comprehensive Plan
The area will also include a hospital and medical complex, and numerous restaurants. When fully completed, over 1.5 million square feet of retail, residential and office space will be divided between a series of two to six-story buildings aligned in an urban, grid-street pattern.

Serving as the tri-city outpatient medical complex for the cities of Suffolk, Portsmouth and Chesapeake, the Sentara BelleHarbour campus opened its doors in May 2008 with the first three-story, 75,000 square-foot facility. Offering a full service 24-hour emergency department, advanced diagnostic imaging, laboratory, physical therapy, a sports medicine center and physician offices, Sentara estimates roughly 31,000

Map 6 – Harbour View Station Town Center and Marketplace development
Source: Divaris Real Estate, Inc.

The Sentara BelleHarbour medical facility opened in May 2008.

The Marketplace at Harbour View is underway and soon to be completed.
patients will pass through BelleHarbour’s emergency department in its first year.4

Additional recent developments that are expected to generate notable traffic is the planned 150,000 square-foot BelleHarbour Town Center located at Plummer Boulevard and Bridge Road. This development will include cafes and coffee shops, retail shops, offices and condominiums, as well as the recently completed 120-room Comfort Suites Inn.5

In early 2007, the Bennet’s Creek Crossing shopping center opened, which included an upscale Farm Fresh and other shops. This shopping center is located in the southwest corner of Bridge Road and Shoulders Hill Road and has been a successful addition to the community.

While the Northern Suburban/Urban Growth Area is poised to be the one of the region’s technological and retail hubs, portions of Bridge Road Corridor have maintained lower density, automobile-oriented commercial areas comprised of scattered commercial sites located on individual parcels directly accessing Bridge Road with their own driveways – typical of older regional highways. Newer commercial uses in the shape of conventional highway strip commercial centers with outparcels (e.g. Creekside Village) can

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4 The Virginian-Pilot “Medical facilities two miles apart in Suffolk is not too much care, officials say”, May 31, 2008.
5 The Virginian-Pilot “Tremendous growth for Bridge Road, Suffolk”, August 3, 2007.
Socioeconomic Data

The Hampton Roads 2030 Long-Range Transportation Plan provides population, household, and employment forecasts over the next 20 years. Overall, the City of Suffolk is expected to be one of the fastest growing cities in Hampton Roads over that time frame. Specifically, the City of Suffolk is expected to increase in population by 96%, households by 101%, and employment by 104%. The Bridge Road Study Area (see Map 3 – District 53) is expected to grow at an even faster pace with population increasing by 161%, households by 173%, and employment by 392%. See Table 1 on
page 10 for detailed socioeconomic data by TAZ for District 53.

**Population**

According to the U.S. Census, the City of Suffolk has seen a 58% increase in population from 52,141 in 1990 to 82,302 in 2008. Much of this growth has occurred in the two designated growth areas (Northern Suburban/Urban Growth Area and Central Suburban/Urban Growth Area) as defined by the City of Suffolk’s 2026 Comprehensive Plan. The population residing within the Bridge Road Study Area increased from 10,635 in 1990 to 17,301 in 2000 indicating a population increase of 63%. The Bridge Road Study Area will continue to be an area of population growth with the TAZ forecast showing a 2030 population of 45,182, a 161% increase.

**Households**

The number of households in the City of Suffolk has also maintained a similar pace in growth since 1990. According to the U.S. Census, between 1990 and 2007 households in the City of Suffolk increased from 18,516 in 1990 to 30,009 in 2007 signifying a 62% growth. The Bridge Road Study Area is expected to show a substantial growth in households during the 2000 to 2030 period at 173%, from 6,045 in 2000 to 16,475 in forecast year 2030.

**Employment**

Employment data from the TAZ 1990 data indicate approximately 19,862 jobs in the City of Suffolk and 1,277 in the Bridge Road Study Area. Total employment for both the City and the Study Area expanded to 26,566 and 3,655 in 2000, indicating a 34% and 172% increase respectively. Furthermore, projections show a spike in employment for both the City and the Bridge Road Study Corridor with the City of Suffolk’s employment growing to 54,100 in 2030, a 104% growth and the Bridge Road Study Area’s employment escalating to 17,975 in 2030, a 392% increase from 2000.
Table 1 – Socioeconomic Data by Transportation Analysis Zones (TAZ) for District 53 in Suffolk
Source: HRTPO 2030 Long-Range Transportation Plan

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Bridge Road Study Area Total

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</table>
ROADWAY CHARACTERISTICS AND TRAFFIC VOLUMES

ROADWAY CHARACTERISTICS AND TRAFFIC VOLUMES

Roadway geometry and characteristics for the entire Bridge Road study corridor (See Table 2) were obtained from a combination of online aerial photos and field observations by HRTPO staff (Spring 2009). This data was used in the development of the Synchro 7.0 Traffic Signal Coordination / SimTraffic Model for the study corridor for the existing and future traffic conditions.

HISTORIC TRAFFIC GROWTH

Average Daily Traffic (ADT) volumes were obtained from the Virginia Department of Transportation (VDOT) for count stations along Bridge Road (U.S. Route 17) and surrounding side streets (See Table 3). The Average Daily Traffic (ADT) ranged between 14,778 and 31,870 vehicles per day in 2008 for Bridge Road. The annual growth rates for a majority of the Bridge Road study corridor have been between 2% - 5%. Shoulders Hill Road has experienced high growth in recent years, averaging about 10% to 16% annually since 1994.

2008 EXISTING TRAFFIC VOLUMES

Weekday morning and afternoon peak hour turning movement counts (February 2009 – May 2009) were provided by the City of Suffolk Traffic Engineering Division for the intersections of Bridge Road and Walden Road, Shoulders Hill Road, Breezeport Way/Bernehowe Manor Lane, Plummer Blvd, Harbour View Boulevard, Western Freeway/I-664, and I-664. Some turn movements at these intersections were not counted. In addition, turning movement counts (September/October 2008) were obtained by the

Table 2 – Bridge Road Corridor roadway characteristics
Source: HRTPO field work, March 2009.

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<td>9.074</td>
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<td>15,692</td>
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<tr>
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<td>Walden Rd</td>
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Table 3 - Historical Weekday Daily Traffic Volumes

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<td>3.4%</td>
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Table 3 - Historical Weekday Daily Traffic Volumes

AGR – Annual Growth Rate
Source: VDOT
Virginia Department of Transportation (VDOT) for Bridge Road at the Western Freeway and I-664 junctions.

These turning movement counts were supplemented with counts and projected counts from recent Traffic Impact Analysis (TIA) studies along Bridge Road, which were also obtained from the City of Suffolk Traffic Engineering Division. The following studies were used to develop the 2008 Existing traffic volumes: Ebenezer United Methodist Church TIA (Oct 2006), Governor’s Pointe TIA (Sept 2003), Nurney TIA (Aug 2006), Shoulders Hill Rd Shopping Center TIA (Aug 2003), Belleharbour Tract 2 TIA (June 2008), and the Lakeview Medical Center TIA (1995). The existing movements at the intersections of Bridge Road & Shoulders Hill Road and Bridge Road & College Drive were estimated using historical growth rates and older counts.

Turning movement counts were estimated by HRTPO staff for the following Bridge Road intersections that did not have data: Eclipse Drive (AM Peak hour only), Windward Lane, and I-664 northbound ramp (to Bridge Road eastbound).

Once all turning movement volumes were entered, the HRTPO staff adjusted and balanced volumes at specific locations along the corridor to ensure reasonable traffic flow from intersection to intersection for the Synchro traffic model. All turning movements for this study were reviewed and approved by the City of Suffolk Traffic Engineering Division. The 2008 Existing Traffic Volumes for the Bridge Road study corridor for the AM and PM weekday peak hours are provided on Map 8 on pages 14-15.

### 2018 Projected Traffic Volumes

The 2018 background traffic volumes were obtained by increasing the 2008 Existing traffic volumes using calculated annual growth rates between 2008 and 2030. The projected 2030 traffic volumes were obtained from the Hampton Roads 2030 Long Range Transportation Plan, which uses population, household, and employment forecasts developed by the HRTPO and area localities to forecast travel. One annual growth rate (1.8%) was used for intersections between the Isle of Wight County Line and Harbour View Boulevard and another slightly lower rate (1.4%) was used for intersections east of Harbour View Boulevard, given the projected forecasts (See Table 4).

Traffic associated with four new developments were added to the background traffic (discussed above) to create the 2018 projected traffic volumes. The City of Suffolk Traffic Engineering Division provided morning and afternoon turning movement count data from four traffic impact studies for new developments along the study corridor. The four studies were: 1) Harbour View Station and The Marketplace at Harbour View Master TIA (February 2007) with an expected completion in 2013, 2) Nurney TIA (August 2006) with an expected completion in 2010, 3) Ebenezer United Methodist Church TIA (October 2006) with an expected completion in 2011, and 4) Belleharbour Tract 2 TIA (June 2008) with an expected completion in 2013. These development projects were not anticipated by City staff as they prepared TAZ data for the 2030 Long Range Plan (LRP) and, therefore, the traffic volumes generated

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<th>Segment To</th>
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<th>2008 - 2030 AGR</th>
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<td>S End Nansomond River</td>
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Table 4 - Projected Weekday Daily Traffic Volumes

Sources: VDOT, City of Suffolk & HRTPO
ROADWAY CHARACTERISTICS AND TRAFFIC VOLUMES

by these projects were added to the background 2018 traffic volumes estimated using the LRP.

To produce the 2018 Projected Traffic Volumes the site development volumes were added to the 2018 background traffic volumes. The HRTPO staff adjusted and balanced the 2018 volumes at specific locations along the corridor to ensure reasonable traffic flow from intersection to intersection for the 2018 future Synchro traffic model. All turn movements were reviewed and approved by the City of Suffolk Traffic Engineering Division. The 2018 Existing Traffic Volumes for the Bridge Road study corridor for the AM and PM weekday peak hours are provided on Map 9 on pages 16-17. The percent change in traffic volumes from 2008 Existing to 2018 Projected for both peak hours is provided on Map 10 on pages 18-19.

PLANNED BRIDGE WIDENINGS

In an effort to promote regional mobility, the Virginia Department of Transportation plans to widen the Hazelwood Bridge over the Chuckatuck Creek between Isle of Wight County and the City of Suffolk as part of its 2025 Transportation Plan. Specifically, the plan is to build an additional 2-lane bridge, parallel to the existing 2-lane Hazelwood Bridge, providing a minimum of four Thru lanes along Bridge Road (U.S. Route 17) between Isle of Wight and Suffolk. Currently, however, no funds have been allocated by the State for this project.

In order to provide a minimum of 4-lanes along Bridge Road (U.S. Route 17) from Isle of Wight County to the I-664/Chesapeake City Line, the Mills E. Godwin Bridge over the Nansemond River would also need to be widened from 2 to 4-lanes. This project is included in the City’s 2026 Comprehensive Plan6. Specifically, the plan is to build an additional 2-lane bridge, parallel to the existing 2-lane bridge. When the original bridge was constructed, right-of-way on the western side was reserved for this future improvement. Currently, there are no funds that have been identified to make this capacity improvement.

6 City of Suffolk. 2026 Comprehensive Plan.

Hazelwood Bridge over the Chuckatuck Creek (2-lanes) between Isle of Wight and the City of Suffolk.

Mills E. Godwin Bridge over the Nansemond River (2-lanes) in the City of Suffolk.

The widening of these two bridges is included as one of the alternatives for the future 2018 analysis of Bridge Road in the Capacity Analysis section of this report. The results will show from a capacity perspective whether or not it is necessary to build these facilities prior to 2018 based on Level of Service given expected traffic volumes. Future consideration will also need to be given for bridge safety, condition, and emergency management as this route currently serves as a critical evacuation route for many Southside communities.
DATA COLLECTION - TRAFFIC ANALYSIS

Map 8 (Continued) - 2008 Existing AM (PM) Peak Turning Movements

Enclosure 3
### Data Collection - Traffic Analysis

#### Percent Change in Peak Hour Volumes

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<td>Crittenden Rd</td>
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<td>Bennetts Creek Shopping Ctr</td>
<td>Knotts Neck Rd</td>
<td>Shoulders Hill Rd</td>
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<td>Breezeport Wy</td>
<td>Sentara Plummer Blvd</td>
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#### Percent Change (2008 to 2018)

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<th>PM Peak Hour</th>
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<td>Percent Change in Peak Hour Volumes</td>
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<tr>
<td>0% AM Peak Hour</td>
<td>0% PM Peak Hour</td>
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</tbody>
</table>

#### Map 10 - Percent Change (2008 to 2018) AM PM Peak Turning Movement Volumes

Enclosure 3
Map 10 (Continued) – Percent Change (2008 to 2018) AM PM Peak Turning Movement Volumes
**ARTERIAL AND INTERSECTION TRAFFIC ANALYSIS**

**ANALYSIS SCENARIOS**

Several analysis scenarios – 2008 Existing, 2008 Existing Optimized, 2018 No Build, 2018 Spot Improvements, 2018 Spot Improvements plus Six-Lane Widening, 2018 Spot Improvements Expanded plus Six-Lane Widening, and 2018 Spot Improvements Expanded plus Six-Lane Widening and Widening Bridges – were assessed to determine where capacity improvements may be justified.

**2008 Existing**

The 2008 Existing scenario includes the Bridge Road study corridor and intersection volumes, geometry, and traffic signal timings as they exist today.

**2008 Existing Optimized**

The 2008 Existing Optimized scenario includes the Bridge Road study corridor and intersection volumes and geometry as they exist today. In addition, the traffic signal timings (intersection cycle lengths, splits, and offsets) were optimized.

**2018 No Build**

The 2018 No Build scenario includes the 2018 projected traffic volumes from the previous section. The traffic signal timings (intersection cycle lengths, splits, and offsets) were re-optimized for the 2018 traffic volumes. This scenario does not include any geometric or traffic signal improvements to improve safety or capacity along the corridor except for the addition of two planned signals at the intersections of Bridge Road with Windward Lane and Townpoint Road. The City of Suffolk anticipates that these two locations will warrant the construction of traffic signals by 2018 and are included in all 2018 scenarios.

The No Build scenario provides a base for comparing each of the build scenarios. It is likely that there will be additional development and possible geometric improvements within the study limits before the year 2018; however, at the time of this study, no improvements were planned. The City of Suffolk anticipates that the speed limit will be 45 mph along Bridge Road from the Isle of Wight County Line to the Chesapeake City Line by 2018 and therefore all 2018 scenarios assume this speed for the entire corridor.

**2018 Spot Improvements**

The first build scenario for the final study year, 2018 Spot Improvements, includes geometric and traffic signal improvements to improve the safety and operations along the corridor without providing corridor-wide capacity improvements, such as widening Bridge Road. These improvements were developed through observations and deficiencies from the 2018 No Build Synchro 7.0 results and SimTraffic simulation runs. A summary of these additional improvements is included in Table 5.

**2018 Spot Improvements plus Six-Lane Widening**

This scenario builds on the 2018 Spot Improvements scenario to include widening Bridge Road from 4 to 6 lanes from Harbour View Boulevard to approximately 500 feet west of Walden Road. This option includes all of the geometric and traffic signal improvements from the Spot Improvements scenario. It also adds an extra Thru lane of capacity in each direction as well as modifies a couple of turn types for Left-Turn lanes. A summary of these improvements is included in Table 6.

**2018 Spot Improvements Expanded plus Six-Lane Widening**

This scenario builds on the 2018 Spot Improvements plus Six-Lane Widening scenario to include additional geometric and traffic signal improvements between Harbour View Boulevard and the I-664 southbound ramp to further relieve heavy traffic congestion that is anticipated in this
area by 2018. A summary of these improvements is included in Table 7.

**2018 Spot Improvements Expanded plus Six-Lane Widening and Widening Bridges**

This scenario is identical to the 2018 Spot Improvements Expanded plus Six-Lane Widening scenario except that it expands the widening of the Hazelwood Bridge over the Chuckatuck Creek and the Mills E. Godwin Bridge over the Nansemond River from 2 to 4 lanes (2 in each direction). A summary of these improvements is included in Table 8.

---

**Bridge Road (U.S. Route 17)**
- Extend the right-lane along Bridge Road west of Harbour View Boulevard (westbound) approximately 500 feet to the Right-Turn lane at Sentara BelleHarbour.
- Modify existing signal timing plans with optimized intersection phasing splits, cycle lengths, and offsets to provide coordination among existing and future traffic signals along Bridge Road.

**Intersection 2: Bridge Road/Crittenden Road**
- Restripe shoulder as a Right-Turn lane on southbound Bridge Road.

**Intersection 3: Bridge Road/Bennetts Pasture Road**
- Add a Left-Turn lane on eastbound Bennetts Pasture Road with 200’ of storage. Redesignate existing lane on eastbound Bennetts Pasture Road as a Thru/Right-Turn lane.
- Add a second Left-Turn lane on northbound Bridge Road with 200’ of storage (also add a second receiving lane on Bennetts Pasture Road).

**Intersection 4: Bridge Road/Lee Farm Lane**
- Add a Right-Turn lane on northbound Lee Farm Lane with 200’ of storage. Modify the traffic signal to include an overlap phase for this Right-Turn movement. Redesignate existing lane on northbound Lee Farm Lane as a Left-Turn lane.
- Extend existing Left-Turn lane on westbound Bridge Road with 250’ of storage. Modify turn type as a protected movement.
- Add a second Left-Turn lane on westbound Bridge Road with 250’ of storage (also add a second receiving lane on Lee Farm Lane). Modify turn type as a protected movement.
- Extend Right-Turn lane on eastbound Bridge Road from 20’ to 200’ of storage.

**Intersection 6: Bridge Road/Shields Hill Road**
- Add a Left-Turn lane on southbound Knotts Neck Road with 150’ of storage. Redesignate existing lane on southbound Knotts Neck Road as a Thru/Right-Turn lane.
- Extend dual Left-Turn lanes on westbound Bridge Road from 200’ to 700’ of storage.
- Add a second Right-Turn lane on northbound Shields Hill Road 730’ in length.
- Extend second receiving lane on southbound Shields Hill Road for 250’ to next driveway.

**Intersection 8: Bridge Road/Breezewood Way**
- Add a second Left-Turn lane on westbound Bridge Road with 300’ of storage (existing Left-Turn lane is approximately 200’ so it will need to be extended to 300’). Also add a second receiving lane on Breezewood Way 375’ to first driveway on right.

**Intersection 9: Bridge Road/Plummer Boulevard**
- Add a second Left-Turn lane on southbound Sentara BelleHarbour with 250’ of storage.
- Add a second Left-Turn lane on eastbound Bridge Road with 280’ of storage. Modify turn type as protected movement.
- Add a free-flow Right-Turn channelized lane on northbound Plummer Boulevard (add receiving lane approximately 325’ to connect with Western Freeway eastbound/I-664 northbound ramp).
- Redesignate middle lane on northbound Plummer Boulevard as a Thru/Left-Turn lane.

**Intersection 10: Bridge Road/Harbour View Boulevard**
- Add a second Right-Turn lane on southbound Harbour View Boulevard.
- Extend dual Left-Turn lanes on southbound Harbour View Boulevard from 300’ to 600’ of storage.

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Table 5 – 2018 Spot Improvements
This scenario contained all of the improvements from the **2018 Spot Improvements** scenario with the following changes/additions:

**Bridge Road (U.S. Route 17)**
- Add an additional Thru lane in both eastbound and westbound directions along Bridge Road from Harbour View Boulevard to approximately 500’ west of Walden Road.
- Modify existing signal timing plans with optimized intersection phasing splits, cycle lengths, and offsets to provide coordination among existing and future traffic signals along Bridge Road.

**Intersection 5: Bridge Road/Walden Road**
- Modify turn type for Left-Turn lanes on eastbound and westbound Bridge Road from protected/permitted to a protected movement.

**Intersection 6: Bridge Road/Shoulders Hill Road**
- Add a Right-Turn lane on eastbound Bridge Road with 300’ of storage length to the driveway for Bennetts Creek Crossing Shopping Center.

**Intersection 7: Bridge Road/Windward Lane**
- Modify turn type for Left-Turn lane on westbound Bridge Road from protected/permitted to a protected movement.

**Intersection 9: Bridge Road/Plummer Boulevard**
- Add a Right-Turn lane on westbound Bridge Road with 175’ of storage.

**Table 6 – 2018 Spot Improvements plus Six-Lane Widening**

This scenario contained all of the improvements from the **2018 Spot Improvements plus Six-Lane Widening** scenario with the following changes/additions:

**Bridge Road (U.S. Route 17)**
- Extend exclusive Right-Turn lane on eastbound Bridge Road at the I-664 southbound ramp 725’ to Townpoint Road. Add a dedicated ramp lane for this Right-Turn lane adjacent to the existing I-664 southbound ramp lane for a total of 2-lanes, which will merge approximately 500’ south of the existing ramp merge.
- Modify existing signal timing plans with optimized intersection phasing splits, cycle lengths, and offsets to provide coordination among existing and future traffic signals along Bridge Road.

**Intersection 10: Bridge Road/Harbour View Boulevard**
- Add a free-flow Right-Turn channelized bay on southbound Harbour View Boulevard (Add receiving lane approximately 1,100’ to connect with Right-Turn lane on westbound Bridge Road at Sentara BelleHarbour).
- Redesignate the three southbound lanes for Harbour View Boulevard as Left-Turn only for a triple left movement onto Bridge Road eastbound (add receiving lane approximately 800’ on Bridge Road).

**Intersection 11: Bridge Road/Townpoint Road**
- Convert existing Left-Turn lane that is striped-out to a Thru lane on eastbound Bridge Road (eastbound approach will consist of a Left-Turn only lane, 3 Thru lanes, and a Right-Turn only lane). Re-align eastbound lanes at the intersection with the receiving lanes.

**Table 7 – 2018 Spot Improvements Expanded plus Six-Lane Widening**
This scenario contained all of the improvements from the **2018 Spot Improvements Expanded plus Six-Lane Widening** scenario with the following changes/additions:

**Bridge Road (U.S. Route 17)**
- Build an additional 2-lane bridge, parallel to the existing 2-lane Hazelwood Bridge, providing four thru lanes along the western portion of the study corridor.
- Build an additional 2-lane bridge parallel to the existing 2-lane Mills E. Godwin Bridge, providing four thru lanes along the western portion of the study corridor.
- Modify existing signal timing plans with optimized intersection phasing splits, cycle lengths, and offsets to provide coordination among existing and future traffic signals along Bridge Road.

Table 8 – 2018 Spot Improvements Expanded plus Six-Lane Widening and Widening Bridges
CAPACITY ANALYSIS

ARTERIAL ANALYSIS

HRTPO staff analyzed the AM and PM Peak Hour conditions of the arterial corridor for the 2008 Existing, 2008 Existing Optimized, 2018 No Build, 2018 Spot Improvements, 2018 Spot Improvements plus Six-Lane Widening, 2018 Spot Improvements Expanded plus Six-Lane Widening, and 2018 Spot Improvements Expanded plus Six-Lane Widening and Widening Bridges scenarios. Each of the five 2018 scenarios were analyzed using the 2018 projected traffic volumes (see Map 9).

Synchro 7.0 Traffic Signal Coordination / SimTraffic Model Software was used to perform an arterial Level of Service (LOS) analysis to measure the effectiveness of each scenario in this study. Synchro uses Highway Capacity Manual (HCM) methods to calculate LOS from average travel speeds along the corridor. The HCM describes Level of Service as a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver traffic interruptions, and comfort and convenience.

As a matter of definition, Level of Service A is considered the best operating conditions of traffic flow and Level of Service F is considered the worst operating conditions of traffic flow (see Figure 1).

Figure 1 – Levels of Service for Roadways

Screen capture of Synchro 7.0 Model for Bridge Rd

Source: Pictures provided by the Department of Transportation Bureau of Transportation Statistics and the MIT Center for Transportation Studies @1995

7 Highway Capacity Manual, Transportation Research Board, 2000
Levels of Service E and F are considered unacceptable and are indicated in red in upcoming tables. LOS D is the “warning” level condition where favorable traffic operations are on the verge of becoming unfavorable. Roadway segments that are operating at LOS D are highlighted in yellow in upcoming tables.

Bridge Road currently has a speed limit of 45 mph for a majority of the corridor with some western sections having a posted speed of 55 mph. The City of Suffolk anticipates lowering the speed limit for the entire corridor to 45 mph by 2018. For this study, Bridge Road was classified as Class II for both 2008 existing and 2018 future conditions (HCM), with average free flow speeds between 35 and 45 mph. Table 9 shows the average travel speeds that define the Levels of Service for this street class.

<table>
<thead>
<tr>
<th>Level of Service (LOS)</th>
<th>Average Travel Speed (mph)</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>

Table 9 – Levels of Service (LOS) for Class II Urban Streets

The detailed results of the arterial LOS analysis are included in a separate technical appendices document in Appendix A. Table 10 contains the overall average roadway travel speeds and corresponding Levels of Service by direction for Bridge Road (between Isle of Wight County Line and the Chesapeake City Line) for each of the improvement scenarios and the existing condition. This measure is for the corridor itself and does not address specific intersections. An analysis of the intersections has also been conducted and is discussed in the next section of this report. Although specific segments along the study corridor may have better or worse Levels of Service, for this analysis an overall average was provided by direction in order to easily compare alternatives.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Eastbound/ Southbound</th>
<th>Westbound/ Northbound</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Peak Hour</td>
<td>Average Travel Speed (mph)</td>
</tr>
<tr>
<td>Existing (2008)</td>
<td>AM</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>36</td>
</tr>
<tr>
<td>Existing Optimized (2008)</td>
<td>AM</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>40</td>
</tr>
<tr>
<td>No Build (2018)</td>
<td>AM</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>29</td>
</tr>
<tr>
<td>Spot Improvements (2018)</td>
<td>AM</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>32</td>
</tr>
<tr>
<td>Spot Improvements + 6-Lane Widening (2018)</td>
<td>AM</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>32</td>
</tr>
<tr>
<td>Spot Improvements Expanded + 6-Lane Widening (2018)</td>
<td>AM</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>32</td>
</tr>
<tr>
<td>Spot Improvements Expanded + 6-Lane Widening + 2 Bridge Widening (2018)</td>
<td>AM</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 10 – Arterial LOS Analysis Results

The Bridge Road study corridor provides a LOS of A/B today, with average travel speeds of 34-37 mph in both directions. Optimizing the existing signal network along the corridor will yield a LOS of A today for both peak hours, with an increase in average travel speeds of about 4 mph in both directions.

By 2018, if no improvements are made (2018 No Build), average travel speeds will fall from 42 mph to 23 mph for the AM peak hour peak direction (Eastbound/Southbound) and from 38 mph to 18 mph for the PM peak hour peak direction (Westbound/Northbound). Despite the overall LOS for the entire corridor being D (PM peak hour), many sections of the corridor, particularly between Shoulders Hill Road and I-664, will be at failing levels. Even though the Spot Improvements and the Spot Improvements plus 6-Lane Widening options provide some congestion relief, they do not solve all congestion issues for the corridor. The Spot Improvements Expanded plus 6-Lane Widening scenario seems to provide the most relief for the entire corridor. Widening the two 2-Lane bridges (Hazelwood and Mills E. Godwin) to 4-Lanes appears to have a minimal impact on the overall travel speed for the 10-year horizon – beyond 10 years, this capacity improvement should provide more benefits.
**INTERSECTION ANALYSIS**

The intersections within the study area were modeled using Synchro 7.0 Traffic Signal Coordination / SimTraffic Model Software. Synchro uses Highway Capacity Manual\(^8\) methods to calculate control delay (the delay resulting from slowing and stopping on the approaches of an intersection) and Levels of Service. Each scenario was modeled to determine which alternatives will provide the greatest improvements to traffic capacity.

The following is the list of intersections that were analyzed in this study for the existing and future scenarios:

1. Bridge Rd / Eclipse Dr / Powell Home (business)
2. Bridge Rd / Crittenden Rd
3. Bridge Rd / Bennetts Pasture Rd / Bennetts Creek Ln
4. Bridge Rd / Lee Farm Ln
5. Bridge Rd / Walden Rd / Bennett’s Creek Crossing Shopping Center
6. Bridge Rd / Shoulders Hill Rd / Knotts Neck Rd
7. Bridge Rd / Windward Ln
8. Bridge Rd / Breezeport Wy / Bernhowe Manor Ln
9. Bridge Rd / Plummer Blvd / Sentara BelleHarbour
10. Bridge Rd / Harbour View Blvd
11. Bridge Rd / Townpoint Rd
12. Bridge Rd / College Dr

Map 11 displays the study area intersections.

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\(^8\) Highway Capacity Manual, Transportation Research Board, 2000
The City of Suffolk plans to add traffic signals at the intersections of Windward Lane and Townpoint Road within the next nine years as development increases in the study area. All other intersections shown on Map 11 are currently signalized.

The 2008 Existing roadway model includes roadway geometry, existing signal timings, and turning movement volumes (AM & PM peak hours), as provided by the City. For the 2008 Existing Optimized roadway model, Synchro was used to optimize signal timings (Cycle Lengths between 60-160 seconds) and offsets for the existing conditions. For each of the 2018 scenarios, the models include the projected traffic volumes and the improvements described in Tables 5, 6, 7, and 8. The future 2018 corridor models all contained optimized signal timings and network offsets after the improvements were added. All three 2018 corridor models also assumed that Windward Lane and Townpoint Road will be signalized and part of the coordinated system.

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

Level of Service A is considered the best operating condition with control delays of less than 10 seconds per vehicle at signalized intersections. Level of Service F is considered the worst operating condition with control delays of greater than 80 seconds per vehicle at signalized intersections. Table 11 lists the range of control delay values that define the Levels of Service. Levels of Service A through D are considered to be acceptable operating conditions, while Levels of Service E and F (indicated in red in upcoming maps and tables) are generally considered to be unacceptable operating conditions.

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

Synchro was used to produce optimal signal timings and phasing for each intersection in the study corridor for each scenario considered. These timings and phasing maximized the LOS and minimized control delay for each intersection. The detailed Synchro reports can be found in the separate technical appendices document in the Appendices B, C, D, E, F, G, H, I, J, K, L, M, N, and O. The intersection control delay values and Levels of Service for each scenario can be found in Table 12 on page 28. An overall graphical summary is provided in Figure 2 on page 30. The intersection LOS results are also provided by individual turn movement for each scenario in Maps 12-25.

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

Table 11 – Definition of Intersection Levels of Service

Source: Highway Capacity Manual 2000
All of the intersections along the Bridge Road study corridor operate at acceptable Levels of Service today (LOS A-D) during the AM and PM peak hours. The intersection of Bridge Road and Walden Road (Intersection 5) yields the highest delay of 41 seconds/vehicle (LOS D). By optimizing the current signal timings and offsets along Bridge Road, the overall network delay per vehicle can be reduced from 13 to 8 seconds/vehicle for the morning peak hour and from 15 to 10 seconds/vehicle for the afternoon peak hour.

Based on the results of the Synchro Model and SimTraffic simulation, the cost of doing nothing appears to be great. There will be extremely heavy traffic congestion from Shoulders Hill Road to I-664 during both peak hours. In the 2018 No Build scenario, four intersections are expected to be operating at unacceptable levels (LOS E or F) during the morning peak hour – Intersections 3, 6, 8, and 9. For the afternoon peak hour, three intersections are expected have failing service levels by 2018 if no improvements are made – Intersections 6, 9, and 10. By 2018, 2 traffic signals are expected to be added along the corridor at Windward Lane and Townpoint Road. These new signalized intersections are expected to be operating at favorable levels in 2018. In the 2018 No Build scenario, the overall network delay per vehicle is expected to be about 35 seconds/vehicle (AM) and 58 seconds/vehicle (PM).

The 2018 Spot Improvements alternative lowers delays at many congested intersections; however, three intersections (Intersections 6, 8, and 9) for the morning peak hour and two intersections (Intersections 9 and 10) for the afternoon peak hour will still have failing service grades.

Expanding the capacity of Bridge Road from 4 to 6-lanes from Walden Road to Harbour View Boulevard in addition to the spot improvements (2018 Spot Improvements plus Six-Lane Widening) provides considerable improvement in traffic operations along Bridge Road. This scenario yields acceptable conditions at all intersections for the morning peak hour and only one failing intersection (Intersection 10) during the afternoon peak hour. In this scenario, the overall network delay per vehicle is expected to be about 14 seconds/vehicle (AM) and 27 seconds/vehicle (PM). After a thorough examination of this alternative (PM peak hour) using the SimTraffic simulation, widespread traffic queuing was observed for the southbound approach of Harbour View Boulevard and along Bridge Road from the I-664 southbound ramp to Harbour View Boulevard (see screen capture photo on the following page).

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Peak Hour</th>
<th>1 - Eclipse Dr</th>
<th>2 - Crittenden Rd</th>
<th>3 - Bennetts Pasture Rd</th>
<th>4 - Lee Farm Ln</th>
<th>5 - Walden Rd</th>
<th>6 - Shoulders Hill Rd</th>
<th>7 - Windward Ln</th>
<th>8 - Breezewood Wy</th>
<th>9 - Plummer Blvd</th>
<th>10 - Harbour View Blvd</th>
<th>11 - Townpoint Rd</th>
<th>12 - College Dr</th>
<th>Overall Network Delay Per Vehicle (sec/veh)</th>
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<tr>
<td>Existing (2008)</td>
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<td>No Build (2018)</td>
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<td>Spot Improvements (2018)</td>
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<td>Spot Improvements + 6-Lane Widening (2018)</td>
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<td>Spot Improvements Expanded + 6-Lane Widening (2018)</td>
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<td>Spot Improvements Expanded + 6-Lane Widening + 2 Bridge Widening (2018)</td>
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</table>

Table 12 – Intersection Level of Service Results

Note: Intersection Delay is not calculated for unsignalized intersections
For the 2018 Spot Improvements plus Six-Lane Widening scenario (PM peak hour), heavy traffic queues were observed in SimTraffic from the I-664 southbound ramp to Harbour View Boulevard.

For the 2018 Spot Improvements Expanded plus Six-Lane Widening scenario (PM peak hour), traffic conditions are greatly improved between I-664 Southbound and Harbour View Boulevard.
As a result of the observed traffic backups in the previous alternative during the afternoon peak hour, another alternative was developed - 2018 Spot Improvements Expanded plus Six-Lane Widening. This scenario adds a southbound triple Left-Turn for Harbour View Boulevard at Bridge Road, an 800’ receiving lane on eastbound Bridge Road, a dedicated parallel I-664 southbound ramp lane approximately 500’ past the existing merge, and other improvements between the ramp and the Townpoint Road intersection. Under this scenario, the Bridge Road and Harbour View Boulevard intersection still operates at unacceptable conditions during the afternoon peak hour (LOS E), however, much of the traffic congestion in this area is vastly improved (see lower screen capture photo on the previous page). The overall network delay per vehicle for this option is expected to be about 12 seconds/vehicle (AM) and 23 seconds/vehicle (PM). In order to improve this intersection (Intersection 10) to acceptable levels during the afternoon peak hour in 2018, a triple Left-Turn for the eastbound approach of Bridge Road will be needed. Given the necessary expansion of Harbour View Boulevard in order to receive three lanes of left-turning vehicles, this improvement was not included. Furthermore, operating conditions at this intersection were acceptable during the morning peak hour (LOS C). Depending on future traffic conditions and upon further study, this may be a feasible solution.

Finally, the last alternative (2018 Spot Improvements Expanded plus Six-Lane Widening and Widening Bridges) built on the previous alternative by expanding the Hazelwood and Mills E. Godwin bridges from 2 to 4-lanes. Despite the Synchro Level of Service results showing little to no improvement for this alternative, the SimTraffic simulation revealed some relief of minor queuing at the entry points to the bridges where 2-lanes merged to 1-lane. Expanding the bridges by 2018, however, does not provide enough congestion relief to merit the costs associated with this option as compared to the corridor and intersection improvements proposed.
in the previous alternatives. It is important to note that a safety analysis of the bridges was not considered as a part of this study. As traffic continues to grow along this route, expanding these bridges may become more feasible beyond the 10-year horizon.

**Recommended Alternative**

The 2018 Spot Improvements Expanded plus Six-Lane Widening alternative provides acceptable Levels of Service at all intersections along Bridge Road in 2018 except for one intersection (Harbour View Boulevard during the PM peak hour) with an overall network delay per vehicle of 12 seconds during the morning peak hour and 23 seconds during the afternoon peak hour. This alternative provides the best overall traffic flow for the entire corridor for the anticipated travel demand by 2018. The costs of doing nothing could be detrimental to the economic vitality of the area surrounding this corridor and the overall quality of life for many Suffolk, Isle of Wight, and Chesapeake residents. It is recommended that the City of Suffolk proceed with a plan to implement the improvements outlined in this alternative as specified in Table 7 on page 22.

Even though this study’s capacity analysis does not recommend widening the two 2-lane bridges (Mills E. Godwin over the Nansemond River and the Hazelwood Bridge over the Chuckatuck Creek) to 4-lanes by 2018, the City and VDOT should continue to plan for expansion beyond the 10-year horizon. Both bridges have been classified by VDOT as “needing repair” in the recently released Hampton Roads Regional Bridge Study (September 2008)⁹, which provided a summary of bridge inspections, sufficiency ratings and other detailed characteristics. Expansion of these bridges would also enhance Bridge Road, which currently serves as a critical evacuation route for many Southside communities. If either of these bridges happened to be out of service during an emergency evacuation, traffic diversion could lead to even more delays and the failure to safely evacuate many residents.

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⁹ Hampton Roads Regional Bridge Study, Hampton Roads Transportation Planning Organization, September 2008
The average intersection delay (seconds/vehicle) is provided next to each circle.

Map 12 – Intersection LOS: 2008 Existing (AM Peak)

Map 13 – Intersection LOS: 2008 Existing (PM Peak)
**Map 14 – Intersection LOS: 2008 Existing Optimized (AM Peak)**

**Map 15 – Intersection LOS: 2008 Existing Optimized (PM Peak)**

The average intersection delay (seconds/vehicle) is provided next to each circle.
The average intersection delay (seconds/vehicle) is provided next to each circle.

Map 16 – Intersection LOS: 2018 No Build (AM Peak)

Map 17 – Intersection LOS: 2018 No Build (PM Peak)
The average intersection delay (seconds/vehicle) is provided next to each circle.

Map 18 – Intersection LOS: 2018 Spot Improvements (AM Peak)

Map 19 – Intersection LOS: 2018 Spot Improvements (PM Peak)
The average intersection delay (seconds/vehicle) is provided next to each circle.

Map 20 Intersection LOS: 2018 Spot Improvements plus Six-Lane Widening (AM Peak)

Map 21 – Intersection LOS: 2018 Spot Improvements plus Six-Lane Widening (PM Peak)
The average intersection delay (seconds/vehicle) is provided next to each circle.

Map 22 – Intersection LOS: 2018 Spot Improvements Expanded plus Six-Lane Widening (AM Peak)

Map 23 – Intersection LOS: 2018 Spot Improvements Expanded plus Six-Lane Widening (PM Peak)
Map 24 – Intersection LOS: 2018 Spot Improvements Expanded plus Six-Lane Widening and Widening Bridges (AM Peak)

Map 25 – Intersection LOS: 2018 Spot Improvements Expanded plus Six-Lane Widening and Widening Bridges (PM Peak)

The average intersection delay (seconds/vehicle) is provided next to each circle.
ACCESS MANAGEMENT AND NEAR-TERM IMPROVEMENTS

ACCESS MANAGEMENT

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

Overall, the study corridor has very good access management in place, particularly with the divided non-traversable grass median. This median is along the entire 7.3 mile corridor with the exception of the Hazelwood and the Mills E. Godwin bridges and their approaches, where it narrows to a 2-lane roadway. The median physically separates traffic traveling in opposite directions and helps channelize turning vehicles at designated median openings. Table 13 provides an existing inventory of driveways and median openings along the study corridor. Along Bridge Road, there are 31 median openings, 39 driveways on the northern and eastern side, and 71 driveways on the southern and western side. Many of the driveways along the corridor are for private single-home residences, which have a minimal impact on traffic flow.

There are currently ten signalized intersections within the Bridge Road study corridor. The signalized intersections of Bridge Road that are included in this study are Eclipse Drive, Crittenden Road, Bennetts Pasture Road/Bennetts Creek Lane, Lee Farm Lane, Walden Road/Bennetts Creek Crossing Shopping Center, Shoulder Hill Road/Knotts Neck Road, Breezeport Way/Bernhowe Manor Lane, Plummer Boulevard, Harbour View Boulevard, and College Drive. In addition, two intersections along Bridge Road (Windward Lane and Townpoint Road) are planned to become signalized within the next three years as development increases in the study area and are included in the future 2018 intersection analysis. It is anticipated that commercial and residential projects under development now will install two more traffic signals before 2018. These new traffic signals will be located at the intersections of Bridge Road with Windward Lane and Townpoint Road. This will bring the total number of traffic signals within this 7.3 mile corridor to twelve, or one every 0.6 mile on average. It is generally recommended that signalized intersection spacing on arterials be limited to 0.5 mile or greater.10 Many of the traffic signals between Walden Road and Harbour View Boulevard are below the recommended spacing; however, using a tool like Synchro, which optimizes the cycle lengths, phasing splits, and offsets, good traffic progression can still be achieved.

<table>
<thead>
<tr>
<th>Route</th>
<th>Roadway Name</th>
<th>Segment From</th>
<th>Segment To</th>
<th>Length (Ml)</th>
<th>Number of Driveways (N/E side)</th>
<th>Driveways Per Mile</th>
<th>Number of Driveways (S/W side)</th>
<th>Driveways Per Mile</th>
<th>Number of Median Openings</th>
<th>Median Openings Per Mile</th>
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<td>Isle of Wight CL</td>
<td>Eclipse Dr</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>17</td>
<td>Bridge Rd</td>
<td>E End Chuckatuck Bridge</td>
<td>Crittenden Rd</td>
<td>0.30</td>
<td>5</td>
<td>16.7</td>
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<td>S End Nansemond River</td>
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<td>Bennetts Pasture Rd</td>
<td>0.91</td>
<td>6</td>
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<td>15</td>
<td>16.5</td>
<td>4</td>
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<tr>
<td>17</td>
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<td>Lee Farm Ln</td>
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<td>Lee Farm Ln</td>
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<td>6.3</td>
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<td>Plummer Blvd</td>
<td>Harbour View Blvd</td>
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<td>0</td>
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<td>0</td>
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<td>0</td>
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<td>Harbour View Blvd</td>
<td>Western Fwy</td>
<td>0.18</td>
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<td>11.1</td>
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<td>2</td>
<td>4.1</td>
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<tr>
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<td>Bridge Rd</td>
<td>I-664</td>
<td>College Dr</td>
<td>0.55</td>
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<td>0</td>
<td>0.0</td>
<td>0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Table 13 – 2009 Existing Access Points

*Bold roadways are signalized intersections. Driveways and median openings at signalized intersections were counted at the segment endpoint. Ramps were included as driveways.

10 Iowa State University Center for Transportation Research and Education, Access Management Toolkit
Commercial Entrance Location

According to the Virginia Department of Transportation (VDOT) Access Management Design Standards for Principle Arterials, entrances shall not be placed within the functional area of any intersection (See Figure 3). Around signalized intersections, more spacing may be required beyond this area as a result of traffic queues.

![Figure 3 – Intersection Physical and Functional Area](source)

The American Association of State Highway and Transportation Officials (AASHTO) specifically states that “a driveway should not be located within the functional boundary of an intersection.”

AASHTO does not specify guidelines for the exact size of the functional area; however, the size must be much larger than the physical area. In general, AASHTO suggests that the functional area should consist of the distance traveled during the braking perception-reaction time plus the distance required to move laterally and come to a stop plus any required storage length.

**Temple Beth El (Location 1 & 2)**

Currently, there are two driveways for access to/from this facility along Bridge Road. The eastern driveway is within the functional area of the signalized intersection (195 feet) at Plummer Boulevard and should be closed. The western driveway is aligned with a median opening that is approximately 485 feet west of the Plummer Boulevard intersection. As traffic queues increase along Bridge Road, this driveway could present safety and operational problems in the future and should be monitored closely. In the future if this becomes a safety problem, one option is to close the median opening between Plummer Boulevard and Breezeport Way and provide access from Levi Solomon Way and therefore a connection to Bridge Road via signalized intersections at Plummer Boulevard and Breezeport Way. The western driveway would then provide right-in/right-out access only. The Sentara

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BelleHarbour driveway (across from Temple Beth El) is currently designated for Right-Turns only and is not using the median opening (Location 2).

Corner Clearance

Corner clearance is the distance between the intersection and the nearest upstream or downstream driveway. Adequate corner clearance is critical in maintaining safe and efficient operations at the intersection. Driveway and access points should be located outside the functional intersection area. Improving corner clearance reduces conflicts that can cause accidents, especially rear-end crashes.

In some cases, driveways are moved from the main street to the side street to provide adequate corner clearance. The corner clearance criteria as recommended in the Transportation Research Board (TRB) Access Management Manual is provided in Figure 4 on page 42. The VDOT Access Management Regulations provide partial guidance on corner clearances directly from the TRB recommendations.

Shell Gas Station at Shoulder Hill Road (Location 3)

At the Shell Gas Station at Shoulder Hill Road, the corner clearance distances are below the recommended distances. Currently, the downstream corner clearance along Bridge Road is only 70 feet and the approach side on Shoulder Hill Road is about 115 feet to the curb cut of the first driveway. The recommended distance for “B-Downstream on Major St” as shown on Figure 4 is 365 feet (interpolated) for 45 mph posted speed. The recommended minimum distance for “C-Approach Side on Minor St” is 50 feet plus the queue storage. According to the 2008 Existing Optimized alternative in Synchro, the existing queue for the morning peak hour is 125 feet (95th percentile), making the minimum distance 175 feet.
### Clearance Type

<table>
<thead>
<tr>
<th>Clearance Type</th>
<th>Volume in Lane Adjacent to Access</th>
<th>Intersection Capacity</th>
<th>Posted Speed</th>
<th>Min. Corner Clearance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A - Upstream on Major St</td>
<td></td>
<td></td>
<td>20 mph</td>
<td>115 ft + queue storage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30 mph</td>
<td>270 ft + queue storage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40 mph</td>
<td>420 ft + queue storage</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50 mph</td>
<td>610 ft + queue storage</td>
</tr>
<tr>
<td>B - Downstream on Major St</td>
<td></td>
<td></td>
<td>30 mph</td>
<td>200 ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>40 mph</td>
<td>305 ft</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>50 mph</td>
<td>425 ft</td>
</tr>
<tr>
<td>C - Approach Side on Minor St</td>
<td>50 vph, ~500 ADT</td>
<td>&lt;100 vph (Stop control with high cross traffic)</td>
<td>200 ft</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;100 vph (Stop control with low cross traffic)</td>
<td>100 ft</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50 mph</td>
<td>100 ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50 mph</td>
<td>50 ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;100 vph (Stop control with high cross traffic)</td>
<td>100 ft</td>
<td></td>
</tr>
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<td></td>
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<td>&lt;200 vph (Stop control with low cross traffic)</td>
<td>75 ft</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>&gt;200 vph (Signal control)</td>
<td>50 ft + queue storage</td>
<td></td>
</tr>
<tr>
<td>D - Departure Side on Minor Approach</td>
<td>20 mph</td>
<td>115 ft</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>30 mph</td>
<td>225 ft</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>40 mph</td>
<td>365 ft</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>50 mph</td>
<td>535 ft</td>
</tr>
</tbody>
</table>

**Figure 4 – Corner clearance criteria at controlled intersections**

vph – vehicles per hour; ADT – average daily traffic

**Access Management and Near-Term Improvements**

Currently, there are traffic queues on the Shoulders Hill Road northbound approach that back up past the first driveway; when Left-Turn vehicles from the westbound Bridge Road approach head south on Shoulders Hill Road and attempt to turn left into the Shell Gas Station, they are forced to stop due to the queue blocking the driveway. Rear-end conflicts are created due to the simultaneous acceleration of southbound thru vehicles with the deceleration of left-turn vehicles (into Shell); this is not only a safety hazard, but it also impedes the operation of the overall intersection. A possible solution would be to close this driveway and to provide shared access via the Etheridge Homes driveway to the south (195 feet corner clearance); a pavement connection would need to be made where the grass divider currently exists.

At the first downstream driveway (70 feet from intersection) for the Shell Gas Station along Bridge Road, rear-end conflict situations are created as a result of the simultaneous acceleration of thru traffic and deceleration of right-turning vehicles. It is recommended that this driveway be closed or relocated to the east of the 2nd driveway along Bridge Road.

**Driveway Width**

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

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

**Bennetts Creek Farm Market (Location 4)**

At the Bennetts Creek Farm Market (east of Windward Lane), the westernmost driveway is 130 feet wide. It is recommended that this driveway be narrowed to the VDOT recommended maximum of 40 feet for a two-way drive. There is also another driveway to the east that has been closed with signs; it is recommended that this driveway be permanently closed and filled in with grass to avoid confusion and potential safety problems.

**The Bennetts Creek Farm Market driveway is too wide. (Location 4)**

**The eastern driveway at Bennetts Creek Farm Market should be permanently closed if it is no longer being used. (Location 4)**
**Sunoco Gas Station at Eclipse Drive (Location 5)**

The Sunoco Gas Station (north of Eclipse Drive) has two driveways along Bridge Road and one driveway along Eclipse Drive. Both driveways along Bridge Road are above the recommended VDOT maximum of 40 feet for a two-way drive (Access Management Design Standards for Principle Arterials). It is recommended that both driveways along Bridge Road be closed and access be made using the side street entrance. At a minimum the driveway closest to the signalized intersection should be closed since it only has a corner clearance of 50 feet.

Across the street at this location, Tautog Road is located within 50 feet of the intersection as well. Ideally, this street should be combined with the Powell Home business driveway at the intersection as a single access point. As traffic increases along Bridge Road, having Tautog Road within the functional area of the intersection could be problematic.

**PH Automotive (Location 6)**

PH Automotive has two driveways that are wider than the VDOT recommended maximum width of 40 feet for two-way traffic. It is recommended to narrow the existing driveways to 40 feet. Another option is to close one of the driveways; the southern driveway is partially blocked by vehicles due to limited on-site parking spaces.

**Length of Median Opening**

Divided roadways need median openings to provide access for crossing traffic as well as left-turning and U-turning movements. AASHTO provides minimum design standards based on the width of the median and the radii of the bullet-nose end.

**South End of Mills E. Godwin Bridge (Location 7)**

The median opening on the south end of the Mills E. Godwin Bridge has a length of 22 feet.
The above-minimum AASHTO design\(^{12}\) for median opening length is 58 feet for medians with bullet-nose ends and a median width of 20 feet (Figure 5). AASHTO recommends that above-minimum design values be used when feasible. When the median opening is too narrow, it does not provide left-turning and U-turning vehicles enough space to turn safely. Vehicles in the Thru lanes must slow down or stop to avoid turning vehicles and could potentially lead to dangerous rear-end collisions. It is recommended that this median opening be lengthened to adequate design standards or be closed.

**ACCESS MANAGEMENT PRACTICES FOR FUTURE DEVELOPMENT**

As traffic volumes continue to increase along the Bridge Road study corridor with new growth and development, safe and efficient travel along this route will be achieved through capacity improvements and applying sound access management principles. The combination of effective land use planning and access management can be an instrumental tool for maintaining high service levels along this regional route. It is recommended that the City of Suffolk refer to the VDOT Access Management Regulations and Standards\(^{13}\) as a resource guide for access management practices and strategies.

**Parcel Interconnectivity**

As new developments are proposed along Bridge Road, their initial design should interconnect commercial parking lots whenever possible. This practice will allow customers to travel from one shopping center or office complex to another via driveways or parallel side streets rather than utilizing Bridge Road.

**Minimize Curb Cuts and Encourage Shared Use Entrances**

Minimizing curb cuts and encouraging shared use entrances reduce the number of access points along the corridor and provide

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

Limit Signalized Intersections

Although traffic signals ease access to and from the side streets, they can potentially erode the safe and efficient progression of traffic along the Bridge Road study corridor. More signalized intersections along Bridge Road would decrease vehicle throughput and travel speeds, while increasing delays for motorists on both Bridge Road and the intersecting side streets. If a traffic signal is warranted, however, it should be installed to provide safe turn movements for all vehicles. The signal location should be carefully planned. During the beginning stages of design, various locations could be tested using a tool like Synchro to determine the best location for traffic progression and operations along Bridge Road. Site access could also be provided via a side street, where a traffic signal already exists. The City should also encourage shared access points whenever possible to minimized conflict points along the corridor.

Pavement Markings

The motoring public depends heavily upon pavement markings for guidance, vehicle positioning and information. Unless pavement markings are clear, consistent and uniform in their application, drivers may become confused and uncertain of their purpose.

Pavement markings are often used to supplement the regulations or warnings of other traffic control devices, such as traffic signs or signals. Sometimes they are used alone to convey regulations or warnings which would not be obtainable by other traffic control devices.

Under favorable conditions, pavement markings convey information to the driver without diverting the driver's attention from the road. Having clear pavement markings will improve safety and visibility.

On the Bridge Road study corridor, many of the pavement markings from the Isle of Wight County Line to Lee Farm Lane are faded and need to be repainted.

**Bridge Road at Eclipse Drive (Location 8)**

Pavement markings are fading at this location. Replacing them will improve visibility and safety.

**Bridge Road at Crittenden Road (Location 9)**

A few pavement markings are fading at this location and need to be restriped.

**Bridge Road at Bennetts Pasture Road (Location 10)**

As shown below, pavement markings are in poor condition at this location. Replacing them will improve visibility and safety.
**Bridge Road at Lee Farm Lane (Location 11)**

Bridge Road at Lee Farm Lane was recently repaved, however the eastbound Right-Turn dashed lane markings were not restriped. Repainting is recommended. Consideration should also be given to widening the existing Right-Turn lane to allow storage of more than one vehicle.

**Knotts Neck Road at Bridge Road (Location 13)**

Stop bar for the Knotts Neck Road intersection approach at Bridge Road is faded. Re-striping it will improve visibility and safety.

**Creekside Village/Food Lion Shopping Center (Location 12)**

At the Creekside Village/Food Lion Shopping Center entrance (3235 Bridge Road), the stop bar and arrow pavement markings are faded. Replacing them will improve visibility and safety at this location.

**Bridge Road at Breezeport Way/Bernhowe Manor Lane (Location 14)**

It appears that the stop bar for the eastbound approach of Bridge Road was moved back a small distance and the Left-Turn arrow was not repainted. A Left-Turn arrow just before the stop bar is recommended to provide clear guidance to drivers.
**ACCESS MANAGEMENT AND NEAR-TERM IMPROVEMENTS**

*Townpoint Road at Bridge Road (Location 15)*

The northbound approach of Townpoint Road at Bridge Road is missing turn arrow markings for the left-lane. Painting a shared Left/Thru pavement marking arrow at this location is recommended.

![Turn arrow pavement marking is missing for Townpoint Road at Bridge Road. (Location 15)](image1)

**VEGETATION OBSTRUCTION**

Trimming vegetation to improve visibility is one of the most cost effective ways to enhance traffic safety along a roadway. Overgrown trees and shrubs endanger us all when they block our view of traffic signs, signals, pedestrians, bicyclists, and motorists.

*Hazelwood Bridge (Location 16)*

The northbound approach before the Hazelwood Bridge (over the Chuckatuck Creek in Suffolk) has several signs that are obstructed by overgrown trees. Trimming the trees and maintaining a clearance buffer of vegetation around the signs is recommended.

*Hazelwood Bridge (Location 17)*

The northbound direction of U.S. Route 17 after the Hazelwood Bridge (in Isle of Wight County) has several signs that are obstructed by overgrown trees. Trimming the trees and maintaining a

![Signs are obstructed by overgrown trees for northbound approach prior to Hazelwood Bridge in Suffolk. (Location 16)](image2)

![Signs are obstructed by overgrown trees for northbound direction (Rte 17) after Hazelwood Bridge in Isle of Wight County. (Location 17)](image3)
clearance buffer of vegetation around the signs is recommended.

**Hazelwood Bridge (Location 18)**

The southbound direction of Bridge Road (U.S. Route 17) after the Hazelwood Bridge (in Suffolk) has several signs that are obstructed by overgrown trees. Trimming the trees and maintaining a clearance buffer of vegetation around the signs is recommended.

**Bennetts Creek Lane at Bridge Road (Location 19)**

For the Bennetts Creek Lane approach at Bridge Road, the view of the traffic signal is partially blocked by pine tree branches. Trimming the trees and maintaining a clear view for all motorists at each approach is recommended.

**Bridge Road (westbound) near I-664 (Location 20)**

For the westbound direction of Bridge Road prior to the I-664 southbound ramp, the “Lane Ends Merge Left” sign is obstructed by overgrown trees and shrubs. Trimming the trees and maintaining a clearance buffer of vegetation around the sign is recommended.

“Lane Ends Merge Left” sign is obstructed by overgrown trees for Bridge Road (westbound) near I-664 ramp. (Location 20)
ROADWAY SHOULDERS AT INTERSECTIONS

Bridge Road (southbound) at Eclipse Drive (Location 21)

Currently, there is a wide shoulder that is occasionally used as a Right-Turn lane for the southbound traffic accessing the intersection of Bridge Road and the commercial entrance (Powell Home) and Tautog Road at Eclipse Drive. If this shoulder is converted to a Right-Turn lane in the future, it is recommended that Tautog Road be aligned with Eclipse Drive to reduce conflicts with Right-Turn vehicles (also see page 44).

Bridge Road (southbound) at Crittenden Road (Location 22)

Currently, there is a wide shoulder being used as a Right-Turn lane for the southbound approach of Bridge Road at Crittenden Road. This area should be restriped as a Right-Turn lane since it is functioning as one presently. This change will increase the overall capacity of the signalized intersection at Crittenden Road by removing
Right-Turn vehicles from Thru lanes. To increase safety at this location, one or both driveways along Bridge Road serving Dogwood Run and New Grace Community Chapel should be considered for closure since access is provided via Crittenden Road. The corner clearances of these two driveways are only 80 feet and 180 feet to the intersection, respectively. The recommended standard distance is 465 feet plus queue storage for upstream driveways on major streets (see Figure 4).

**Bennetts Pasture Road (eastbound) at Bridge Road** (Location 23)

Right-Turn vehicles are currently using the shoulder for the eastbound approach of Bennetts Pasture Road at Bridge Road and causing road surface damage. Adding a Right-Turn lane will eliminate this safety hazard and assist with the overall operation of the traffic signal at this location.

**STREETS SIGNS**

The placement of clear and highly visible street signs is a critical element to reduce crashes and congestion and to improve the efficiency along a roadway network. If signs are not uniform throughout the traveling corridor, drivers may become confused and make many unnecessary extra trips or U-turns to reach their final destination. In addition, signs that are not clearly defined or marked could lead to potentially dangerous incidents.

**Bridge Road at Eclipse Drive** (Location 24)

The street signs identifying Eclipse Drive and Bridge Road are small and difficult for drivers to read. It is recommended to install large street signs on the traffic signal mast arms for all approaches similar to the street signs used at the intersection of Bridge Road and Walden Road.

Also, at this intersection, there is a faded “DIVIDED HIGHWAY” sign (as shown on the following page) for the westbound approach of Eclipse Drive that needs to be replaced.
Bridge Road at Crittenden Road (Location 25)

The street signs identifying Crittenden Road and Bridge Road are small and difficult for drivers to read. It is recommended to install large street signs on the vertical signal poles on both sides of Bridge Road similar to the street signs used at the intersection of Bridge Road and Lee Farm Lane.

Bridge Road at Bennetts Pasture Road/Bennetts Creek Lane (Location 26)

The street signs identifying the intersection of Bennetts Pasture Road/Bennetts Creek Lane and Bridge Road are small and difficult for drivers to read. It is recommended to install large street signs on the vertical signal poles on both sides of Bridge Road similar to the street signs used at the intersection of Bridge Road and Lee Farm Lane.

Sentara BelleHarbour Driveway (Location 27)

Exiting from the Sentara BelleHarbour driveway (550 feet west of Plummer Boulevard) onto westbound Bridge Road, there is a Stop Sign with a small “3-Way” rectangular sign attached to the post below it. The “3-Way” writing has been purposely painted over in white since it is not a 3-Way stop location (see photos on the following page). The white paint is beginning to fade and could potentially create confusion and an unsafe situation.
since this stop does not operate as a 3-Way stop. The small rectangular “3-Way” sign should be removed so it does not cause problems in the near future.

A Stop Sign with a small 3-Way rectangular sign (painted over in white) was used for the driveway exiting Sentara BelleHarbour in place of a standard Stop Sign – if the paint continues to fade, it could potentially be dangerous for drivers. (Location 27)

**Bridge Road (westbound) at Harbour View Boulevard (Location 28)**

There are currently three westbound Thru lanes for Bridge Road at the Harbour View Boulevard signalized intersection. After the traffic signal, 3-lanes become 2-lanes, with the far right lane tapering into the left two lanes. Prior to the Harbour View Boulevard intersection are a “LANE ENDS MERGE LEFT” sign and a “LANE ENDS” visual sign. In addition, there is a small sign that states “RIGHT LANE MUST TURN RIGHT”. This is confusing for drivers since the far right lane is an exclusive Right-

The placement of the Lane Ends Merge Left signs along Bridge Road (westbound) prior to Harbour View Boulevard is confusing to drivers because the far right lane is an exclusive Right-Turn lane. (Location 28)
Turn lane onto Harbour View Boulevard. Some drivers headed toward the Harbour View Station Town Center may think that the right lane is ending prior to the Harbour View Boulevard intersection and change lanes several times, creating an unsafe weave of vehicles. The short-term solution is to place the “LANE ENDS” sign just to the west of the traffic signal at Harbour View Boulevard. The long-term solution is to extend the right-lane along Bridge Road (westbound) approximately 500 feet to the Right-Turn lane at Sentara BelleHarbour and remove the “LANE ENDS MERGE LEFT” and the “LANE ENDS” signs prior to Harbour View Boulevard. This solution would increase safety by removing the merge and provide additional capacity for Bridge Road in the westbound direction.

Several alternative improvements to this lane merge area were presented in the 2018 scenarios discussed in the Arterial and Intersection Traffic Analysis section of this report. The capacity analysis recommended the 2018 Spot Improvements Expanded plus Six-Lane Widening option, which included adding a Thru lane in both directions for Bridge Road (Harbour View to 500 feet west of Walden Road), a free-flow Right-Turn channelized bay on southbound Harbour View Boulevard, and a receiving lane approximately 1,100 feet to connect with the Right-Turn lane on westbound Bridge Road at Sentara BelleHarbour.
ACCESS MANAGEMENT AND NEAR-TERM IMPROVEMENTS

The street signs at the intersection of Bridge Road and College Drive/Lynn Drive are small and difficult for drivers to read. (Location 30)

There are currently no signs identifying Bridge Road or directing travelers toward I-664 at the southbound approach of Harbour View Boulevard at Bridge Road. (Location 29)

Harbour View Boulevard at Bridge Road (Location 29)

There is no street sign identifying Bridge Road for the Harbour View Boulevard southbound approach. It is recommended to install large street sign on the traffic signal mast arms similar to the street signs used at the intersection of Bridge Road and Walden Road. In addition, it would be helpful for unfamiliar drivers in the area to post signs directing them to I-664.

Bridge Road at College Drive/Lynn Drive (Location 30)

Small street signs currently exist on the College Drive median (north of the intersection) and on the southeast corner at Lynn Drive and Bridge Road, which are difficult for drivers to read. It is recommended to install a large street signs on the traffic signal mast arms for all approaches similar to the street signs used at the intersection of Bridge Road and Walden Road.

Placing larger street signs on the traffic signal horizontal mast arms will assist motorists when traveling and reduce unnecessary trips or U-turns. (Location 30)
Refer to “Access Management and Near-Term Improvements” section of this report on pages 39-55 for an assessment at each location as well as the recommended improvement.
CONCLUSIONS AND RECOMMENDATIONS

The Bridge Road (U.S. Route 17) study corridor, which connects many Isle of Wight and Suffolk residents to I-664 and many communities on the Southside, is a vital roadway that currently serves nearly 32,000 vehicles per day\(^{14}\). The Bridge Road study area is one of the fastest growing areas in Hampton Roads offering a conglomeration of a rural lifestyle mixed with developed neighborhoods, retail, and office centers. The area also benefits from its strategic proximity to the regional transportation network and amenities of the Hampton Roads metropolitan area. By 2018, it is anticipated that morning and afternoon peak hour traffic volumes will increase as much as 90% for a majority of the study corridor over existing conditions. Preserving the corridor’s capacity, safety, level of traffic service, while simultaneously providing access to many adjacent activity centers will be critical to the future growth and vitality of this area.

This study provided a comprehensive review of the arterial and intersection capacity, access management and other near-term improvements that will be necessary along Bridge Road (U.S. Route 17) in Suffolk, Virginia within the next ten years. For the arterial and intersection traffic analysis, this study reviewed the existing conditions as well as five scenarios for 2018 including No Build, Spot Improvements, Spot Improvements plus Six-Lane Widening, Spot Improvements Expanded plus Six-Lane Widening, and Spot Improvements Expanded plus Six-Lane Widening and Widening Bridges options to determine what benefits each would provide.

The arterial analysis revealed that optimizing the existing signal network along the corridor will yield a Level of Service (LOS) of A today for both AM and PM peak hours, with an increase in average travel speeds of about 4 mph in both directions. By 2018, if no improvements are made (2018 No Build), average travel speeds will fall from 42 mph to 23 mph for the AM peak hour peak direction (Eastbound/

\(^{14}\) Virginia Department of Transportation (VDOT)

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Peak Hour Average Travel Speed (mph)</th>
<th>LOS</th>
<th>Peak Hour Average Travel Speed (mph)</th>
<th>LOS</th>
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<tbody>
<tr>
<td>Existing (2008)</td>
<td>AM 36 A 37 A</td>
<td>PM 36 A 34 B</td>
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<tr>
<td>Existing Optimized (2008)</td>
<td>AM 42 A 41 A</td>
<td>PM 40 A 38 A</td>
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<tr>
<td>No Build (2018)</td>
<td>AM 23 C 34 B</td>
<td>PM 29 B 18 D</td>
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<tr>
<td>Spot Improvements (2018)</td>
<td>AM 27 C 35 B</td>
<td>PM 32 B 22 D</td>
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<tr>
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<td>PM 32 B 26 C</td>
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<tr>
<td>Spot Improvements Expanded + 6-Lane Widening (2018)</td>
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<td>PM 32 B 28 C</td>
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<tr>
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<td>AM 36 A 36 A</td>
<td>PM 32 B 28 C</td>
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</tbody>
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**Arterial LOS Analysis Results**

Southbound) and from 38 mph to 18 mph for the PM peak hour peak direction (Westbound/Northbound). Despite the overall LOS for the entire corridor being D (PM peak hour), many sections of the corridor, particularly between Shoulders Hill Road and I-664, will be at failing levels.

The intersection analysis showed that if no additional geometric or traffic signal improvements are made to Bridge Road by 2018 (2018 No Build), four of the twelve signalized intersections during morning peak hour and three of the twelve during the afternoon peak hour will be operating at unacceptable levels (LOS E or F).

The 2018 Spot Improvements alternative lowers delays at many congested intersections; however, three intersections for the morning peak hour and two intersections for the afternoon peak hour will still have failing service grades.

Expanding the capacity of Bridge Road from 4 to 6-lanes from Walden Road to Harbour View Boulevard in addition to the spot improvements (2018 Spot Improvements plus Six-Lane...
**Intersection Level of Service Results**

Widening) provides considerable improvement in traffic operations along Bridge Road. After a thorough examination of this alternative (PM peak hour) using the SimTraffic simulation, widespread traffic queuing was observed for the southbound approach of Harbour View Boulevard and along Bridge Road from the I-664 southbound ramp to Harbour View Boulevard.

The 2018 Spot Improvements Expanded plus Six-Lane Widening scenario adds a southbound triple Left-Turn for Harbour View Boulevard at Bridge Road, an 800’ receiving lane on eastbound Bridge Road, a dedicated parallel I-664 southbound ramp lane approximately 500’ past the existing merge, and other improvements between the ramp and the Townpoint Road intersection. Under this scenario, the Bridge Road and Harbour View Boulevard intersection still operates at unacceptable conditions during the afternoon peak hour (LOS E), however, much of the traffic congestion in this area is vastly improved.

The last alternative (2018 Spot Improvements Expanded plus Six-Lane Widening and Widening Bridges) was identical to the previous alternative except that it included widening both the Hazelwood and the Mills E. Godwin bridges from 2 to 4-lanes. Despite the Synchro Level of Service results showing little to no improvement for this alternative, the SimTraffic simulation revealed some relief of minor queuing at the entry points to the bridges where 2-lanes merged to 1-lane. Expanding the bridges by 2018, however, does not provide enough congestion relief to merit the costs associated with this option as compared to the corridor and intersection improvements proposed in the previous alternatives. It is important to note that a safety analysis of the bridges was not considered as a part of this study. As traffic continues to grow along this route, expanding these bridges may become more feasible beyond the 10-year horizon.

The recommended alternative is the 2018 Spot Improvements Expanded plus Six-Lane Widening. It provides acceptable Levels of Service at all intersections along Bridge Road in 2018 except for one intersection (Harbour View Boulevard during the PM peak hour) with an overall network delay per vehicle of 12 seconds during the morning peak hour and 23 seconds during the afternoon peak hour. This option provides the best overall traffic flow for the entire corridor for the anticipated travel demand by 2018. The costs of doing nothing could be detrimental to the economic vitality of the area surrounding this corridor and

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**Table: Intersection Level of Service**

<table>
<thead>
<tr>
<th>Alternative</th>
<th>1 - Eclipse Dr</th>
<th>2 - Crittenden Rd</th>
<th>3 - Bennetts Pasture Rd</th>
<th>4 - Lee Farm Ln</th>
<th>5 - Walden Rd</th>
<th>6 - Shoulders Hill Rd</th>
<th>7 - Windward Ln</th>
<th>8 - Breezewood Wy</th>
<th>9 - Plummer Blvd</th>
<th>10 - Harbour View Blvd</th>
<th>11 - Townpoint Rd</th>
<th>12 - College Dr</th>
<th>Overall Network Delay per Vehicle (sec/vehicle)</th>
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<tr>
<td></td>
<td>PM  A (9) A (9) B (11) A (10) B (16) C (23)</td>
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<td></td>
<td>PM  C (21) B (13) B (10) B (14) B (15) D (48) B (10)</td>
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**Note:** Intersection Delay is not calculated for unsignalized intersections.
the overall quality of life for many Suffolk, Isle of Wight, and Chesapeake residents.

Even though this study’s capacity analysis does not recommend widening the two 2-lane bridges (Mills E. Godwin over the Nansemond River and the Hazelwood Bridge over the Chuckatuck Creek) to 4-lanes by 2018, the City and VDOT should continue to plan for expansion beyond the 10-year horizon. Both bridges have been classified by VDOT as “needing repair” in the recently released Hampton Roads Regional Bridge Study (September 2008)\(^\text{15}\), which provided a summary of bridge inspections, sufficiency ratings and other detailed characteristics. Expansion of these bridges would also enhance Bridge Road, which currently serves as a critical evacuation route for many Southside communities.

If either of these bridges happened to be out of service during an emergency evacuation, traffic diversion could lead to even more delays and the failure to safely evacuate many residents.

In addition to arterial and intersection traffic analysis, this study included an evaluation of the access management conditions along the length of the corridor and presented a methodology for controlling the access of future development. It also provided recommendations for near-term improvements to ensure safe and efficient travel along the corridor, such as pavement markings, vegetation obstruction, and signage.

\(^{15}\) Hampton Roads Regional Bridge Study, Hampton Roads Transportation Planning Organization, September 2008
CONCLUSIONS AND RECOMMENDATIONS

Summarized below are the recommendations from this study:

Bridge Road (U.S. Route 17) Corridor Improvements

- Add an additional Thru lane in both eastbound and westbound directions along Bridge Road from Harbour View Boulevard to approximately 500’ west of Walden Road.
- Extend exclusive Right-Turn lane on eastbound Bridge Road at the I-664 southbound ramp 725’ to Townpoint Road. Add a dedicated ramp lane for this Right-Turn lane adjacent to the existing I-664 southbound ramp lane for a total of 2-lanes, which will merge approximately 500’ south of the existing ramp merge.
- Modify existing signal timing plans with optimized intersection phasing splits, cycle lengths, and offsets to provide coordination among existing and future traffic signals along Bridge Road.

Intersection Improvements

Intersection 3: Bridge Road/Bennets Pasture Road
- Add a Left-Turn lane on eastbound Bennets Pasture Road with 200’ of storage. Redesignate existing lane on eastbound Bennets Pasture Road as a Thru/Right-Turn lane.
- Add a second Left-Turn lane on northbound Bridge Road with 200’ of storage (also add a second receiving lane on Bennets Pasture Road).

Intersection 4: Bridge Road/Lee Farm Lane
- Add a Right-Turn lane on northbound Lee Farm Lane with 200’ of storage. Modify the traffic signal to include an overlap phase for this Right-Turn movement. Redesignate existing lane on northbound Lee Farm Lane as a Left-Turn lane.
- Extend existing Left-Turn lane on westbound Bridge Road with 250’ of storage. Modify turn type as a protected movement.
- Add a second Left-Turn lane on westbound Bridge Road with 250’ of storage (also add a second receiving lane on Lee Farm Lane). Modify turn type as a protected movement.
- Extend Right-Turn lane on eastbound Bridge Road from 20’ to 200’ of storage.

Intersection 5: Bridge Road/Walden Road
- Modify turn type for Left-Turn lanes on eastbound and westbound Bridge Road from protected/permission to a protected movement.

Intersection 6: Bridge Road/Shields Hill Road
- Add a Left-Turn lane on southbound Knotts Neck Road with 150’ of storage. Redesignate existing lane on southbound Knotts Neck Road as a Thru/Right-Turn lane.
- Extend dual Left-Turn lanes on westbound Bridge Road from 200’ to 700’ of storage.
- Add a second Right-Turn lane on northbound Shields Hill Road 730’ in length.
- Extend second receiving lane on southbound Shields Hill Road for 250’ to next driveway.
- Add a Right-Turn lane on eastbound Bridge Road with 300’ of storage length to the driveway for Bennets Creek Crossing Shopping Center.

Intersection 7: Bridge Road/Windward Lane
- Modify turn type for Left-Turn lane on westbound Bridge Road from protected/permission to a protected movement.

Intersection 8: Bridge Road/Breezepoint Way
- Add a second Left-Turn lane on westbound Bridge Road with 300’ of storage (existing Left-Turn lane is approximately 200’ so it will need to be extended to 300’). Also add a second receiving lane on Breezepoint Way 375’ to first driveway on right.

Intersection 9: Bridge Road/Plummer Boulevard
- Add a second Left-Turn lane on southbound Sentara BelleHarbour with 250’ of storage.
- Add a second Left-Turn lane on eastbound Bridge Road with 280’ of storage. Modify turn type as protected movement.
- Add a free-flow Right-Turn channelized lane on northbound Plummer Boulevard (add receiving lane approximately 325’ to connect with Western Freeway eastbound/I-664 northbound ramp).
- Redesignate middle lane on northbound Plummer Boulevard as a Thru/Left-Turn lane.

Intersection 10: Bridge Road/Harbour View Boulevard
- Add a third Left-Turn lane on southbound Harbour View Boulevard and extend storage from 300’ to 600’ (add receiving lane approximately 800’ on Bridge Road).
- Add a free-flow Right-Turn channelized bay on southbound Harbour View Boulevard (add receiving lane approximately 1,100’ to connect with Right-Turn lane on westbound Bridge Road at Sentara BelleHarbour). Also remove the “LANE ENDS MERGE LEFT” and the “LANE ENDS” signs prior to Harbour View Boulevard.
CONCLUSIONS AND RECOMMENDATIONS

Intersection 11: Bridge Road/Townpoint Road

- Convert existing Left-Turn lane that is striped-out to a Thru lane on eastbound Bridge Road (eastbound approach will consist of a Left-Turn only lane, 3 Thru lanes, and a Right-Turn only lane). Re-align eastbound lanes at the intersection with the receiving lanes.

Driveway and Access Improvements

It is recommended that the City of Suffolk refer to the VDOT Access Management Regulations and Standards as a resource guide for actual implementation of these improvement projects.

- Temple Beth El (just west of Plummer Boulevard) – Close driveway on Bridge Road that is 195’ west of Plummer Boulevard since it is within the functional area of the signalized intersection. Monitor traffic queues and crashes along Bridge Road for the western driveway at the median opening. If this location becomes a problem in the future, one option is to close the median opening and provide rear access from Levi Solomon Way via Plummer Boulevard and Breezeport Way, which are signalized intersections.

- Shell Gas Station at Shoulders Hill Road – The driveway along Shoulders Hill Road has a corner clearance of 115’ (minimum distance should be 175’). It is recommended to close this driveway and provide shared access via the Etheridge Custom Homes business driveway to the south (195’ corner clearance); a pavement connection would need to be made where the grass divider currently exists. As a result of rear-end conflicts, it is also recommended to close the first downstream driveway for the Shell Gas Station (70’ east of the intersection) along Bridge Road or relocate it to the east of the 2nd driveway opening.

- Bennetts Creek Farm Market (east of Windward Lane) – Narrow existing 130 feet wide driveway to the VDOT recommended maximum of 40’ for a two-way drive. There is also another driveway to the east that has been closed with signs; it is recommended that this driveway be permanently closed and filled in with grass to avoid confusion and potential safety problems.

- Sunoco Gas Station (north of Eclipse Drive) – Close both driveways along Bridge Road and encourage access via the side street entrance along Eclipse Drive.

- Powell Home and Tautog Road at Bridge Road – Tautog Road is currently located on 50’ from the intersection. Consider realigning and combining Tautog Road with the Powell Home business driveway to reduce conflicts at this signalized intersection.

- PH Automotive – Reduce driveway widths from 51’ to the VDOT recommended maximum width of 40’ for two-way traffic. Consider closing southern driveway to provide more parking to the business.

- Median opening at the Mills E. Godwin Bridge south end – The current opening length is only 22’. It is recommended that this median opening be lengthened to adequate design standards (58’) or be closed.

- Dogwood Run and New Grace Community Chapel (at Crittenden Road) – There are two driveways for these businesses along Bridge Road that are 80’ and 180’ from the intersection and are within the functional area. The recommended standard distance is 465’ plus queue storage for upstream driveways on major streets. Closure of one or both of these driveways is recommended as access is also currently provided via Crittenden Road.

Pavement Marking Recommendations

- Repaint pavement markings at the following intersections along Bridge Road: Eclipse Drive, Crittenden Road, and Bennetts Pasture Road.

- Bridge Road at Crittenden Road – Restripe shoulder as a Right-Turn lane on southbound Bridge Road.

- Lee Farm Lane at Bridge Road - Repaint pavement markings for the Right-Turn bay on the Bridge Road eastbound approach.

- Creekside Village/Food Lion Shopping Center (3235 Bridge Road) – Repaint the stop bar and arrow pavement markings.

- Knotts Neck Road at Bridge Road – Repaint stop bar for Knotts Neck Road approach.

- Bridge Road at Breezeport Way/Bernhowe Manor Lane – Repaint Left-Turn arrow for eastbound approach just before the stop bar.

- Townpoint Road at Bridge Road – Paint a shared Left/Thru pavement marking arrow on the left lane for the northbound approach of Townpoint Road.

Trimming Vegetation

- Northbound approach before Hazelwood Bridge (in Suffolk) – Trim trees and maintain a clearance buffer of vegetation around the signs.

• Northbound direction after Hazelwood Bridge (in Isle of Wight County) – Trim trees and maintain a clearance buffer of vegetation around the signs.
• Southbound direction after Hazelwood Bridge (in Suffolk) – Trim trees and maintain a clearance buffer of vegetation around the signs.
• Bennetts Creek Lane approach at Bridge Road – Trim pine tree branches that are currently obstructing the view of the traffic signal.
• Bridge Road (westbound) near I-664 – Prior to the I-664 southbound ramp, the “Lane Ends Merge Left” sign is obstructed by overgrown trees and shrubs. Trimming the trees and maintaining a clearance buffer of vegetation around the sign is recommended.

**Signage Improvements**

• Bridge Road at Eclipse Drive – Install large street signs on the traffic signal mast arms for all approaches similar to the street signs used at the intersection of Bridge Road and Walden Road. Remove all existing small street signs. Also replace faded “DIVIDED HIGHWAY” sign for the westbound approach of Eclipse Drive.
• Bridge Road at Crittenden Road – Install large street signs on the vertical signal poles on both sides of Bridge Road similar to the street signs used at the intersection of Bridge Road and Lee Farm Lane. Remove all existing small street signs.
• Bridge Road at Bennetts Pasture Road/Bennetts Creek Lane – Install large street signs on the vertical signal poles on both sides of Bridge Road similar to the street signs used at the intersection of Bridge Road and Lee Farm Lane. Remove all existing small street signs.
• Sentara BelleHarbour Driveway (550’ west of Plummer Boulevard) – Remove the small rectangular sign on the Stop Sign post with the text “3-Way” (painted over in white) as it could potentially create confusion and an unsafe situation since this location does not operate as a 3-Way stop.
• Bridge Road (westbound) at Harbour View Boulevard – The short-term solution is to place the “LANE ENDS” sign after the traffic signal at Harbour View Boulevard on Bridge Road and remove the “LANE ENDS MERGE LEFT” and the “LANE ENDS” signs prior to Harbour View Boulevard. The long-term solution is to extend the right-lane along Bridge Road (westbound) from Harbour View Boulevard to the Right-Turn lane at the Sentara BelleHarbour traffic signal and remove all “LANE ENDS” signs prior to Harbour View Boulevard (This long-term solution is already provided in the Intersection Improvements on page 60).

• Harbour View Boulevard at Bridge Road – Install large street signs on the traffic signal mast arms for all approaches similar to the street signs used at the intersection of Bridge Road and Walden Road. In addition, it would be helpful for unfamiliar drivers in the area to post signs directing them to I-664 at the southbound approach of Harbour View Boulevard.
• Bridge Road at College Drive/Lynn Drive – Install large street signs on the traffic signal mast arms for all approaches similar to the street signs used at the intersection of Bridge Road and Walden Road. Remove all existing small street signs.
PUBLIC REVIEW AND COMMENTS

As part of the Hampton Roads Transportation Planning Organization’s (HRTPO) efforts to provide opportunities for the public to review and comment on the draft Bridge Road Corridor Study prior to the final product being published, a 30-day public comment period was provided. The draft Bridge Road Corridor Study was issued from July 31, 2009 through August 31, 2009. Additional opportunities for public comment and review were also available during the September 2, 2009 and October 7, 2009 HRTPO Transportation Technical Advisory Committee meetings and the October 21, 2009 HRTPO Board meeting. No public comments were received.