

# Identifying Promising Intersections for High-Congestion-Benefit/Low-Cost Improvements



## REPORT DOCUMENTATION

### TITLE

Identifying Promising Intersections for High-Congestion-Benefit/Low-Cost Improvements

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### ABSTRACT

In the recent CMP master document, HRTPO staff identified arterial roadway segments with high potential for intersection congestion alleviation (called “PICA” for short), i.e. segments that have more delay than one would expect given their volume per lane and location/type (e.g. rural, high design speed vs. urban, low design speed).

In this analysis, staff examines each high-PICA segment in the CMP master document, identifies the promising ones—those likely to receive major benefit from minor improvement—and recommends further analysis to estimate that benefit.

### ACKNOWLEDGMENTS

This document was prepared by the Hampton Roads Transportation Planning Organization (HRTPO) in cooperation with the local jurisdictions and transit agencies of Hampton Roads, Federal Highway Administration (FHWA), Federal Transit Administration (FTA), Virginia Department of Transportation (VDOT), Virginia Department of Rail and Public Transportation (DRPT), and Virginia Port Authority (VPA). The contents of this report reflect the views of the HRTPO. The HRTPO staff is responsible for the facts and the accuracy of the data presented herein. This document does not constitute a standard, specification, or regulation. The contents do not necessarily reflect the official views or policies of the FHWA, FTA, VDOT or DRPT. This report does not constitute a standard, specification, or regulation. FHWA, FTA, VDOT or DRPT acceptance of this report as evidence of fulfillment of the objectives of this program does not constitute endorsement/approval of the need for any recommended improvements nor does it constitute approval of their location and design or a commitment to fund any such improvements. Additional project level environmental impact assessments and/or studies of alternatives may be necessary.

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## Overview

In the recent CMP master document<sup>1</sup>, HRTPO staff identified arterial roadway segments with high potential for intersection congestion alleviation (called “PICA” for short), i.e. segments that have **more delay than one would expect given their volume per lane and location/type** (e.g. rural, high design speed vs. urban, low design speed)<sup>2</sup>.

In this analysis, staff examines each high-PICA segment in the CMP master document, **identifies the promising ones**—those likely to receive major benefit from minor improvement—and **recommends further analysis to estimate that benefit**.

After preparing a preliminary analysis, staff solicited comments from the traffic engineers of the subject cities. Their specific comments are included with each intersection on the following pages; their general comments follow:

“Overall, this is very valuable analysis that is great support to our programs for identifying improvements.”

“All the retiming recommendations are fine.”

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<sup>1</sup> *HR Congestion Management Process, System Performance and Mitigation Report*, HRTPO, Oct. 2014, pg. 40

<sup>2</sup> For further explanation of the development and calculation of PICA, see page 39 of the CMP master document mentioned above.



Arterial roadway segments with the highest potential for intersection congestion alleviation (i.e. highest PICA segments) are reproduced in Table 9 (AM) and Table 10 (PM) below.

**Table 9 – Roadway Segments with the Highest Potential for Intersection Congestion Alleviation (PICA) Values – 2013 AM PEAK PERIOD**

JURIS-DICTION	FACILITY NAME	SEGMENT FROM	SEGMENT TO	DIR	HIGHEST PICA
NOR/PORT	MIDTOWN TUNNEL ●	MLK FWY/WESTERN FREEWAY	BRAMBLETON AVE	NB	1.11
VB	INDIAN RIVER RD	FERRELL PKWY	KEMPSVILLE RD	WB	0.70
HAM	PEMBROKE AVE	SETTLERS LANDING RD	LA SALLE AVE	EB	0.64
VB	NORTHAMPTON BLVD ●	DIAMOND SPRINGS RD	WESLEYAN DR/NORFOLK CL	WB	0.64
NOR	NORTHAMPTON BLVD ●	WESLEYAN DR/VA BEACH CL	I-64	WB	0.61
VB	INDEPENDENCE BLVD	I-264	BAXTER RD	SB	0.58
SH	ROUTE 35	ROUTE 671	GRAYS SHOP RD (RTE 673)	NB	0.57
VB	NORTHAMPTON BLVD	WESLEYAN DR/NORFOLK CL	DIAMOND SPRINGS RD	EB	0.54
VB	INDEPENDENCE BLVD	HOLLAND RD	BAXTER RD	NB	0.53
NOR	NORTHAMPTON BLVD	I-64	WESLEYAN DR/VA BEACH CL	EB	0.52
HAM	ABERDEEN RD	MERCURY BLVD	TODDS LA	NB	0.50
VB	WITCHDUCK RD	I-264	VA BEACH BLVD	NB	0.43
VB	KEMPSVILLE RD	PROVIDENCE RD	PRINCESS ANNE RD	EB	0.38
HAM	MERCURY BLVD	I-64	POWER PLANT PKWY	WB	0.38
CHES	KEMPSVILLE RD	GREENBRIER PKWY	CHESAPEAKE EXPRESSWAY	WB	0.36
NOR	ST PAULS BLVD ●	BRAMBLETON AVE	MONTICELLO AVE	NB	0.36
NOR	CHESAPEAKE BLVD	CROMWELL DR	LAFAYETTE BLVD	SB	0.35
CHES	MILITARY HWY/GILMERTON BRIDGE	CANAL DR	BAINBRIDGE BLVD	EB	0.34
NOR	PRINCESS ANNE RD	LLEWELLYN AVE	COLLEY AVE	WB	0.34
CHES	GEORGE WASHINGTON HWY	MILL CREEK PKWY	I-64	NB	0.34

Source: HRTPO analysis of INRIX and VDOT data. The Potential for Intersection Congestion Alleviation (PICA) is defined as Highest Peak Period Travel Time Index – Predicted Peak Period Travel Time Index at a similar facility. ● indicates a roadway with a high PICA that is caused by nearby bottlenecks such as tunnel approaches.

**Table 10 – Roadway Segments with the Highest Potential for Intersection Congestion Alleviation (PICA) Values – 2013 PM PEAK PERIOD**

JURIS-DICTION	FACILITY NAME	SEGMENT FROM	SEGMENT TO	DIR	HIGHEST PICA
NOR	4TH VIEW ST ●	OCEAN VIEW AVE	I-64	WB	1.30
NOR	HAMPTON BLVD ●	BRAMBLETON AVE	21ST ST	SB	1.24
VB	INDIAN RIVER RD	I-64	CENTERVILLE TNP	EB	1.23
VB	INDIAN RIVER RD	CENTERVILLE TNP	KEMPSVILLE RD	EB	1.05
NOR	BRAMBLETON AVE ●	COLLEY AVE	HAMPTON BLVD	WB	0.87
CHES	MILITARY HWY ●	I-464	BAINBRIDGE BLVD	WB	0.69
VB	WITCHDUCK RD	I-264	PRINCESS ANNE RD	SB	0.68
NOR	NEWTOWN RD	I-264	VA BEACH BLVD	NB	0.61
VB	INDIAN RIVER RD	I-64	PROVIDENCE RD	WB	0.60
VB	INDEPENDENCE BLVD	I-264	BAXTER RD	SB	0.57
JCC/WMB	ROUTE 199	JOHN TYLER HWY (RTE 5)	JAMESTOWN RD	EB	0.55
NOR	ST PAULS BLVD ●	BRAMBLETON AVE	I-264 RAMP/MACARTHUR MALL	SB	0.53
CHES	GEORGE WASHINGTON HWY ●	I-64	MILL CREEK PKWY	SB	0.53
CHES	BATTLEFIELD BLVD	GREAT BRIDGE BLVD/KEMPSVILLE RD	CEDAR RD	SB	0.51
CHES	GREENBRIER PKWY	EDEN WAY	VOLVO PKWY	SB	0.50
VB	WITCHDUCK RD	I-264	VA BEACH BLVD	NB	0.50
NOR	CHESAPEAKE BLVD	I-64	LITTLE CREEK RD	NB	0.49
VB	INDIAN RIVER RD	FERRELL PKWY	KEMPSVILLE RD	WB	0.47
VB	INDIAN RIVER RD	I-64	PROVIDENCE RD	EB	0.46
NOR	NEWTOWN RD	I-264	KEMPSVILLE RD	SB	0.45

Source: HRTPO analysis of INRIX and VDOT data. The Potential for Intersection Congestion Alleviation (PICA) is defined as Highest Peak Period Travel Time Index – Predicted Peak Period Travel Time Index at a similar facility. ● indicates a roadway with a high PICA that is caused by nearby bottlenecks such as tunnel approaches.

## Methodology

In order to identify promising intersections—those which may receive high benefit from low cost intersection improvements—staff performed the following analysis for each high-PICA arterial segment listed in the 2014 CMP master document:

1. Identify the individual intersection along the subject arterial segment which is likely causing the high PICA value (“controlling intersection”)

Given that staff had measured PICA in the CMP master document for arterial segments by direction (from crossing arterial to crossing arterial), the controlling intersection is usually the intersection at the end of the segment.

2. Determine whether or not a project improving the intersection is imminent

If such a project is imminent, no recommendation was made.

3. Determine whether or not delay at the subject intersection is likely to be reduced by adding approach lanes (thru, left, or right)

Delay can likely be reduced at intersections by adding approach lanes for movements that a) have a high volume, and b) currently lack the maximum number of approach lanes<sup>3</sup>. The volume of a movement can be roughly estimated (low vs. high) by examining the geographic context of the intersection. For example, given the triangle formed by Witchduck Rd, Independence Blvd, and Va. Beach Blvd, it is likely that the SB Witchduck left turn volume at Va. Beach Blvd is low.

4. Recommend next steps

If the intersection appears NOT to be a good candidate for lane addition, staff recommended using software (e.g. Synchro) to compare the delays associated with existing timing and optimal timing, and thereby determine whether or not signal re-timing would be effective.

If the intersection IS a good candidate for lane addition, staff recommended using software (e.g. Synchro) to estimate the delay effect of candidate improvements.

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<sup>3</sup> The number of lanes approaching an intersection in a given direction is limited by the number of lanes exiting the intersection along the other intersection legs. For example, for a 4-way intersection of two 4-lane roads, each approach is limited to a maximum of 2 thru lanes, 2 left turn lanes, and 2 right turn lanes.

## Analysis of AM High-PICA Segments

Segments with high PICA in the AM are shown in Table 9 below.

**Table 9 – Roadway Segments with the Highest Potential for Intersection Congestion Alleviation (PICA) Values – 2013 AM PEAK PERIOD**

JURIS- DICTION	FACILITY NAME	SEGMENT FROM	SEGMENT TO	DIR	HIGHEST PICA
NOR/PORT	MIDTOWN TUNNEL ●	MLK FWY/WESTERN FREEWAY	BRAMBLETON AVE	NB	1.11
VB	INDIAN RIVER RD	FERRELL PKWY	KEMPSVILLE RD	WB	0.70
HAM	PEMBROKE AVE	SETTLERS LANDING RD	LA SALLE AVE	EB	0.64
VB	NORTHAMPTON BLVD ●	DIAMOND SPRINGS RD	WESLEYAN DR/NORFOLK CL	WB	0.64
NOR	NORTHAMPTON BLVD ●	WESLEYAN DR/VA BEACH CL	I-64	WB	0.61
VB	INDEPENDENCE BLVD	I-264	BAXTER RD	SB	0.58
SH	ROUTE 35	ROUTE 671	GRAYS SHOP RD (RTE 673)	NB	0.57
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CHES	MILITARY HWY/GILMERTON BRIDGE	CANAL DR	BAINBRIDGE BLVD	EB	0.34
NOR	PRINCESS ANNE RD	LLEWELLYN AVE	COLLEY AVE	WB	0.34
CHES	GEORGE WASHINGTON HWY	MILL CREEK PKWY	I-64	NB	0.34

Source: HRTPO analysis of INRIX and VDOT data. The Potential for Intersection Congestion Alleviation (PICA) is defined as Highest Peak Period Travel Time Index – Predicted Peak Period Travel Time Index at a similar facility. ● indicates a roadway with a high PICA that is caused by nearby bottlenecks such as tunnel approaches.

On the following pages, staff examines each AM high-PICA segment listed above<sup>4</sup> using the above methodology to recommend analysis of the delay benefit of minor improvements for promising intersections.

<sup>4</sup> ignoring those segments with congestion caused downstream [marked with bullet]



Indian River Rd (Ferrell Pkwy to Kempsville Rd) WB, Va. Beach  
Controlling Intersection: *Indian River / Kempsville Intersection*



The City of Va. Beach is currently executing a project to convert this traditional intersection to an innovative one (“indirect left turns to the north and south on Kempsville Road and median U-turn lefts to the east and west on Indian River Road”).

**Recommendation:** N.A. (The completion of this project will likely alleviate congestion at this intersection.)

Pembroke Ave (Settlers Landing Rd to LaSalle Ave) EB, Hampton  
Controlling Intersection: *Pembroke / LaSalle Intersection*



**Pembroke Ave** (running SW/NE) **LaSalle Ave** (running north/south)

Source: Google Maps

This intersection was retimed in 2013. Hampton staff reports a low left-turn volume from EB Pembroke onto NB LaSalle (137 vph), i.e. no additional left-turn lanes required. According to Hampton staff (11-9-15 email):

“The issues at this intersection is the long exclusive pedestrian phase which is used very frequently throughout all time periods which can short some phases when actuated but this was accounted for during the last retiming project in 2013. We are in the process of performing a study that may end up transferring this to concurrent phasing...”

**Recommendation:** N.A.



Independence Blvd (I-264 to Baxter Rd) SB, Va. Beach

Controlling Intersection: *Independence / Baxter Intersection*



**Independence Blvd** (running north/south) **Baxter Road** (running east/west)

Source: Google Maps

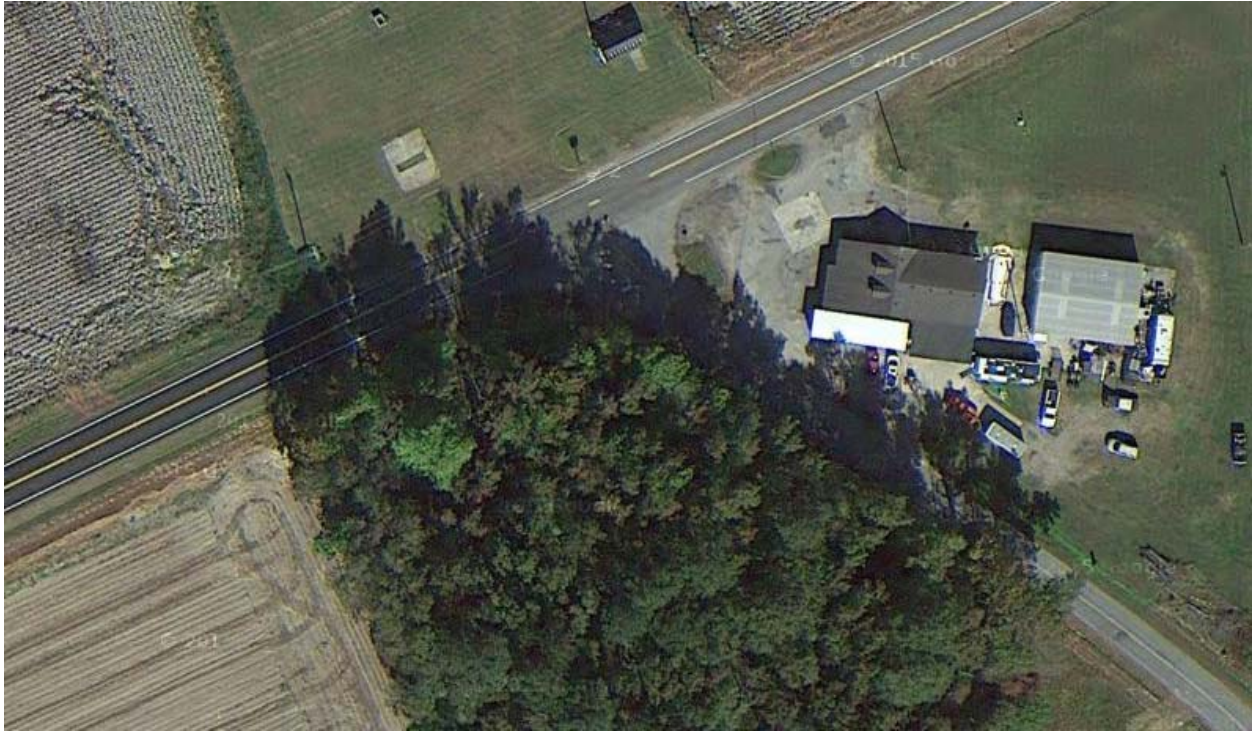
Given that a large number of turn lanes (including a triple-left set) have been provided at this intersection (2 SB, 4 EB, 2.5 NB, and 2 WB- total 10.5), and that the maximum number of thru lanes have been provided<sup>5</sup>, it is unlikely that additional turn lanes or lane conversion (i.e. converting a thru lane into a turn lane) would be fruitful.

**Recommendation:** Given the high PICA value, we recommend checking the signal timing with software (e.g. Synchro). [Note that the NB Independence segment (Holland Rd to Baxter Rd) also has a high PICA score (see below), given more credence to timing problems at this intersection.]

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<sup>5</sup> given the number of lanes downstream of intersection

Route 35 (Rte 671 to Rte 673) NB, Southampton County  
Controlling Intersection: Meherrin Rd / Grays Shop Rd Intersection



**Meherrin Rd** (running east/west) **Grays Shop Rd** (running north/south)

Source: Google Maps

This intersection being un-signalized, it appears that the intersection is not the cause of the high PICA score for the subject highway segment. (The score could be the result of bad data.)

**Recommendation:** N.A.



Northampton Blvd (Wesleyan Dr to Diamond Springs Rd) EB, Va. Beach  
Controlling Intersection: *Northampton / Diamond Springs Interchange*



**Northampton** (running SW/NE) **Diamond Springs** (running NW/SE)

Source: Google Maps

Given that Independence Blvd and Diamond Springs Rd provide the main paths for persons traveling west on Northampton Blvd to access the Va. Beach Blvd corridor, the WB-Northampton-to-SB-Diamond-Springs volume is likely fairly high.

**Recommendation:** Given the high PICA value, we recommend testing an additional left-turn lane for the WB-Northampton-to-SB-Diamond-Springs movement.

Independence Blvd (Holland Rd to Baxter Rd) NB, Va. Beach  
Controlling Intersection: *Independence /Baxter Intersection*

Due to a high PICA score for the SB Independence segment approaching this same intersection, this intersection was analyzed above and checking signal timing was recommended. (Note: If the existing timing is close to optimal, the high PICA value for this NB segment may be caused by spillback from congestion downstream.)

Northampton Blvd (I-64 to Wesleyan Dr) EB  
Controlling Intersection: *Northampton / Wesleyan Intersection*



**Northampton Blvd** (running SW/NE) **Wesleyan Dr** (running NW/SE)

Source: Google Maps

After 2013 when INRIX collected the data HRTPO staff used to calculate PICA values, Norfolk and Va. Beach completed a project improving Wesleyan Dr, including construction of triple-left turn lanes, likely lowering the need for congestion alleviation at this intersection.

**Recommendation:** N.A.



Aberdeen Rd (Mercury Blvd to Todds Ln) NB, Hampton  
Controlling Intersection: *Aberdeen / Todds Intersection*



**Aberdeen Rd** (running north-south) **Todds Ln** (running east-west)

Source: Google Maps

In 2012, Hampton staff completed a retiming project in which this intersection's v/c ratio was found to be 0.51 in AM and 0.65 in PM. However, Hampton staff reports an insufficiently long northbound right-turn (NBRT) lane.

**Recommendation:** Test (e.g. w/ Synchro) improvement scenario #2 against #1:

1. Existing Lane Configuration and Existing Timing
2. Existing Lane Configuration and Longer NBRT Lane

Witchduck Rd (I-264 to Va. Beach Blvd) NB, Va. Beach

Controlling Intersection: *Witchduck / Va. Beach Blvd Intersection*

(See also analysis of another potentially controlling intersection on this segment [Witchduck/Cleveland intersection] in the PM section below.)



**Witchduck Rd** (running north-south) **Virginia Beach Blvd** (running east-west)

Source: Google Maps

Although a \$32 million widening of Witchduck Rd (from I-264 to Va. Beach Blvd) is planned (2034 Long-Range Transportation Plan, HRTPO, Jan. 2012, pg. 18-9), a low-cost intersection improvement executed in the short-term at this intersection may be valuable.

Each approach has right-turn lanes, and the approaches with high left-turn volumes have dual left-turn lanes.

**Recommendation:** Given the high PICA value, we recommend checking signal timing with software (e.g. Synchro). (Note: If existing timing is close to optimal, the high PICA value for this segment may be caused by the left turn accessing I-264 WB or the school zone.)



Kempsville Rd (Providence Rd to Princess Anne Rd) NB, Va. Beach

Controlling Intersection: *Kempsville / Witchduck / Princess Anne Intersection*



**Princess Anne Rd (east-west), Kempsville Rd (to south), Witchduck Rd (to north)**

Source: Google Maps

A massive intersection project is underway for this intersection, the completion of which will likely alleviate congestion at this intersection.

**Recommendation:** N.A.

Mercury Blvd (I-64 to Power Plant Pkwy) WB, Hampton  
Controlling Intersection: *Mercury / Power Plant*



**Mercury Blvd** (running east-west), **Todds Ln** (to NW), **Power Plant Pkwy** (to SE)  
Source: Google Maps

Each approach has right-turn lanes, and the approaches with high left-turn volumes have dual left-turn lanes.

**Recommendation:** N.A.



Kempsville Rd (Greenbrier Pkwy to Chesapeake Expressway) WB, Chesapeake  
Controlling Intersection: Kempsville Rd / Battlefield Blvd / Great Bridge Blvd



**Battlefield Blvd (running N-S), Kempsville Rd (to east), Great Bridge Blvd (to west)**

Source: Google Maps

Although each approach has a dedicated right-turn lane, only the Kempsville Rd approach has dual left-turn lanes. (WB Great Bridge Blvd cannot receive dual LTL's from NB Battlefield.)

**Initial Recommendations:**

Test (e.g. w/ Synchro) improvement scenarios #2 thru #4 against #1:

1. Existing Lane Configuration and Existing Timing
2. Existing Lane Configuration and Optimized Timing
3. EB Great Bridge Blvd Lane Addition: add a left turn lane, and/or add a thru lane
4. SB Battlefield Blvd Lane Addition: add a left turn lane, resulting in dual LTLs

Reviewing these initial recommendations, the City of Chesapeake commented:

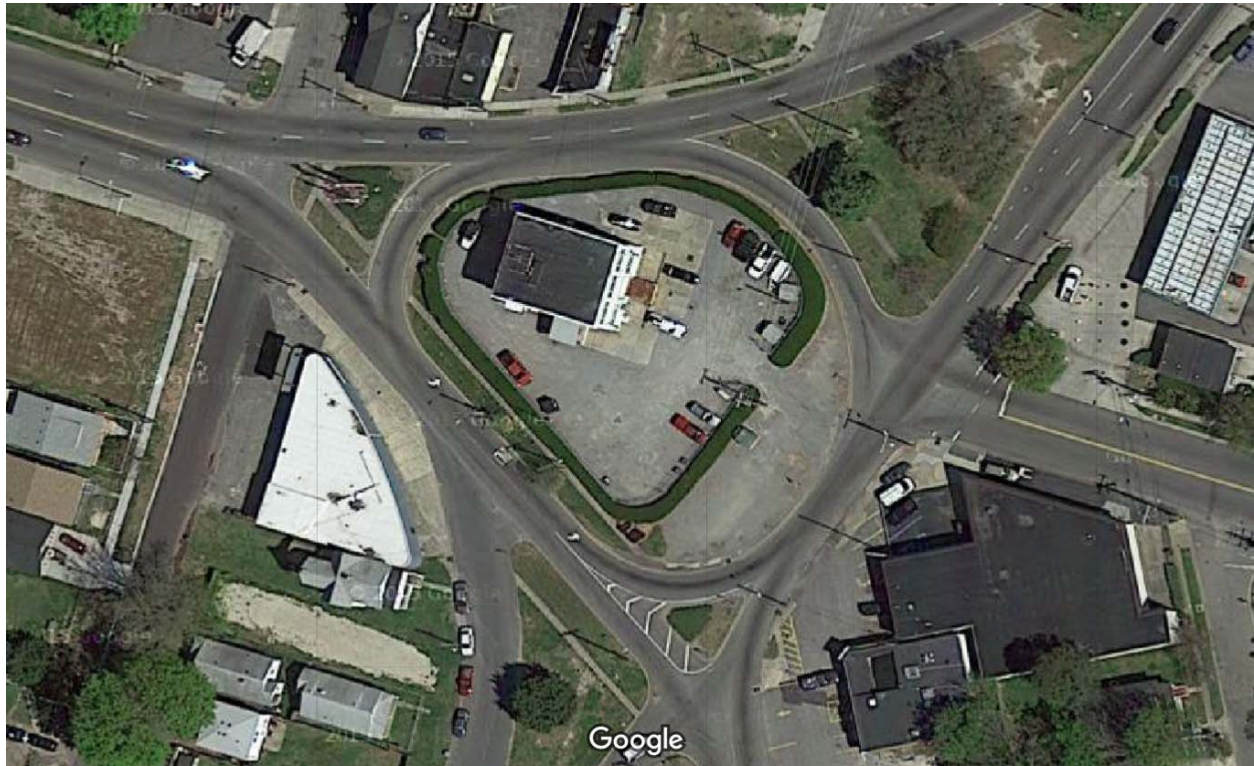
- The WB approach to this signal is more congested in the PM than AM.
- In 2014, the City added a right turn overlap to the signal timing plan (any improvement in travel from which could not be reflected in this HRTPO analysis based on 2013 travel times).
- The City planned to re-time this Battlefield corridor in late September 2015.
- The City has a current CMAQ funding request for improvements to this intersection including adding another EB lane to the Great Bridge Blvd approach.
- SB Battlefield has less than 100 left turns in the AM, so adding another left-turn lane for that approach would likely not be cost-effective.

**Final Recommendation:**

1. Test (e.g. w/ Synchro) the performance—for the EB Great Bridge Blvd approach—of adding a left turn lane, and/or adding a thru lane.
2. Pursue construction of best performing EB Great Bridge Blvd approach lane.



Chesapeake Blvd (Cromwell Dr to Lafayette Blvd) SB, Norfolk  
Controlling Intersection: *SB Chesapeake / Lafayette*



Given that the intersection of SB Chesapeake Blvd and Lafayette Blvd is not signalized, the high PICA value on Table 9 may not reflect a needed improvement.

**Recommendation:** N.A.

Military Hwy (Canal Dr to Bainbridge Blvd) EB, Chesapeake  
Controlling Intersection: *Military / Bainbridge*



Given that this intersection is not signalized, the high PICA value on Table 9 may reflect the Gilmerton Bridge replacement project.

**Recommendation:** N.A.



Princess Anne Rd (Llewellyn Ave to Colley Ave) WB, Norfolk

Controlling Intersection: The delay on this segment may be controlled by the *Princess Anne / Colonial Intersection* and/or the *Princess Anne / Colley Intersection*, both analyzed below.

*Princess Anne / Colonial Intersection*



**Princess Anne Rd** (running east-west) **Colonial Ave** (running north-south)

Source: Google Earth

Given that the above Google Earth shot shows left turn lanes on Colonial, and yet the Google Maps 45° shot (not shown) did not, restriping has apparently occurred recently at this intersection, perhaps following the gathering of the INRIX data on which the PICA score is based.

**Recommendation:** N.A.

*Princess Anne / Colley Intersection, Norfolk*



**Princess Anne Rd** (running east-west) **Colley Ave** (running north-south)

Source: Google Maps

**Initial Recommendation:** Given that the heavily-travelled NB Colley Ave approach to this intersection is currently limited to one lane (i.e. no left or right turn lanes) due to the three on-street parking spots at the intersection, we recommend checking the efficacy (via software (e.g. Synchro)) of replacing those three spots with a two-lane approach (i.e. either a thru/left lane and right turn lane, or a left turn lane and thru/right lane).

Reviewing these initial recommendations, the City of Norfolk commented:

- The City is aware of short-lived congestion at this intersection.
- Parking is at a premium in this area.

**Final Recommendation:** (given the City's comments) Re-address congestion at this intersection if congestion or land use changes.



George Washington Hwy (Mill Creek Pkwy to I-64) NB, Chesapeake  
Controlling Intersection: *George Washington Hwy / Shell / Galberry*



**George Washington Hwy** (running north/south) **Shell Rd** (to east) **Galberry Rd** (to west)  
Source: Google Maps

**Initial Recommendation:** Test (e.g. w/ Synchro) the benefit of adding lanes at this intersection, e.g. adding another NB left-turn lane.

Reviewing these initial recommendations, the City of Chesapeake commented:

- An additional left-turn lane on the NB approach would improve travel through this intersection.
- A few years ago, when the City widened George Washington Hwy, it was not feasible to construct dual left-turn lanes for NB approach due to proximity of houses to road.

**Final Recommendation:** Test (e.g. w/ Synchro) the benefit of adding lanes at this intersection, e.g. adding another NB left-turn lane, and compare that benefit to the cost of buying the necessary additional right-of-way.



## Analysis of PM High-PICA Segments

Segments with high PICA in the PM are shown in Table 10 below.

**Table 10 – Roadway Segments with the Highest Potential for Intersection Congestion Alleviation (PICA) Values – 2013 PM PEAK PERIOD**

JURIS-DICTION	FACILITY NAME	SEGMENT FROM	SEGMENT TO	DIR	HIGHEST PICA
NOR	4TH VIEW ST ●	OCEAN VIEW AVE	I-64	WB	1.30
NOR	HAMPTON BLVD ●	BRAMBLETON AVE	21ST ST	SB	1.24
VB	INDIAN RIVER RD	I-64	CENTERVILLE TNPK	EB	1.23
VB	INDIAN RIVER RD	CENTERVILLE TNPK	KEMPSVILLE RD	EB	1.05
NOR	BRAMBLETON AVE ●	COLLEY AVE	HAMPTON BLVD	WB	0.87
CHES	MILITARY HWY ●	I-464	BAINBRIDGE BLVD	WB	0.69
VB	WITCHDUCK RD	I-264	PRINCESS ANNE RD	SB	0.68
NOR	NEWTOWN RD	I-264	VA BEACH BLVD	NB	0.61
VB	INDIAN RIVER RD	I-64	PROVIDENCE RD	WB	0.60
VB	INDEPENDENCE BLVD	I-264	BAXTER RD	SB	0.57
JCC/WMB	ROUTE 199	JOHN TYLER HWY (RTE 5)	JAMESTOWN RD	EB	0.55
NOR	ST PAULS BLVD ●	BRAMBLETON AVE	I-264 RAMP/MACARTHUR MALL	SB	0.53
CHES	GEORGE WASHINGTON HWY ●	I-64	MILL CREEK PKWY	SB	0.53
CHES	BATTLEFIELD BLVD	GREAT BRIDGE BLVD/KEMPSVILLE RD	CEDAR RD	SB	0.51
CHES	GREENBRIER PKWY	EDEN WAY	VOLVO PKWY	SB	0.50
VB	WITCHDUCK RD	I-264	VA BEACH BLVD	NB	0.50
NOR	CHESAPEAKE BLVD	I-64	LITTLE CREEK RD	NB	0.49
VB	INDIAN RIVER RD	FERRELL PKWY	KEMPSVILLE RD	WB	0.47
VB	INDIAN RIVER RD	I-64	PROVIDENCE RD	EB	0.46
NOR	NEWTOWN RD	I-264	KEMPSVILLE RD	SB	0.45

Source: HRTPO analysis of INRIX and VDOT data. The Potential for Intersection Congestion Alleviation (PICA) is defined as Highest Peak Period Travel Time Index – Predicted Peak Period Travel Time Index at a similar facility. ● indicates a roadway with a high PICA that is caused by nearby bottlenecks such as tunnel approaches.

On the following pages, staff examines each PM high-PICA segment listed above<sup>6</sup> using the above methodology (outlined at the beginning of this report) to recommend analysis of the delay benefit of minor improvements for promising intersections.

<sup>6</sup> ignoring those segments with congestion caused downstream [marked with bullet]

Indian River Rd (I-64 to Centerville Tnpk) EB, Va. Beach  
Controlling Intersection: *Indian River / Centerville Intersection*



**Indian River Rd (running east-west) Centerville Tnpk (running north-south)**

Source: Google Maps

Although demand at this intersection may exceed its current capacity, based on traveling this route each weekday PM peak, it appears that EB traffic approaching this intersection at that time is hampered by downstream intersections (e.g. Indian River / Kempsville). (Note that the downstream segment is also on Table 10 as a PM high-PICA segment, and therefore addressed below.)

**Recommendation:** Following the completion of the current Lynnhaven Pkwy project (between Indian River Rd and Centerville Tnpk)—which will remove vehicles from the Indian River / Kempsville Intersection—and the current Indian River / Kempsville Intersection project—which will reduce delay at that intersection—re-calculate PICA at this (Indian River / Centerville) intersection.



Indian River Rd (Centerville Rd to Kempsville Rd) EB, Va. Beach  
*Controlling Intersection: Indian River / Kempsville Intersection*



The completion of the current Lynnhaven Pkwy project (between Indian River Rd and Centerville Tnpk)—which will remove vehicles from the Indian River / Kempsville Intersection—and the current Indian River / Centerville intersection project will likely ameliorate the problem identified by the current high PICA of this segment.

**Recommendation:** N.A.



Witchduck Rd (I-264 to Princess Anne Rd) SB, Va. Beach

Controlling Intersection: *Witchduck / Princess Anne / Kempsville Intersection*

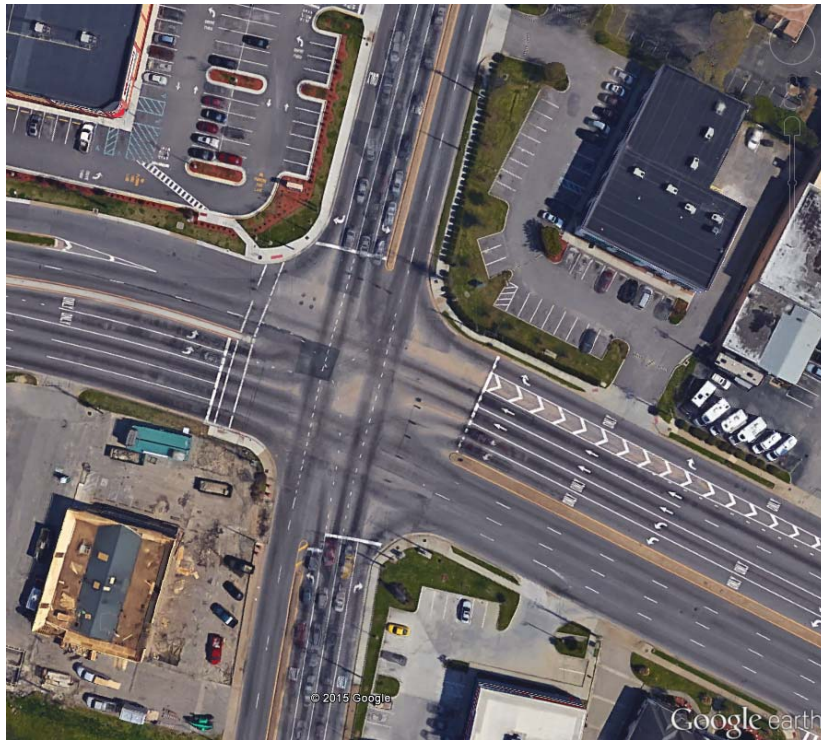


The completion of the current Witchduck / Princess Anne / Kempsville intersection project will likely ameliorate the problem identified by the current high PICA of this segment.

**Recommendation:** N.A.

Newtown Rd (I-264 to Va. Beach Blvd) NB, Norfolk

Controlling Intersection: *Newtown Rd / Va. Beach Blvd Intersection*



**Newtown Rd** (running north/south) **Va. Beach Blvd** (running east/west)

Source: Google Earth

It is likely that this intersection causes more delay than expected in the PM due to the lack of dual left-turn lanes, particularly on the NB and SB Newtown Rd approaches. Although this intersection (at least the SB approach) would be upgraded with the planned \$24 million Newtown Rd project (2034 LRTP, HRTPO, Jan. 2012, pg. 18-5), significant congestion relief could be provided sooner and much more cheaply by adding these turn lanes.

**Initial Recommendation:** Compare the delay of the following scenarios using software:

1. Existing intersection configuration and existing timing.
2. Existing intersection configuration and optimized timing.
3. Addition of left-turn lanes on the NB and SB Newtown Rd approaches.
4. Addition of above left-turn lanes plus the EB and WB thru lanes associated with widening of Va. Beach Blvd from Janaf Shopping Center to Newtown Rd.

Reviewing these initial recommendations, the City of Norfolk commented:

- The City recently added an additional left turn lane for the EB approach.
- This intersection is one of the City's most congested.
- This intersection is frequently re-timed.
- An unfunded highway project would widen Va. Beach Blvd from Military Circle to Newtown Rd.
- An extra lane a couple thousand feet long on the EB approach to the subject intersection would add much capacity benefit.
- Adding a SB left would improve travel through this intersection.
- The EB left storage lane being too short, a new controller at this intersection could operate the EB left twice per cycle, helping some.
- The intersection needs pedestrian signals and pedestrian safety improvements.

**Final Recommendation:** Compare the delay of the following scenarios using software:

1. Existing intersection configuration and existing timing.
2. Addition of left-turn lanes on the NB and SB Newtown Rd approaches.
3. Addition of above left-turn lanes plus the EB and WB thru lanes associated with widening of Va. Beach Blvd from Janaf Shopping Center to Newtown Rd.



Indian River Rd (I-64 to Providence Rd) WB, Va. Beach  
Controlling Intersection: *Indian River / Providence Intersection*



**Indian River Rd (running NW-SE) Providence Rd (running SW-NE)**

Source: Google Maps

Even though Providence is a four-lane road, it only has one thru lane in each direction at this intersection. Therefore, it is likely that this intersection causes more delay than expected due to the lack of dual thru lanes on the EB and WB Providence Rd approaches. Providence Rd being four lanes, this improvement could be made at the intersection alone, requiring no widening of Providence Rd upstream or downstream of the intersection.

**Initial Recommendation:** Compare the following scenarios using software (e.g. Synchro):

1. Existing intersection configuration and existing timing.
2. Existing intersection configuration and optimized timing.
3. Addition of thru lanes on EB and WB Providence Rd approaches.
4. Addition of thru lanes on EB and WB Indian River Rd approaches.

Reviewing these initial recommendations, the City of Va. Beach commented:

- The City's CIP includes project 2.042.000 Indian River Rd/Providence Rd Intersection Improvement (see below).

2.042.000: Indian River Rd/Providence Rd Intersection Improv.

Description and Scope

CIP Section:	Roadways	CIP Status:	Approved	Active Project
Project Type:	New Facility Construction/Expansion	First Year in CIP:	2013-2014	
Business Area:	Quality Physical Environment	Projected Completion:	12/31/2018	
City District(s):	Centerville, Kempville			

This project provides funding to construct improvements to Indian River Road between Providence Road and Level Green Boulevard. Improvements will include, but not be limited to, signal improvements, road improvements, and pedestrian improvements. This project includes the relocation of the signal from Indian River & Level Green (West) to Indian River & Level Green (East), a new left-turn lane at Level Green (East), closing the median opening at Level Green (West) as well as upgrading the signals at Indian River & Providence and Indian River & Sunnyside. This project also includes the elimination of the outer, Indian River, southeast-bound, "drop-lane" between Sunnyside and Providence.

Points of Contact

Project Manager:	Public Works - Annette B. Hare, P.E.	(757)-385-4131
Department Contact:	Public Works - Joanne Berry	(757)-385-4131

Schedule of Activities

Project Activity	Approved Budget			Current Estimates		
	Start	End	Cost	Start	End	Cost
2000 Design	07/01/2013	06/30/2014	693,000	02/14/2014	09/18/2015	255,000
3000 Site Acquisition	03/01/2014	10/31/2014	267,700	07/03/2015	12/31/2015	70,000
4000 Private Utility Adjustments	07/01/2014	12/31/2014	1,261,000	09/01/2015	12/01/2015	180,000
5000 Construction	01/01/2015	12/31/2015	2,750,000	01/04/2016	08/02/2016	1,250,000
6000 Street Lights	01/01/2016	04/30/2016	200,000			
7000 Landscaping	03/01/2016	05/31/2016	1,250,000	03/01/2016	03/30/2016	31,500
9000 Contingencies	07/01/2013	05/31/2016	1,335,000	02/14/2014	08/02/2016	265,700
<b>Overall Project Start, End &amp; Cost:</b>	<b>07/01/2013</b>	<b>06/31/2018</b>	<b>7,758,700</b>	<b>02/14/2014</b>	<b>08/02/2018</b>	<b>2,062,200</b>

Current Status and Progress

Final design phase underway.

Last Updated: 7/22/2015 4:14:57PM

Attachments

Related Projects



**Va. Beach CIP Project affecting Intersection of Indian River Rd and Providence Rd**

**Final Recommendation:** As part of the design of the above CIP project, compare the following scenarios using software (e.g. Synchro):

1. Existing intersection configuration and optimized timing.
2. Convert the Providence right-turn lanes to shared thru-rights.
3. Addition of thru lanes on EB and WB Providence Rd approaches.
4. Addition of thru lanes on EB and WB Indian River Rd approaches.

Independence Blvd (I-264 to Baxter Rd) SB, Va. Beach  
Controlling Intersection: *Independence / Baxter Intersection*



**Recommendation:** See recommendation for this intersection in the AM section above.



Rte 199 (John Tyler Hwy to Jamestown Rd) EB, Williamsburg  
Controlling Intersection: *Rte 199 / Jamestown Rd Intersection*



**Rte 199 (running NW-SE) Jamestown Rd (running SW-NE)**

Source: Google Maps

16 years ago, HRTPO staff studied the operation of this intersection (*Route 199 Transportation Study*, HRPDC, April 1999) under various improvement alternatives. Staff found that adding a left turn lane to the WB Rte 199 approach (and adding right turn lanes at three approaches) would provide LOS D in the forecast year 2015. Following the study, the right turn lanes were added, allowing the thru-right lanes to be converted to thru lanes. The proposed left turn lane, however, was not constructed.

This intersection currently has maximum thru lanes at its approaches, single left turn lanes, and single right turn lanes at each approach. Therefore, to improve this intersection would require one or more additional left-turn lanes.

**Recommendation:** Use software (e.g. Synchro) to estimate the delay improvement expected from additional left turn lanes on the SB, EB, and NB approaches<sup>7</sup>.

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<sup>7</sup> SB Jamestown Rd south of this intersection having only one thru lane, dual WB left turn lanes are not recommended.

Battlefield Blvd (Kempsville Rd to Cedar Rd) SB, Chesapeake  
Controlling Intersection: *Battlefield /Cedar Intersection*



**Battlefield Blvd** (running north-south) **Cedar Road** (running east-west)

Source: Google Maps

Currently, the lack of a dedicated SB right turn lane for the heavy right turn movement forces both thru and right-turning traffic to use two lanes, providing sub-optimal performance at this intersection. Adding a lane to the SB Battlefield Blvd approach at Cedar Rd would provide two thru lanes and a dedicated right turn lane, reducing delays at this intersection in the PM.

**Initial Recommendation:** Use software (e.g. Synchro) to estimate the delay improvement expected from an additional SB approach lane.



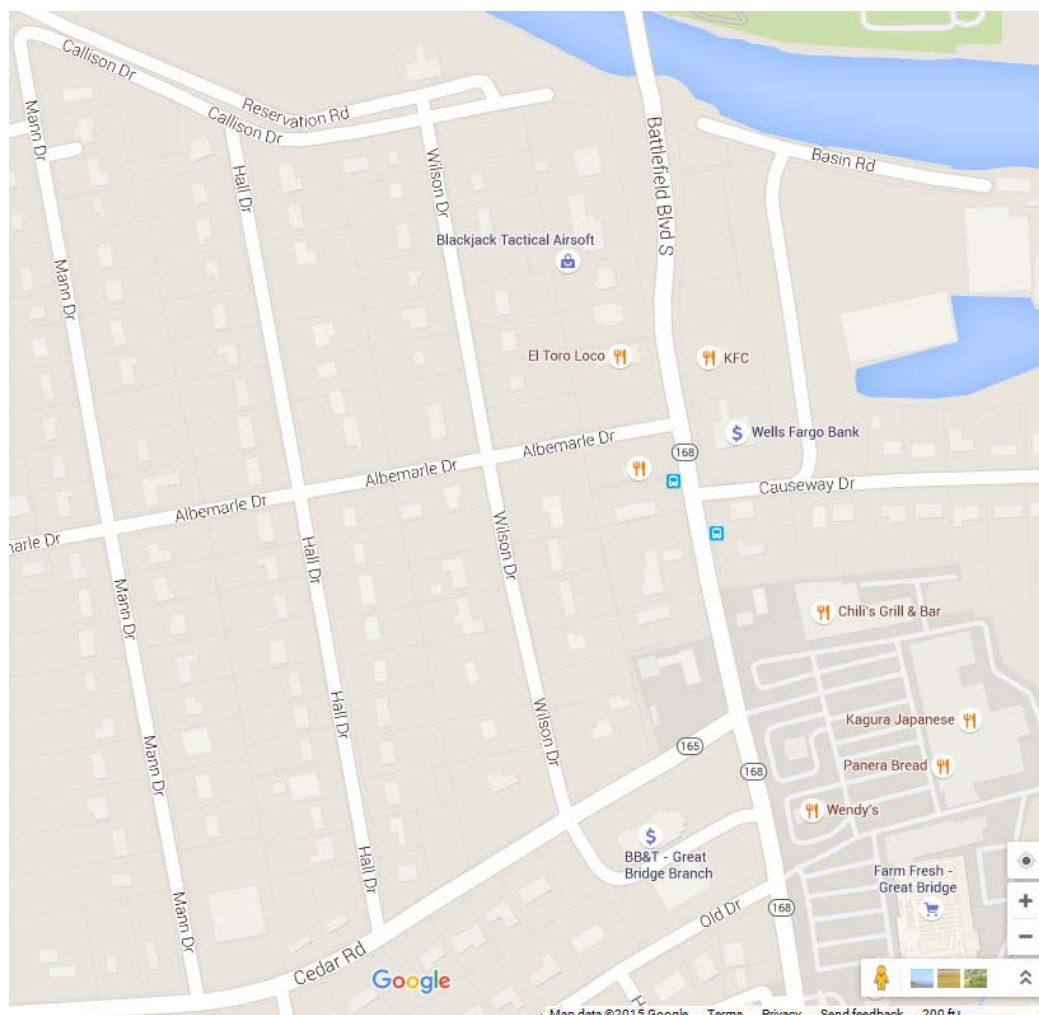
Reviewing these initial recommendations, the City of Chesapeake commented:

- An additional SB approach lane would improve travel through this intersection.
- Several years ago, a feasibility study for such improvement indicated that utility relocation and right-of-way acquisition alone would cost well over \$1 million, freezing the project.
- Adding a signal at the Battlefield and Albemarle intersection would remove some traffic from the Battlefield/Cedar intersection.

### **Final Recommendation:**

Use software (e.g. Synchro) to estimate the delay improvement expected from:

1. an additional SB approach lane
2. a new signal at Battlefield Blvd / Albemarle Rd



**Intersections of Battlefield/Albemarle and Battlefield/Cedar**



Greenbrier Pkwy (Eden Way to Volvo Pkwy) SB, Chesapeake  
Controlling Intersection: *Greenbrier / Volvo Intersection*



**Greenbrier Pkwy (running north-south) Volvo Pkwy (running east-west)**

Source: Google Maps

A third lane was recently added for vehicles leaving this intersection in the NB direction. Given the number of lanes currently exiting this intersection (3NB, 2WB, 2SB, 2EB), additional left turn lanes could be added to the EB, NB, and WB approaches, and—most importantly—an additional thru lane could be added to the NB approach.

**Initial Recommendation:** Use software (e.g. Synchro) to estimate the delay effect of adding approach lanes at this intersection.

Reviewing these initial recommendations, the City of Chesapeake commented:

- Adding an additional WB left lane and an additional NB thru lane would improve travel through this signal.

**Final Recommendation:** Use software (e.g. Synchro) to estimate the delay effect of adding approach lanes at this intersection, e.g. an additional WB left and an additional NB thru.

### Witchduck Rd (I-264 to Va. Beach Blvd) NB, Va. Beach

Controlling Intersection: Given the 23 total lanes approaching the Witchduck / Va. Beach Blvd intersection, the unexpected delay on this segment of Witchduck Rd may come from the *Witchduck / Cleveland Intersection*. (See also the photo and analysis of the Witchduck / Va. Beach Blvd intersection in the AM section above.)



### **Witchduck Rd (running north-south) Cleveland St (running east-west)**

Source: Google Maps

Although a \$32 million widening of Witchduck Rd (from I-264 to Va. Beach Blvd) is planned (*2034 Long-Range Transportation Plan*, HRTPO, Jan. 2012, pg. 18-9), a low-cost intersection improvement executed in the short-term at Cleveland St may be valuable.

Given the number of existing lanes exiting this intersection, additional approach lanes could be added to the WB, NB, and EB approaches.

**Initial Recommendation:** Use software (e.g. Synchro) to test the delay improvement effect of adding approach lanes at this intersection.



Reviewing these initial recommendations, the City of Virginia Beach commented:

- The City intends to improve the EB Cleveland approach to this intersection under CIP project 2.401.000 “Greenwich Rd Crossover & Cleveland St Improvements”
  - (This is a companion project to the proposed “I-64 WB to I-264 EB Improvement Thru Witchduck Rd” project (UPCs 57048 and 17630, including the Greenwich/Cleveland flyover) currently being considered in HRTAC’s financial plan.

**Final Recommendation:** Use software (e.g. Synchro) to test the delay improvement effect of adding EB Cleveland approach lanes at this intersection.

City of Virginia Beach, VA  
Public Works  
Capital Project Detail Sheet

**2.401.000: Greenwich Rd Crossover & Cleveland St Improvements**

PUBLIC COPY

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Description and Scope

CIP Section: **Roadways**      CIP Status: **Approved**      Active Project  
 Project Type: **New Facility Construction/Expansion**      First Year in CIP: **2010-2011**  
 Business Area: **Quality Physical Environment**  
 City District(s): **Kempsville**

VDOT #264-134-102 project will realign Greenwich Road and connect it to Cleveland Street by a bridge structure over I-264. However, VDOT relocated Greenwich Road ends at the Cleveland Street/Clearfield Avenue intersection. This City project will acquire the necessary right-of-way and easements for the VDOT's Greenwich Road crossover and the design and construction for the three phases of the Cleveland Street improvements from the Clearfield Avenue intersection to the Witchduck Road intersection. The first phase includes installing a box culvert in the existing open channel and constructing the fourth leg of the Clearfield Avenue/Cleveland Street intersection. The second phase involves relocating the existing Clearfield Avenue/Cleveland Street intersection. The third phase will improve Cleveland Street from Clearfield Avenue intersection to the Witchduck Road intersection.

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Points of Contact

Project Manager: **Public Works - Norbert R Kuhn, P.E.**      (757)-385-4131  
 Department Contact: **Public Works - Ed W Britt Jr.**      (757)-385-4131

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Schedule of Activities

Project Activity	Approved Budget			Current Estimates		
	Start	End	Cost	Start	End	Cost
2000 Design	07/01/2010	11/30/2015	100,000	07/01/2010	06/30/2021	1,004,045
3000 Site Acquisition	07/01/2010	03/31/2015	1,550,000	07/01/2010	06/30/2021	4,780,000
4000 Private Utility Adjustments	07/01/2014	12/31/2015	4,669,500	07/31/2013	06/30/2020	945,568
5000 Construction	01/01/2015	10/31/2016	1,748,924	09/26/2014	07/31/2023	7,103,495
6000 Street Lights	07/01/2015	10/31/2016	3,470,000	04/01/2015	10/02/2023	530,000
7000 Landscaping				03/01/2015	08/30/2023	315,795
9000 Contingencies	07/01/2010	10/31/2016	440,662	07/01/2010	06/30/2024	1,584,847
<b>Overall Project Start, End &amp; Cost:</b>	<b>07/01/2010</b>	<b>10/31/2016</b>	<b>11,878,088</b>	<b>07/01/2010</b>	<b>06/30/2024</b>	<b>16,260,760</b>

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Current Status and Progress

On Phase 1A, the construction is completed except for the parking space markings and landscaping. On Phase 1B and Phase 2, the design is approximately 90% completed and site acquisition is underway. On Phase 3, currently reviewing supplemental agreement for design services. However, the "Current Estimates" reflect the three phases of the project. The "Approved Budget" only funded Phase 1 & 2.  
 Last Updated: 7/13/2015 4:54:18PM

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Attachments

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Related Projects

2.025.000: Witchduck Road - Phase II  
 2.412.000: Cleveland St/Clearfield Ave Intersection Improvements  
 6.604.000: Witchduck Rd - Phase II Sewer Improvements  
 X.034.000: I-264/Witchduck Road Interchange Improvements

**Cleveland Street Project in Va. Beach CIP**

Chesapeake Blvd (I-64 to Little Creek Rd) NB, Norfolk  
Controlling Intersection: *Chesapeake / Little Creek Intersection*



**Chesapeake Blvd** (running north-south) **Little Creek Rd** (running east-west)

Source: Google Maps

Given that only two approaches have dedicated right turn lanes, and only one approach has dual left turn lanes, the addition of left-turn and right-turn lanes to this intersection of two 4-lane roadways may significantly reduce delay.

**Initial Recommendation:** Use software (e.g. Synchro) to estimate the delay improvement effect of adding turn lanes at this intersection.

Reviewing these initial recommendations, the City of Norfolk commented:

- There are no significant congestion issues at this intersection.

**Final Recommendation:** Re-visit testing improvements to this intersection if congestion increases.



Indian River Rd (Ferrell Pkwy to Kempsville Rd) WB, Va. Beach  
Controlling Intersection: *Indian River / Kempsville Intersection*



For analysis of this intersection, see AM section above.

[document continues on following page]



Indian River Rd (Providence Rd to I-64) EB, Va. Beach  
Controlling Intersection<sup>8</sup>: *Indian River / Reon Intersection*



**Indian River Rd** (running east-west) **Reon Dr** (running north-south)

Source: Google Maps

Given the heavy congestion on EB Indian River east of I-64 in the PM, the congestion on this segment of Indian River (west of I-64) may be caused off-site, i.e. by spillback from the over-capacity intersections on the eastern segment. Given, however, the heavy left turn volume on SB Reon Dr (toward the interstate)—and its single left-turn lane—it appears that delay at this intersection may be significantly reduced (at least for travelers approaching on Reon) by an additional left turn lane(s) on SB Reon.

Note that—given the triangular configuration of Reon, Providence, and Indian River—right turns from SB Reon are likely low in volume. Likewise, thru movements from SB Reon into Pinewood Village are likely low.

**Recommendation:** Use software (e.g. Synchro) to estimate the delay improvement effect of an additional Reon Dr left turn lane(s). This lane could be added either by a) building a new lane(s), or b) converting the existing right turn lane into a left-thru-right lane.

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<sup>8</sup> See identification of controlling intersection/segment below picture.

Newtown Rd (I-264 to Kempsville/Princess Anne Rd) SB, Va. Beach  
Controlling Intersection: Newtown / Kempsville/Princess Anne Intersection



**Newtown Rd** (running SW-NE) **Kempsville Rd** (running NW) **Princess Anne Rd** (running SE)  
Source: Google Maps

Given that only one approach has dual left turn lanes, the addition of lanes to this intersection (particularly an additional left turn lane on EB Kempsville Rd for interstate-bound traffic) may significantly reduce delay.

**Initial Recommendation:** Use software (e.g. Synchro) to estimate the delay improvement effect of adding lanes at this intersection.

Reviewing these initial recommendations, the City of Norfolk commented:

- Traffic volumes may have been higher here during construction of improvements to the Witchduck/PA/Kempsville intersection.
- There is currently no significant congestion at this intersection.
- Communication between the signals along Newtown Rd and the city traffic office is programmed.

**Final Recommendation:** Re-visit testing improvements to this intersection if congestion increases.

**Next Steps**

HRTPO staff prepared this document as a source of ideas for low-cost congestion improvement at the subject intersections. We hope that the cities responsible for these intersections respond to the recommendations of this report by gathering more information, e.g. performing recommended modeling and estimating the cost of candidate improvements.



## **Appendix A                      Survey of HRT0 Members Re Related Habits of Their City**

On July 29, 2015, HRTPO staff emailed HRT0 members the following questions:

1. "Does your city implement low-cost intersection improvements (e.g. lane re-configurations, turn-lane additions, etc.)?"
2. --"If so, what funds are used to implement them?"
3. "Does your city have a formal process for identifying congested intersections to be improved?"
4. --"If so, what generally does that formal process entail?"
5. "Who in your city is responsible for identifying (formally or otherwise) candidate low-cost intersection improvements?"

The results can be found on the following pages.

Does your city implement low-cost intersection improvements (e.g. lane re-configurations, turn-lane additions, etc.)?

- 5 Yes
- 1 No

What funds are used to implement them?

- Funding can come from a variety of sources:
  - New development
  - Traffic shed
  - Local
  - TIF
  - HSIP
  - RSTP
  - City CIP
  - CMAQ
  - Neighborhood Grants
  - Traffic Operations Dept  
Operating Budget Funds
  - General, State, Federal

Does your city have a formal process for identifying congested intersections to be improved?

- 2 Yes
- 4 No

What does that formal process entail?

- All new development (rezoning) to report traffic impacts:
  - Analysis of intersection capacity and any operational issues are examined and various improvements are proposed.
- Each year Traffic Engineering reviews accident data and identifies high accident locations and crash reduction improvements.
- Citizens' Requests
- HRTPO Congestion Management Reports
- TMC Observations




Who in your city is responsible for identifying (formally or otherwise) candidate low-cost intersection improvements?

- Traffic Engineering / Operations
- City Transportation/Traffic Engineer
- Planning Department

## Appendix B                      Agency and Public Comments

### **Norfolk Intersections in your Paper for High-Benefit Minor Improvements**

Fowler, Brian <Brian.Fowler@norfolk.gov>

 You replied to this message on 8/26/2015 4:36 PM.

Sent: Thu 8/20/2015 9:53 AM

To: Rob Case

Cc: Brown, Rob

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Rob,

Comments on Norfolk intersections in your paper:

Princess Anne/Colley

We aware that there is some short-lived congestion at this intersection in the Ghent area. Parking is at a premium in this area. Things may have been worse in 2013 as a result of a major reconstruction of the Brambleton/Colley intersection.

Newtown/Virginia Beach Blvd.

The City actually performed a minor improvement at this intersection not too long ago, creating a dual left in the eastbound direction. This intersection is one of our most congested – it gets a lot of attention in terms of timing. There has been a planned project around for years (never funded) to improve Virginia Beach Blvd to the west. For this intersection an extra lane to the west for a couple of thousand feet would bring about most of that capacity benefit. There definitely needs to be a dual left southbound.

If we had a better traffic signal controller we could operate the eastbound left twice per cycle and that would help a little (because the 2-lane storage is too short). The intersection also needs pedestrian signals and pedestrian safety improvements.

Chesapeake/Little Creek

There are no significant issues here with regard to congestion.

Newtown/Kempsville

There are no significant issues here with regard to congestion. Traffic volumes may have been heavier at this location due to Witchduck construction project. Traffic variability is influenced by I-264 incidents. Traffic signals along Newtown are not on-line, sometimes causing timing issues. Communication is programmed for upgrade.

**Brian C. Fowler, PE, PTOE**

Assistant City Transportation Engineer

**City of Norfolk**

Department of Public Works \ Division of Transportation

Note: HRTPO staff modified the report in response to these comments.

## **RE: Norfolk Intersections in your Paper for High-Benefit Minor Improvements**

Steven Froncillo <sfroncillo@CityOfChesapeake.Net>

Sent: Mon 8/31/2015 2:26 PM

To: Rob Case

Cc: Earl Sorey; Sam Sawan

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Rob,

Below are my comments:

### ***Kempsville/Battlefield***

I was little surprised to see this roadway segment (Kempsville WB) on the AM Peak period list – this approach is more of a problem in the PM (in the AM we don't see many WB cycle failures, just in the PM). To improve WB flow (Kempsville RD approach) we added a right turn overlap last year; the right turn movement is very heavy (+750 vph in the peaks). We are also currently re-timing the Battlefield corridor to include this intersection (we should be implementing the new timings in late September) – I don't anticipate a big improvement after we re-time, traffic flow through this intersection is over capacity and we do give Battlefield Blvd priority since it has the higher volumes. We have a current CMAQ request for funding improvements to this intersection which does include adding another EB lane as your reports indicates (however, with the utility relocation and rw needed this won't be a low cost improvement). SB Battlefield has less than 100 left turns in the AM, so I'm not sure adding another lane (duals) would have any substantial impact on the signal operation – also, this would require shifting the NB lanes which would be costly.

Concur with recommendation #3

### ***GW/Shell/Galberry***

Concur with your recommendation that more lanes are needed (dual lefts); however, rw is very limited along GW Hwy and I don't think this would be a low cost improvement. We widened this highway 3-4 years ago and at that time it was not feasible to get dual lefts.

### ***Battlefield/Cedar***

Concur with your recommendation that another SB lane is needed. We initiated a project to add a SB lane here 5-6 years ago; however, the initial feasibility study indicated that the utility relocation and rw acquisition needed to add the lane was well over \$1million – due to the high cost the project never went forward. I would also add the recommendation to study signalizing the intersection at Battlefield/Albemarle – this would transfer some of the Cedar traffic destined for NB Battlefield to this signal and allow more green time for SB Battlefield.

### ***Greenbrier/Volvo***

Concur with adding a WB left (duals) and a NB thru. We already have dual EB lefts.

Overall, this is very valuable analysis that is great support to our programs for identifying improvements.

Thanks

Steve

Note: HRTPO staff modified the report in response to these comments.





**RE: VB Intersections in your Paper for High-Benefit Minor Improvements**

Frank Hickman <fhickman@vbgov.com>

Sent: Thu 9/3/2015 3:51 PM

To: Rob Case

 Message  Greenwich.PNG (148 KB)  IRR Prov.PNG (108 KB)

Rob, all the retiming recommendations are fine. I do have a few other comments.

The Newtown signals on pgs 24 (Newtown & VBB) and 33 (Newtown/Kempsville/PA) do not belong to me. They are Norfolk's.

Also we have a few construction projects (project sheets attached) that deal with suggestions on sheet 13 and 25.

-pg 13/ Witchduck fm VBB to I-264/ Have a Greenwich Flyover project there dealing with Witchduck & Cleveland


-pg 25/IRR & Providence/ have a project there that could address your suggestions

Thanks/fh

Note: HRTPO staff modified the report in response to these comments.

## RE: my intersection analysis

Willson, Martin <mwillson@hampton.gov>

 You replied to this message on 11/9/2015 5:06 PM.

Sent: Mon 11/9/2015 4:19 PM

To: Rob Case

Cc: Yorks, John

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Rob,

See our responses to the three traffic signal intersections that were identified for improvement.

Let me know if you have any question regarding our findings.

Thank you

### AM

#### Pembroke Ave & LaSalle Ave

- The EBLT is not heavy during the AM peak period. The peak hour volume was 137 vehicles when last counted in 2013 and there has not been any significant changes in that area that would have changed things much since then. The V/C ratio for the AM period is 0.70 which is a comfortable number. The issues at this intersection is the long exclusive pedestrian phase which is used very frequently throughout all time periods which can short some phases when actuated but this was accounted for during the last retiming project in 2013. We are in the process of performing a study that may end up transferring this to concurrent phasing (A large apartment complex located near the intersection is now a non-livable space)
- Regarding the potential improvements are as follows:
  - 2. Optimizing the splits in Synchro results in phase 1 (EBLT) being assigned 23 seconds of split time in the 110 second cycle length. The existing timings give it 24 seconds with the potential of getting 3 additional seconds if the side streets gap out by that much or the exclusive pedestrian phase is not served.
  - 3. If it were changed to strictly dual lefts, this would leave one lane to serve all of the EB through traffic, which has roughly double the volume of the EBLT in the AM Peak period. This would bring the V/C ratio for the EB through to 0.94 from 0.33 which is counterproductive. Changing to a shared through/left would require split phasing this intersection. This does not kill the MOEs for the AM but it would for the PM peak period. It just seems like an unnecessary change.
  - On top of these points, it should be noted that there is a railroad that runs parallel with Pembroke Ave in this area so there will not much, if any, right of way that could be used for new lanes on the south side of the intersection

#### Todds Ln & Aberdeen Rd

- This intersection was part of a retiming project in 2012 and this intersection is heavy but was never an area of any real issues. The WBLT V/C ratio for the AM period is 0.51 and 0.65 in the PM. I did not go through the models with the proposed changes for this because a V/C ratios seemed good and did not merit any kind of change.
- One helpful change would be a longer NB Right turn storage. In the PM this lane backs out into the shared northbound left/thru lane.

#### Mercury Blvd & Power Plant Pkwy/Todds Ln

This intersection is near capacity in AM and PM which is largely due to its proximity to I-64 and uneven volume distribution across the EB and WB lanes. There is also long pedestrian phase (SB) that is used fairly frequently which can impact main street progression but the V/C ratios are all reasonable. D

Note: HRTPO staff modified the report in response to these comments.



## COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION  
HAMPTON ROADS DISTRICT  
1700 NORTH MAIN STREET  
SUFFOLK, VIRGINIA 23434

Charles A. Kilpatrick, P.E.  
Commissioner

November 18, 2015

25 November 2015 responses by HRTPO staff below in red

Robert B. Case, P.E., Ph.D.  
Hampton Roads Transportation Planning Organization  
723 Woodlake Drive  
Chesapeake, Virginia 23320

Re: Identifying Promising Intersections for High-Congestion-Benefit/Low-Cost Improvements

Dear Dr. Case,

The Hampton Roads District Transportation Planning Office has completed a courtesy review of the *Identifying Promising Intersections for High-Congestion-Benefit/Low-Cost Improvements* white paper document. The primary focus of this review is to ensure consistency with planned state transportation projects identify in VDOT's Six-Year Improvement Program and any other major transportation issues that should be included or further explored in the document. As such, the comments identified below are preliminary in nature and provided for your review or revision as deemed appropriate.

As part of the regional Congestion Management Process (CMP), The Hampton Roads Transportation Planning Organization (HRTPO) has identified 12 arterial roadway segments with high potential for intersection congestion alleviation, or PICA, and has developed low cost, high benefit recommendations for alleviating congestion at these intersections with relatively minor improvements. Most of the recommendations include improved signal timing, and adding additional turning lanes. Some of these recommendations have been vetted by localities and their responses are included in the report. Other recommended improvements have been withheld for further analysis to estimate cost benefit.

The Hampton Roads District has reviewed and acknowledged the recommendations, and as the recommendations do not impact state maintained roadways, we defer to the localities for general acceptance and implementation. We do however have the following comments regard the document:

**WE KEEP VIRGINIA MOVING**

Note: HRTPO staff insert (in red) its responses into this comment letter.



General Comments:

- This report does not appear to be in keeping with the standard formatting of other HRTPO documents. Could this report perhaps be used as an appendix to the CMP master document or other congestion studies that have been recently completed by the HRTPO?  
**Final report will be in HRTPO format.**
- There appears to be an abundant use of acronyms and shorthand that is misleading to the reader (i.e., the use of PA instead of Princess Anne Road, VB and GB Blvd. instead of Virginia Beach and Great Bridge Boulevard, and the use of "m" instead of Million ), this could also be resolved by including an acronyms page to the document.  
**Acronyms have been written out.**
- There's a fair amount of geographic jumping around due to the ordering of sites by PICA value. Including the locality on the individual pages, as seen on the initial table, would improve reader comprehension.  
**Locality names have been added to pages.**
- Please reconsider the use of passive phrases like "may be fruitful" (i.e., on Page 21, the end of the first paragraph). Recommendations should be made in the active voice.  
**This particular phrase has been converted to a recommendation.**
- There are several maps and graphics missing from the document (including pages 19, 26, 31, etc.) which make it difficult for the reader to understand the recommendation and/or conclusion without searching for a map themselves.  
**Maps have been added.**
- Many recommendations call for the adding of turning lanes and thru lanes at intersections. Depending on the cost of right-of-way, paving and construction, you may want to reconsider labeling these recommendations as "low-cost solutions". Further cost analysis should be considered with the next iteration of this study.  
**Recommendation for cost analysis added in "Next Steps" section at end of report.**

Traffic Engineering/Planning Comments

- In addition to individual intersections, systems of intersections should also be considered for traffic congestion.  
**So noted.**
- In certain instances, adding additional receiving lanes at an intersection would facilitate adding additional approach lanes as well. Has this approach been considered?
- It seems that intersection geometry and other factors were used as an indication of the relative predominance of turning movements, as indicated by various references throughout the text. Was any attempt made to determine the actual turning movements at these locations? Some of this information is available for free from localities' websites.  
**No. So noted.**

AASHTO and TRB recommend the following regarding left-turn lanes:

- Exclusive left-turn lanes where volume exceeds 100 veh/hr.
- Double left-turn lanes where volume exceeds 300 veh/hr.

**So noted.**

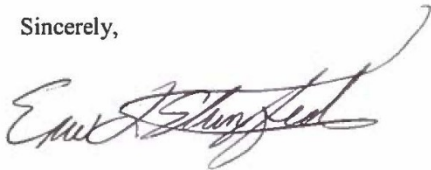
- Page 8, Pembroke Ave. and LaSalle Ave: How does the intersection skew have any impact on the turning movement volumes? The statement “Given intersection acute angle and location, there are likely high left-turn volumes from EB Pembroke onto NB LaSalle” does not seem defensible. The document does not indicate anywhere that turning movements counts were obtained. Where does this assumption come from?  
**People take shortest path, ∴ typically the more acute the angle, the lower the % of turns.**
- Page 9, Independence Blvd and Baxter Rd: In the count of turning lanes, all approaches count both left- and right-turn lanes, but NB only counts right-turn lanes, omitting the double left. Why was this done?  
**NB has two left-turn lanes and one-half right-turn lane, therefore 2.5 turn lanes.**
- Page 11, Northampton Blvd and Diamond Springs Rd: Why was the possibility of additional turn lanes not analyzed at Northampton/Diamond Springs given that there are additional receiving lanes for turning movements on every leg?  
**We have revised the report in accordance with your comment.**
- Page 12, Independence Blvd and Baxter Rd: Regarding the statement “...may be caused by spillback from congestion downstream.” Does this mean there was no field work done as part of this study? A field review during rush hour should reveal whether this is an accurate statement.  
**No field work was done.**
- Page 13, Aberdeen Rd and Todds Ln: Is there evidence that the WB Todds Ln left-turn onto SB Aberdeen Rd is actually a high volume movement? It would seem these users could have made the WB Cunningham Dr. left-turn onto SB Todds Ln if they came from the Peninsula Town Center area.  
**SB Aberdeen is a major north-south arterial, as is SB Todds.**
- Page 20, Princess Anne Rd and Colonial Ave: Concerning the conflict between the two Google aerial views, was any attempt made to either contact the City or verify the roadway restriping in person?  
**No field work was done but the draft was reviewed by the City.**
- Page 25, Indian River Rd and Centerville Rd: Regarding the statement “based on travelling this route each weekday...” Does this mean that a field review has been performed at this location or has it only been observed on the daily commute?  
**Observed on the daily commute.**
- Page 27, Newtown Rd and Virginia Beach Blvd: Due to right-of-way constraints, adding the left-turn lane to NB Newtown may not be cheaper. We suggest a field review to determine if LT queuing is really a problem before making a recommendation.  
**Our intention was to create a report with ideas that the cities could explore.**
- Page 27, Newtown Rd and Virginia Beach Blvd: While it is not common practice to go from a single left-turn lane to three, it is possible in the case of the intersection of Newtown Rd and Virginia Beach Blvd, particularly for the SB movement. Was this considered?  
**Triple-lefts were not considered; they have been used in HR toward the interstate.**

Robert B. Case, P.E., Ph.D.  
November 18, 2015  
Page Two

- Page 29, Indian River Rd and Providence Rd: Many assumptions about this intersection could be cleared up by a field visit.  
**Field visits were not a part of this study.**
- Page 34, Battlefield Blvd and Albemarle Rd: A further study of the impacts to adding a signal to Battlefield Boulevard and opening Albemarle Road up to left turns may be required.  
**Yes, our intention was to create a report with ideas that the cities could explore.**
- Page 35, Greenbrier Pkwy and Volvo Pkwy: Depending on the NB right-turn volume at Greenbrier Pkwy /Volvo Pkwy intersection, the NB right-turn lane could be converted to a thru-right lane. There are also additional receiving lanes for the EB and NB left-turns. Was this considered?  
**We like that idea (and hadn't thought of it); lane alignment however is a problem.**
- Page 41, Indian River Rd and Reon Dr: While it is not common practice to go from a single left-turn lane to three, it is possible in the case of the intersection of Reon Dr and Indian River Rd, particularly for the SB movement. Was this considered?  
**The report was modified to reflect this possibility.**

The comments identified are preliminary in nature and provided for your review or revision as deemed appropriate. Please notify Mr. Carl Jackson at 757-925-2596, should you have any questions.

Sincerely,



Eric L. Stringfield  
Hampton Roads Transportation Planning Director

ELS/cej