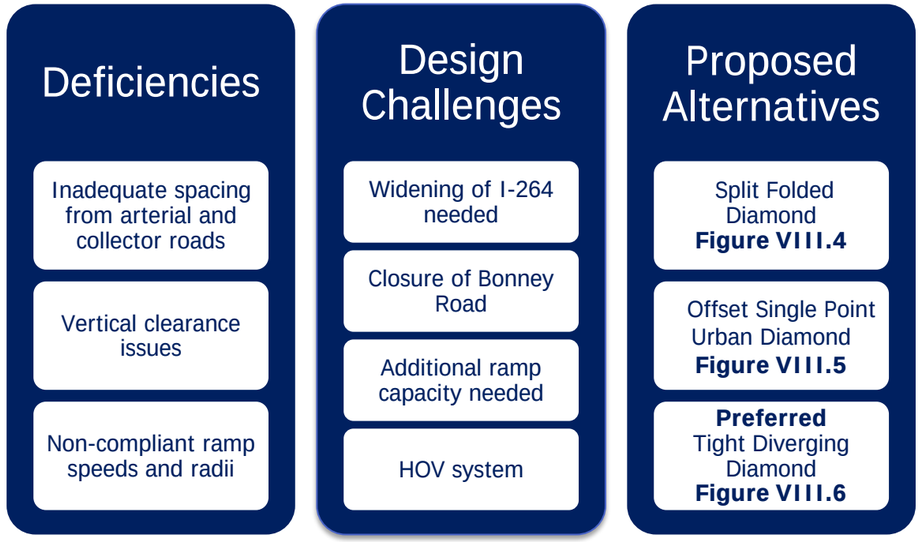
VIII. Rosemont Road Interchange



VIII.1 Existing Conditions

Existing conditions present at the Rosemont Road interchange are described in this chapter focusing on roadway geometry, volumes, capacity analysis, and crash history.

VIII.1.1 Geometry, Speeds, Lanes, Traffic Control

Figure VIII.1 and **Figure VIII.1A** display a summary of the existing roadway geometry. The Rosemont Road interchange is configured as a partial cloverleaf design. Several geometric deficiencies exist at the Rosemont Road interchange, some of the notable deficiencies include:

- Less than 14.5 feet of vertical clearance over Rosemont Road
- Less than 14.5 feet of vertical clearance over South Plaza Trail
- Ramp speeds are non-compliant at 4 locations
- Ramp radius is non-compliant for posted speed at 1 location
- Access spacing is non-compliant at 2 locations

Additional details on the existing conditions geometry at the Rosemont Road interchange can be found in the Technical Appendix.

VIII.1.2 Volumes & Operations

Figure VIII.2: Existing Volumes displays the existing weekday peak hour volumes for the Rosemont Road interchange for the year 2014. Traffic counts were conducted during early December 2014, with counts conducted on Tuesdays, Wednesdays and/or Thursdays. The peak hour counts document the typical commuter pattern on I-264, with heavier volumes in the westbound direction during the AM peak period and in the eastbound direction during the PM peak period. On Rosemont Road, the heavier volumes are mostly in the northbound direction in the AM peak period until Bonney Road and in the southbound direction in the PM peak period.

Table 8.1 displays a summary of the results of the capacity analysis of existing conditions using the Highway Capacity Manual (HCS) software package. The analysis shows all freeway movements operate with LOS D or better conditions in both peak hours. Many of the movements are operating with LOS D conditions.

Table 8.1
Summary of 2014 Existing Conditions HCS Capacity Analysis
I-264 & Rosemont Road Interchange

Movement (Type)	AM Peak Hour		PM Peak Hour	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
EB I-264 between Independence Blvd and Rosemont Rd (Freeway)	23.5	C	27.0	D
EB I-264 to Rosemont Rd (Diverge)	18.1	B	25.3	C
SB Rosemont Rd to EB I-264 (Merge)	17.6	B	21.5	C
NB Rosemont Rd to EB I-264 (Merge)	20.4	C	23.7	C
EB I-264 East of Rosemont Rd (Freeway)	21.4	C	26.1	D
WB I-264 East of Rosemont Rd (Freeway)	31.0	D	26.4	D
WB I-264 to Rosemont Rd (Diverge)	31.2	D	27.6	C
NB Rosemont Rd to WB I-264 (Merge)	29.3	D	22.9	C
SB Rosemont Rd to WB I-264 (Merge)	32.5	D	26.4	C
WB I-264 between Independence Blvd and Rosemont Rd (Freeway)	34.2	D	28.3	D

*** VR > Max**
**** VFO + VR12 > Max**
***** VFI + V12 > Max**

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2014 Existing Geometry
I-264 & Rosemont Rd Interchange

Figure VIII.1	July 2016

Virginia Beach Blvd

Bonney Rd

Begin Shoulder Lane

End Shoulder Lane at Exit

Rosemont Rd

Sentara Way

INTERSTATE 264

25 mph

35 mph

55 mph

INSET SCALE IS TWO TIMES LARGER THAN PLAN SCALE SHOWN BELOW

SCALE
0 200' 400'

LEGEND

- (2) NUMBER OF LANES
- (4) NUMBER OF LANES INCLUDING HOV
- HOV SYSTEM
- DIRECTION OF TRAVEL
- 65 mph HOV SYSTEM POSTED SPEED
- 40 mph POSTED SPEED
- N.P. NOT POSTED SPEED
- PROPOSED / EXISTING SIGNAL

NOTE: INSET SCALE = 2x PLAN SCALE

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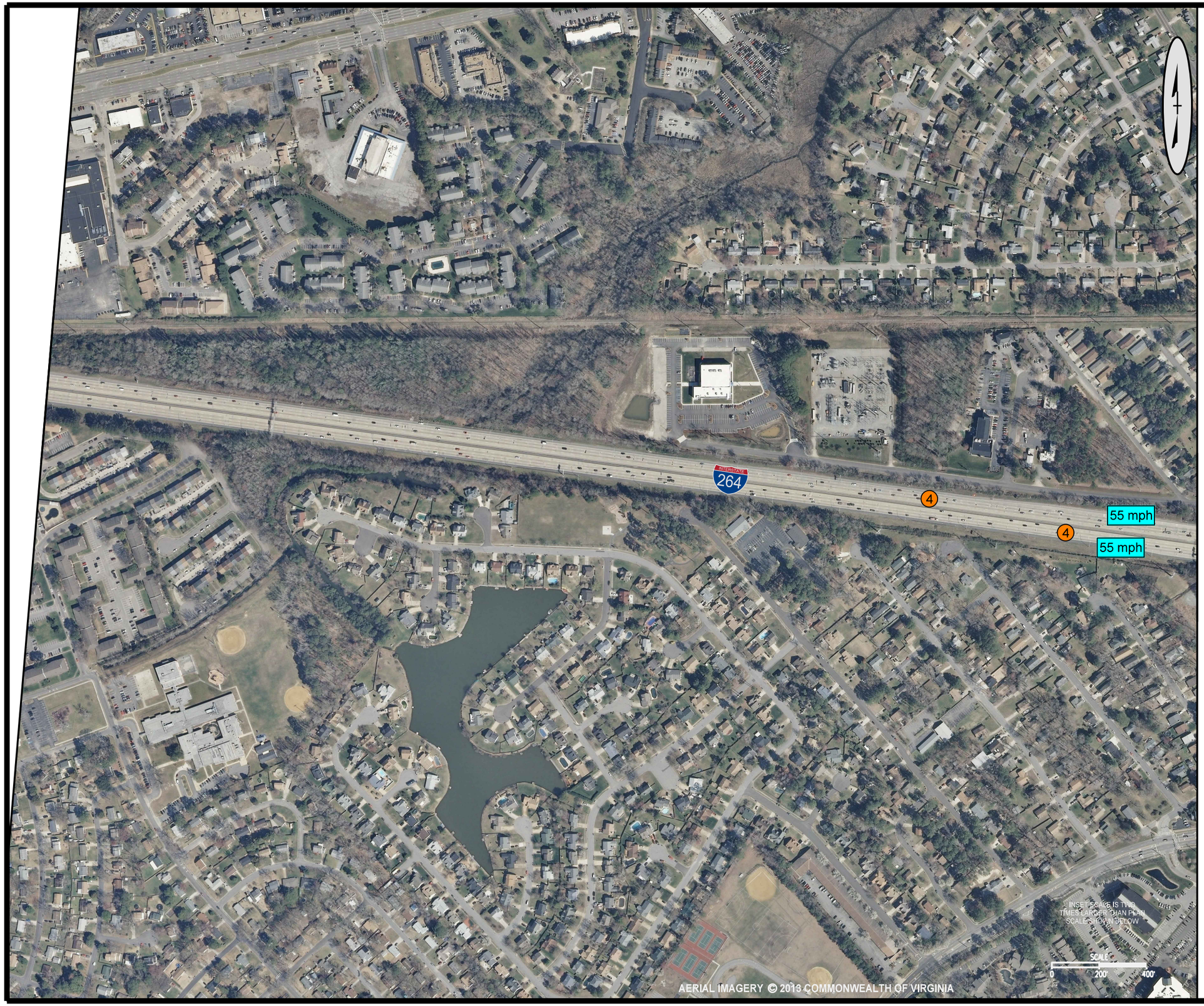
2014 Existing Geometry
I-264 from Rosemont Rd to Lynnhaven Pkwy

Figure VIII.1A	July 2016



LEGEND

- 2 — NUMBER OF LANES
- 4 — NUMBER OF LANES INCLUDING HOV
- HOV SYSTEM
- DIRECTION OF TRAVEL
- 65 mph — HOV SYSTEM POSTED SPEED
- 40 mph — POSTED SPEED
- N.P. — NOT POSTED SPEED
- PROPOSED / EXISTING SIGNAL

NOTE: INSET SCALE = 2x PLAN SCALE

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2014 Peak Hour Volumes
I-264 & Rosemont Rd Interchange

Figure VIII.2

July 2016

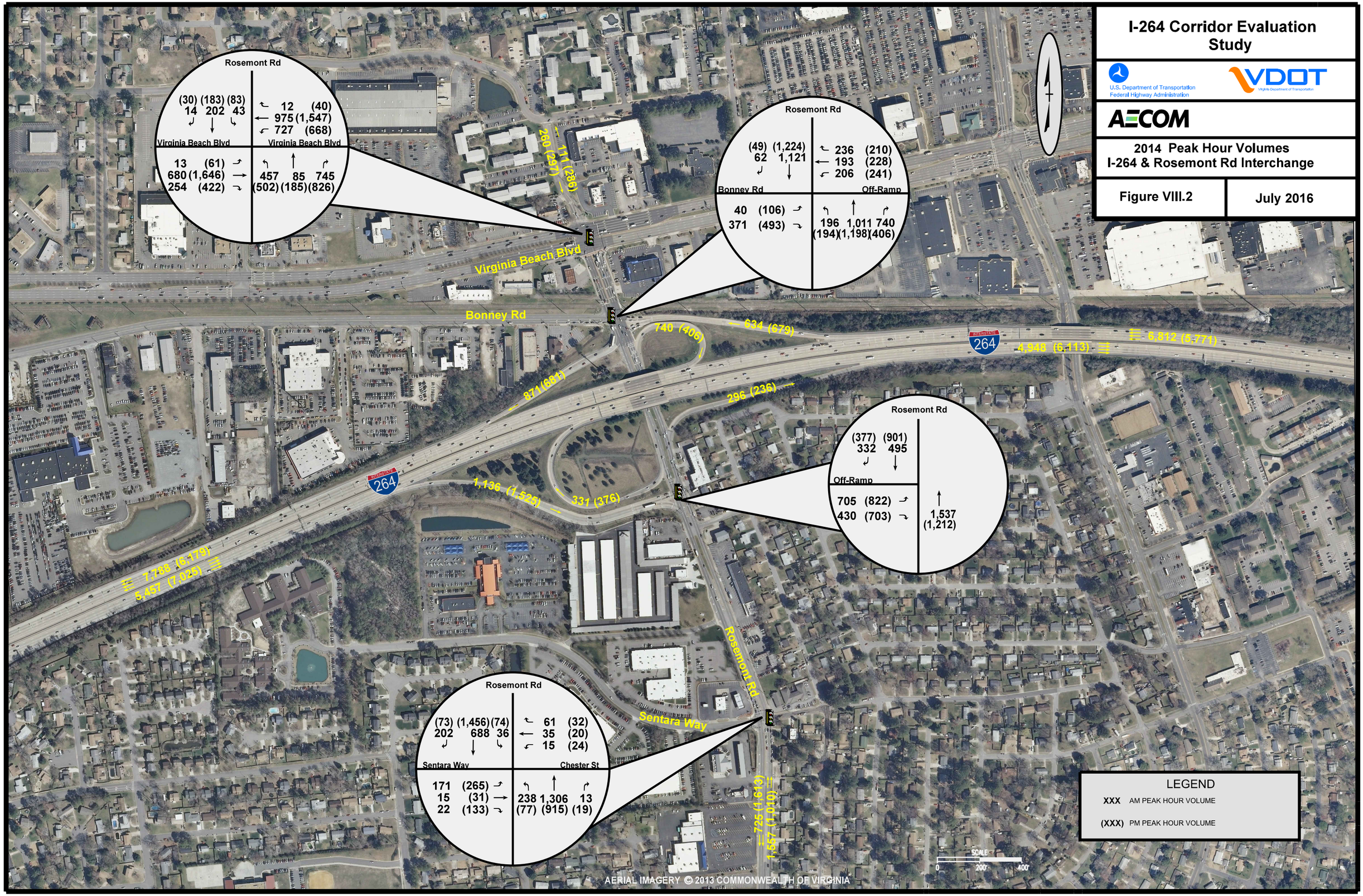

Table 8.2 summarizes the existing conditions CORSIM analysis of the Rosemont Road interchange with I-264. CORSIM produced similar results to the HCS 2010 analysis - if not better - at some locations. The analysis shows all freeway movements operate with LOS D or better conditions in both peak hours.

Table 8.2
Summary of 2014 Existing Conditions CORSIM Capacity Analysis
I-264 & Rosemont Road Interchange

Movement (Type)	AM Peak Hour		PM Peak Hour	
	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS
EB I-264 between Independence Blvd and Rosemont Rd (Freeway)	23.5	C	23.2	C
EB I-264 to Rosemont Rd (Diverge)	19.3	B	24.7	C
SB Rosemont Rd to EB I-264 (Merge)	17.5	B	21.3	C
NB Rosemont Rd to EB I-264 (Merge)	19.6	B	23.3	C
EB I-264 East of Rosemont Rd (Freeway)	20.6	C	24.2	C
WB I-264 East of Rosemont Rd (Freeway)	28.8	D	24.2	C
WB I-264 to Rosemont Rd (Diverge)	27.8	C	23.3	C
NB Rosemont Rd to WB I-264 (Merge)	27.3	C	21.2	C
SB Rosemont Rd to WB I-264 (Merge)	32.3	D	24.7	C
WB I-264 between Independence Blvd and Rosemont Rd (Freeway)	33.6	D	26.2	D

Capacity Analysis indicates that all freeway movements at the Rosemont Road interchange are currently operating with <u>adequate</u> capacity.

Table 8.3 summarizes the existing conditions SimTraffic capacity analysis of the Rosemont Road corridor. The analysis shows poor service levels for the four intersections in the AM peak hour. The Virginia Beach Boulevard and Rosemont Road intersection and the I-264 westbound off-ramp/Bonney Road and Rosemont Road intersection will exhibit LOS F in the PM peak hour. The Sentara Way/Chester Street and Rosemont Road intersection and I-264 eastbound off-ramp and Rosemont Road intersection will exhibit LOS C in the PM peak hour.

Table 8.3
Summary of 2014 Existing Conditions SimTraffic Capacity Analysis
I-264 at Rosemont Road Improvement Alternatives

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Virginia Beach Blvd. & Rosemont Rd	**88.4**	**F**	**87.9**	**F**
I-264 WB Off-Ramp/Bonney Road & Rosemont Rd.	**87.9**	**F**	**106.0**	**F**
I-264 EB Off-Ramp & Rosemont Rd.	**74.1**	**E**	23.3	C
Sentara Way/Chester St. & Rosemont Rd.	**90.7**	**F**	33.7	C

Table 8.4 presents a summary of the existing conditions SimTraffic queueing analysis, and the results show that vehicle queues extending from the traffic signals are currently accommodated by the storage available on the respective off-ramps. However, queues on the westbound off-ramp are lengthy and approach the storage limits of the off-ramp in the AM peak hour.

Table 8.4
Summary of 2014 Existing Conditions SimTraffic Queue Analysis
I-264 at Rosemont Road Improvement Alternatives

Intersection	Ramp Length (feet)	AM Peak Hour		PM Peak Hour	
		Average (feet)	95th % (feet)	Average (feet)	95th % (feet)
WB I-264 Off-Ramp to Rosemont Road	1,170	396	1,046	384	711
EB I-264 Off-Ramp to Rosemont Road	1,335	253	347	240	327

Intersections in the interchange area operate at <u>inadequate</u> capacity. Speeds are slow and vehicle queue lengths are excessively long.

VIII.1.3 Crashes

Figure VIII.3 displays the 4-year crash history at Rosemont Road for the years 2009-2012. It illustrates a large number of crashes throughout the interchange, with a somewhat more frequent crash occurrence to the west. Crashes are close to evenly distributed by direction. The ramps in both directions of travel show a high density of crashes, which is likely related to a combination of congestion and geometric deficiencies. The eastbound I-264 to Rosemont Road off-ramp and the northbound Rosemont Road to westbound I-264 on-ramp also show a high density of crashes nearest Rosemont Road.

Table 8.5 summarizes the crash history by direction and type of freeway facility (ramp or mainline) at the Rosemont Road interchange for the period 2009-2012. A total of 161 crashes occurred in the interchange vicinity and a majority (114) occurred on the mainline freeway. Crash severity included 68 injury crashes and 0 fatal crashes. The two most frequent types of crashes, Rear End and Fixed Object Off-Road, make up 69% of the total types of crashes.

Table 8.5
Summary of Crash History at I-264 & Rosemont Road
2009-2012

Location	Type of Crash						Severity		
	Rear End	Angle	Sideswipe - Same Dir.	Fixed Object Off Road	Misc.	**Total**	Property Damage Only	Injury	Fatal
EB Mainline	27	3	4	13	4	**51**	30	21	0
WB Mainline	25	12	6	15	5	**63**	37	26	0
EB Ramps	7	2	2	5	1	**17**	10	7	0
WB Ramps	14	6	4	5	1	**30**	16	14	0
Total	**73**	**23**	**16**	**38**	**11**	**161**	**93**	**68**	**0**

VIII.2 Forecasted Conditions

The analysis of forecasted conditions includes the development and evaluation of future volumes and operations for the year 2040. The No Build Alternative and three improvement alternatives are described, followed by an explanation of the basis for the selection of the preferred alternative. Cost and impacts for the preferred alternative are listed at the end of this section as well.

It should also be noted that – as previously discussed in the section on the development of forecasts - the travel demand model network for all year 2040 forecasts included the proposed Sentara Way flyover extending from existing Sentara Way north across I-264 and intersecting with Bonney Road. This connection has been recommended in the City's *Rosemont SGA Plan.*

VIII.2.1 Forecasted Volumes & Operations

Table 8.6 displays the forecasted conditions volumes for the No Build (regular font) and Build Alternatives (**bold font**) at the Rosemont Road interchange for the year 2040. Existing volumes are also listed *(in italics)* in order to provide for comparison. In general, the volumes exhibited moderate growth (~10-20%) over existing conditions volumes. The roadway geometry for the No Build Alternative for this interchange includes the widening of Rosemont Road from a four-lane facility to a six-lane facility. This project is included in the Hampton Roads Constrained Long Range Transportation Plan.

Table 8.6
Forecasted Conditions Volumes for Build Alternatives
I-264 & Rosemont Road Interchange

Interstate & Direction	Movement		2014 Existing Volumes		2040 No Build Alternative		2040 Build Alternatives	
	From	To	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour	AM Peak Hour	PM Peak Hour
I-264 EB	Mainline before Rosemont		*5,457*	*7,025*	5,992	7,795	**6,592**	**8,480**
	EB I-264	Rosemont Rd	*1,136*	*1,525*	1,281	1,799	**1,841**	**2,435**
	SB Rosemont Rd	EB I-264	*331*	*376*	485	594	**336**	**377**
	NB Rosemont Rd	EB I-264	*296*	*236*	509	387	**299**	**245**
	Mainline after Rosemont		*4,948*	*6,113*	5,704	6,977	**5,386**	**6,667**
I-264 WB	Mainline before Rosemont		*6,812*	*5,771*	7,792	6,664	**7,474**	**6,326**
	WB I-264	Rosemont Rd	*634*	*679*	1,003	1,106	**638**	**679**
	NB Rosemont Rd	WB I-264	*740*	*406*	907	461	**1,472**	**904**
	SB Rosemont Rd	WB I-264	*871*	*681*	910	743	**1,084**	**902**
	Mainline after Rosemont		*7,788*	*6,179*	8,607	6,763	**9,392**	**7,453**

Shown later in this section, **Table 8.9** displays a summary of the results of the HCS and CORSIM capacity analysis of the No Build Alternative. Since traffic volume throughout the interchange is forecasted to exhibit moderate growth, service levels have deteriorated to worse conditions than those found in the existing conditions. The interchange exhibits deficiencies in many westbound movements during the AM peak hour, while other movements exhibit adequate service levels. Westbound I-264 in both the east and west direction of the interchange exhibits LOS E. The diverge movement to Rosemont Road and the merge from southbound Rosemont Road to westbound I-264 both display LOS E in the AM peak hour.

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Crash Type Map (2009-2012)
I-264 & Rosemont Road Interchange

Figure VIII.3 | July 2016

N

Cronin Rd
Driveway
Casselberry Ln
Moorland Dr
Alcott Rd
Lampl Ave
Malibu Palms Dr
Malibu Dr
Rosemont Rd
St
Caren Dr
Birchwood Park Dr
58
58
58
Malibu Dr
Bonney Rd
Rodriquez Dr
Wagner St
Chestnut Ct
Butternut Ln
Spruce St
Pine Ct
Poplar St
264
264
Boyd Rd
Palm Beach Pl
Shasta Ct
E Ave
Hilber St
Paladin Dr
Victoria Dr
Plaza Trl
Wayne St
Waverly Dr
Rosemont Rd
Barry St
Continental St
Palace Pl
Sentara Way
Auto Nation Way
Gateway Pl
Spruce Cir
Spruce St
Bentley Gate Way
Chester St
Berwick Cres
Palace Green Blvd
South Blvd
Presidential Blvd
Donnawood Ct
Historyland Dr
Teakwood Dr
Remus Ln
Cassady Ave
Colonel Cir

LEGEND

CRASH TYPE

- Rear End
- Angle
- Head On
- Sideswipe - Same Direction
- Sideswipe - Opposite Direction
- Fixed Object in Road
- Train
- Non-Collision
- Fixed Object - Off Road
- Bicyclist
- Motorcyclist
- Backed Into
- Other

Feet
0 200 400

Table 8.9 also displays a summary of the results of the CORSIM analysis of the No Build Alternative, which shows poor service levels for many westbound movements of the interchange as well, other movements exhibit adequate service levels. Here also, the results have deteriorated to worse conditions than those found under existing conditions.

The results of the HCS and CORSIM capacity analysis indicate the forecasted year 2040 volumes will be inadequately accommodated on a few of the westbound I-264 interchange ramps. Deficiencies involve both the mainline freeway lanes and individual interchange ramps associated with the westbound movements at the interchange.

Table 8.7 summarizes the 2040 No Build Alternative SimTraffic capacity analysis of the Rosemont Road corridor. The analysis shows poor service levels for all four intersections during both peak hours. The service levels have deteriorated from existing conditions at almost all intersections for each peak hour. The close spacing of the signalized intersections combined with heavy volumes cannot be accommodated by the existing interchange configuration and existing intersection locations.

Table 8.7
Summary of 2040 No Build SimTraffic Capacity Analysis
I-264 at Rosemont Road Improvement Alternatives

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Virginia Beach Blvd. & Rosemont Rd	**133.8**	**F**	**141.2**	**F**
I-264 WB Off-Ramp/Bonney Road & Rosemont Rd.	**100.9**	**F**	**129.9**	**F**
I-264 EB Off-Ramp & Rosemont Rd.	**55.8**	**E**	**75.3**	**E**
Sentara Way/Chester St. & Rosemont Rd.	**141.2**	**F**	**156.7**	**F**

Table 8.8 presents a summary of the 2040 No Build Alternative SimTraffic queueing analysis, and the results show that vehicle queues extending from the traffic signals spill back to interstate and impact freeway operations. The westbound off-ramp is well beyond capacity and average queue lengths will overflow the available storage length and queue on interstate. The eastbound off-ramp exhibits 95% queues spilling onto interstate in the PM peak hour. Reported queue lengths were only reported up to a maximum 1,500 feet in length, modeling demonstrated much longer lengths because the modeled ramps were much longer than the actual ramps. The actual ramp lengths are only 1,170 feet and 1,335 feet.

Table 8.8
Summary of 2040 No Build SimTraffic Queue Analysis
I-264 at Rosemont Road Improvement Alternatives

Intersection	Ramp Length (feet)	AM Peak Hour		PM Peak Hour	
		Average (feet)	95th % (feet)	Average (feet)	95th % (feet)
WB I-264 Off-Ramp to Rosemont Road	1,170	**1,500+**	**1,500+**	**1,500+**	**1,500+**
EB I-264 Off-Ramp to Rosemont Road	1,335	344	542	433	**1,500+**

VIII.2.2 Improvement Alternatives

Capacity analysis of the Rosemont Road interchange indicates that various deficiencies are forecasted to occur. Consequently, any major maintenance activities (such as bridge replacement) should be designed to incorporate consideration of a plan for future improvements. To that end, three improvement alternatives have been developed and analyzed. These are shown in **Figures VIII.4, VIII.5 and VIII.6.** Geometric compliance has been intentionally provided with all proposed improvements.

All three improvement alternatives include the closure of the westbound I-264/Bonney Road signalized intersection. To mitigate removal of the Bonney Road connection a flyover connecting Bonney Road to Sentara Way is included in all 3 improvement alternatives. Also, additional freeway capacity is in both directions through the interchange and to the west on I-264.

The first improvement alternative in **Figure VIII.4 – Split Folded Diamond –** consists of relocating westbound I-264 movements to off and on ramps with North Plaza Trail. The existing westbound I-264 off-ramp to Rosemont Road is closed, and the loop ramp to westbound I-264 is expanded, and the existing on-ramp to westbound I-264 from southbound Rosemont Road is retained.

The second improvement alternative in **Figure VIII.5 – Offset Single Point Urban Diamond -** consists of reconstructing all of the ramps at the interchange as well as adding capacity to the west of I-264 and through the interchange. The on-ramp from Rosemont Road to westbound I-264 and the off-ramp from westbound I-264 to Rosemont Road will both be configured as an underpass.

The third improvement alternative in **Figure VIII.6 – Tight Diverging Diamond -** consists of reconstructing all of the ramps at the interchange into two focal point intersections on Rosemont Road.

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2040 Build Alternative
I-264 & Rosemont Rd Interchange
Split Folded Diamond

Figure VIII.4	July 2016

Virginia Beach Blvd
Bonney Rd
Rosemont Rd
Sentara Way
INTERSTATE 264

35 mph
30 mph
25 mph
55 mph
45 mph
30 mph
25 mph
30 mph
55 mph

LEGEND

- NUMBER OF LANES
- NUMBER OF LANES INCLUDING HOV
- HOV SYSTEM
- DIRECTION OF TRAVEL
- 65 mph — HOV SYSTEM POSTED SPEED
- 40 mph — POSTED SPEED
- N.P. — NOT POSTED SPEED
- PROPOSED / EXISTING SIGNAL

NOTE: INSET SCALE = 2x PLAN SCALE

SCALE
0 200' 400'

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2040 Build Alternative
I-264 & Rosemont Rd Interchange
Offset Single Point Urban Diamond

Figure VIII.5	July 2016

Virginia Beach Blvd

Bonney Rd

Rosemont Rd

Sentara Way

Underpass

Underpass

INTERSTATE 264

INTERSTATE 264

25 mph

20 mph

35 mph

45 mph

45 mph

25 mph

55 mph

55 mph

55 mph

55 mph

LEGEND

- NUMBER OF LANES
- NUMBER OF LANES INCLUDING HOV
- HOV SYSTEM
- DIRECTION OF TRAVEL
- 65 mph — HOV SYSTEM POSTED SPEED
- 40 mph — POSTED SPEED
- N.P. — NOT POSTED SPEED
- PROPOSED / EXISTING SIGNAL

NOTE: INSET SCALE = 2x PLAN SCALE

SCALE
0 200' 400'

I-264 Corridor Evaluation Study

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2040 Build Preferred Alternative
I-264 & Rosemont Rd Interchange
Tight Diverging Diamond

Figure VIII.6	July 2016

Virginia Beach Blvd

Bonney Rd

Rosemont Rd

Sentara Way

35 mph

35 mph

55 mph

55 mph

45 mph

55 mph

55 mph

55 mph

INTERSTATE 264

LEGEND

- 2 — NUMBER OF LANES
- 4 — NUMBER OF LANES INCLUDING HOV
- HOV SYSTEM
- DIRECTION OF TRAVEL
- 65 mph — HOV SYSTEM POSTED SPEED
- 40 mph — POSTED SPEED
- N.P. — NOT POSTED SPEED
- PROPOSED / EXISTING SIGNAL

NOTE: INSET SCALE = 2x PLAN SCALE

SCALE
0 200' 400'

The improvement alternatives have been analyzed using the same procedures – HCS and CORSIM - used in the analysis of existing conditions and No Build Alternative. The results of the capacity analysis for all the forecasted year 2040 alternatives (including the No Build Alternative) are shown in **Table 8.9.** A density listed with a (+) was analyzed as a freeway segment due to HCS limitations such as add lanes (where an on-ramp creates a continuous additional lane to the freeway) and drop lanes (where a continuous freeway lane drops to an off-ramp). The Rosemont Road interchange Build Alternative improvements have locations where the geometry is atypical and is not capable of being appropriately analyzed using HCS 2010 procedures.

Split Folded Diamond

The results in **Table 8.9** display almost all movements associated with the Split Folded Diamond interchange at LOS D or better. The mainline freeway section east of the interchange exhibits LOS E in the westbound direction for the AM peak hour. This alternative does not serve all movements. Motorists moving from westbound I-264 to southbound Rosemont Road would need to exit on the ramp to northbound North Plaza Trail and then to westbound Virginia Beach Boulevard before turning left to southbound Rosemont Road.

For the signalized intersections and unsignalized ramp movements along the Rosemont Road study area, the SimTraffic capacity analysis summarized in **Table 8.10** indicates that the intersection of Sentara Way/Chester Street and Rosemont Road will exhibit LOS F conditions in the AM peak hour and LOS E conditions in the PM peak hour. The Virginia Beach Boulevard and Rosemont Road intersection will exhibit LOS F conditions in the PM peak hour.

Table 8.11 presents a summary of the SimTraffic queueing analysis, and the results show that vehicle queues extending from the traffic signals will be accommodated by the storage available on the respective off-ramps. The westbound I-264 off-ramp to Rosemont Road in this alternative has been eliminated.

Offset Single Point Urban Diamond

The results in **Table 8.9** display almost all movements associated with the Offset Single Point Urban Diamond interchange at LOS D or better. The mainline freeway section east of the interchange exhibits LOS E conditions in the westbound direction for the AM peak hour. The results are slightly different from the Split Folded Diamond as different volumes were analyzed for each alternative due to the split interchange developed at South Plaza Trail.

The SimTraffic capacity analysis results in **Table 8.10** show that most of the service levels will exhibit adequate service levels of D or better. The Virginia Beach Boulevard and Rosemont Road intersection will exhibit LOS F conditions in the PM peak hour. The Sentara Way/Chester Street and Rosemont Road intersection will exhibit LOS F conditions in the AM peak hour.

Table 8.11 presents a summary of the SimTraffic queueing analysis, and the results show that vehicle queues extending from the traffic signals will be accommodated by the storage available on the respective off-ramps; however, there will be heavier queueing on the eastbound I-264 off-ramp in the AM peak hour.

Tight Diverging Diamond

The results in **Table 8.9** show that almost all of the movements associated with the Tight Diverging Diamond interchange exhibit adequate service levels of D or better. The mainline freeway section east of the interchange exhibits LOS E conditions in the westbound direction for the AM peak hour. The capacity analysis results are similar to the previous alternative improvement discussed. Again, the results are slightly different from the Split Folded Diamond as different volumes were analyzed for each alternative due to the split interchange developed at South Plaza Trail.

For the signalized intersections along the Rosemont Road study area, the SimTraffic capacity analysis summarized in **Table 8.10** indicates that almost all of the intersections will exhibit adequate service levels of D or better. The only exception to this is the intersection of Virginia Beach Boulevard and Rosemont Road which exhibits LOS F conditions in the PM peak hour. The SimTraffic results significantly improve in the AM peak hour at the Sentara Way/Chester Street and Rosemont Road intersection for the Tight Diverging Diamond Alternative. The SimTraffic results rely heavily on the variation in delay between each alternative experienced by northbound movement at this intersection, which is ultimately affected by the downstream signal in conjunction with the Rosemont Rd. interchange. In the split folded diamond alternative, all movements at the Sentara Way/Chester Street and Rosemont Road intersection experienced significant delays since the geometry south of the Rosemont Road interchange is similar to existing conditions. The Offset Single Point Urban Diamond Alternative improves delay at all movements, except the northbound movement which still experiences significant delay. The delay for the northbound movement for the Tight Diverging Diamond alternative at the Sentara Way/Chester Street and Rosemont Road interchange was the best overall out of the 3 alternatives due to the signal improvements developed within the vicinity of the Rosemont Road interchange. Overall, the tight diverging diamond significantly improves flow on Rosemont Road in the AM peak hour resulting in huge performance increases over the other alternatives.

Table 8.11 presents a summary of the SimTraffic queueing analysis, and the results show that vehicle queues extending from the traffic signals will be accommodated by the storage available on the respective off-ramps.

Table 8.9
Summary of Capacity Analysis Results
Year 2040 Alternatives: Rosemont Road & I-264

Year 2040 Alternative		No Build Alternative				Split Folded Diamond				Offset Single Point Urban Diamond				Tight Diverging Diamond			
Time of Day		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Dir	Movement (Type)	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS	Density	LOS
	HCS Analysis Results																
East-bound I-264	EB I-264 between Independence Blvd and Rosemont Rd (Freeway)	25.9	C	30.3	D	19.0	C	26.1	D	19.0	C	26.1	D	19.0	C	26.1	D
	EB I-264 to Rosemont Rd (Diverge)	20.9	C	29.7	D	19.0+	C	26.1+	D	19.0+	C	26.1+	D	19.0+	C	26.1+	D
	SB Rosemont Rd to EB I-264 (Merge)	20.1	C	24.7	C	10.8	B	13.7	B	-	-	-	-	-	-	-	-
	NB Rosemont Rd to EB I-264 (Merge)	23.8	C	27.2	C	15.7+	B	19.8+	C	-	-	-	-	-	-	-	-
	NB/SB Rosemont Rd to EB I-264 (Merge)	-	-	-	-	-	-	-	-	16.3	B	18.6	B	15.5+	B	19.6+	C
	EB I-264 East of Rosemont Rd (Freeway)	24.6	C	30.1	D	23.5	C	30.0	D	23.3	C	29.6	D	23.3	C	29.6	D
West-bound I-264	WB I-264 East of Rosemont Rd (Freeway)	**37.7**	**E**	31.0	D	**36.0**	**E**	29.3	D	**35.2**	**E**	28.8	D	**35.2**	**E**	28.8	D
	WB I-264 to NB S. Plaza Trail (Diverge)	**-**	**-**	-	-	34.9	D	30.6	D	-	-	-	-	-	-	-	-
	SB S. Plaza Trail to WB I-264 (Merge)	**-**	**-**	-	-	28.5	D	23.0	C	-	-	-	-	-	-	-	-
	WB I-264 to Rosemont Rd (Diverge)	**37.1**	**E**	33.5	D	-	-	-	-	15.7	B	11.7	B	30.5	D	26.3	C
	NB Rosemont Rd to WB I-264 (Merge)	32.2	D	24.9	C	32.5+	D	24.8+	C	-	-	-	-	-	-	-	-
	SB Rosemont Rd to WB I-264 (Merge)	**35.3**	**E**	28.7	D	28.1+	D	22.7+	C	-	-	-	-	-	-	-	-
	NB/SB Rosemont Rd to WB I-264 (Merge)	**-**	**-**	-	-	-	-	-	-	21.0+	C	17.0+	B	28.1+	D	22.7+	C
	WB I-264 between Independence Blvd and Rosemont Rd (Freeway)	**40.2**	**E**	31.6	D	32.5	D	22.7	C	32.5	D	22.7	C	32.5	D	22.7	C
	CORSIM Analysis Results																
East-bound I-264	EB I-264 between Independence Blvd and Rosemont Rd (Freeway)	19.3	C	26.0	C	18.2	C	23.8	C	18.1	C	23.8	C	18.2	C	23.8	C
	EB I-264 to Rosemont Rd (Diverge)	20.3	C	28.8	D	19.7	B	26.5	C	19.7	B	26.7	C	19.8	B	26.6	C
	SB Rosemont Rd to EB I-264 (Merge)	18.7	B	24.8	C	14.9	B	18.8	B	-	-	-	-	-	-	-	-
	NB Rosemont Rd to EB I-264 (Merge)	21.9	C	27.8	C	16.1	B	19.8	B	-	-	-	-	-	-	-	-
	NB/SB Rosemont Rd to EB I-264 (Merge)	-	-	-	-	-	-	-	-	16.0	B	17.1	B	13.9	B	17.0	B
	EB I-264 East of Rosemont Rd (Freeway)	22.6	C	28.6	D	17.4	B	21.6	C	17.3	B	21.4	C	17.3	B	21.3	C
West-bound I-264	WB I-264 East of Rosemont Rd (Freeway)	34.6	D	28.1	D	32.2	D	27.1	D	31.7	D	26.6	D	31.7	D	26.6	D
	WB I-264 to NB S. Plaza Trail (Diverge)	**-**	**-**	-	-	30.4	D	25.4	C	-	-	-	-	-	-	-	-
	SB S. Plaza Trail to WB I-264 (Merge)	**-**	**-**	-	-	27.9	C	22.1	C	-	-	-	-	-	-	-	-
	WB I-264 to Rosemont Rd (Diverge)	**37.5**	**E**	27.8	C	31.1	D	23.6	C	29.8	D	24.9	C	29.7	D	24.9	C
	NB Rosemont Rd to WB I-264 (Merge)	**55.5**	**F**	23.3	C	28.8	D	21.1	C	-	-	-	-	-	-	-	-
	SB Rosemont Rd to WB I-264 (Merge)	**72.8**	**F**	27.5	C	27.1	D	20.9	C	-	-	-	-	-	-	-	-
	NB/SB Rosemont Rd to WB I-264 (Merge)	**-**	**-**	-	-	-	-	-	-	27.9	C	21.7	C	27.8	C	21.6	C
	WB I-264 between Independence Blvd and Rosemont Rd (Freeway)	**86.4**	**F**	31.6	D	18.2	C	23.8	C	26.9	D	20.8	C	26.9	D	20.9	C

Table 8.10
Summary of 2040 Build SimTraffic Capacity Analysis
I-264 at Rosemont Road Improvement Alternatives

Intersection	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
Split Folded Diamond (Figure VIII.4)				
Virginia Beach Blvd. & Rosemont Rd	44.2	D	**153.8**	**F**
I-264 WB On-Ramps & Rosemont Rd.^	1.8	A	4.6	A
I-264 EB Off-Ramp & Rosemont Rd.	51.6	D	50.1	D
Sentara Way/Chester St. & Rosemont Rd.	**227.5**	**F**	**58.4**	**E**
Offset Single Point Urban Diamond (Figure VIII.5)				
Virginia Beach Blvd. & Rosemont Rd	52.5	D	**120.7**	**F**
I-264 WB On-/Off-Ramp & Rosemont Rd.^	3.1	A	10.4	B
I-264 EB Off-Ramp & Rosemont Rd. (SPUI intersection)	43.3	D	37.7	D
Sentara Way/Chester St. & Rosemont Rd.	**160.8**	**F**	53.9	D
Tight Diverging Diamond (Figure VIII.6)				
Virginia Beach Blvd. & Rosemont Rd	52.6	D	**137.7**	**F**
I-264 WB On-/Off-Ramp & Rosemont Rd.	24.5	C	21.9	C
I-264 EB Off-Ramp & Rosemont Rd.	24.3	C	21.9	C
Sentara Way/Chester St. & Rosemont Rd.	37.0	D	49.1	D

^ - Unsignalized ramp movements.

Table 8.11
Summary of 2040 Build Conditions SimTraffic Queue Analysis
I-264 at Rosemont Road Improvement Alternatives

Intersection	Ramp Length (feet)	AM Peak Hour		PM Peak Hour	
		Average (feet)	95th % (feet)	Average (feet)	95th % (feet)
Split Folded Diamond (Figure VIII.4)					
WB I-264 Off-Ramp to Plaza Trail	1,170	~	~	~	~
EB I-264 Off-Ramp to Rosemont Road	1,335	244	297	219	281
Offset Single Point Urban Diamond (Figure VIII.5)					
WB I-264 Off-Ramp to Rosemont Road	1,170	4	50	52	244
EB I-264 Off-Ramp to Rosemont Road	1,335	489	691	250	344
Tight Diverging Diamond (Figure VIII.6)					
WB I-264 Off-Ramp to Rosemont Road	1,170	227	355	229	363
EB I-264 Off-Ramp to Rosemont Road	1,335	274	382	329	450

~ This movement was not analyzed because traffic data was not available for this location.

VIII.2.3 Alternative: Cost

Planning level cost estimates were developed for the three improvement alternatives for the Rosemont Road Interchange. Detailed calculations have been included in the Technical Appendix. It should be noted that the estimates do not include costs associated with complete removal of existing I-264 through lanes and inflation/escalation. A 4" overlay was assumed over portions of I-264 that are not being completely removed. The cost estimates in year 2015 dollars are:

Alternative	Cost (in $million)
Split Folded Diamond	**$475.0**
Offset Single Point Urban Diamond	**$548.3**
Tight Diverging Diamond	**$459.1**

VIII.2.4 Stakeholder Coordination

Coordination meetings were held with staff from the City of Virginia Beach and Hampton Roads Transit (HRT). In general, representatives from both agencies were supportive of the evaluation process and the selection of the Tight Diverging Diamond as the preferred alternative.

HRT expressed concerns with the former Norfolk Southern rail line (is it currently owned by the City of Virginia Beach) crossings at Rosemont and potentially South Plaza Trail. It appears that if a future LRT project were to be constructed along the former Norfolk Southern Rail line, it would likely bridge over Rosemont Road, and if there were additional interchange ramps at South Plaza Trail, the bridging may need to continue from Rosemont through South Plaza Trail. This potential design would be very costly as compared to an at-grade rail crossing at South Plaza Trail. Based on these concerns HRT was opposed to the Split Folded Diamond interchange.

VIII.2.5 Impacts

Identification of potential impacts on key resources from construction of the three improvement alternatives was evaluated using desktop GIS mapping analysis. Detailed exhibits are included in the Technical Appendix. Summarized in **Table 8.12**, the results show that the three alternatives would not impact water resources (wetlands, for example) and would not impact Section 4(f) properties (public parks, for example). The Split Folded Diamond would impact 7 adjacent buildings and 10 residential units. The Offset Single Point Urban Diamond alternative improvement would impact 9 adjacent buildings and 24 residential units and the Tight Diverging Diamond alternative improvement would impact 7 adjacent buildings and 10 residential units.

Table 8.12
Rosemont Road Interchange Improvement Alternative Impacts

Improvement Alternative	WATER	BUILDINGS	RESIDENTIAL	POTENTIAL SECTION 4F
Split Folded Diamond	N	7	10	N
Offset Single Point Urban Diamond	N	9	24	N
Tight Diverging Diamond	N	7	10	N

VIII.3 Recommendation

The key to selecting a preferred alternative for this interchange is the ability of the set of improvements to address the severe deficiencies occurring and forecasted to occur on the local street system. The ramps and their interface with the freeway are functioning adequately, but congestion associated with the local street system is the cause of excessive delays. Although the planned widening of Rosemont Road to six lanes addresses much of the arterial's capacity deficiency, continuing with the interchange's poor configuration of local street intersections and freeway ramp junctions would offset forecasted benefits of roadway widening.

To reduce the number of street intersections in the interchange areas, all three Build Alternative improvements provided for the closing of the intersection of Bonney Road with Rosemont Road. To mitigate the impacts of this closure, the Sentara Way flyover was included in each improvement alternative.

Considering access and service, the Split Folded Diamond alternative was eliminated from consideration because of the circuitous route it would force motorists to complete to move from westbound I-264 to southbound Rosemont Road. The added volumes of this movement would cause severe congestion at the Virginia Beach Boulevard intersection with Rosemont Road.

The Offset Single Point Urban Diamond alternative provided for accommodation of all movements to and from I-264 at the interchange. However, it exhibited three disadvantages when compared with the Tight Diverging Diamond alternative:

1. Service levels at arterial intersections are worse;
2. Impacts to adjacent properties are substantially more severe; and,
3. Costs are estimated to be $89.2 million more (19%)

Finally, the CORSIM and SimTraffic analysis results indicate that the Tight Diverging Diamond interchange works the best on the Rosemont Road corridor. Based on the all the evaluation criteria, the Tight Diverging Diamond is recommended as the preferred alternative.