8.0 Capacity Improvement Strategies

Capacity Improvement Strategies for the I-526 corridor are improvements to the roadways within the corridor that are highly effective at solving congestion issues but come at a higher cost than other improvement strategies.

Capacity Improvement strategies considered for this study include the widening of I-526 to a six-lane section, collector-distributor systems, interchange improvement alternates, braided entrance/exit ramps, barrier-separated lanes, alternate routes, and arterial widening. This chapter explains the deficiencies along the corridor, and the recommended mainline I-526 improvements, interchange improvements, and potential alternate routes required to address the deficiencies.

8.1 Deficiency Overview

Many of the deficiencies identified along the I-526 corridor are associated with the close proximity of nearby interchanges that result in substandard weave lengths and vehicles attempting to accelerate and decelerate in the same lane, creating poor operating conditions. These weaving issues are identified with the close spacing of the I-526 interchanges with Leeds Avenue, Dorchester Road/Paramount Drive, Montague Avenue, and International Boulevard. The close spacing of the I-26 & I-526 interchange and the I-526 & Rivers Avenue interchange also creates weaving issues.

Another deficiency identified throughout the corridor is the length of acceleration and deceleration lanes to/from the I-526 mainline. With the higher volumes of traffic during the peak hours, there is reduced gap acceptance length for vehicles entering I-526, contributing to the congestion along the mainline.

Other identified deficiencies are associated with substandard vertical curves along I-526. Requirements for minimum K values in sag curves have increased in SCDOT's *Highway Design Manual* since the Interstate was constructed. The cost to upgrade the existing sag curves may outweigh the potential benefits; therefore it is recommended that unless a crash issue is identified due to the vertical curve, a design exception is recommended for this deficiency.

Maps summarizing the location of the deficiencies identified along the I-526 corridor are provided in Appendix A.

8.2 I-526 Mainline Improvements

Several deficiencies along the I-526 mainline were considered, including traffic congestion, weaving, acceleration/deceleration lanes, and vertical/horizontal curves. Improvements to address these deficiencies are summarized herein.

8.2.1 Widening

The future traffic projections show the need for I-526 to be widened from Paul Cantrell Boulevard to east of Rivers Avenue. For the majority of the corridor, this deficiency will be addressed by widening the mainline to the existing median, which can accommodate an additional lane in each direction. As noted in Chapter 7, at the General Westmoreland Bridge over the Ashley River and east of Rivers Avenue, the additional lane will be achieved by restriping the existing bridge structures to accommodate three lanes in each direction. With the restriping the bridge structures, the remaining shoulder widths will be substandard and will need to have an approved design exception, which will consider the cost and environmental impacts of widening the bridges in these areas.

In addition to the mainline widening, the projected traffic congestion along I-526 in the afternoon will be also be mitigated by the construction of braided ramps and lengthened acceleration and deceleration lanes discussed in the following sections.

8.2.2 Braided Ramps

As previously noted, many of the operational problems along I-526 are due to interchanges being in close proximity to each other, especially from Leeds Avenue to Rivers Avenue. To address the closely-spaced interchanges, two improvement scenarios were considered. The first scenario was a collector-distributor (CD) system between interchanges from Leeds Avenue to I-26, which would remove the weaving actions from I-526 and place them on the slower design speed of the CD. The second scenario was a series of braided ramps in each direction between Dorchester Road and Montague Avenue, Montague Avenue and International Boulevard, and International Boulevard and I-26 that would eliminate the weaving to/from the I-526 mainline.

VISSIM analyses were conducted for each of the two scenarios, and it was determined that both a CD system and braided ramps would both work operationally along the corridor. However, it was determined the cost of the braided ramps was lower than a CD system due to fewer new bridge structures, that the CD system could get overloaded with traffic, and that the signing would be simpler for the braided ramps

scenario. Therefore, the braided ramps are recommended to address the weaving and congestion deficiencies along the I-526 corridor.

8.2.3 Other Mainline Improvements

The deficiencies associated with the sag vertical curves along I-526 are due to the increase of the "K" values from when the road was constructed and the current SCDOT design standards. The cost to upgrade the existing sag curves may outweigh the potential benefits; therefore it is recommended that unless a crash issue is identified due to the vertical curve, a design exception is recommended for this deficiency.

Inadequate acceleration and deceleration lane lengths were also identified as deficiencies along I-526 at the interchanges with US 17/Sam Rittenberg Boulevard and Paul Cantrell Boulevard. These deficiencies are being addressed by lengthening the ramps in these areas as recommended in Chapter 7.

The last deficiencies associated with the I-526 mainline involve the horizontal clear zones. These areas will be looked at on a case by case basis as the recommended interchange types could affect these areas. Efforts will be made to provide the necessary clear zones with any improvements, and if a proper clear zone cannot be provided, then any obstacles will likely be shielded with the use of barriers.

8.3 Interchanges

As part of the review of capacity improvements to the I-526 study corridor, several improvement scenarios were considered at the nine interchanges to address existing and projected congestion issues. These scenarios are summarized herein, and include consideration of the *Synchro* and *VISSIM* traffic analyses.

8.3.1 I-526 & US 17/Sam Rittenberg Boulevard

The existing configuration of the I-526 & US 17 interchange is a partial diamond with a loop serving northbound US 17 to eastbound I-526 traffic. US 17 northbound traffic travels through the existing I-526 & US 17 intersection through a newly constructed designated lane that is separated from through traffic by a concrete barrier. The I-526 & Sam Rittenberg Boulevard interchange consists of a half diamond connecting traffic to and from the east along I-526. I-526 westbound ends at a signalized intersection with Sam Rittenberg Boulevard.

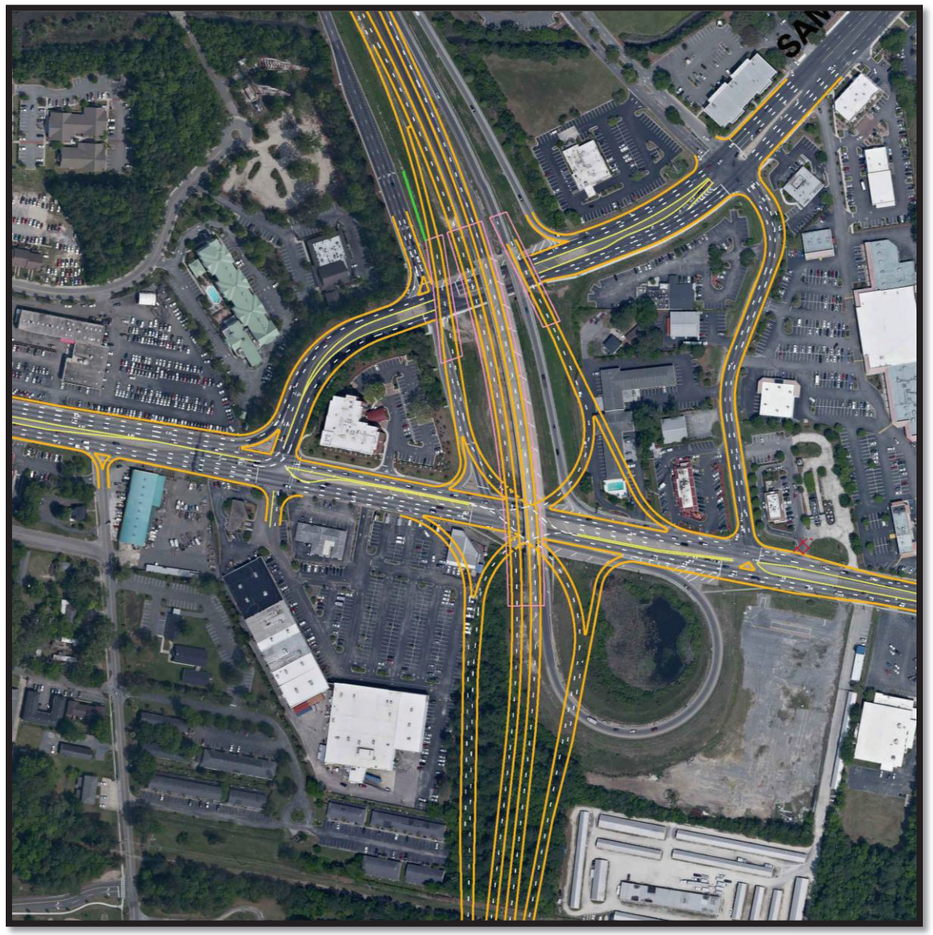
Several improvement alternates were considered for the interchange, mainly based upon the Draft Environmental Impact Statement analyses conducted by Wilbur Smith Associates, Inc. for the Mark Clark Expressway (MCE) project. With the approval of the MCE project pending, the alternates considered both the MCE preferred Alternate G and the MCE No Build scenarios.

- **Alternate 1 – Modified SPUI (MCE Alternate G):** This alternate, illustrated in Exhibit 8-1, was a modified single point urban interchange (SPUI) that included three new ramps and directed I-526 westbound traffic to the existing US 17 & Sam Rittenberg Boulevard intersection to access US 17 northbound. The results of the *Synchro* analyses showed that the SPUI intersection would operate at an acceptable LOS in the year 2035, but the US 17 & Sam Rittenberg Boulevard intersection would require improvements to operate at an acceptable LOS for 2035 conditions.

Exhibit 8-1: US 17 Alternate 1 – Modified SPUI

- **Alternate 2 – Full SPUI (MCE Alternate G):** This alternate, illustrated in Exhibit 8-2, uses a standard SPUI with the four ramps at the intersection of I-526 & US 17. The results of the *VISSIM* analyses showed that the intersection would operate at an acceptable LOS for 2035 conditions; therefore, this alternate is recommended with implementation of the Alternate G scenario of the MCE project.

Exhibit 8-2: US 17 Alternate 2 – Full SPUI



- **Alternate 3 – Partial Cloverleaf (MCE Alternate G):** This alternate, illustrated in Exhibit 8-3, adds a second loop ramp for a partial cloverleaf design for the southern half of the interchange. Due to the potential significant impacts of the loop improvements, no further consideration was given to this alternate.

Exhibit 8-3: US 17 Alternate 3 – Partial Cloverleaf

- **Alternate 4 – Two-Way Bridge & Loop (MCE No Build):** This alternate, illustrated in Exhibit 8-4, considers routing the existing I-526 westbound to US 17 northbound traffic over the existing overpass and around the existing loop. This would remove the need for the existing signalized intersection of I-526 westbound & US 17. The results of the *VISSIM* analyses showed that US 17 would operate at an acceptable LOS for 2035 conditions; therefore, this alternate is recommended with implementation of the No Build scenario of the MCE project.

Exhibit 8-4: US 17 Alternate 4 – Two-Way Bridge

A summary of the analysis criteria for each alternate of the I-526 & US 17/Sam Rittenberg Boulevard interchange is provided in Table 8-1. With consideration of the MCE Alternate G scenario, Alternate 2 – Full SPUI is the recommended interchange configuration as it provides for all movements with lower impact to surrounding properties. With consideration of the MCE No Build scenario, Alternate 4 is the recommend interchange configuration, as it improves traffic flow along US 17 at a relatively low cost.

Table 8-1: I-526 & US 17/Sam Rittenberg Boulevard Evaluation Summary

Summary of Criteria	Alternate			
	1	2*	3	4*
Number of Deficiencies Addressed	2 of 3	2 of 3	2 of 3	2 of 3
Utility Impacts	High	High	Medium	Low
Right-of-Way Impacts	Medium	Medium	High	Low
Environmental Impact	High	High	High	Low
Estimated Construction Costs	High	High	Medium	Low

*Recommended Alternate

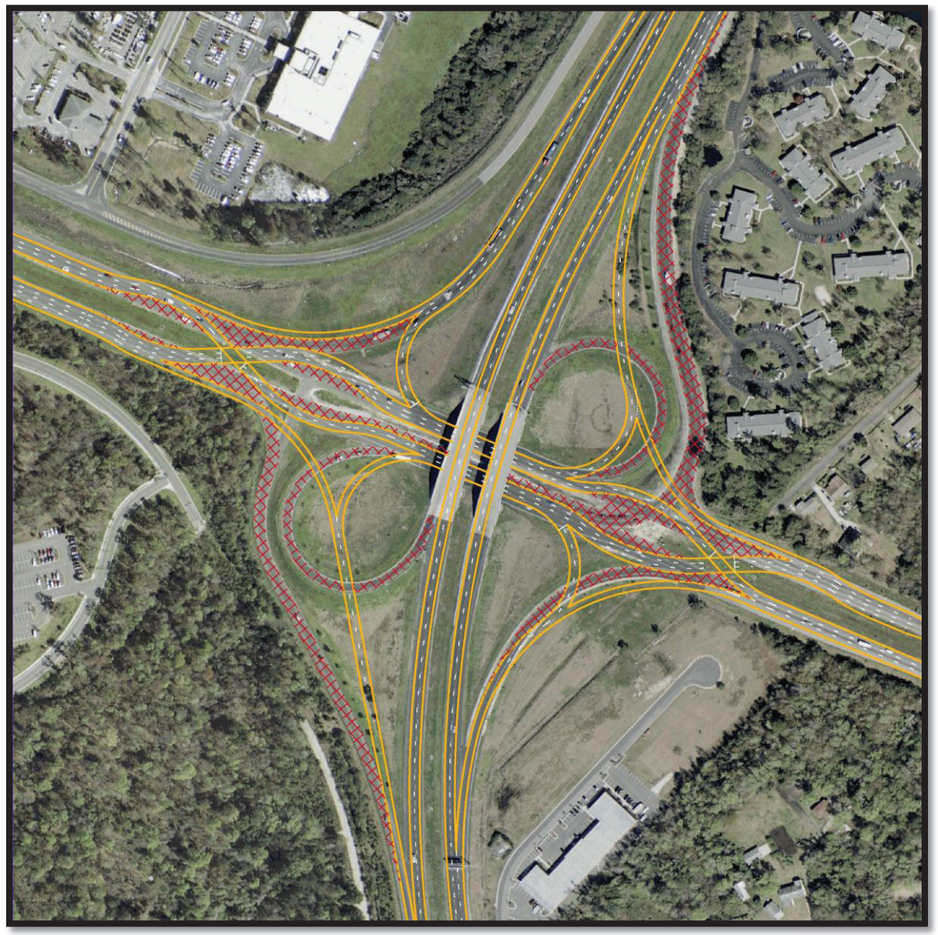
8.3.2 I-526 & Paul Cantrell Boulevard

The existing configuration of the I-526 & Paul Cantrell Boulevard interchange is a partial cloverleaf with loops serving the movements from I-526 eastbound to Paul Cantrell Boulevard westbound and I-526 westbound to Paul Cantrell Boulevard eastbound. This interchange serves heavy commuter movements to/from West Ashley to the west on Paul Cantrell Boulevard, and improvements were identified to address the heavy Paul Cantrell Boulevard eastbound to I-526 eastbound movement in the AM peak hour and the heavy I-526 westbound to Paul Cantrell Boulevard westbound movement in the PM peak hour.

- **Alternate 1 – DDI:** Due to heavy left-turn traffic from eastbound Paul Cantrell Boulevard to I-526 eastbound in the AM peak hour, a diverging diamond interchange (DDI) was considered as illustrated in Exhibit 8-5. In a DDI, traffic crosses to the opposite side of the roadway to allow for two-phase signalization and significantly reducing left-turn conflicts.

  However, the results of the *Synchro* analyses indicated an unacceptable LOS for the Paul Cantrell Boulevard & I-526 West Ramps intersection, due to the heavy Paul Cantrell Boulevard through volumes and the heavy I-526 westbound off-ramp volumes in the year 2035.

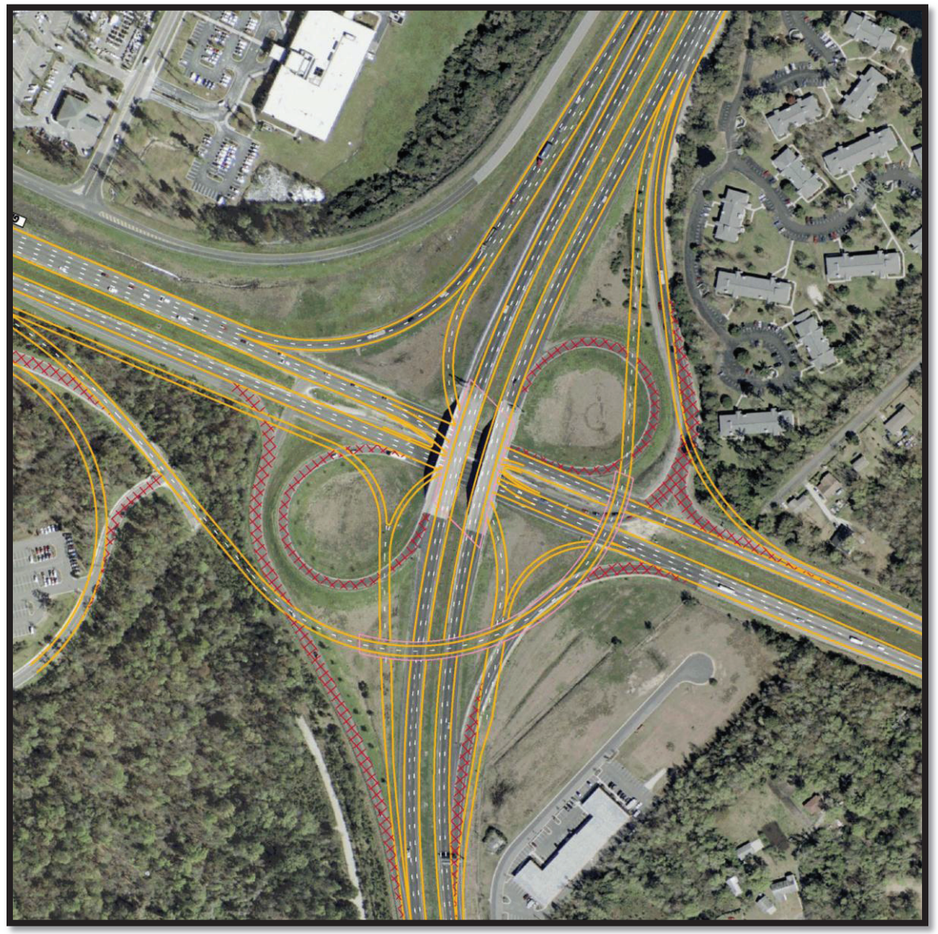
Exhibit 8-5: Paul Cantrell Boulevard Alternate 1 – DDI



- **Alternate 2 – Modified SPUI with Directional Ramp to I-526 Eastbound:** This alternate, illustrated in Exhibit 8-6, was a modified SPUI with a directional ramp to I-526 eastbound to accommodate the heavy left turn movement in the AM peak hour.

The results of the *Synchro* analyses indicate that this configuration would operate at an acceptable LOS for 2035 conditions. However, to provide for the modified SPUI, the I-526 bridge structures over Paul Cantrell Boulevard would need to be replaced to remove the columns from the median of Paul Cantrell Boulevard, resulting in a significant impact to the interchange.

Exhibit 8-6: Paul Cantrell Boulevard Alternate 2 – Modified SPUI

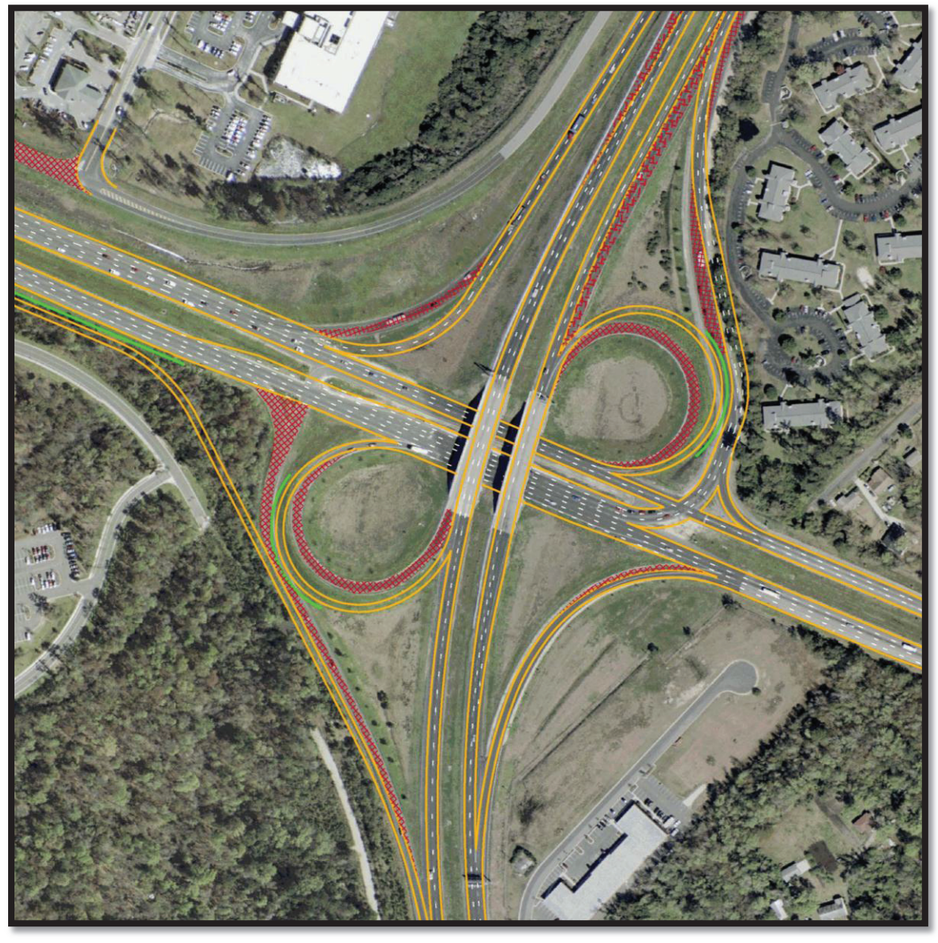


- **Alternate 3 – Two-Lane Paul Cantrell Eastbound to I-526 Eastbound Loop:** This alternate, illustrated in Exhibit 8-7, utilizes a two lane loop ramp to replace the dual left turns from Paul Cantrell eastbound to I-526 eastbound. Due to the potential significant impacts of the loop improvements, no further consideration was given to this alternate.

Exhibit 8-7: Paul Cantrell Boulevard Alternate 3 – Two-Lane Loop

- **Alternate 4 – Triple Left-Turn Lanes:** This alternate, as illustrated in Exhibit 8-8, maintains the existing interchange configuration and provides for a triple left-turn movement from eastbound Paul Cantrell Boulevard to I-526 eastbound. The acceleration lanes to I-526 eastbound would be lengthened to the bridge over the Ashley River. The results of the *VISSIM* analyses showed that the interchange would operate at an acceptable LOS for 2035 conditions; therefore, this alternate is recommended.

Exhibit 8-8: Paul Cantrell Boulevard Alternate 4 – Triple Left-Turn Lanes



A summary of the analysis criteria for each alternate of the I-526 & Paul Cantrell Boulevard interchange is provided in Table 8-2. The major deficiencies associated with the interchange include the high volume of traffic from eastbound Paul Cantrell Boulevard to I-526 eastbound in the AM peak hour and the return movement in the afternoon. Alternate 4 – Triple Left-Turn lanes addresses the operations in the AM peak hour at a relatively low cost. The afternoon movement will improve with the new ramp configuration and with consideration of improvements to the Paul Cantrell Boulevard & Magwood Drive intersection, discussed in the next section.

Table 8-2: I-526 & Paul Cantrell Boulevard Evaluation Summary

Summary of Criteria	Alternate			
	1	2	3	4*
Number of Deficiencies Addressed	10 of 14	10 of 14	10 of 14	9 of 14
Utility Impacts	High	Medium	Low	Low
Right-of-Way Impacts	Low	High	High	Medium
Environmental Impact	Low	Low	Low	Low
Estimated Construction Costs	Low	High	Medium	Low

*Recommended Alternate

8.3.3 Paul Cantrell Boulevard & Magwood Drive

This existing intersection consists of an at-grade signalized intersection with a six-lane Paul Cantrell Boulevard cross section with exclusive right-turn lanes and double left-turn lanes from Paul Cantrell Boulevard westbound to Magwood Drive southbound (towards the Roper St. Francis Hospital) at the intersection. This intersection serves heavy commuter movements to/from the north on Magwood Drive, which are projected to impact the I-526 & Paul Cantrell Boulevard interchange. Due to the heavy traffic volumes, it was determined that grade-separation improvements would be necessary to achieve acceptable LOS at the intersection; therefore, grade-separated improvements were identified to improve the capacity of the intersection.

- **Alternate 1 – Tight Urban Diamond:** This alternate, illustrated in Exhibit 8-9, considers a grade-separated tight urban diamond interchange for the existing at-grade intersection. The results of the *VISSM* analyses indicate that both Magwood Drive intersections will operate at an acceptable LOS in the year 2035 for both projected AM and PM peak volumes. Therefore, this alternate is recommended for the Paul Cantrell Boulevard & Magwood Drive intersection.

Exhibit 8-9: Paul Cantrell Boulevard & Magwood Drive Alternate 1 – Tight Urban Diamond

8.3.4 I-526 & Leeds Avenue

The existing configuration of this interchange is a diamond design with signalized intersections at each end of the ramp terminal where I-526 passes under Leeds Avenue.

- **Alternate 1 – SPUI:** This alternate, illustrated in Exhibit 8-10, is a single-point urban interchange, which would require the replacement of the existing Leeds Avenue bridge structure over I-526. An acceptable LOS was achieved for 2035 projected volumes for both peak periods with the SPUI configuration.

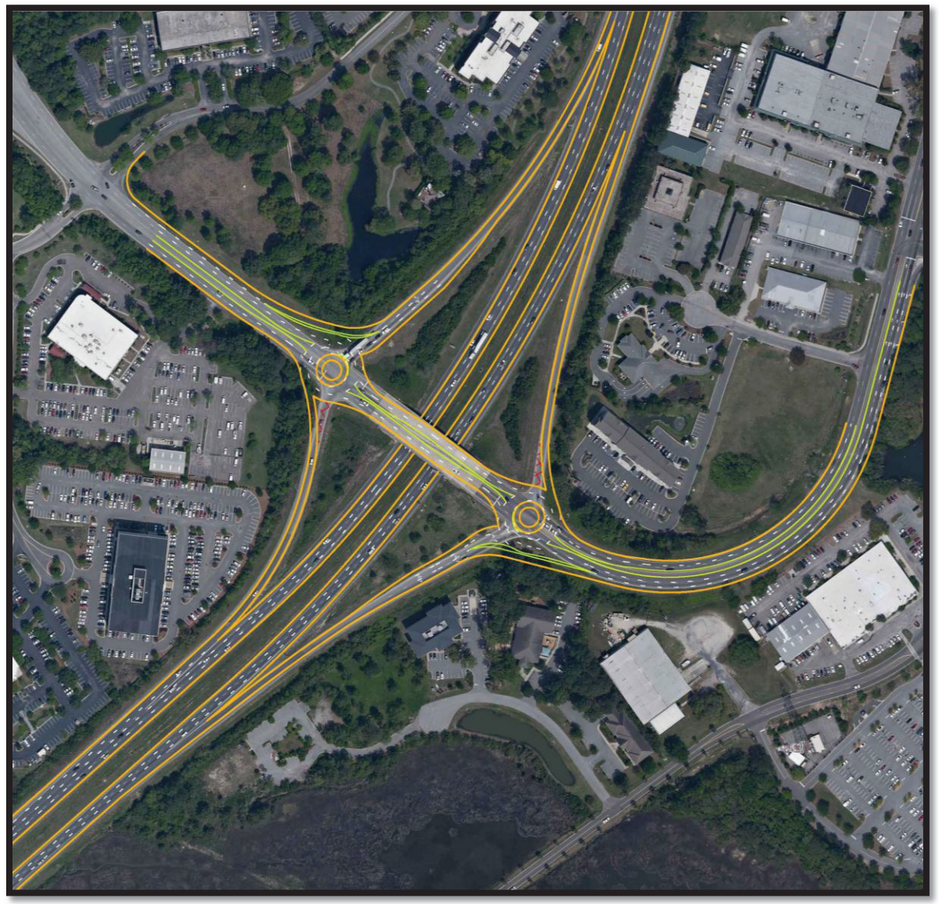
Exhibit 8-10: Leeds Avenue Alternate 1 – SPUI

- **Alternate 2 – DDI:** This alternate, illustrated in Exhibit 8-11, is a DDI that could utilize the existing Leeds Avenue bridge structure over I-526. An acceptable LOS was achieved at each I-526 ramp intersection for 2035 projected volumes with the DDI configuration.

Exhibit 8-11: Leeds Avenue Alternate 2 – DDI

- **Alternate 3 – Roundabout "Bow Tie" Interchange:** This alternate, illustrated in Exhibit 8-12, would maintain the existing bridge structure configuration but install roundabouts at the I-526 ramp terminals along Leeds Avenue, forming a "bowtie" appearance. The results of the *VISSM* analyses indicate that both Leeds Avenue intersections will operate at an acceptable LOS in the year 2035 for both projected AM and PM peak volumes.

Exhibit 8-12: Leeds Avenue Alternate 3 – Roundabout "Bow Tie" Interchange



A summary of the analysis criteria for each alternate of the I-526 & Leeds Avenue interchange is provided in Table 8-3. The recommend alternate for this interchange is providing dual left-turn lanes from Leeds Avenue to I-526 EB and I-526 WB respectively (TO14), which will require the second receiving lane for both entrance ramps.

Table 8-3: I-526 & Leeds Avenue Evaluation Summary

Summary of Criteria	Alternate		
	1	2	3
Number of Deficiencies Addressed	3 of 3	3 of 3	3 of 3
Utility Impacts	Low	Low	Low
Right-of-Way Impacts	Low	Medium	Medium
Environmental Impact	Low	Medium	Medium
Estimated Construction Costs	High	Medium	High

8.3.5 I-526 & Dorchester Road/Paramount Drive

The I-526 & Dorchester Road/Paramount Drive interchange is a split diamond serving Dorchester Road and Paramount Drive. I-526 eastbound and westbound traffic exits at Paramount Drive and Dorchester Road, respectively, to signalized intersections; traffic can then pass through the first signalized intersection to a second signalized intersection with the other roadway. Additionally, there is a slip ramp to I-526 westbound from an adjacent subdivision.

No operational or congestion deficiencies were identified for the interchange; therefore, no capacity improvements were identified. As noted in Chapter 7, traffic operations improvements were identified for the ramps, including the potential removal of the north leg of the I-526 eastbound & Paramount Drive intersection, simplifying the Dorchester Road and Paramount Drive roadway network around the interchange.

It should be noted that the braided ramps between Dorchester Road and Montague Avenue begin in the interchange area, but they do not immediately impact the interchange.

8.3.6 I-526 & Montague Avenue/International Boulevard

The existing I-526 & Montague Avenue interchange is a split diamond with CD roads that connect north to International Boulevard. I-526 eastbound and westbound traffic exits at Montague Avenue and International Boulevard, respectively, to signalized intersections; traffic can then pass through the first signalized intersection to a second signalized intersection with the other roadway via the CD road. Additionally, there is a slip ramp to I-526 westbound from International Boulevard, and there is a loop for I-526 eastbound traffic to International Boulevard westbound (towards the Charleston International Airport).

No operational or congestion deficiencies were identified for the I-526 & Montague Avenue interchange; therefore, no capacity improvements were identified.

The I-526 & International Boulevard interchange serves heavy commuter traffic as well as traffic from Charleston International Airport/Boeing and Tanger Outlet Mall, and is projected to see a significant growth in traffic volume in the future. Therefore, improvements were identified to address the existing and future traffic growth in the area at the interchange.

In addition, it should be noted that a potential alternate route was considered in the analysis that impacts the I-526 & Montague Avenue/International Boulevard interchange, and is described further in Section 9.4.

- **Alternate 1 – DDI:** This alternate, illustrated in Exhibit 8-13, is a DDI which is appropriate due to the high volumes of left-turn traffic at the interchange and can be constructed within the existing footprint of the interchange. The design would also require braided ramps between Montague Avenue and International Boulevard, due to the fact that the DDI configuration does not support through traffic on the minor-street approaches. The results of the *VISSIM* analyses indicate acceptable LOS being achieved at each intersection for 2035 projected volumes with the DDI configuration.
- **Alternate 2 – SPUI:** This alternate considered a SPUI for the interchange. However, the I-526 bridge structures over International Boulevard would need to be replaced to remove the columns from the median, resulting in a significant impact to the interchange. In addition, the *Synchro* analyses indicated that acceptable LOS could only be achieved at the interchange by providing for four International Boulevard through lanes in each direction.

A summary of the analysis criteria for each alternate of the I-526 & International Boulevard interchange is provided in Table 8-4. Alternate 1 – DDI is recommended at this location due to the lower costs and impacts of construction with the ability to accommodate the high future-year traffic volumes.

Exhibit 8-13: International Boulevard Alternate 1 – DDI

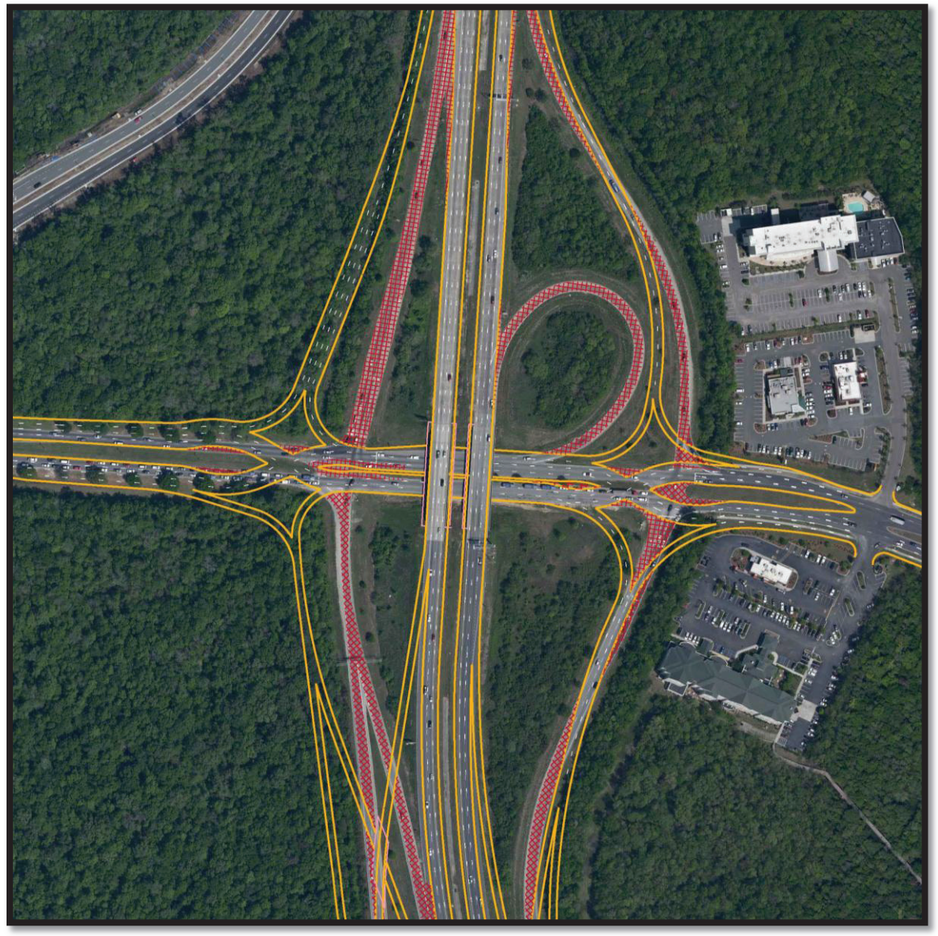


Table 8-4: I-526 & International Boulevard Evaluation Summary

SUMMARY OF CRITERIA	ALTERNATE	
	1*	2
Number of Deficiencies Addressed	6 of 7	6 of 7
Utility Impacts	Low	Low
Right-of-Way Impacts	Low	Low
Environmental Impact	Low	Low
Estimated Construction Costs	Low	High

*Recommended Alternate

8.3.7 I-26 & I-526

Detailed discussion regarding the development of improvement recommendations for the I-26 & I-526 interchange can be found in Chapter 9.

8.3.8 I-526 & Rivers Avenue

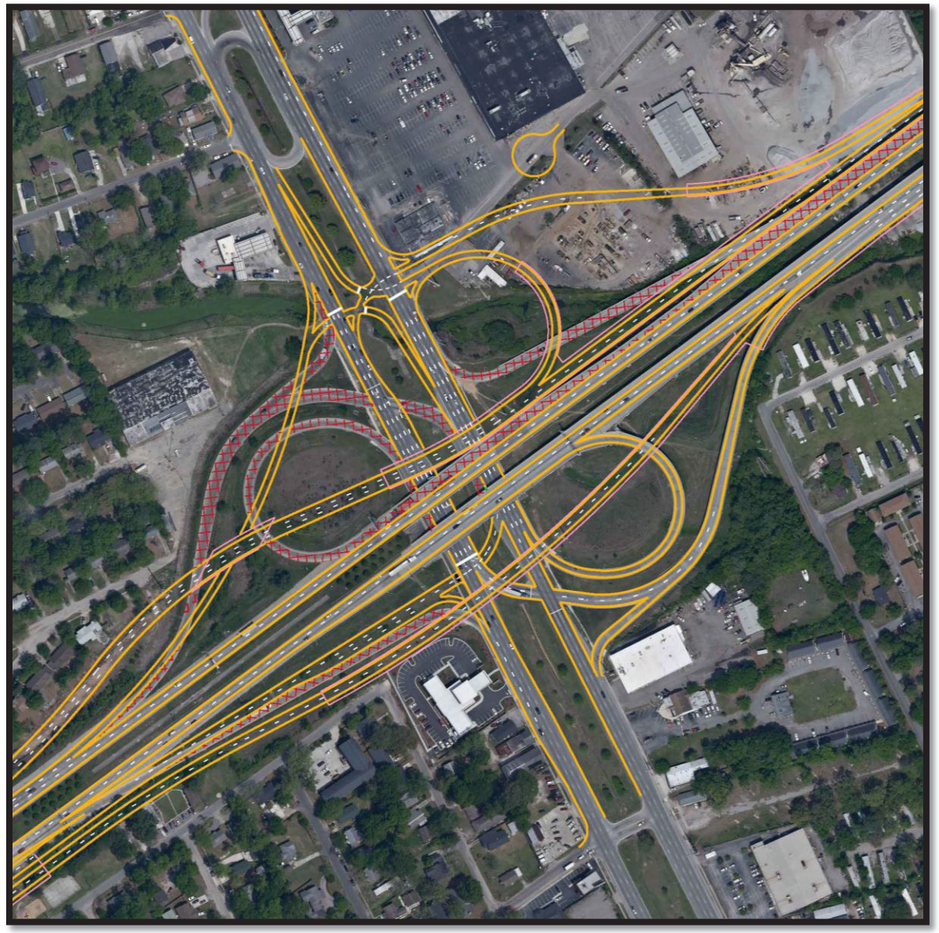
The I-526 & Rivers Avenue interchange is located in close proximity to the east of the I-26 & I-526 interchange and is comprised of a partial cloverleaf with loops in the southeast and northwest quadrants. The left turns from Rivers Avenue to I-526 in both directions are signalized to accommodate double left-turn lanes onto the ramps. Rivers Avenue is a six-lane cross section through the interchange area. Improvements were identified to be consistent with the improvements to the I-26 & I-526 interchange.

- **Alternate 1 – DDI:** This alternate, illustrated in Exhibit 8-14, is a DDI which accommodates the heavy left turn movements from Rivers Avenue and replaces the existing loops. The results of the *Synchro* analyses showed that an acceptable LOS can be achieved at each intersection for 2035 projected volumes for both peak periods with the DDI configuration.

Exhibit 8-14: Rivers Avenue Alternate 1 – DDI

- **Alternate 2 – Partial Cloverleaf:** This alternate, illustrated in Exhibit 8-15, is a partial cloverleaf interchange with an additional loop placed in the northeast quadrant of the interchange, to provide for a greater length for traffic to weave between Rivers Avenue and the I-26 interchange. The *Synchro* analyses indicated that the Rivers Avenue interchange would operate at acceptable LOS as a partial cloverleaf in the 2035 peak periods.

Exhibit 8-15: Rivers Avenue Alternate 2 – Partial Cloverleaf

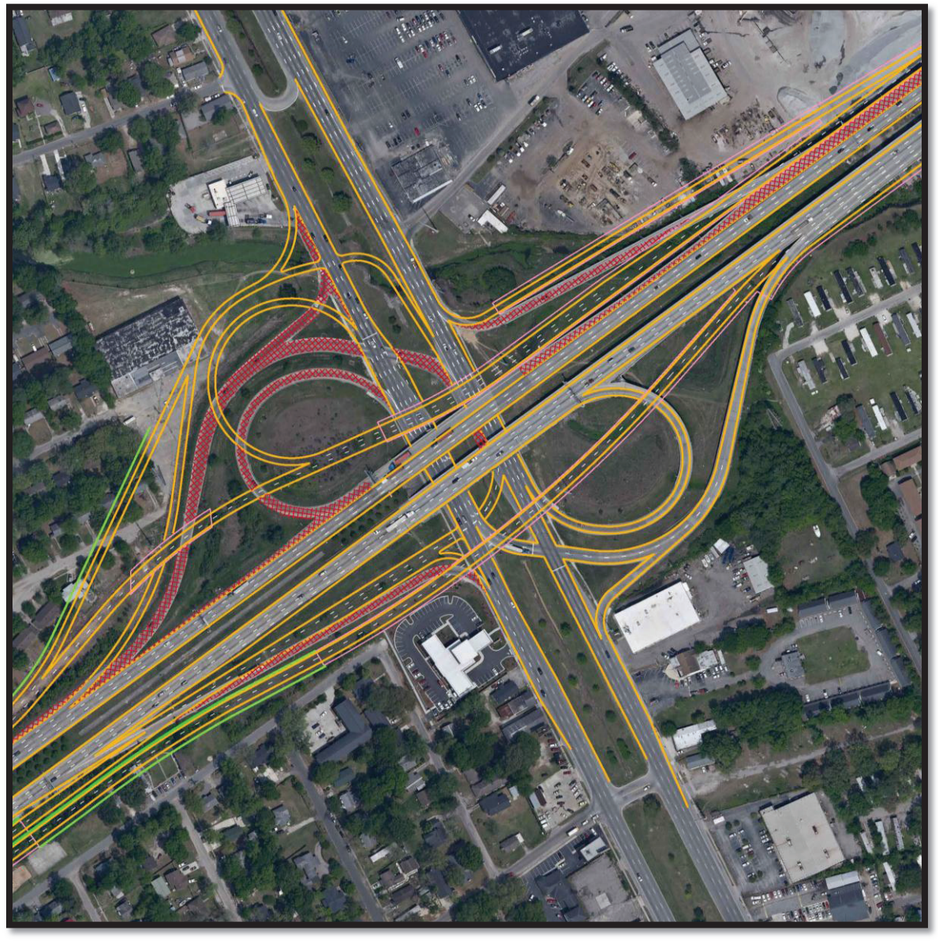


- **Alternate 3 – Partial Interchange:** The partial interchange alternate, illustrated in Exhibit 8-16, provides access to/from I-526 towards Mount Pleasant only. Traffic to/from the west towards I-26 would be accommodated by Remount Road or Montague Avenue. The removal of the movements to/from the west would resolve many of the deficiencies along I-526 between I-26 and Rivers Avenue and would present a significant cost savings; however, it was determined that the recommended alternate needed to provide for all existing movements, therefore this alternate was not considered for further study.

Exhibit 8-16: Rivers Avenue Alternate 3 – Partial Interchange

- **Alternate 4 – Maintain Existing Configuration:** This alternate, illustrated in Exhibit 8-17, maintains the existing interchange form and includes relocated ramps to accommodate the proposed CD road along I-526. The results of the *VISSIM* analyses indicate that the interchange will operate at acceptable LOS in the peak periods of the year 2035.

Exhibit 8-17: Rivers Avenue Alternate 4 – Maintain Existing Configuration



A summary of the analysis criteria for each alternate of the I-526 & Rivers Avenue interchange is provided in Table 8-5. Alternate 4 – Maintain Existing Configuration is recommended due to the minimal impacts to the interchange.

Table 8-5: I-526 & Rivers Avenue Evaluation Summary

Summary of Criteria	Alternate			
	1	2	3	4*
Number of Deficiencies Addressed	3 of 4	3 of 4	3 of 4	3 of 4
Utility Impacts	Low	Low	Low	Low
Right-of-Way Impacts	Medium	High	Low	High
Environmental Impact	Low	Low	Low	Low
Estimated Construction Costs	Medium	High	Low	High

*Recommended Alternate

8.4 Alternate Routes

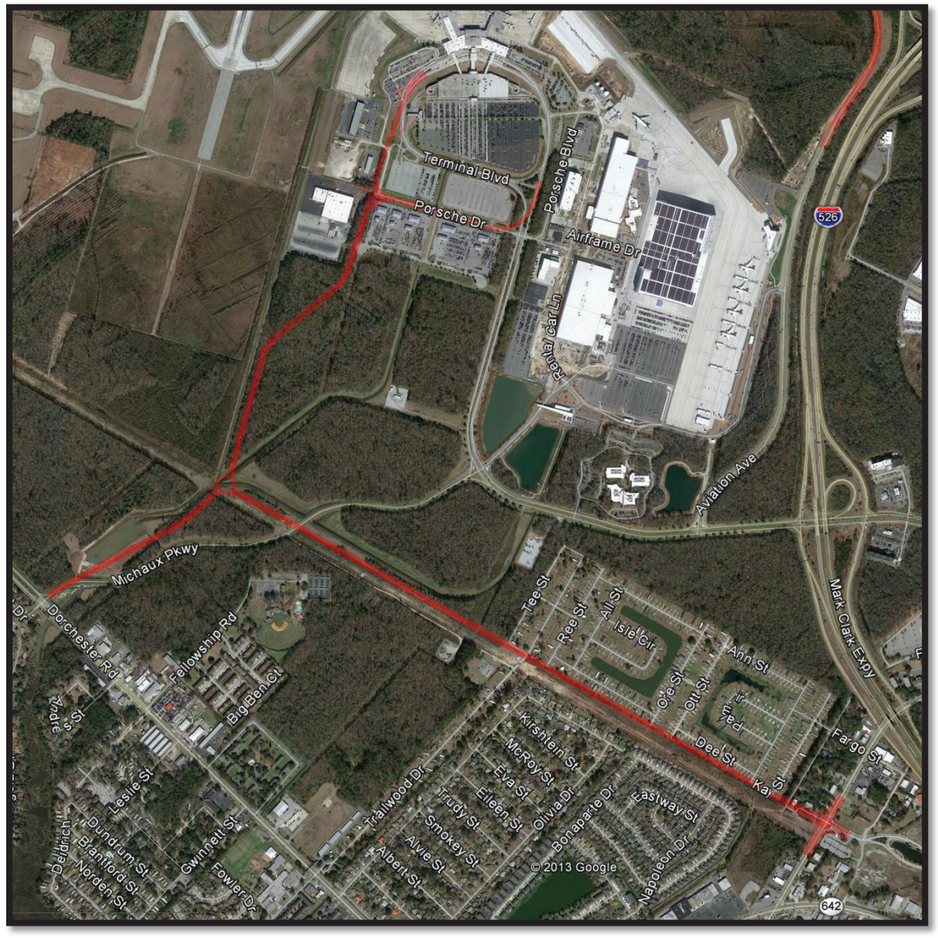
As part of the I-526 corridor analysis, two alternate/parallel routes were also considered and are described herein.

8.4.1 Michaux Parkway Connector

The Michaux Parkway Connector is an alternate route that will impact the heavy commuting traffic that currently utilizes International Boulevard and Michaux Parkway between Dorchester Road and I-526. A new roadway is planned to generally follow an existing power line easement, routing traffic from International Boulevard to Montague Avenue. The general alignment of the new roadway is illustrated in Exhibit 8-18.

It is anticipated that this new roadway connection to Montague Avenue will redistribute a potentially significant volume of traffic from the I-526 & International Boulevard interchange to the I-526 & Montague Avenue interchange. The results of the preliminary sketch planning analyses indicate that improvements to the I-526 & Montague Avenue interchange will likely be necessary.

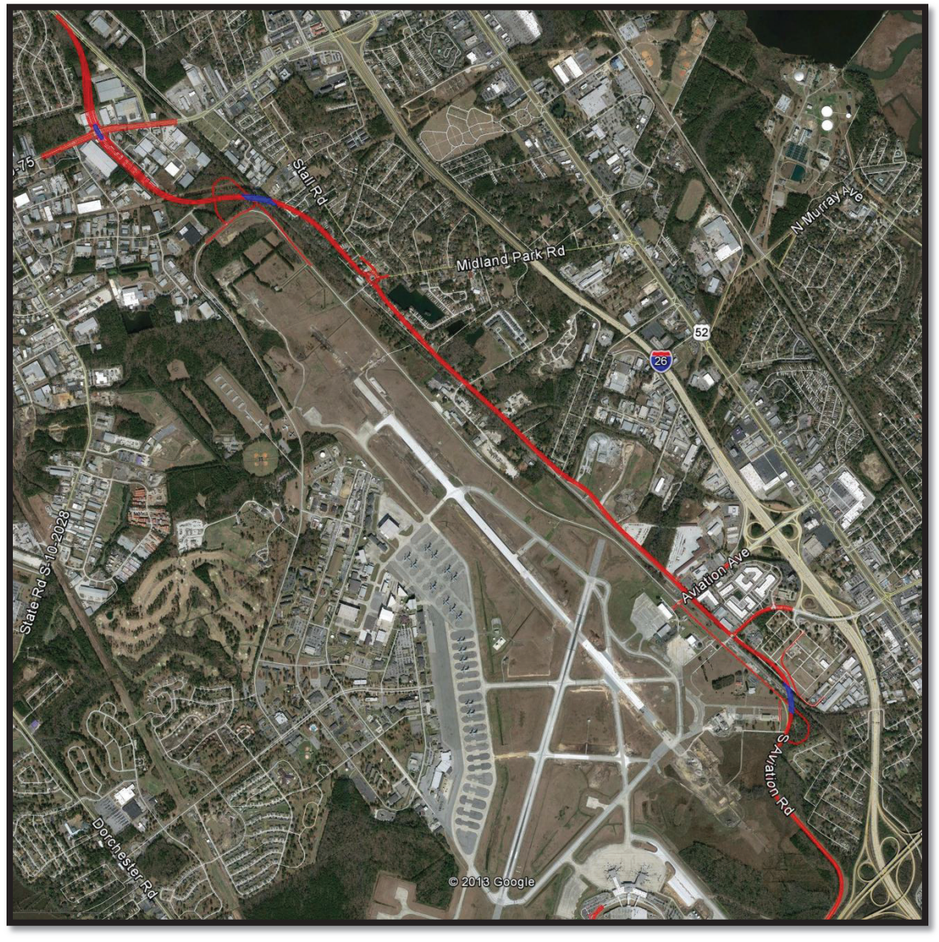
Exhibit 8-18: Michaux Parkway Connector



8.4.2 South Aviation Avenue Extension

The extension of South Aviation Avenue to Ashley Phosphate Road is an alternate route that will parallel I-26 and provide another access connection to the north for Charleston International Airport and Boeing traffic. The general alignment of the new roadway is illustrated in Exhibit 8-19.

Exhibit 8-19: South Aviation Avenue Extension



8.5 *VISSIM* Build Analyses

Detailed discussion of the *VISSIM* analyses which resulted in the recommended capacity improvement projects outlined in this Chapter is provided in Chapter 10.

8.6 Environmental Review

Using the recommend conceptual improvements, the project corridor was reviewed to determine if the human and natural environments would be impacted. As noted herein, the recommended conceptual improvements included mainline capacity improvements and interchange and intersection modifications. The project corridor was subdivided into 11 segments that were evaluated in detail, and are separated between this section and Chapter 9 for the I-26 & I-526 interchange area. This section describes seven of the project segments that do not impact the I-26 & I-526 interchange area.

It should be noted that no capacity improvements were proposed for the corridor's most sensitive natural area, the crossing of the Ashley River. Information on the corridor's human and natural environments was obtained from:

- Current and historical aerial photography,
- US Fish and Wildlife Service's (USFWS) National Wetlands Inventory (NWI) mapping,
- Threatened and endangered species list for Charleston County,
- Federal Emergency Management Agency (FEMA) Floodplain Insurance Rate Maps (FIRM),
- South Carolina Department of Archives and History (SCDAH) records,
- South Carolina Department of Health and Environmental Control (SCDHEC) records, and
- Limited investigations during site visits.

Table 8-6 provides a brief summary of the potential impacts of the recommended conceptual improvements on the adjacent human and natural environments. Additional detailed studies within the project corridor will be required to determine the presence and/or likely impact to wetlands, threatened and endangered species, and cultural/historic resources. The potential required detailed studies are detailed herein, along with a more detailed summary for each of the seven project segments that do not impact the I-26 & I-526 interchange area.

8.6.1 Environmental Documentation and Permitting

Federal regulations governing highways identify three specific types of environmental documents or classes of actions (23 CFR 771.115) to address the potential benefits and impacts to the human and natural environments be evaluated during the NEPA process. The three classes of actions are the Environmental Impact Statement (EIS), Categorical Exclusions (CE) and Environmental Assessments (EA). These documents would be reviewed by SCDOT and approved by FHWA.

Table 8-6: Environmental Impact Summary

Location	Route	Potential Wetland Impacts	Potential Floodplain Impacts	Potential Relocations		Potential Noise Receptors	Threatened & Endangered Species Impacts	Potential Cultural Resource Impacts
				Resid.	Comm.			
1) Paul Cantrell Boulevard	I-526	No	Yes	0	0	29	Unlikely	Unlikely
2) Leeds Avenue	I-526	No	Yes	0	0	9	Unlikely	Unlikely
3) Dorchester Road/ Paramount Drive	I-526	No	Yes	0	0	41	Unlikely	Unlikely
4) Montague Avenue	I-526	No	No	0	4	15	Unlikely	Unlikely
5) International Boulevard	I-526	Yes	No	0	0	5	Unlikely	Unlikely
10) Rivers Avenue Interchange	I-26	No	Yes	8	1	28	Unlikely	Unlikely
11) I-526 East of Rivers Avenue	I-526	Yes	Yes	0	0	45	Unlikely	Unlikely

In general, the size and scope of each improvement project will assist in determining which environmental document will most appropriately address the project's potential benefits and impacts. While it is unlikely that the entire project corridor would be evaluated as a single project, such a project would likely require an EIS due to its size. It is more likely that each project segment, individual interchange or combinations of interchanges in close proximity will be evaluated separately. In these cases, a series of EAs would be the

likely starting point to evaluate the projects' environmental impacts. Only minor projects with limited impacts such as resurfacing, restriping or interchange improvements requiring no or minimal new right of way would be appropriately evaluated with a CE.

Section 404 of the Clean Water Act (1972) requires the permitting of dredged or fill material being placed in wetlands or waters of the US as is often the case with road construction projects. The permit would be coordinated through the Charleston District of the US Army Corps of Engineers (USACE) and would mirror the NEPA document. While it is unlikely that the entire project corridor would be evaluated as a single project, such a project's potential impacts to wetlands from construction activities would require an approved individual permit from the USACE. Separate improvement projects to single or a grouping of interchanges may qualify to be permitted as a SCDOT general permit (GP) if certain impact thresholds are not exceeded. While the level of NEPA documentation is generally determined at the beginning of each project the required permits are more often determined once preliminary plans are developed and potential impacts are established.

8.6.2 Segment 1 – Paul Cantrell Boulevard

This segment includes the I-526 & Paul Cantrell Boulevard interchange, the I-526 mainline, and Paul Cantrell Boulevard between Magwood Drive and Tobias Gadson Boulevard. The I-526 mainline in this segment extends approximately 6,700 feet to the east (north) and 2,300 feet to the west (south) of the interchange. The adjacent land uses include undeveloped saltwater marsh, low and high density residential neighborhoods, commercial properties and undeveloped forested lands.

The USFWS NWI maps indicate that there are no wetland systems immediately adjacent to the I-526 mainline along this segment that would be impacted by the recommended improvements. A review of the FEMA FIRMs for this section indicates that the floodplain associated with the Ashley River approaches the interchange in each of the four quadrants. The recommended improvements would not likely result in any potential relocations. A review of this section of the project corridor indicated that approximately 29 noise receptors exist within 300 feet of the I-526 mainline.

8.6.3 Segment 2 – Leeds Avenue Interchange

This segment includes the I-526 & Leeds Avenue interchange, the I-526 mainline, and the Leeds Avenue approaches from both sides of the interchange. The I-526 mainline in this segment extends approximately 2,300 feet east (north) and 1,600 feet west (south) of the interchange. The adjacent land uses include commercial properties, warehousing and industrial sites.

The USFWS NWI maps indicate that there are no wetland systems adjacent to the I-526 mainline along this segment. A review of the FEMA FIRMs for this section indicates that the floodplain associated with the Ashley River approaches the interchange in the northeast, southeast, and southwest quadrants. The proposed improvements would not likely result in any potential relocations. A review of this section of the project corridor indicated that approximately nine noise receptors exist within 300 feet of the I-526 mainline.

8.6.4 Segment 3 – Paramount/Dorchester Interchange

This segment includes the I-526 & Dorchester Road/Paramount Drive interchange and the I-526 mainline approaches extending approximately 3,000 feet east (north) to 1,400 feet west (south) of the interchange. The adjacent land uses include residential neighborhoods, commercial properties and industrial sites.

The USFWS NWI maps indicate that there are no wetland systems adjacent to the I-526 mainline along this segment. A review of the FEMA FIRMs for this section indicates that a floodplain associated with a tributary to the Ashley River exists southeast of Paramount Road. The recommended improvements would not likely result in any potential relocations. A review of this section of the project corridor indicated that approximately 41 noise receptors exist within 300 feet of the I-526 mainline.

8.6.5 Segment 4 – Montague Avenue Interchange

This segment includes the I-526 & Montague Avenue interchange and the I-526 mainline and ramp approaches extending approximately 400 feet east (north) of the interchange to approximately 1,800 feet west (south) of the interchange. The adjacent land uses include a mixture of commercial, residential and industrial warehousing.

Being a previously urbanized and developed area, the USFWS NWI maps indicate that there are no wetlands present in this section; therefore, no wetland impacts are anticipated. A review of the FEMA FIRMs for this section indicates that no floodplains exist within or adjacent to the project corridor. The proposed improvements would likely result in four potential relocations due to the installation of the braided ramps between the Dorchester Road and International Boulevard interchanges. A review of this section of the project corridor indicated that approximately 15 noise receptors exist within 300 feet of the I-526 mainline.

8.6.6 Segment 5 – International Boulevard Interchange

This segment includes the I-526 & International Boulevard interchange and the I-526 mainline and ramp approaches extending approximately 4,100 feet east (north) of the interchange to approximately 2,000 feet

west (south) of the interchange. The adjacent land uses are primarily undeveloped forests as this section of I-526 is adjacent to and includes portions of the Charleston International Airport and Joint Base Charleston.

The USFWS NWI maps indicate that freshwater wetland communities border the eastern and western sides of the I-526 mainline. New ramp construction associated with the proposed braided ramp configuration would likely impact wetlands in this section. However, a review of the FEMA FIRMs indicates that no floodplains exist within or adjacent to the project corridor. The recommended improvements would not likely result in any potential relocations between the International Boulevard and I-26 interchanges. A review of this section of the project corridor indicates that approximately five noise receptors exist within 300 feet of the I-526 mainline.

8.6.7 Segment 10 – Rivers Avenue Interchange

This segment includes the I-526 & Rivers Avenue interchange and its approaches from each of the four cardinal directions extending approximately 1,700 feet west to 1,000 feet east of the interchange along I-526 and approximately 1,300 feet north of the interchange (near Chime Street) to approximately 800 feet south of the interchange (near Rebecca Street) along Rivers Avenue. The adjacent land uses several residential neighborhoods and commercial properties along Rivers Avenue.

The USFWS NWI maps indicate that there are no wetland communities adjacent to the I-26 mainline. A review of the FEMA FIRMs for this section indicates that floodplains exist within the project section. The proposed improvements would likely result in four potential relocations due to the installation of new ramps in the northeast and southeast quadrants of the interchange. A review of this section of the project corridor indicated that approximately 28 noise receptors exist within 300 feet of the I-526 mainline.

8.6.8 Segment 11 – I-526 East of Rivers Avenue

This segment includes the I-526 mainline east of the Rivers Avenue interchange extending approximately 5,650 feet. The adjacent land uses includes forested areas associated with Filbin Creek along with several residential neighborhoods.

The USFWS NWI maps indicate that there are freshwater wetland systems both to the north and south of the I-526 mainline corridor. A review of the FEMA FIRMs for this section indicates that floodplains associated with Filbin Creek do also exist along both sides of the I-526 corridor within the project section. While the recommended improvements would not likely result in any potential relocations, a review of this section of the project corridor indicated that approximately 45 noise receptors exist within 300 feet of the I-526 mainline.

8.7 Summary – Capacity Improvement Strategies

Conceptual plans illustrating the recommended improvement alternates for the I-526 mainline and study area interchanges are provided in Appendix A.

For the capacity improvement strategies, the measure of effectiveness was based upon the *VISSIM* analyses results, which are documented in chapter 10. Based upon the recommendations of the capacity improvements for the I-526 mainline and each of the study interchanges discussed in this chapter, Table 8-7 summarizes details the Capacity Improvement strategies considered for in the analysis, including approximate implementation costs.

Included in Table 8-7 is the recommended timing of the improvement strategies, which was based upon additional interim-year *VISSIM* Build analyses as well as service volume information documented in the Transportation Research Board's *Highway Capacity Manual* (2010).

Table 8-7: Capacity Improvement Summary

LABEL	STRATEGY DESCRIPTION	TIMING	COST	ASSOCIATED STRATEGIES
CAP 1	Improve I-26 & I-526 Interchange (Alternate 7)	2020	$256,500,000	
CAP 2	Widen I-526 to a six-lane section between Paul Cantrell Boulevard to Rivers Avenue	2020	$100,900,000	OPS 29
CAP 3	Construct braided ramps along I-526 eastbound between Montague Avenue and International Boulevard	2020	$5,800,000	
CAP 4	Construct triple left-turn lanes to I-526 eastbound from Paul Cantrell Boulevard eastbound	2020	$15,700,000	CAP 5
	Extend I-526 eastbound acceleration lanes from Paul Cantrell Boulevard to the Ashley River Bridge			
CAP 5	Construct Two-lane exit ramp from I-526 westbound to Paul Cantrell Boulevard westbound	2020	$16,000,000	CAP 4
CAP 6	Improve I-526 & US 17/Sam Rittenberg Boulevard Interchange (MCE Alternate G)	2025	$77,100,000	OPS 1, OPS 2, OPS 3, OPS 4
	Improve I-526 & US 17/Sam Rittenberg Boulevard Interchange (MCE No Build)		$7,500,000	
CAP 7	Improve I-526 & International Boulevard Interchange	2025	$109,300,000	
	Construct Braided ramps along I-526 eastbound and westbound between I-26 and Dorchester Road			
CAP 8	Improve I-526 & Paul Cantrell Boulevard Interchange	2030	$16,800,000	CAP 9
CAP 9	Improve Paul Cantrell Boulevard & Magwood Drive Interchange	2030	$27,800,000	CAP 8