PALMETTO COMMERCE PARKWAY 3

TECHNICAL MEMORANDUM:

Traffic Study / Alternatives Analysis / Statement of Work

Prepared for:

CHARLESTON COUNTY
SOUTH CAROLINA

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June 2022

PALMETTO COMMERCE PARKWAY 3

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DOCUMENT PURPOSE

This Statement of Work (SOW) describes the justification, impacts and benefits of a proposed new roadway between Ashley Phosphate Road and Remount Road. This initiates Charleston County's request for an easement to build the new roadway across Parcel No. 475-00-00-024, owned by the United States Air Force. A request for a waiver for the new roadway in the clear zone of Runway 15 and Runway 21 was completed and approved at the JB Charleston level in 2021 but has not received any traction since leaving the base level. Charleston County is now attempting to secure an easement through JB Charleston property that is needed for the new roadway. It is the hope of the county that securing this right of way will then allow for the clear zone waiver to be approved.

EXECUTIVE SUMMARY

The Palmetto Commerce Parkway Phase 3 (PCP3) Project is the third and final segment of a corridor that will connect Ladson Road to Remount Road, providing a parallel route to Interstate 26 (I-26) and Rivers Avenue (US 52). The current southern (or eastern) terminus of Palmetto Commerce Parkway is at its intersection with Ashley Phosphate Road.

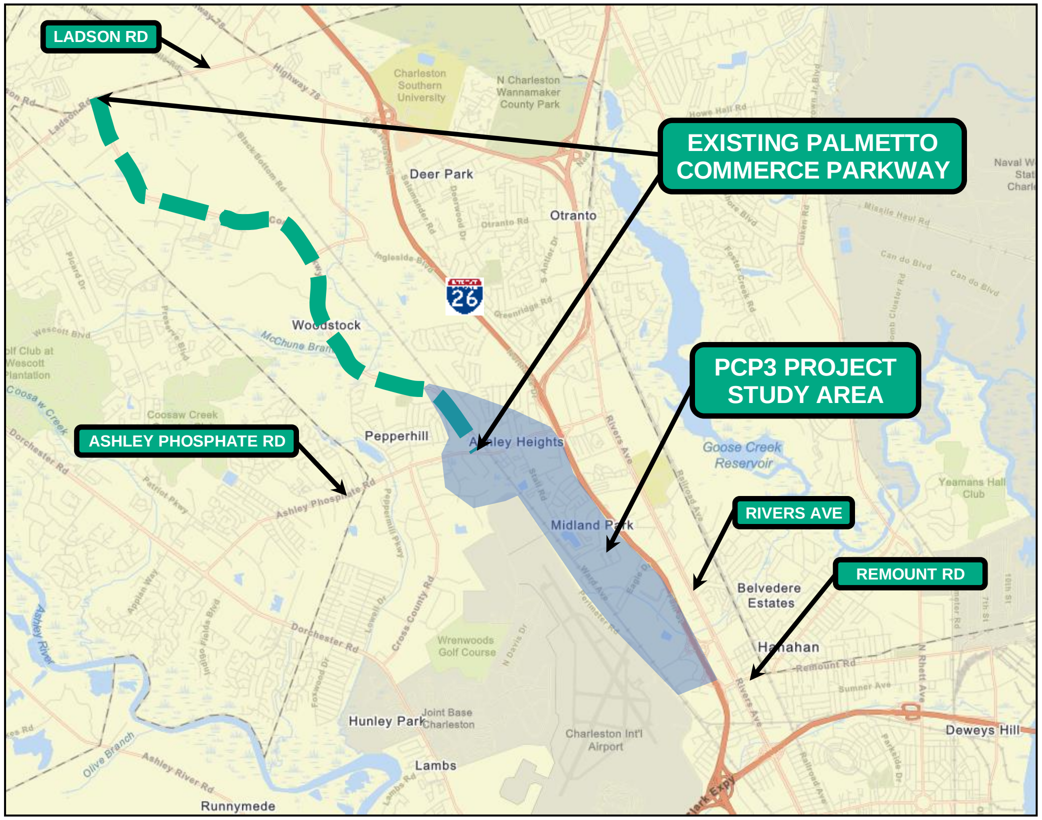
The final segment of Palmetto Commerce Parkway will include a grade-separated interchange over Ashley Phosphate Road, as well as a grade separated crossing over the Norfolk Southern Railroad, connecting with Midland Park Road, West Aviation Avenue, and terminating at Remount Road.

Figure ES-1 illustrates the limits of the existing Palmetto Commerce Parkway, and the study are for the final segment.

The roadway will include two lanes in each direction with a landscaped median. Median breaks will be provided at intersections where access is warranted. Bicycle and pedestrian facilities will be on one side of the roadway.

This traffic study will describe the need for the project based on existing and future forecasted traffic conditions. It will also describe the development and traffic-based screening of the range of alternatives.

FIGURE ES-1: Palmetto Commerce Parkway



PROJECT NEED

The South Carolina Department of Transportation (SCDOT) 2040 Multimodal Transportation Plan states in its Interstate Plan[1] that, in the Charleston area, the primary eastbound congestion point along I-26 occurs in the AM peak hour between the US 52 Connector and West Aviation Avenue, and the primary westbound congestion point along I-26 occurs between Montague Avenue and Ashley Phosphate Road.

The Berkeley Charleston Dorchester Council of Governments (BCDCOG) Long Range Transportation Plan summarizes the traffic Level of Service (LOS) based on volume to capacity (v/c) ratios for the corridors included in its Congestion Management Process[2] (CMP). The CMP corridors are designated because of their importance to regional mobility. The CMP indicates the following:

- I-26 operated at LOS F, and traffic volumes grew and an annual rate of 5.2% between 2015 and 2019 (22% total in four years).
- Ashley Phosphate Road operated at LOS F between Cross County Road and Palmetto Commerce Parkway.
- Ashley Phosphate operated at LOS D between Palmetto Commerce Parkway and I-26.
- Ashley Phosphate operated at LOS E between I-26 and Rivers Avenue.
- Rivers Avenue operated at acceptable LOS through 2014, but volume has since grown by an annual rate of 4.3% (18% total).
- Cross County Road and Dorchester Road were beyond capacity in 2014. This is an alternative route to traveling I-526 and I-26 south of Ashley Phosphate Road.
- The Ashley Phosphate Road interchange on I-26 is one of twelve recurring bottlenecks on congestion management corridors in the BCD region. The "recurring" designation indicates that it is a bottleneck at the same locations during peak travel periods. It is also designated as a non-recurring bottleneck, or one that is subject to congestion due to crashes, disabled vehicles, work zones or adverse weather events.

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[1] South Carolina Department Transportation (2014). *South Carolina Multimodal Transportation Plan, Interstate Plan.* https://www.scdot.org/multimodal/pdf/SC_MTP_Interstate_Plan_FINAL.pdf
[2] Berkeley-Charleston-Dorchester Council of Governments (2019). Congestion Management Process, CHATS Long Range Transportation Plan. https://bcdcog.com/wp-content/uploads/2015/12/CMP-Report-Final-012819.pdf

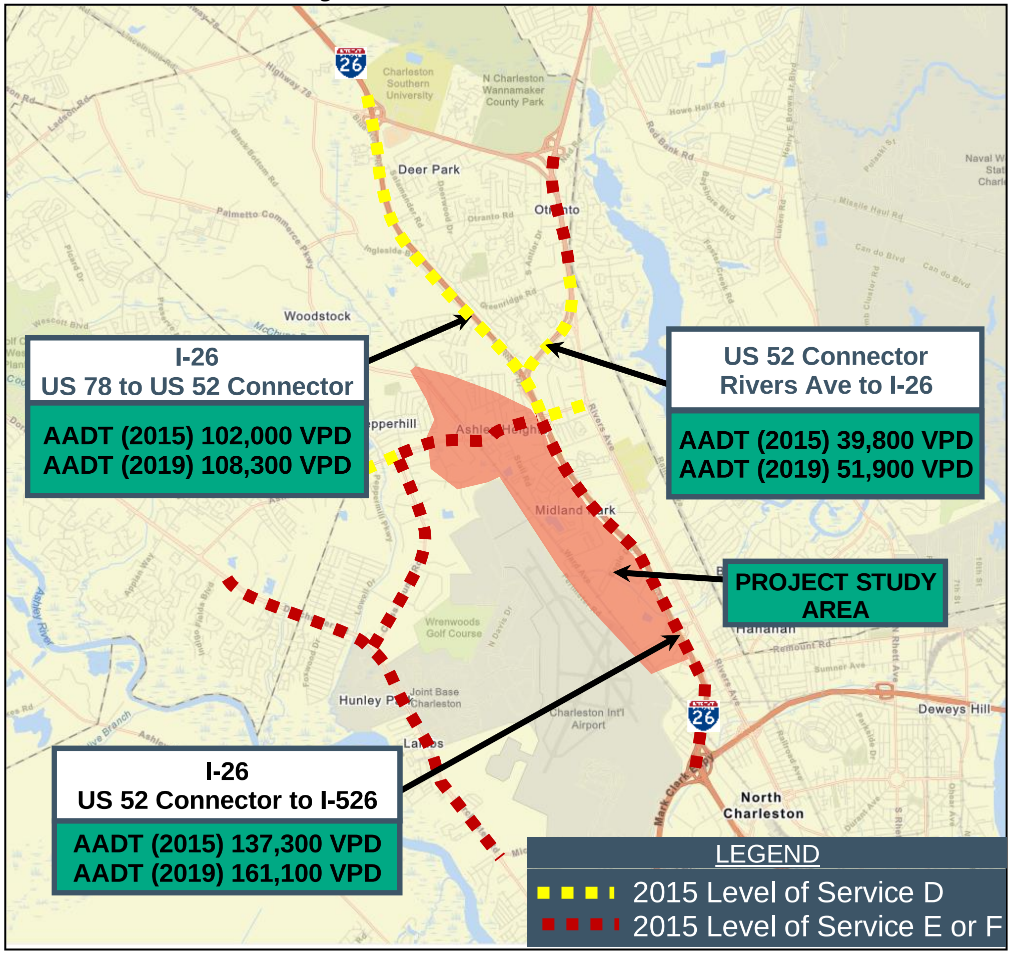
The US 52 Connector links Rivers Avenue north of Ashley Phosphate Road to I-26 immediately west of the Ashley Phosphate Road interchange. The US 52 Connector provides access to I-26 for commuters from Goose Creek and Moncks Corner, and rapidly growing parts of Berkeley County. According to Average Annual Daily Traffic Volumes (AADT) provided by SCDOT, daily traffic volumes on the US 52 Connector grew from 39,800 vehicles per day in 2015 to 51,900 in 2019. These volumes are approximately equal to the difference in AADT between the two adjoining sections of I-26. The daily volumes on I-26 east of the US 52 Connector were 49 percent higher than the adjoining section between US 78 and the US 52 Connector.

I-26 east of the US 52 Connector includes four lanes in each direction (including one of the westbound collector-distributor lanes), while the adjoining section of I-26 to the west includes three lanes in each direction. The additional lane is not adequate for the added traffic demand. In 2015, I-26 operated at LOS D and LOS F on the west and east sides of the US 52 Connector, respectively.

Figure ES-2 includes a map of these roadways, including their 2015 and 2019 AADT and 2015 LOS. The project study area for the Palmetto Commerce Parkway Phase 3 project is also shown on the figure.

The SCDOT plans to construct capacity improvements along the I-526 corridor between Virginia Avenue and Paul Cantrell Boulevard with the 526 Lowcountry Corridor (526 LCC) Project.[3] That project, particularly the overhaul of the system-to-system interchange of I-26 and I-526, will help reduce congestion on I-26 between

FIGURE ES-2: Network Congestion and Traffic Growth



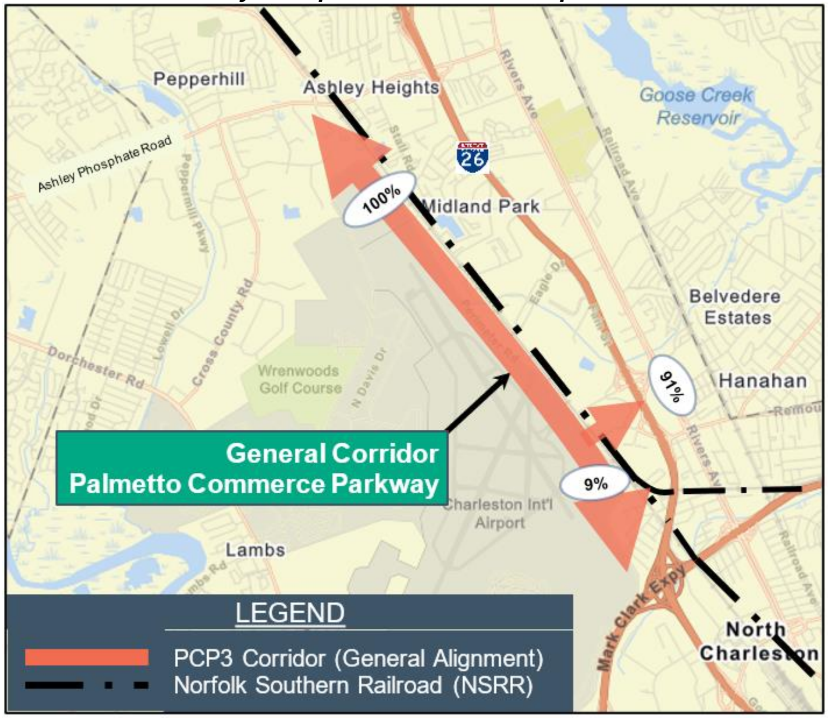
[3] South Carolina Department of Transportation (2020). *526 Lowcountry Corridor West*. https://www.526lowcountrycorridor.com/west/

West Aviation Avenue and Montague Avenue. That project will not, however, reduce congestion between West Aviation and the US 52 Connector, or Ashley Phosphate Road. There are no provisions in the current Long-Range Transportation Plan (LRTP) to widen or otherwise add capacity to I-26 between West Aviation Avenue and US 78.

The Charleston Area Transportation Study (CHATS) travel demand model, developed and maintained by BCDCOG, was used to establish the logical termini of the PCP3 project. The northern terminus is fixed, as the corridor currently ends at Ashley Phosphate Road.

The southern terminus was originally considered to be International Boulevard. This was re-evaluated in the current version of the model, considering the 526 LCC and a new Airport Connector Road are completed. The model results indicate that, when PCP3 is extended to Remount Road and West Aviation Avenue, approximately 91% of the traffic on PCP3 is carried to or from the direction of I-26 on these two roads. The remaining traffic, connecting with South Aviation Avenue between Remount Road and International Boulevard, does not exceed the capacity of South Aviation Avenue. This trip distribution is illustrated in **Figure ES-3**. Remount Road was therefore determined to be the logical southern terminus for the project. The width of the study area for the evaluation of alternative alignments was then established between I-26 on the east and South Aviation Avenue on the west.

FIGURE ES-3: Ashley Phosphate to Remount Trip Distribution



The Norfolk Southern Railroad, also shown in **Figure ES-3**, is another important consideration for the PCP3 corridor. This railroad carries intermodal and commodity traffic, and in the vicinity of West Aviation Avenue and Remount Road, provides siding for delivery of aggregate cars to the Vulcan Materials aggregate storage yard. The at-grade crossings at these two streets are frequently blocked while switching occurs, or whenever trains leave the Seven Mile Yard. The freight traffic on these tracks is expected to increase with the completion of South Carolina State Ports Authority's Hugh K. Leatherman Terminal and the adjoining Navy Base Intermodal Facility (NBIF). The Final Environmental Impact Statement (EIS) prepared for the NBIF forecasts four new intermodal trains per day on this track, each having an average length greater than 8,000 feet. The EIS estimates that by 2038, these trains will occupy the nearby at-grade crossing of Rivers Avenue for 10 minutes and 52 seconds, creating a vehicular queue on

Rivers Avenue greater than one mile, and adversely affecting traffic on Interstate 526[4]. The trains are expected to occupy the crossings at Remount Road, West Aviation Avenue, and Ashley Phosphate Road for similar durations. Vehicular traffic volumes on Ashley Phosphate Road are 80 percent greater than those on Rivers Avenue at these at-grade rail crossing locations. The Norfolk Southern Railroad forms a barrier to the dominant travel patterns predicted by the CHATS travel demand model for the last segment of Palmetto Commerce Parkway. The forecasted increase in freight rail traffic on this line would diminish the effectiveness of the PCP3 project, unless a grade separated crossing of these tracks is incorporated in the project. The only other grade separated crossing of these tracks between I-526 and Ashley Phosphate Road is on I-26, the corridor that the PCP3 project seeks to relieve.

CORRIDOR ALIGNMENT ALTERNATIVES

A range of alternative alignments were developed using combinations of segments of existing roadway and new alignment and were screened based on two tier traffic operational criteria:

> **Traffic Tier 1 Criteria:** Extent to which the alignment alternative provided the intended relief to the congested corridors (I-26, Rivers Avenue, Ashley Phosphate Road.
>
> **Traffic Tier 2 Criteria:** The Level of Service (LOS) at the intersection with existing roadways, particularly the key connections at Ashley Phosphate Road, West Aviation Avenue and Remount Road.

A variety of alignments were evaluated to connect the western terminus near Ashley Phosphate Road to the eastern terminus at Remount Road using the CHATS model.

The first-tier screening determined the extent to which a given alignment would attract traffic from the corridors for which the project is intended to provide traffic relief, leading to three of the 16 preliminary alternative alignments being carried forward to the second-tier screening, each of which included a connection of PCP3 to Ashley Phosphate Road at a new intersection west of the existing Palmetto Commerce Parkway & Ashley Phosphate Road intersection, and an alignment that lies adjacent and generally parallel to the existing Norfolk Southern Railroad right-of-way.

The second-tier screening used a GIS-based desktop evaluation to compare the relative community and environmental impacts of the three alternative alignments carried forward from the first-tier screening process. The results of the second-tier screening showed

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[4] Atkins North America, Inc. for U.S. Army Corps of Engineers (2016). *Proposed Navy Base Intermodal Container Transfer Facility, Transportation Analysis Technical Memorandum*.

that two alternatives, Alternatives D and D1, were suitable to be carried forward as reasonable alternatives. Alternatives D and D1 have very similar alignments – the difference being that Alternative D assumes the proposed PCP3 roadway will occupy a portion of the railroad right-of-way, while Alternative D1 assumes PCP3 is shifted to the east just out of the railroad right-of-way. The latter was developed to account for the possibility that an agreement is not reached with the railroad to share its right-of-way. From a traffic volume forecast and traffic analysis perspective, the two alternatives are identical.

The process of screening these 16 alternatives down to Alternative D as Charleston County's recommended build alternative is described in detail in **Appendix A.**

TRAFFIC FORECAST

Existing condition AM and PM peak hour traffic volumes were collected at the 27 intersections in the study area in October of 2018. Using trip projections from CHATS travel demand model for the No-Build and Build condition, future traffic volumes for the design year (2045) No-Build and Build conditions were determined. These traffic volumes served as the basis for intersection design recommendations along the proposed PCP3 corridor as well as for the study area intersection capacity comparison between the No-Build and Build conditions. The process of developing peak hour design volumes is documented in **Appendix B**.

The design year is normally chosen to be at least 20 years after the year that the project is expected to be opened to traffic. In this case, Charleston County has selected 2045 as the design year. The forecasted volumes were used to develop intersection alternatives. The alignment defined by Alternative D was coupled with the preferred alternative for intersections that were developed as documented in **Appendix C**, to define the conditions for the study area capacity analysis. This analysis is a comparison of the existing conditions, design year no-build conditions, and the design year build conditions (PCP3 is completed).

STUDY AREA CAPACITY ANALYSIS

The capacity Along Dorchester Road, the Build condition is anticipated to improve intersection LOS south of Ashley Phosphate, drawing traffic away from this north-south route via PCP3 as an alternative. However, the intersection of Dorchester Road & Ashley Phosphate Road is anticipated to experience slightly worse LOS in the Build condition due to increased left- and right-turning movement volumes to and from Ashley Phosphate bound to/from the proposed PCP3. However, this intersection is anticipated to experience failing level of service in the PM Peak Hour of the No-Build conditions and therefore is likely to warrant improvements with or without the PCP3 project.

Traffic volumes along Ashley Phosphate Road between Dorchester Road and PCP3 are anticipated to be slightly higher in the Build conditions than in the No-Build conditions, due to increased demand created by the alternative north-south corridor of PCP3, leading to slightly worse LOS conditions along this section of the corridor. However, many of the intersections along Ashley Phosphate Road between Dorchester Road and PCP3 are anticipated to experience undesirable level of service in the No-Build conditions, thereby likely warranting improvements with or without the PCP3 project.

Along Ashley Phosphate Road east of PCP3, the traffic volumes are anticipated to be significantly reduced in the Build conditions compared to the No-Build conditions, leading to significantly improved levels of service (in some cases from failing LOS to acceptable LOS) at the intersections along this segment of Ashley Phosphate, including the ramp terminal intersections with I-26 eastbound and westbound.

The LOS/delay at the intersection of Palmetto Commerce Parkway/PCP3 & Ashley Phosphate Road is anticipated to be significantly improved in the Build condition compared to the No-Build condition, due to the proposed Single-Point-Urban-Interchange at this intersection, as discussed in Chapter 4 of this report. This stands to reason, as significant capacity improvements at this intersection are associated with this interchange.

The level of service and delay at the intersection of Palmetto Commerce Parkway & Weber Boulevard is anticipated to be comparable in both the No-Build and Build conditions, though the LOS at this intersection is anticipated to be failing in both the AM and PM peak hours, regardless. This indicates that improvements to the intersection may be warranted with or without the PCP3 project.

At the intersection of Ingleside Boulevard & US 78, control delay at the intersection is anticipated to be slightly improved in the Build condition, though not by a large enough margin to provide a different LOS grade.

The LOS/delay at the intersections along Midland Park Road are anticipated to be significantly improved in the Build condition, as traffic demand along Midland Park Road and along Stall Road is reduced by the addition of PCP3.

The study area intersections along Rivers Avenue (between and including Ashley Phosphate Road and Remount Road) are anticipated to experience improved LOS/delay in the Build conditions, due to the traffic demand diverted from Rivers Avenue to the alternative north-south route of the proposed PCP3 corridor. Notable improvements to intersection LOS are anticipated at the intersections of Rivers Avenue & Ashley Phosphate Road, Rivers Avenue & Midland Park Road, and Rivers Avenue & Remount Road.

Intersections along Aviation Avenue are anticipated to experience higher delays/LOS in the Build condition, due to the significantly increased demand along this route destined for PCP3 northbound. However, as was discussed in Chapter 4, these delays and LOS are anticipated to be within an acceptable LOS threshold and operate such that 95th percentile queues do not extend beyond the ramps onto I-26.

Intersections along Aviation Avenue are anticipated to experience slightly higher delays in the Build condition, due to the significantly increased demand along this route originating from PCP3 southbound. However, as was discussed in Chapter 4, these delays and LOS are anticipated to be within an acceptable LOS threshold and operate such that 95th percentile queues do not extend beyond the ramps onto I-26.

COORDINATION WITH JOINT BASE CHARLESTON

This document provides the methodology and results of an alternative screening process that produced Charleston County's recommended alternative. The PCP3 project is an important transportation project that addresses challenges that can be observed today – congestion on surrounding corridors of Ashley Phosphate Road, Interstate 26, Dorchester Road and Rivers Avenue.

Another project that is currently under construction, the Hugh Leatherman Container Terminal and associated Navy Base Intermodal Facility, will worsen the daily traffic conditions immediately bordering Joint Base Charleston with the addition of four new intermodal freight trains per day blocking at Norfolk Southern Railroad's at-grade crossings on Ashley Phosphate Road, Midland Park Road, West Aviation Avenue, and Remount Road.

The PCP3 project is a four-lane facility connecting Ashley Phosphate to West Aviation Avenue and Remount Road and will provide grade separated crossings of Ashley Phosphate Road, as well as the Norfolk Southern Railroad. This only other grade-separated crossing over this railroad for over 200,000 daily commuters is Interstate 26, considering the combined daily traffic volume of Dorchester Road, I-26, and Rivers Avenue. In addition to the benefits of the PCP3 project, both in terms of congestion relief and system reliability, the facility will also enhance access to Joint Base Charleston. The Rivers Gate is located at the end of South Aviation Road and serves as the designated commercial vehicle point of entry to the base. The PCP3 project will enable commercial vehicles, and all other vehicles using this gate, to reach this gate without traveling through the graded areas of clear zones of Runway 21 or Runway 15 as they do today. PCP3 would enable South Aviation Avenue, which also passes through the graded areas of these runways, to be closed to commercial and all public traffic.

ASSESSING RISKS TO RUNWAY CLEAR ZONES & ACCIDENT POTENTIAL ZONES

The US Air Force must evaluate the potential risks associated with the proposed PCP3 project. Specifically, this relates to the proposed project passing through the clear zones of Runways 15 and 21.

For Runway 15, the project moves public traffic from South Aviation to PCP3. The proposed PCP3 will be located along the existing Ward Avenue. The project also permanently removes the section of Midland Park Road between Stall Road and South Aviation Avenue. This is a section that is closed periodically by Joint Base Charleston under certain security conditions. South Aviation Avenue is parallel to and 847 feet offset from the centerline of Runway 15/33. The offset from Runway 15/33 to proposed PCP3 (existing Ward Avenue) varies but measures 1,326 feet at the intersection with Midland Park Road.

The PCP3 project also passes through the clear zone of Runway 21. Similar to Runway 15, the public traffic is moved out of the graded area of the clear zone, but the volume of traffic will increase significantly. Based on traffic control and the future delays forecast by the expected increase in train traffic, this document includes a comparative analysis of no-build and build conditions and the corresponding maximum number of vehicles present in the clear zone during the peak traffic hour of the day.

By virtue of its purpose, PCP3 is forecast to attract more traffic than South Aviation Avenue. The Air Force must determine whether moving the public traffic out of the graded area of these clear zones, is more or less of a risk to its mission at Joint Base Charleston.

The proposed PCP3 is a controlled access facility between Ashley Phosphate Road and Midland Park Road. The only access point within this section is within APZ1 and is exclusively for access to the Joint Base Charleston commercial gate. South of Midland Park, the proposed access is restricted to accommodate existing land use. It is important to note that the northbound and southbound lanes of the proposed PCP3 are divided by a raised median. The individual driveways along what is currently Ward Avenue will be limited to right in/right out with PCP3. Public street intersections with PCP3 will include a median break for left turns.

Chapter 7 provides a comparative traffic analysis of the maximum number of vehicles within the clear zone of Runway 21 under no-build and build conditions, respectively. A comparison of the position of the vehicles to the runways 15 and 21 are also shown to assist in assessing project risks.

Chapter 8 provides an overview of property acquisition that will result from the PCP3 project, as well as potential parcels for which property rights might be secured along the PCP3 corridor through the Readiness and Environmental Integration (REPI) Program.

Charleston County is assisting in the identification of partners to take advantage of the REPI funds in support of the Air Force missions at Joint Base Charleston and requests the guidance of Joint Base Charleston and the Air Force to integrate the PCP3 project with this process.

1.0 INTRODUCTION

Interstate 26 (I-26) extends from Interstate 240 in Asheville, North Carolina to US Highway 17 in Charleston. Within South Carolina, I-26 interchanges with Interstates 85 and 585 in Spartanburg area, Interstate 385 south of Greenville, Interstates 20, 126 and 77 in Columbia, Interstate 95 south of Orangeburg, and Interstate 526 in North Charleston.

In the Charleston area, the primary eastbound congestion point along I-26 occurs in the AM peak hour between the US 52 Connector and West Aviation Avenue, and the primary westbound congestion point along I-26 occurs between Montague Avenue and Ashley Phosphate Road. These bottlenecks were identified in the SCDOT 2014 Multimodal Transportation Plan.

Table 1 lists the Average Annual Daily Traffic (AADT) at SCDOT count stations on I-26, Rivers Avenue, Ashley Phosphate Road, and the US 52 Connector. These traffic volumes are shown for 2014, the year of the SCDOT plan, and 2018, the most recent year of counts available.

Table 1: Freeway and Arterial Traffic Growth – Ashley Phosphate to I-526

Route	From	To	SCDOT Station	2014 LOS	AADT		Annual Growth
					2014	2019	
I-26	US 78	US 52 Connector	2187		98,200	108,300	2.0%
I-26	US 52 Connector	West Aviation Avenue	2161	E	132,400	161,900	5.2%
Rivers Avenue	Ashley Phosphate Road	West Aviation Avenue	159	C	40,100	47,400	4.3%
Ashley Phosphate Road	Palmetto Commerce Parkway	I-26	440	F	58,000	61,000	1.3%
US 52 Connector	Rivers Avenue	I-26	172	D	32,600	41,600	6.3%

Source: SCDOT

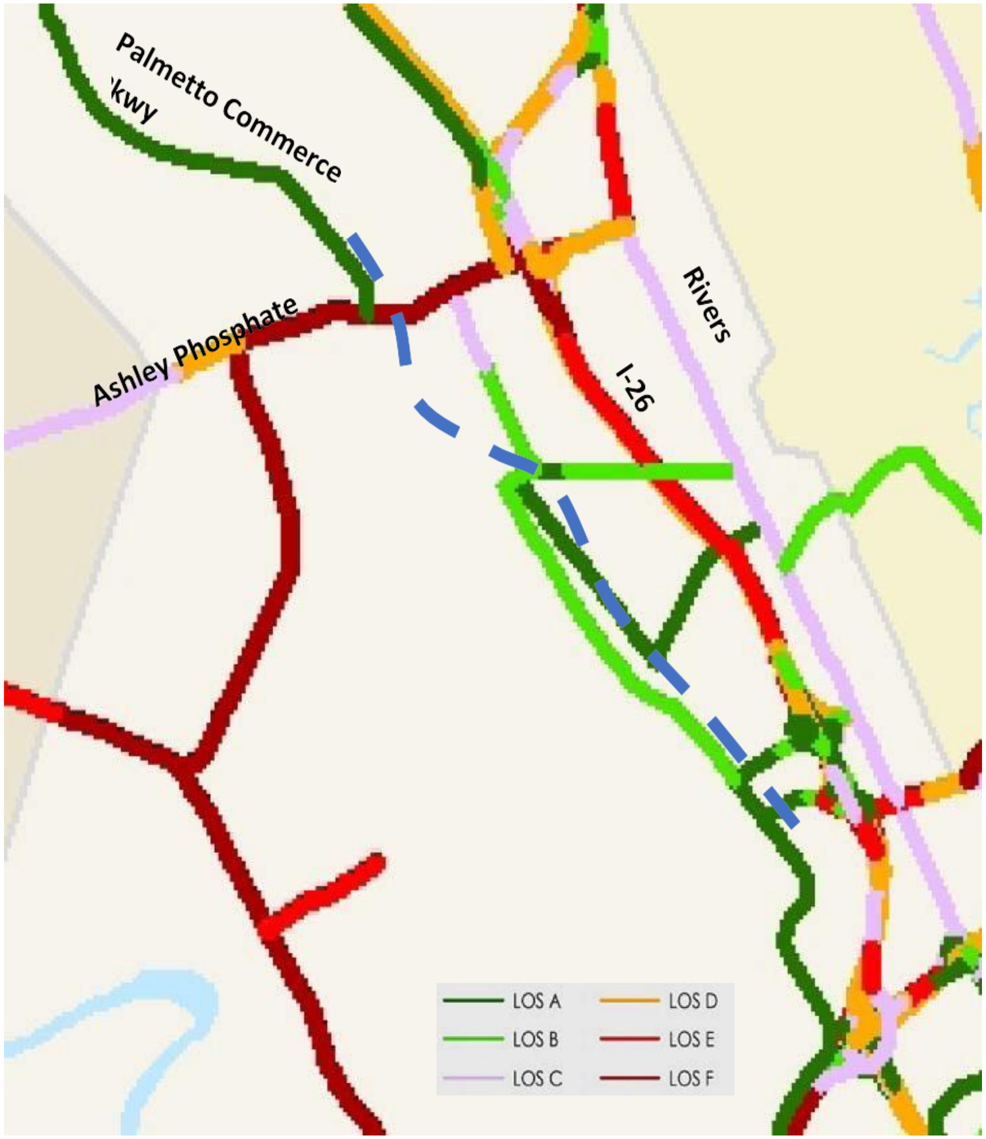
The Berkeley Charleston Dorchester Council of Governments (BCDCOG) Long Range Transportation Plan summarizes the traffic level of service based on volume to capacity ratios for collector and arterial routes throughout the region on a map. **Figure 1** is a capture of the portion of that map covering the area along the I-26 corridor from Ashley Phosphate Road to I-526. The roadways are color coded to reflect their level of service in 2015 (using 2014 traffic volumes), and indicate the following:

- I-26 was close to failure in 2015 prior to the 5.2% annual growth experienced over the past 4 years (22% total).
- Ashley Phosphate Road is beyond capacity.
- Rivers Avenue operated at acceptable LOS through 2014, but volume has grown by an annual rate of 4.3% (18% total).
- Cross County Road and Dorchester Road were beyond capacity through 2014. This is an alternative to traveling I-526 and I-26 south of Ashley Phosphate Road.

The LOS shown for these corridors are based on planning level capacities. They do not account for the full effects of over-capacity intersections on the surface streets, or geometric deficiencies on the freeway (I-26). Rivers Avenue includes unacceptable intersection LOS at Remount Road, for example.

The SCDOT will construct capacity improvements along the I-526 corridor between Virginia Avenue and Paul Cantrell Boulevard with the 526 Lowcountry Corridor Project. That project, particularly the overhaul of the system-to-system interchange of I-26 and I-526, will help reduce congestion on I-26 between West Aviation Avenue and Montague Avenue. That project will not, however, reduce congestion between West Aviation and the US 52 Connector (Ashley Phosphate Road), or beyond to US 78. There are no provisions in the current Long-Range Transportation Plan (LRTP) to widen or

Figure 1: Long Range Transportation Plan – 2015 (Actual Level of Service)



Source: Berkley Charleston Dorchester Council of Governments otherwise add capacity to I-26 between West Aviation Avenue and US 78. A new parallel corridor is needed.

Palmetto Commerce Parkway was constructed in two phases between Ladson Road to Ashley Phosphate Road. The third and final phase of the project, Palmetto Commerce Parkway Phase 3 (PCP3), will complete the corridor by extending Palmetto Commerce Parkway from Ashley Phosphate Road to Remount Road. The PCP3 project will provide a four-lane facility that the regional travel demand model indicates will draw approximately 45,000 vehicles per day from parallel corridors such as I-26 and Rivers Avenue, and from the arterials that carry traffic between them, such as Ladson Road/US 78 and Ashley Phosphate Road.

2.0 CAPACITY ANALYSIS

With the design of the PCP3 corridor and the intersection along it, a capacity analysis of the study area intersections for the 2018 Existing, 2045 No-Build, and 2045 Build conditions was conducted to compare each of the scenarios.

The capacity analysis of intersections is based on the methodologies and guidelines contained in the Transportation Research Board's publication HCM 2010 Highway Capacity Manual (HCM, 2010). These methodologies describe the operational conditions in terms of a Level of Service (LOS), defined as:

"…a quality measure describing operations conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience. Six LOS are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions and the driver's perception of those conditions. Safety is not included in the measures that establish service levels."

Trafficware's Synchro (Version 10) software and simulation package were used in performing the analyses. The LOS for signalized intersections is based on the average control delay per vehicle of the intersection overall, whereas the LOS for unsignalized intersections is based on the average control delay for the worst approach. **Table 2** shows the HCM LOS criteria for signalized and unsignalized intersections.

Table 2: Intersection HCM 2010 LOS Criteria

	Control Delay (sec/veh)	
LOS	**Unsignalized**	**Signalized**
A	< 10	< 10
B	> 10-15	> 10-20
C	> 15-25	> 20-35
D	> 25-35	> 35-55
E	> 35-50	> 55-80
F	> 50	> 80

The results of this intersection capacity analysis are shown in **Table 3**, with a side-by-side comparison of each of the three analysis conditions, as well as in **Figure** 2**2**, **Figure** 3**3**, and **Figure 4** for the 2018 Existing, 2045 No-Build, and 2045 Build conditions, respectively. A discussion of these results, particularly focusing on each of the primary affected corridors in the study area, follows the table and figures. Discussions following these figures detail the anticipated differences in operation (from a vehicular intersection control delay perspective) along the various corridors in the PCP3 study area between the 2045 No-Build and 2045 Build conditions.

The process of determining the most effective intersection type for each location is described in greater detail in **Appendix C**.

Table 3: Level of Service Analysis Results

Intersection		AM Peak Hour			PM Peak Hour		
		2018 Existing	2045 No-Build	2045 Build	2018 Existing	2045 No-Build	2045 Build
1	Dorchester Rd & W Hill Blvd	A/8.0	B/18.7	B/19.9	C/23.5	E/64.9	D/37.1
2	Dorchester Rd & Cross Country Rd	E/61.1	D/48.8	D/36.4	D/43.4	F/110	F/108
3	Dorchester Rd & Lincoln Patriot Blvd	D/36.1	F/148	E/72.6	C/25.5	D/52.6	D/45.7
4	Dorchester Rd & Ashley Phosphate Rd	C/30.0	D/43.5	E/61.5	E/62.9	F/106	F/136
5	Ashley Phosphate Rd & Lincoln Patriot Blvd	D/41.2	E/64.0	E/62.2	D/45.4	F/126	F/88.9
6	Ashley Phosphate Rd & Cross Country Rd	D/51.1	E/76.4	F/113	E/64.0	F/90.6	F/141
7	Ashley Phosphate Rd & Pepperdam Ave	B/13.1	C/20.5	B/10.3	B/11.1	F/114	C/31.8
8	Ashley Phosphate Rd & PCP/PCP3	D/35.2	F/165	C/30.8	D/38.1	C/32.5	D/42.0
108	Ashley Phosphate Rd & Old PCP*	N/A	N/A	A/4.3	N/A	N/A	A/7.6
9	PCP & Weber Blvd	C/26.6	F/103	F/118	C/31.7	F/156	F/151
10	Ashley Phosphate Rd & Stall Rd	D/45.6	F/86.7	D/54.6	D/41.1	D/51.8	D/51.0
11	Ashley Phosphate Rd & Northside Dr	C/33.5	D/35.2	D/42.3	C/30.7	F/85.6	D/43.0
12	Ashley Phosphate Rd & I-26 EB Ramps	E/60.5	D/48.9	C/29.4	B/18.6	B/15.5	C/21.8
13	Ashley Phosphate Rd & Northwoods Dr	D/45.1	D/49.1	D/45.8	E/73.0	F/102	D/53.6
14	Ashley Phosphate Rd & Rivers Ave	E/72.0	F/152	E/98.1	E/59.9	F/105	F/83.2
15	PCP3/S. Aviation & Midland Park Rd	E/38.1	F/>300	B/17.3	F/91.2	F/>300	E/63.6
16	Midland Park Rd & Stall Rd	D/33.4	F/124	B/11.3	F/215	F/111	B/12.9
17	Midland Park Rd & Rivers Ave*	D/40.5	D/37.5	C/20.6	C/28.3	E/69.3	C/24.9
18	Rivers Ave & Aviation Ave*	C/34.5	D/49.0	D/42.1	C/35.0	D/46.6	D/53.8
181	Rivers Ave & Aviation Ave*	A/4.2	A/6.4	A/5.4	C/24.0	D/28.6	A/7.9
19	Aviation Ave & I-26 WB Ramps*	B/10.4	A/7.6	B/16.1	A/6.4	A/5.5	D/50.7
20	Aviation Ave & I-26 EB Ramps*	B/13.5	B/13.7	B/20.2	C/23.3	A/7.1	D/42.9
21	Aviation Ave & Core Ave*	B/13.2	B/14.9	B/15.1	C/21.0	B/19.0	D/49.4
22	PCP3/S. Aviation & Aviation Ave*	B/19.8	C/27.4	C/34.0	B/17.2	E/73.3	E/61.0
221	PCP3 & Aviation Ave*	N/A	N/A	A/9.4	N/A	N/A	D/45.1
23	Remount Rd & S. Aviation Ave*	C/23.0	D/51.4	B/11.4	B/15.3	C/29.8	B/15.0

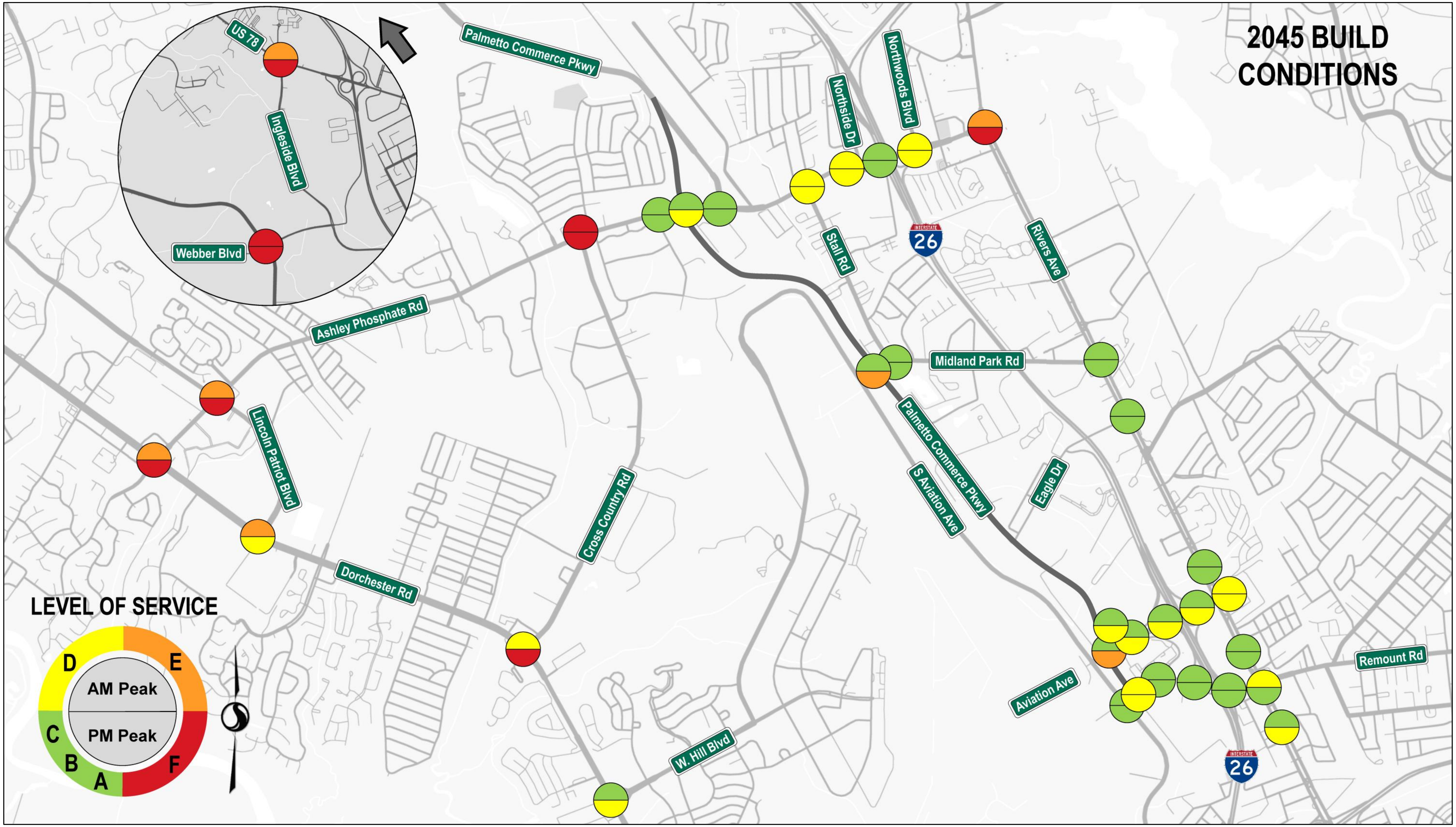
Intersection	AM Peak Hour			PM Peak Hour		
	2018 Existing	2045 No-Build	2045 Build	2018 Existing	2045 No-Build	2045 Build
231 Remount Rd & PCP3*	N/A	N/A	D/54.4	N/A	N/A	D/47.8
24 Remount Rd & Core Ave*	B/11.0	B/12.8	C/22.7	B/11.1	B/10.8	C/23.7
25 Remount Rd & I-26 EB Ramps*	C/20.7	C/25.7	C/22.1	B/18.0	C/24.9	C/21.1
26 Remount Rd & I-26 WB Ramps*	B/18.3	B/11.4	B/11.8	B/15.1	B/15.3	A/8.7
27 Remount Rd & Rivers Ave*	E/66.2	E/56.5	D/48.1	E/60.3	B/24.5	C/29.9
270 Rivers Ave U-Turn (N of Remount)*	N/A	D/42.2	B/15.6	N/A	B/11.1	A/8.3
271 Remount Rd & U-Turn (S of Remount)*	N/A	B/10.8	B/10.3	N/A	B/11.2	D/37.2
28 US 78 & Ingleside Blvd	E/58.0	E/65.0	E/60.3	D/40.2	F/126	F/119
29 Rivers Ave & Eagle Dr*	A/8.8	C/30.4	A/6.5	A/8.7	B/16.8	C/20.3

** Results shown are Synchro LOS*

Figure 2: 2018 Existing Condition LOS

Figure 3: 2045 No-Build Condition LOS

Figure 4: 2045 Build Condition LOS



2.1 DORCHESTER ROAD

Along Dorchester Road, highlighted in **Figure 5**, the Build condition is anticipated to improve intersection LOS south of Ashley Phosphate, drawing traffic away from this north-south route via PCP3 as an alternative. However, the intersection of Dorchester Road & Ashley Phosphate Road is anticipated to experience slightly worse LOS in the Build condition due to increased left- and right-turning movement volumes to and from Ashley Phosphate Road bound to/from the proposed PCP3. This intersection is anticipated to experience failing level of service in the PM Peak Hour of the No-Build conditions and therefore is likely to warrant improvements with or without the PCP3 project.

Figure 5: Dorchester Road

2.2 ASHLEY PHOSPHATE ROAD

Traffic volumes along Ashley Phosphate Road, highlighted in **Figure 6**, between Dorchester Road and PCP3 are generally anticipated to be slightly higher in the Build conditions than in the No-Build conditions, due to increased demand created by the alternative north-south corridor of PCP3, leading to slightly worse LOS conditions along this section of the corridor. However, many of the intersections along Ashley Phosphate Road between Dorchester Road and PCP3 are anticipated to experience undesirable level of service in the No-Build conditions, thereby likely warranting improvements with or without the PCP3 project.

Along Ashley Phosphate Road east of PCP3, the traffic volumes are anticipated to be significantly reduced in the Build conditions compared to the No-Build conditions, leading to significantly improved levels of service (in some cases from failing LOS to acceptable LOS) at the intersections along this segment of Ashley Phosphate, including the ramp terminal intersections with I-26 eastbound and westbound.

Figure 6: Ashley Phosphate Road

2.3 PALMETTO COMMERCE PARKWAY

This third phase of Palmetto Commerce Parkway is highlighted in **Figure 7**. The LOS/delay at the intersection of Palmetto Commerce Parkway/PCP3 & Ashley Phosphate Road is anticipated to be significantly improved in the Build condition compared to the No-Build condition, due to the proposed Single-Point-Urban-Interchange at this intersection. This stands to reason, as significant capacity improvements at this intersection are associated with this interchange.

The level of service and delay at the intersection of Palmetto Commerce Parkway & Weber Boulevard is anticipated to be comparable in both the No-Build and Build conditions, though the LOS at this intersection is anticipated to be failing in both the AM and PM peak hours, regardless. This indicates that improvements to the intersection may be warranted with or without the PCP3 project.

At the intersection of Ingleside Boulevard & US 78, control delay at the intersection is anticipated to be slightly improved in the Build condition, though not by a large enough margin to provide a different LOS grade.

Figure 7: Palmetto Commerce Parkway

2.4 MIDLAND PARK ROAD

The LOS/delay at the intersections along Midland Park Road, highlighted in **Figure 8**, are anticipated to be significantly improved in the Build condition, as traffic demand along Midland Park Road and along Stall Road is reduced by the addition of PCP3.

Figure 8: Midland Park Road

2.5 RIVERS AVENUE

In general, at the study area intersections along Rivers Avenue, highlighted in **Figure 9** between and including Ashley Phosphate Road and Remount Road, are anticipated to experience improved LOS/delay in the Build conditions, due to the traffic demand diverted from Rivers Avenue to the alternative north-south route of the proposed PCP3 corridor. Notable improvements to intersection LOS are anticipated at the intersections of Rivers Avenue & Ashley Phosphate Road, Rivers Avenue & Midland Park Road, and Rivers Avenue & Remount Road.

Figure 9: Rivers Avenue

2.6 WEST AVIATION AVENUE

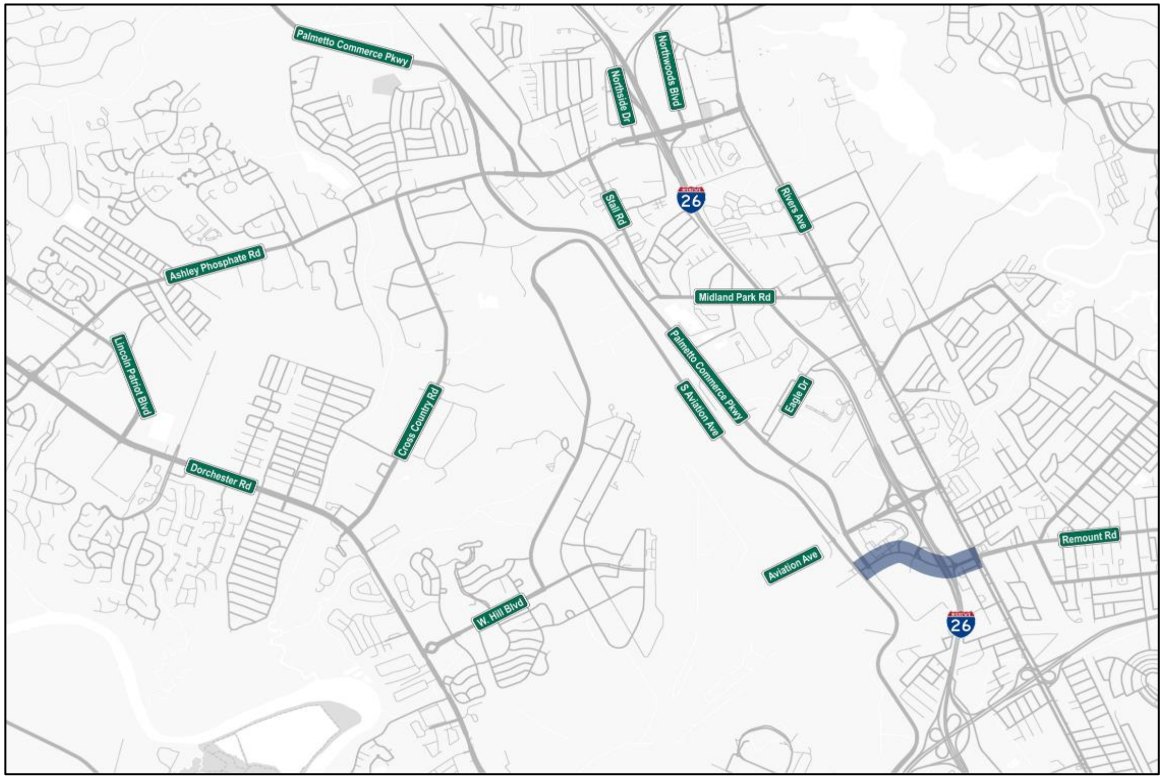
In general, intersections along West Aviation Avenue, highlighted in **Figure 10**, are anticipated to experience higher delays/LOS in the Build condition, due to the significantly increased demand along this route destined for PCP3 northbound. However, as was discussed in Chapter 4, these delays and LOS are anticipated to be within an acceptable LOS threshold and operate such that 95th percentile queues do not extend beyond the ramps onto I-26.

Figure 10: West Aviation Avenue

2.7 REMOUNT ROAD

In general, intersections along Remount Road, highlighted in **Figure 11**, are anticipated to experience slightly higher delays/LOS in the Build condition, due to the significantly increased demand along this route originating from PCP3 southbound. However, as was discussed in Chapter 4, these delays and LOS are anticipated to be within an acceptable LOS threshold and operate such that 95th percentile queues do not extend beyond the ramps onto I-26.

Figure 11: Remount Road



2.8 CORRIDOR ALIGNMENT ALTERNATIVES

The CHATS model was used to establish the logical termini of the PCP3 project. The northern terminus is intuitive, as the corridor currently ends at Ashley Phosphate Road. The southern terminus was originally considered to be International Boulevard. This was re-evaluated in the current version of the CHATS model, considering the 526 LCCW and ACR project to be completed. The CHATS model results indicate that, when PCP3 is extended to Remount Road and West Aviation Avenue, approximately 91% of the traffic on PCP3 is carried to or from the direction of I-26 on these two roads. The remaining traffic, connecting with South Aviation Avenue between Remount Road and International Boulevard, does not exceed the capacity of South Aviation Avenue.

Remount Road was therefore determined to be the logical southern terminus for the project purpose and need. The study area for the evaluation of alternative alignments was then established between I-26 and South Aviation Avenue, and between reasonable connection points on the existing Palmetto Commerce Parkway and Remount Road.

A range of alternative alignments (16 in total) were developed using combinations of segments of existing roadway and new alignment and were screened using a two-tier screening process. The first-tier screening determined the extent to which a given alignment would attract traffic from the corridors for which the project is intended to provide traffic relief, leading to three of the 16 preliminary alternative alignments being carried forward to the second-tier screening, each of which included a connection of PCP3 to Ashley Phosphate Road at a new intersection west of the existing Palmetto Commerce Parkway & Ashley Phosphate Road intersection, and an alignment that paralleled closely the existing railroad right-of-way.

The second-tier screening used a GIS-based desktop evaluation to compare the relative community and environmental impacts of the three alternative alignments carried forward from the first-tier screening process. The results of the second-tier screening showed that two alternatives, Alternatives D and D1, were suitable to be carried forward as reasonable alternatives. Alternatives D and D1 have very similar alignments – the difference being that Alternative D assumes the proposed PCP3 roadway travels in the railroad right-of-way, while Alternative D1 assumes PCP3 is shifted to the east just out of the railroad right-of-way. From a traffic volume projection and traffic analysis perspective, the two alternatives are identical.

2.9 TRAFFIC PROJECTIONS

Existing condition AM and PM peak hour traffic volumes were collected at the 27 intersections in the study area in October of 2018. Using trip projections from Berkeley-Charleston-Dorchester Council of Government's (BCDCOG's) Charleston Area Transportation Study (CHATS) travel demand model for the No-Build and Build condition, future traffic volumes for the design year No-Build and Build conditions were determined.

These traffic volumes served as the basis for intersection design recommendations along the proposed PCP3 corridor as well as for the study area intersection capacity comparison between the No-Build and Build conditions.

2.10 PCP3 INTERSECTION DESIGN RECOMMENDATIONS

Traffic analysis was conducted at the various intersections along the proposed PCP3 corridor to recommend intersection design suitable to accommodate the Build condition traffic volume projections. These intersections included:

2.10.1 At the Northern Terminal:

At the intersection of PCP3 & Ashley Phosphate Road, a Single-Point-Urban-Interchange (SPUI) was found to be most appropriate and provide acceptable traffic operations in the design year.

2.10.2 Between the Northern and Southern Termini:

At the intersection of PCP3 & S. Aviation Avenue – providing access to Joint Base Charleston (JBC) – a pair of right-in/right-out intersections (taking advantage of the necessary grade separation over the rail line) were found to provide full access to JBC without introducing another signalized control along the corridor.

At the intersection of PCP3 & Midland Park Road, it was found that a signalized intersection was necessary to accommodate the projected traffic demand volumes in the design year.

2.10.3 At the Southern Terminal:

At the intersection of PCP3 & Aviation Avenue, a "Green-T" intersection (such that southbound traffic was able to flow uncontrolled) was found to be necessary to accommodate the traffic demand volumes and eliminate queues which extended into the Airforce Clear Zone to the north.

Given the close proximity of the intersections of PCP3 & Remount Road and Remount Road & S. Aviation Avenue, it was deemed necessary to operate these two intersections with one signal controller, to enable traffic to flow freely between them.

At the intersection of Aviation Avenue & Core Avenue, it was found to be necessary to improve the northbound and southbound approaches geometrically such that the split phasing of the signal can be removed. Additionally, the westbound left-turn was prohibited, and the exclusive eastbound left-turn phase was removed, in order to accommodate the significant through volumes at this intersection destined for PCP3.

The intersection of Remount Road & Core Avenue was found to operate acceptably as a two-way stop-controlled intersection, the control that exists today.

3.0 PROJECT EFFECTS ON JOINT BASE CHARLESTON

3.1 COMPARISON OF VEHICLE OCCUPANCY IN RUNWAY CLEAR ZONES

The purpose of this analysis is to provide an estimate of the maximum number of vehicles anticipated to be in the Clear Zone of Runway 21 at any given instance in both the 2045 No-Build and Build conditions. Design AM and PM peak hour volumes, illustrated in **Appendix B** were used for this analysis.

In order to compare the risks related to aircraft/runway incidents in both the No-Build and Build conditions, the maximum number of vehicles anticipated to be in the Air Force Clear Zone in a worst-case instant was estimated by analyzing projected queue lengths and densities in segments of South Aviation Avenue (in the No-Build) and PCP3 (in the Build) which pass through the Clear Zone.

It is important to note here, that both no-build and build conditions for the design year include the effects of all committed transportation improvements in the region's long range transportation plan. Projects which are most significant to the Palmetto Commerce Parkway traffic forecasts are the I-526 Lowcountry Corridor, which includes the reconstruction of the I-26/I-526 System interchange. This also includes the Hugh K. Leatherman Container Terminal and Navy Base Intermodal Facility. The latter is forecast to produce four additional intermodal trains per day on the Norfolk Southern Railway tracks that cross Ashley Phosphate Road, Midland Park Road, West Aviation Avenue and Remount Road, just east of South Aviation Avenue. These intermodal trains are expected to be up to 10,000 feet in length. The amount of time that these at-grade rail crossings are occupied by the intermodal trains is a significant consideration in the no-build condition, since the PCP3 build condition creates a grade separated crossing of the Norfolk Southern tracks.

3.1.1 2045 No-Build Conditions

Comparing the future traffic volumes in **Appendix B** illustrates that the volume along South Aviation Avenue in the No-Build conditions is significantly less than the volume along PCP3 in the Build Conditions. However, the rail line just east of the intersection of South Aviation Avenue & West Aviation Avenue will impede the flow of southbound left-turning vehicles (of which there are anticipated to be 210 per hour in the AM peak hour and 370 per hour in the PM peak hour in 2045). The most significant factor contributing to the number of vehicles in the Clear Zone in the No-Build condition is the maximum queue length for the southbound approach at the intersection of South Aviation Avenue & West Aviation Avenue in the event of a train occupying the at-grade crossing.

Prior to determining this maximum queue length, a travel time study was conducted to determine the likelihood of rerouting of these impeded southbound left-turns. In other words, is it a reasonable assumption to analyze the queue length corresponding to the full southbound left-turning demand, or is it reasonable that some portion of this volume would reroute in the event of a train blockage? Based on current and projected commuting patterns, as well as the possible destinations of southbound left-turning traffic at this intersection, the destination for southbound left-turning vehicles for which continuing southbound along South Aviation past West Aviation provides a reasonable alternate route is I-26 just south of West Montague Avenue. Therefore, the travel time in the design year from the South Aviation Avenue & West Aviation Avenue intersection to I-26 eastbound just south of the I-26 & West Montague Avenue interchange was estimated for two alternative routes:

Route 1: 'Desired' path via West Aviation Avenue to I-26 Eastbound

Route 1 represents the 'desired' path which vehicles would take to complete the route if the train were not blocking their travel. It includes travel along West Aviation Avenue, including delays at intersections along West Aviation Avenue, and travel along I-26 eastbound. **Table 4** shows the anticipated travel time of this route for the PM peak hour (the peak hour for which the southbound left-turn is the highest).

Table 4: No-Build Route 1 Anticipated PM Peak Hour Travel Time in 2045

Type	Roadway/Intersection	Movement	Distance (mi)	Speed (mph)	Time (min)
Link Travel Time	W. Aviation Ave	S. Aviation Ave to Core Ave	0.25	35	0.43
Intersection Delay	W. Aviation Ave & Core Ave	Eastbound Through	--	--	0.70
Link Travel Time	W. Aviation Ave	Core Ave to I-26 EB Ramp	0.1	35	0.17
Intersection Delay	W. Aviation Ave & I-26 EB Ramp	Eastbound Left	--	--	0.39
Link Travel Time	I-26 EB	Aviation Ave to Montague Ave	2.59	65	2.39
	Train Delay				Varies
			TOTAL TRAVEL TIME		**4.08**

Considering the speed limits and anticipated intersection delays on the path, the travel time is estimated to be just over 4 minutes + the train delay. Railroad crossing studies and anticipated rail activity in the area has predicted that trains at the crossing at W. Aviation Avenue could reach up to 10 minutes in the future. However, this time is likely to vary, and the time of each crossing may not be known by the public. So, the travel time could be anywhere from 4 minutes to 14 minutes plus the time to dissipate the built-up queue.

Route 2: 'Alternate' path via S. Aviation Avenue, International Boulevard, W. Montague Avenue

Route 2 represents the alternate path vehicles could take to reach the destination of I-26 just south of W. Montague Avenue if the decision was made to bypass the desired route in the event of a train blockage. **Table 5** shows the anticipated travel time in the design year for this path in the PM peak hour. Considering the speed limits and anticipated intersection delays on the path, the travel time is estimated to be just under 11 minutes.

The comparison of the travel times for the two routes indicates a travel time of approximately 4 minutes (+ train delay) for the 'desired' path and approximately 11 minutes for the alternate path. As noted previously, the maximum train delay (of approximately 10 minutes) would certainly favor taking the alternate path. However, given the variability of the delay and the uncertainty in the public of how long the train is likely to delay their travel, coupled with the large disparity in the travel time between the alternate route and the unimpeded 'desired' route (7 minutes or 175% of the desired travel time), it is unlikely that significant rerouting would occur.

Therefore, queueing analysis for the No-Build conditions was conducted under the assumption that all demand for the southbound left-turn remained in the left-turn queue. So, the total number of vehicles in the Clear Zone in the No-Build conditions was determined to be the sum of vehicles in the southbound queue in the Clear Zone in the event of a 10-minute train blockage plus the number of vehicles traveling northbound along S. Aviation in the Clear Zone at a given instant during this train blockage.

Table 5: No-Build Route 2 Anticipated PM Peak Hour Travel Time in 2045

Type	Roadway/Intersection	Movement	Distance (miles)	Speed (mph)	Time (min)
Link Travel Time	S. Aviation Ave	W. Aviation Ave to Intl. Blvd	2.5	35	4.28
Intersection Delay	S. Aviation Ave & Intl. Blvd	Southbound Left	--	--	1.25
Link Travel Time	Intl. Blvd	S. Aviation Ave to I-526 WB Ramp	0.2	35	0.35
Intersection Delay	Intl. Blvd & I-526 WB Ramp	Eastbound Through	--	--	0.87
Link Travel Time	Intl. Blvd	I-526 WB Ramp to I-526 EB Ramp	0.14	35	0.24
Intersection Delay	Intl. Blvd & I-526 EB Ramp	Eastbound Through	--	--	0.00
Link Travel Time	Intl. Blvd	I-526 EB Ramp to Centre Pointe Dr	0.27	35	0.46
Intersection Delay	Intl. Blvd & Centre Pointe Dr	Eastbound Through	--	--	0.16
Link Travel Time	Intl. Blvd	Centre Pointe Dr to Tanger Outlet Blvd	0.28	35	0.48
Intersection Delay	Intl. Blvd & Tanger Outlet Blvd	Eastbound Through	--	--	0.00
Link Travel Time	Intl. Blvd	Tanger Outlet Blvd to Montague Ave	0.17	35	0.29
Intersection Delay	Intl. Blvd Blvd & Montague Ave	Eastbound Left	--	--	1.69
Link Travel Time	Montague Ave	International Blvd to I-26 EB	0.5	35	0.86
			TOTAL TRAVEL TIME		10.93

In order to estimate the maximum queue in the event of a 10-minute train blockage, the intersection of South Aviation Avenue & West Aviation Avenue was modeled in Synchro version 10 for both AM and PM peak hour conditions. While Synchro cannot model a railroad crossing directly, the crossing (and delay associated with a train blockage) was modeled as a pretimed signalized intersection with one leg having a 600 second phase length (simulating the 10-minute train blockage). These conditions were then simulated in SimTraffic, a microsimulation tool in the Synchro software, which records, among other metrics, maximum queue lengths (in feet).

The results of this analysis indicated a maximum southbound queue length of 663 feet in the AM peak hour and 1,877 feet in the PM peak hour. This queue length begins at the southbound approach stop-bar of the South Aviation Avenue and West Aviation Avenue intersection. However, the queue actually passes into the Clear Zone 328 feet north of the intersection. Therefore, the actual queue length in the Clear Zone is the length minus 328 feet: 335 feet in the AM peak hour and 1,549 feet in the PM peak hour. Assuming an approximate length of 20 feet/vehicle in the queue, these queue lengths equate to 17 vehicles in the AM peak hour and 77 vehicles in the PM peak hour. These values represent the maximum number of vehicles in the southbound direction of travel located in the Clear Zone in the worst case.

In order to estimate the number of vehicles in the northbound direction, the hourly volume of the northbound through and eastbound left-turning vehicles (those able to pass through the intersection in spite of a train blockage) were used to estimate a density (vehicles/mi/lane) during the peak hours. Density is a measure of the demand volume divided by the speed. The northbound demand volume along S. Aviation Avenue is 200 veh/hr in the AM peak hour and 230 veh/hr in the PM peak hour. Given the peak hour factor (0.94) and heavy vehicle factor (0.95), the demand volumes in terms of passenger cars per lane are 223 pc/ln/hr in the AM peak hour and 257 pc/ln/hr in the PM peak hour.

The free-flow-speed (FFS) along this section is assumed to be 42 mph (the speed limit of 35 miles per hour + 7 mph, per the HCM 6th Edition, Page 12-28). Therefore, the density along this section can be estimated to be 5 vehicles/mi/lane (223 veh/hr / 42 mph) in the AM peak hour and 6 vehicles/mi/ln (257 veh/hr / 42 mph) in the PM peak hour. This density value is in a per mile unit. Therefore, to estimate the number of vehicles in the Clear Zone, the length of South Aviation Avenue in the Clear Zone was determined – 3,200 feet. These 3,200 feet is approximately 0.6 miles. Therefore, to determine the number of vehicles in the Clear Zone in the northbound direction along S. Aviation Avenue, the density was multiplied by a factor of 0.6, leading to the calculation of 3 vehicles in a worst-case instance in the Clear Zone in the AM peak hour and 4 vehicles in the Clear Zone in the PM peak hour. Therefore, the total number of vehicles in the Clear Zone in the 2045 No-Build conditions is 20 vehicles during the AM peak hour and 81 vehicles during the PM peak hour. These results are also summarized and presented in **Table 6**.

Table 6: Number of Vehicles in the Air Force Clear Zone in 2045 No-Build Conditions

NO. of VEHICLES IN CLEAR ZONE: 2045 NO-BUILD				
Feet within clear zone	*3200 feet*			
Base Free Flow Speed	*42 mph*			
Number of Lanes	*1*			
Hourly Demand Volumes	*AM Peak*		*PM Peak*	
	200 NB through + EB left volume	*430 SB*	*230 NB through + EB left volume*	*430 SB*
Heavy Vehicles	*5%*			
PHF	*0.94*			
Driver Familiarity	*1*			
Vp = V/(phf*N*fHV)				
PHF=0.94	N=1	F_{hv} = 0.95		
Vp (NB - AM) = 223 pc/ln/hr		**Vp (NB - PM) = 257 pc/ln/hr**		
D = Vp / S				
D (NB - AM) = 5 pc/mi/ln		**D (NB - PM) = 6 pc/mi/ln**		
Southbound Queue in Clear Zone = Max Queue from Stop Bar - 328 feet (outside clear zone)				
AM Max Queue = 335 ft		**PM Max Queue = 1549 ft**		
Number of Vehicles (NB) = D*2 lanes*3,200 feet clear zone/5280 ft/mi) Number of Vehicles (SB) = Max Queue / 20 ft/vehicle				
$N_{veh\ (NB-AM)}$ = 3 vehicles	**$N_{veh\ (SB-AM)}$ = 17 vehicles**	**TOTAL = 20**	**vehicles in AM peak hour in clear zone***	
$N_{veh\ (NB-PM)}$ = 4 vehicles	**$N_{veh\ (SB-PM)}$ = 77 vehicles**	**TOTAL = 81**	**vehicles in PM peak hour in clear zone***	

* At given instant of worst case (train blockage)

3.1.2 2045 Build Conditions

A similar process as was performed for the No-Build conditions was followed for the Build conditions to determine the maximum number of vehicles in the clear zone in a given instant.

Based on current and anticipated commuting patterns, as well as the possible destinations of southbound right-turning traffic at this intersection, the destination for southbound right-turning vehicles could be Boeing, a destination along International Boulevard, or even potentially I-526 westbound. The alternate route to taking South Aviation to reach these destinations would be to take the southbound left at the PCP3 & Remount Road intersection and take I-26 eastbound to I-526 westbound. Therefore, the travel time in the design year from the PCP3 & Remount Road to International Boulevard was estimated for two alternative routes:

Route 1: 'Desired' path via S. Aviation to International Boulevard

Route 1 represents the 'desired' path which vehicles would take to complete the route if the train were not impeding their travel. It includes travel along S. Aviation Avenue including the delay at the intersections of Remount Road & S. Aviation Avenue. **Table 7** shows the anticipated travel time of this route for the AM peak hour (the peak hour for which the southbound right-turn is the highest).

Table 7: Build Route 1 Anticipated PM Peak Hour Travel Time in 2045

Type	Roadway/Intersection	Movement	Distance (miles)	Speed (mph)	Time (min)
Link Travel Time	W. Aviation Ave	S. Aviation Ave to Core Ave	0.05	35	0.09
Intersection Delay	Remount Rd & S. Aviation Ave	Westbound Left	--	--	0.47
Link Travel Time	S. Aviation Ave	Remount Rd to Intl. Blvd	2.32	35	3.98
	Train Delay				Varies
			TOTAL TRAVEL TIME		**4.54**

Considering the speed limits and anticipated intersection delays on the path, the travel time is estimated to be approximately 4 ½ minutes + the train delay. Railroad crossing studies and anticipated rail activity in the area has predicted that trains at the crossing at W. Aviation Avenue could reach up to 10 minutes in the future. However, this time is likely to vary, and the time of each crossing may not be known by the public. So, the travel time could be anywhere from 4 ½ minutes to 14 ½ minutes plus the time to dissipate the built-up queue.

Route 2: 'Alternate' path via Remount Road, I-26 eastbound, I-526 westbound

Route 2 represents the alternate path vehicles could take to reach the destination of International Blvd if the decision was made to bypass the desired route in the event of a train blockage. **Table 8** shows the anticipated travel time in the design year for this path in the PM peak hour.

Table 8: Build Route 2 Anticipated PM Peak Hour Travel Time in 2045

Type	Roadway/Intersection	Movement	Distance (mi)	Speed (mph)	Time (min)
Link Travel Time	Remount Rd	PCP3 to I-26 EB Ramp	0.38	35	0.65
Intersection Delay	Remount Rd & I-26 EB Ramp	Eastbound Left	--	--	0.35
Link Travel Time	I-26 EB & I-526 WB	Remount Rd to Intl. Blvd	2.22	65	3.80
			TOTAL TRAVEL TIME		**4.80**

Considering the speed limits and anticipated intersection delays on the path, the travel time is estimated to be just under 5 minutes.

The comparison of the travel times for the two routes indicates a travel time of approximately 4 ½ minutes (+ train delay) for the ‘desired’ path and approximately 5 minutes for the alternate path. Given the disparity in travel time between these routes, it is likely that in the event of a train blockage, southbound right-turners will reroute taking the alternate path, reducing the southbound queue at the PCP3 & Remount Road intersection.

Therefore, the queueing analysis for the Build conditions was conducted under the assumption that the train blockage would lead to diverted trips from the southbound right-turn to the southbound left-turn. The queueing analysis indicated that in this case, the maximum southbound queue at this intersection did not reach the Clear Zone to the north. So, the maximum number of vehicles was determined by density anticipated along PCP3 given the peak hour volumes and not by the queue length from the intersection at Remount Road & PCP3.

In order to estimate the number of vehicles in the southbound direction, the AM and PM peak hourly demand volumes were used to estimate a density (vehicles/mi/lane) during the peak hours. As seen in **Table 9**, the southbound demand volume along PCP3 is 2,400 veh/hr in the AM peak hour and 1,640 veh/hr in the PM peak hour. Given the peak hour factor (0.94), heavy vehicle factor (0.95), and number of lanes in one direction (2), the southbound demand volumes in terms of passenger cars per lane are 1,340 pc/ln/hr in the AM peak hour and 916 pc/ln/hr in the PM peak hour. The base free-flow-speed (BFFS) along this section is assumed to be 42 mph (the speed limit of 35 miles per hour + 7 mph, per the HCM 6th Edition, Page 12-28). Given the 12-ft lane widths, 6-ft shoulder clearances, and 1.67 access points/mile conditions of the proposed PCP3 alignment, the FFS is assumed to be 41.6 mph.

The density along this section is estimated as the demand volume divided by the speed. Therefore, the density in the southbound direction is calculated to be 32 vehicles/mi/lane (1,340 veh/hr / 41.6 mph) in the AM peak hour and 22 vehicles/mi/ln (916 veh/hr / 41.6 mph) in the PM peak hour. This density value is in a per mile unit. Therefore, to estimate the number of vehicles in the Clear Zone, the length of PCP3 in the Clear Zone was determined to be 3,305 feet or 0.625 miles. Therefore, to determine the number of vehicles in the Clear Zone in the southbound direction along PCP3, the density was multiplied by a factor of 0.625 and multiplied by 2 (to account for the two lanes of travel), leading to the calculation of 45 vehicles in a worst-case instance in the Clear Zone in the AM peak hour and 28 vehicles in the Clear Zone in the PM peak hour.

In order to estimate the number of vehicles in the northbound direction, the AM and PM peak hourly demand volumes were used to estimate a density (vehicles/mi/lane) during the peak hours. The northbound demand volume along PCP3 is 1,560 veh/hr in the AM peak hour and 2,880 veh/hr in the PM peak hour. Given the peak hour factor (0.94), heavy vehicle factor (0.95), and number of lanes in one direction (2), the northbound demand volumes in terms of passenger cars per lane are 871 pc/ln/hr in the AM peak hour and 1,609 pc/ln/hr in the PM peak hour. The base free-flow-speed (BFFS) along this section is assumed to be 42 mph (the speed limit of 35 miles per hour + 7 mph, per the HCM 6th Edition, Page 12-28). Given the 12-ft lane widths, 6-ft shoulder clearances, and 1.67 access points/mile conditions of the proposed PCP3 alignment, the FFS is assumed to be 41.6 mph.

Table 9: Number of Vehicles in the Air Force Clear Zone in 2045 Build Conditions

2045 BUILD - ALTERNATIVE D				
Feet within clear zone	*3,305*	*feet*		
Base Free Flow Speed	*42*	*mph*		
Number of Lanes	*2*			
Lane Width	*12*	*feet*		
Shoulder Width	*6*	*Feet*		
Access Point Density	*1.67*	*5 access points in 3 miles*		
Terrain	*Level*			
Median	*Divided*			
Hourly Demand Volumes	*AM Peak*		*PM Peak*	
	1,560 NB	*2,410 SB*	*2,880 NB*	*1,500 SB*
Heavy Vehicles	*5%*			
PHF	*0.94*			
Driver Familiarity	*1*			
$V_p = V/(phf*N*f_{HV})$				
PHF=0.94	N=2		f_{HV}=0.95	
Vp (NB - AM) = 873 pc/ln/hr			**Vp (SB - AM) = 1,349 pc/ln/hr**	
Vp (NB - PM) = 1,609 pc/ln/hr			**Vp (SB - PM) = 840 pc/ln/hr**	
D = Vp / S				
D (NB - AM) 21 pc/mi/ln			**D (SB - AM) = 32 pc/mi/ln**	
D (NB - PM) 39 pc/mi/ln			**D (SB - PM) = 20 pc/mi/ln**	
Number of Vehicles = D*2 lanes*3,305 feet clear zone/5280 ft/mi)				
$N_{veh\ (NB-AM)}$ = 26 vehicles	**$N_{veh\ (SB-AM)}$ = 41 vehicles**	**TOTAL = 67**	**vehicles in AM peak hour in clear zone**	
$N_{veh\ (NB-PM)}$ = 48 vehicles	**$N_{veh\ (SB-PM)}$ = 25 vehicles**	**TOTAL = 73**	**vehicles in PM peak hour in clear zone**	

* At given instant of worst case (train blockage)

In summary, for 2045 No-Build conditions, considering a train blockage at S. Aviation Avenue, 20 vehicles could be in the Air Force Clear Zone at a given instant during the AM peak hour and 81 vehicles could be in the Air Force Clear Zone at a given instant during the PM peak hour.

For 2045 Build conditions, considering the significant volume traveling along PCP3 and the resulting density of vehicles along the corridor, 71 vehicles could be in the Air Force Clear Zone at any given instant during the AM peak hour and 76 vehicles could be in the Air Force Clear Zone at any given instant during the PM peak hour. These numbers of vehicles, also shown in **Table 10** below, represent the peak hour number of vehicles anticipated to be in the Clear Zone during each of the commuter peak hours in the design year.

Table 10: Peak Hour Number of Vehicles Anticipated in the Clear Zone in 2045

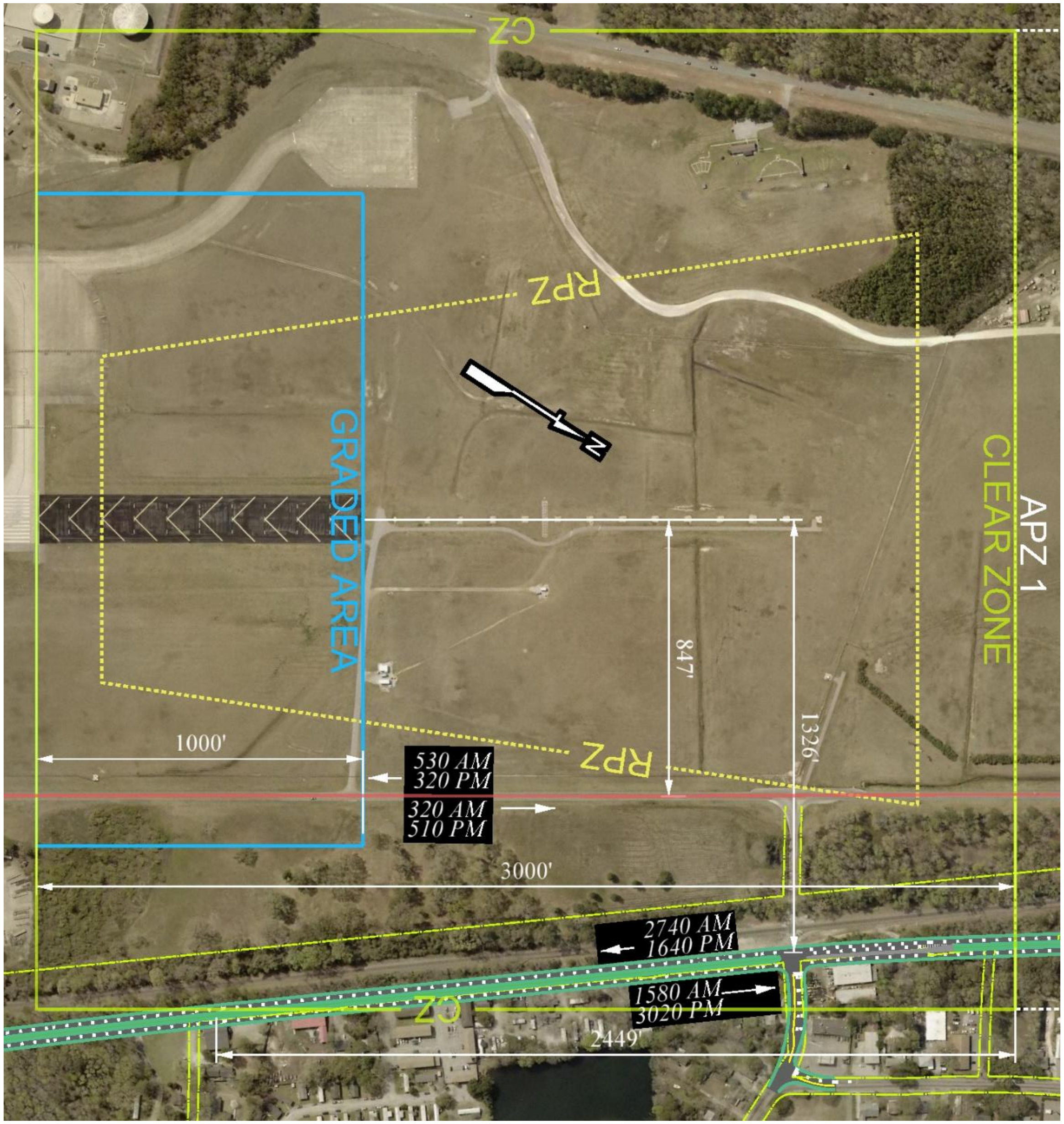
Scenario	AM Peak Hour	PM Peak Hour
2045 No-Build	20	81
2045 Build	67	73

3.2 NO-BUILD VS BUILD MAGNITUDE AND POSITION OF TRAFFIC WITHIN CLEAR ZONES

For the purposes of assessing the risk of the proposed roadway (build condition) against the no-build as it relates to traffic volumes within the clear zone, it may be important to compare the volume and location in aggregate. Stantec referenced The California Airport Land Use Planning Handbook, which contains data from NTSB on aircraft accident characteristics in the vicinity of airports between 2000 and 2009. The comparison here is in two categories; 1) the relative risk between no-build and build conditions to automobile passengers traveling parallel to the runway through the clear zone, and 2) the relative risk between no-build and build conditions to automobile passengers traveling through the clear zone and crossing the extended runway centerline. In both categories, the forecasted traffic volume is higher in the build condition, while the distance from the runway centerline (parallel) and the runway threshold (crossing) are greater.

Figure 12, **Figure 14** and **Figure 17** provide an illustration of the location of the no-build (South Aviation) and build (PCP3) routes and their corresponding no-build (South Aviation) and build (PCP3) AM and PM peak hour traffic volume forecast in the year 2045. The build condition assumes that South Aviation Avenue will be closed to public traffic through the clear zones of Runways 15 and 21 in the build condition. **Figure 13** and **Figure 15** are similar to **Figures 12 and 14** for Runways 15 and 21 but include an overlay of the crash location pattern from the previously referenced study.

Figure 12: No-Build vs Build Traffic in Runway 15 Clear Zone



Runway 15

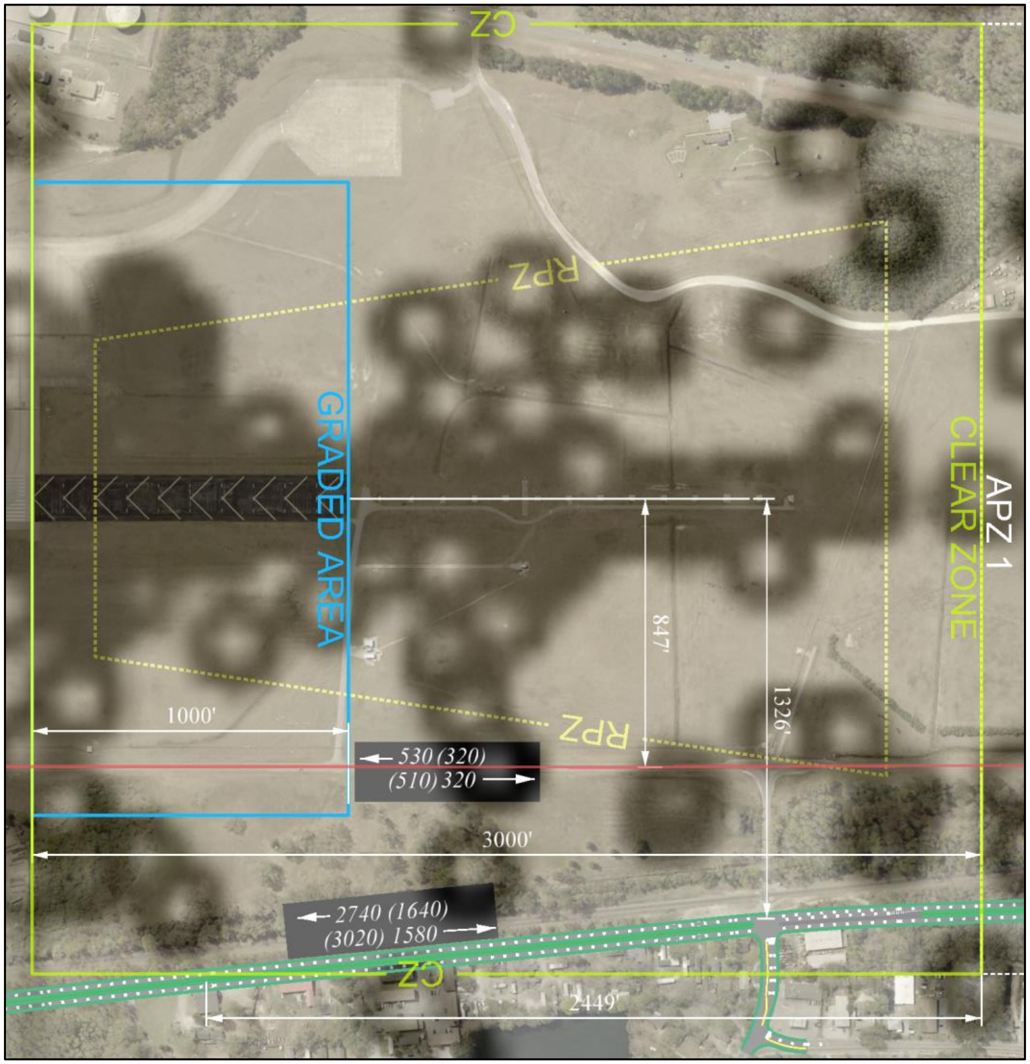
Figure 12 provides the locations of South Aviation Avenue and PCP3 relative to the centerline of Runway 15/33. For purposes of this study, it has been assumed that South Aviation Avenue would remain open to public traffic through the clear zone of Runway 15. South Aviation Avenue connects with Midland Park Road, a route that provides an alternative access to Rivers Avenue, and to Ashley Phosphate Road, via Stall Road.

Commercial vehicles entering Joint Base Charleston must use South Aviation Avenue to reach the JBC commercial gate. South Aviation is accessed at Midland Park Road, West Aviation Avenue, Remount Road, or International Boulevard. In the build condition, exclusive ramps from PCP3 will connect to South Aviation Avenue outside of the clear zone.

Ward Avenue currently lies along the proposed alignment of PCP3 between Midland Park Road on the north and Eagle Drive on the south. Average Daily Traffic on this road is currently 3,000 vehicles.

The build condition removes the portion of Midland Park Road that connects to South Aviation Avenue. Public traffic would no longer need to pass through the graded area of this clear zone. The distance from the centerline of the runway to the nearest roadway lanes increases by a minimum of 479 feet.

Figure 13: Accident Pattern in Runway 15 Clear Zone



Runway 15

Figure 13 shows the pattern of arrival accident locations from the California Airport Land Use Planning Handbook. This pattern is superimposed over the image shown in Figure 12.

The graph below shows the cumulative percentage of aircraft accidents that occurs within a specified distance from the runway centerline. From the data collected for the study approximately 24% of arriving and departing crashes from the study occur beyond 1,312 feet (400 meters) from the runway centerline.

The lateral distance of South Aviation Avenue, the Norfolk Southern Railroad and the proposed PCP3 are also shown on the graph. The graph has been extrapolated beyond 1,312 feet.

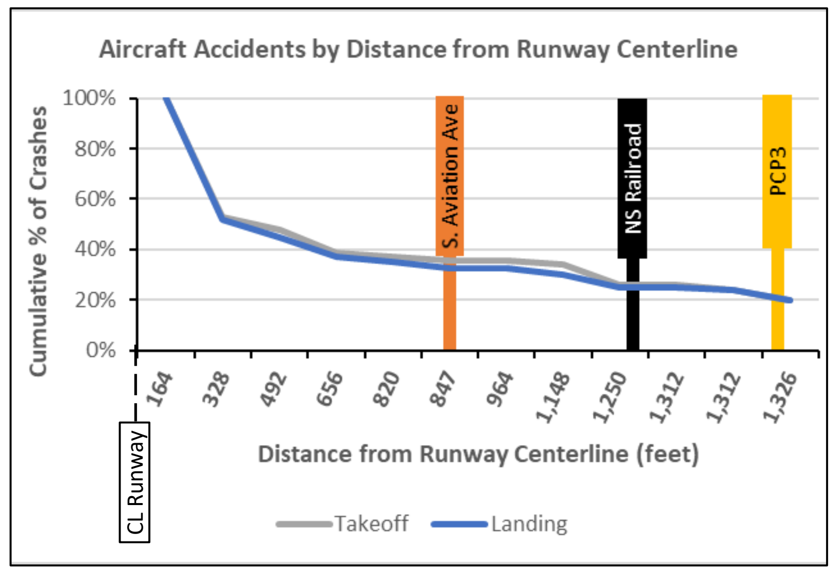
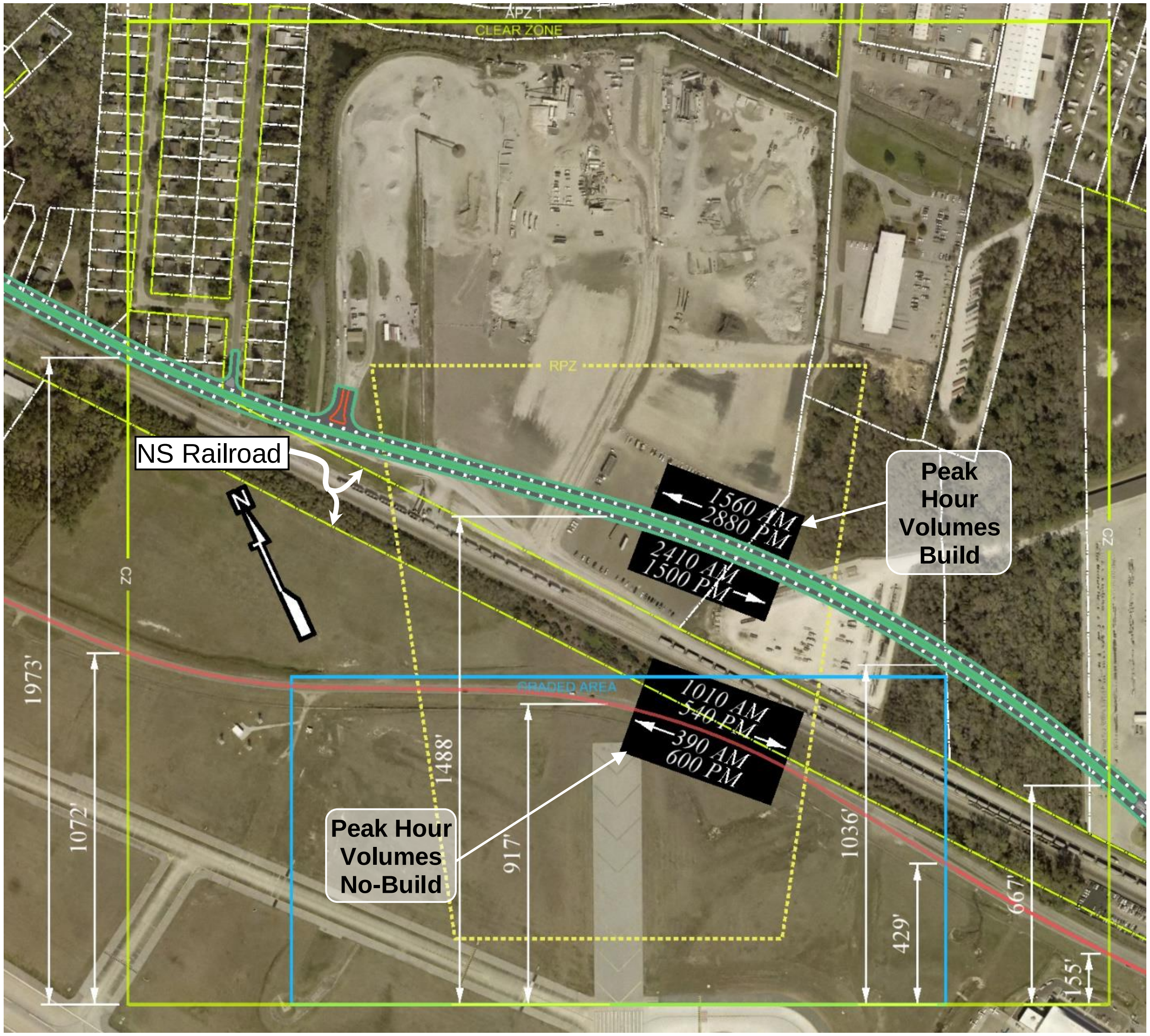


Figure 14: No-Build vs Build Traffic in Runway 21 Clear Zone



Runway 21

Figure 14 provides the locations of South Aviation Avenue and PCP3 relative to the threshold of Runway 21. The no-build peak hour traffic volumes shown in this figure assume that South Aviation Avenue remains open to through traffic through the clear zone in the design year.

Ward Avenue currently lies along the proposed alignment of PCP3 between Midland Park Road on the north and Eagle Drive on the south. Average Daily Traffic on this road is currently 3,000 vehicles. This provides access to the residential development in the upper left portion of the clear zone in this figure.

Access from West Aviation Avenue to the industrial area in the upper center of the clear zone occurs via the Access Road along the edge of the railroad.

The proposed PCP3 alignment is pushed out to avoid encroachment upon the graded area of the clear zone as shown. Access points, or driveways, from PCP3 to this industrial tract will be limited to the two existing access points that are present today.

Runway 21 is the only runway end at JBC that has a paved overrun less than 1,000 feet. Construction of PCP3 would allow JBC to consider closing S. Aviation to through traffic, which may provide the opportunity to extend this overrun.

Figure 15: Accident Pattern in Runway 21 Clear Zone

Runway 21

Figure 15 shows the pattern of arrival accident locations from the California Airport Land Use Planning Handbook. This pattern is superimposed over the image shown in Figure 14.

The graph below shows the cumulative percentage of aircraft accidents that occurs within a specified distance from the threshold along the extended centerline of the runway. From the data collected for the study approximately 32% of arriving and 3% departing crashes occur beyond 13,123 feet (4,000 meters) from the runway threshold. The distance along centerline from the threshold to S. Aviation Avenue, Norfolk Southern Railroad and the proposed PCP3 are shown on the graph.

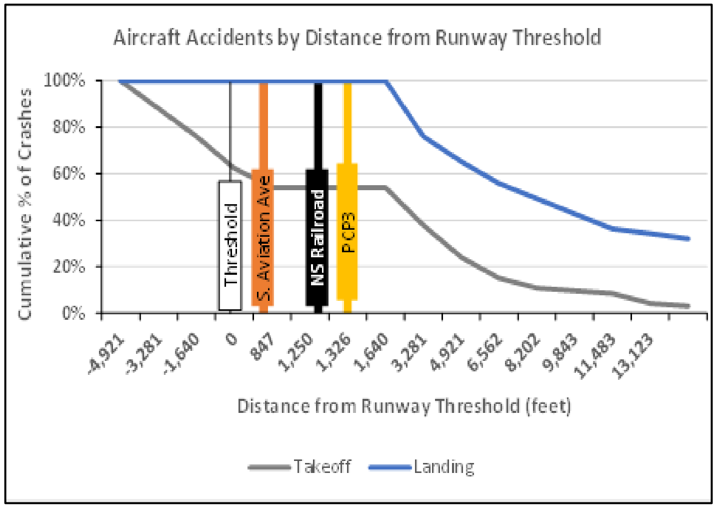


Figure 16 is a profile of Runway 21 extended, showing the clearances over South Aviation Avenue, Norfolk Southern Railroad, and the proposed PCP3 roadway. The clearance height above South Aviation Avenue and PCP3 is 15'-0". The clearance height shown above the railroad is 23'-0".

The 23'-0" railroad clearance envelope encroaches on the 50:1 approach-departure clearance surface.

The 15'-0" roadway clearance envelope falls right at the 50:1 approach-departure clearance surface. It is important to note that this represents the profile of the centerline of the runway. South Aviation Avenue and the extended centerline of Runway 21 do not cross at a right angle. South Aviation gets closer to the threshold within the width of the approach-departure surface, and the roadway clearance envelope encroaches on this surface.

Figure 16: No-Build and Build Relationship to Runway 21 Approach/Departure Clearance Surface

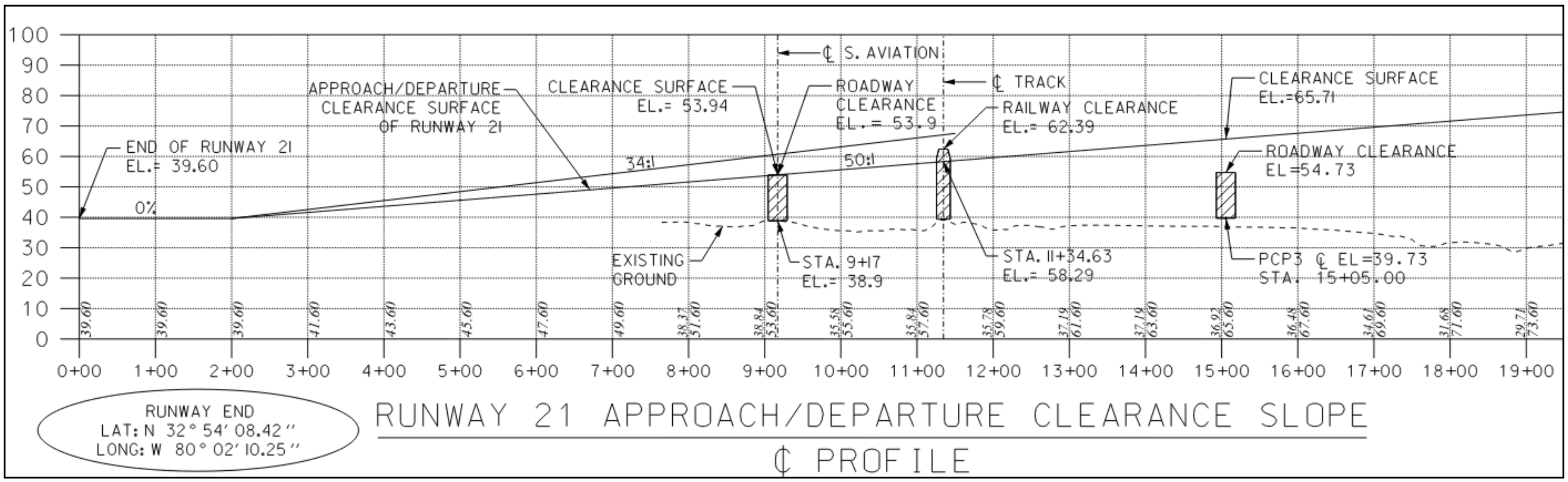
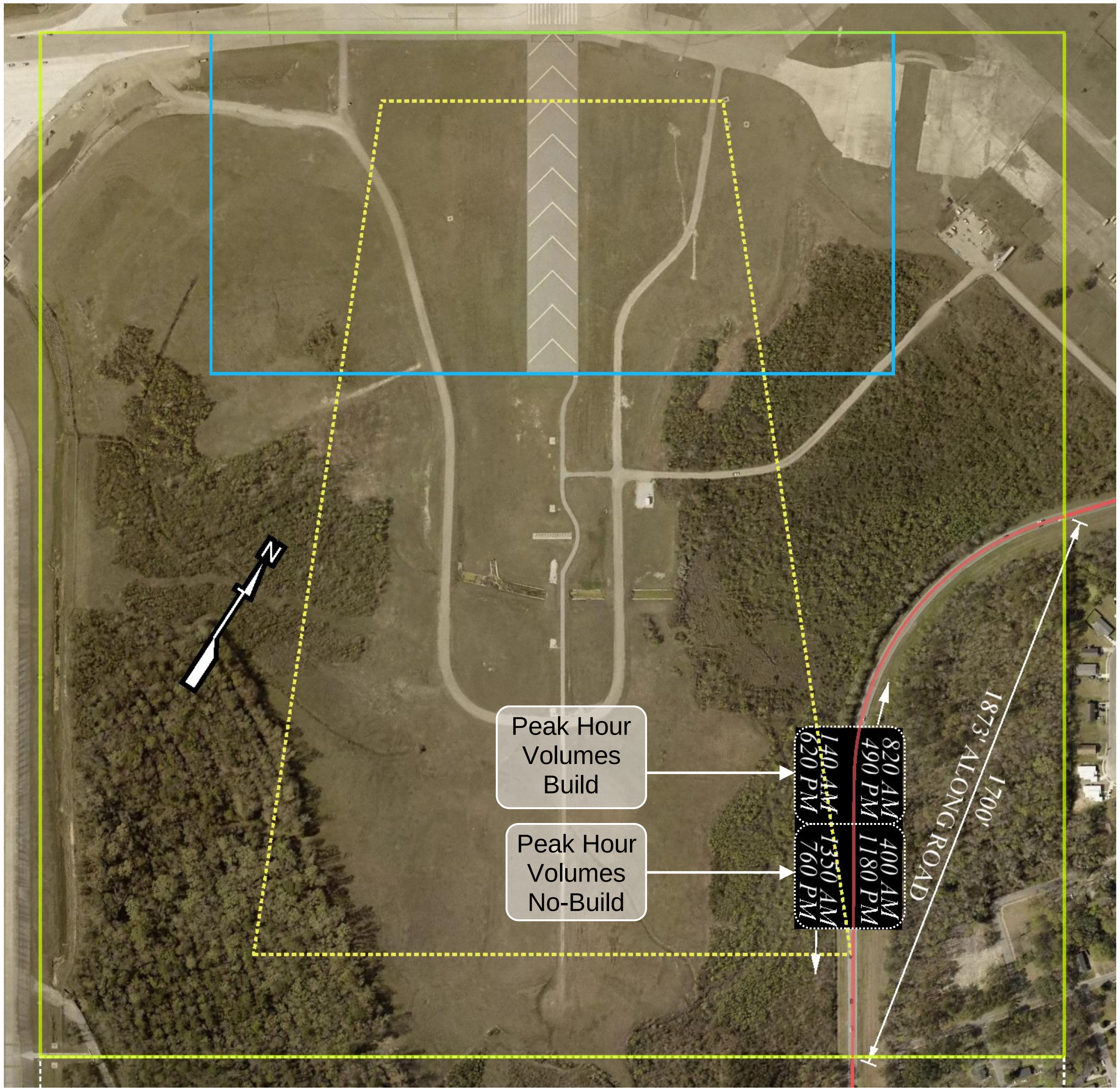


Figure 17: No-Build vs Build Traffic in Runway 33 Clear Zone



Runway 33

Figure 17 shows the existing location of South Aviation Avenue as it crosses through the clear zone of Runway 33

Reference is made to Figure ES-3 in the Executive Summary, to illustrate how traffic is redirected by the design of PCP3. More specifically, how the limited access design, grade separation over the railroad, and the removal of the Midland Park Road and West Aviation Avenue connections to South Aviation Avenue reduce through traffic on South Aviation Avenue between Remount Road and International Boulevard. This reduces traffic through the Runway 33 clear zone.

These results were produced using the Charleston Area Transportation Study (CHATS) Travel Demand Model.

4.0 MITIGATING LAND USE IN CLEAR ZONES AND APZ

4.1 RIGHT OF WAY ACQUISITION

4.1.1 ACCESS MANAGEMENT

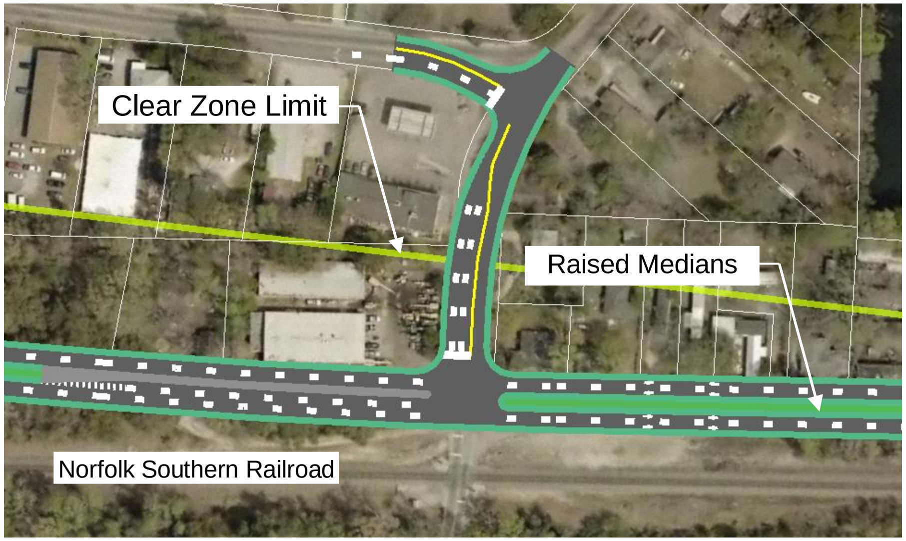
The typical process for acquisition of road right of way begins with defining the limits of property needed to construct, operate and maintain the roadway. This includes provisions for roadway drainage and utilities. Drainage for the roadway may include cross drainage necessary to maintain existing drainage patterns, as well as detention and water quality facilities. During right of way acquisition, Charleston County will offer and/or negotiate with each property owner to secure the road right of way. If terms are not reached, the property may be acquired through eminent domain.

Portions of PCP3 will occupy existing road right of way. Ward Avenue between Midland Park Road and Eagle Drive has a dedicated public right of way. The physical Ward Avenue roadbed also overlaps the right of way of the Norfolk Southern Railroad, and the railroad has agreed that the roadway can continue to occupy their right of way to the existing extent of encroachment.

A critical concern expressed by Joint Base Charleston has been access to the proposed PCP3 roadway. The concern is based on the increased potential for development generated by a four-lane roadway connecting to other arterials. While this is a valid concern, one method that the County may employ is to implement an access management plan. Such a plan could become a condition of a waiver needed from the Air Force to construct PCP3 through the runway clear zones.

The design of PCP3 is inherently a restricted access roadway, by virtue of its shared border with the railroad, and since the proposed PCP3 will include a raised median, as illustrated in **Figure 18**. The medians diminish the potential for large developments bordering PCP3, since private entrances would be restricted to right in/right out.

Figure 18: Access Control for Palmetto Commerce Parkway Phase 3



4.1.2 RESIDENTIAL, COMMERCIAL, AND INDUSTRIAL DISPLACEMENTS

The number of parcel acquisitions for right of way is approximately eighty-one (81) from end to end of the project corridor, based on recommended alignment.

After removal of the right of way for the new roadway, the area of the remaining parcel was measured to determine whether it could be built upon based on its current zoning designation according to the City of North Charleston zoning ordinance. Front, rear and side yard depths specific to the parcel's zoning were plotted on each parcel to illustrate the available building footprint. This analysis was used to determine the number of persons that would be removed from Accident Potential Zones (APZ) and Clear Zones (CZ) of Runways 15 and 21 based on the potential development or redevelopment density after the construction of the new roadway.

The potential number of persons on the affected parcels within these zones was determined by either the number of persons per household for residentially zoned land, or the number of building square feet per employee for industrial or commercially zoned land.

Residentially Zoned Parcels

The United States Census Bureau, American Community Survey5 reported that there were 2.54 persons per household in the City of North Charleston in the year 2018. This was applied to the number of dwellings that could potentially develop on residentially zoned land obtained for the PCP3 roadway project. The result is the reduction of potential inhabitants within the APZ and CZ of each runway. If a parcel contained multiple mobile homes, and that portion remaining after the new road right of way was acquired did not meet the minimum area required for a mobile home park (3 Acres), it was assumed that one mobile home would occupy that remainder.

Commercial or Industrially Zoned Parcels

The United States Energy Information Administration publishes commercial building statistics based on national surveys that include employment and occupancy data such as floor space per employee. The latest available data is based on surveys performed in

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[5] *United States Census Bureau, Selected Housing Characteristics, 2018: ACS 1-Year Estimates Data Profiles, North Charleston City, South Carolina. Average household size of renter-occupied unit.*
https://data.census.gov/cedsci/table?tid=ACSDP1Y2018.DP04&vintage=2018&g=1600000US4550875&t=Household%20Size%20and%20Type&hidePreview=false&layer=VT_2018_160_00_PY_D1&cid=DP05_0001E

2012 and released in 2016. The median area per surveyed categories of commercial and industrial buildings is 1,029 square feet.[6] This was applied to the building area could potentially develop on commercially or industrially zoned land obtained for the PCP3 roadway project. The result is the reduction of potential employees within the APZ and CZ of each runway.

Table 33 is a summary of the results of this analysis, illustrating that the development potential of property acquired for the right of way of the PCP3 will reduce the development potential within the APZs and CZs of Runways 15 and 21 corresponding to (up to) 152 residents and 919 workers.

Table 33: Residential and Industrial Development Potential Removed from APZ and Clear Zone

Runway	Zone	Land Area Removed (Ac)	Dwellings Removed	Inhabitants Removed	Building Area[a] Removed (Sq. Ft.)	Employees Removed
15	APZ 1	33.5	47	118.4	467,261	454.1
15	APZ 2	14.4	0	0	251,321	244.2
15	CZ	2.4	25	63.5	5,137	5.0
21	CZ	0.7	3	7.6	0	0.0
Totals		**51.0**	**74.6**	**189.5**	**723,719**	**703.3**

[a] Building area was established using the setbacks (front, rear, side yards) of the actual zoning classification. Build coverage of 40% of the parcel was used, based on the highest current coverage of the affected parcels along PCP3.

The following assumptions also apply to this analysis:

- Proposed Alignment: This alignment shares right of way with the Norfolk Southern Railroad. Preliminary coordination with the railroad indicates that the road may be built within their right of way to the extent that Ward Avenue currently exists within their right of way.
- The determination of whether the remaining portion of a parcel impacted by the project was dependent in part on continued road access. Access to Palmetto Commerce Parkway was considered to be available on a right in-right out bases to these parcels that do not have access to another public roadway.
- Adjacent properties may have the same owner. For purposes of this analysis, each parcel was evaluated individually, and no assumptions about parcels being joined to allow access or to form a buildable remnant were made.

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[6] *US Energy Information Administration, Independent Statistics & Analysis, 2012 CBECS Table PBA2. "Summary table: total and medians of floorspace, number of workers, hours of operation, and age of building by building activity subcategories, 2012.* *https://www.eia.gov/consumption/commercial/data/2012/bc/cfm/pba2.php*

4.2 READINESS AND ENVIRONMENTAL PROTECTION INTEGRATION

Through continued coordination between Joint Base Charleston and Charleston County, an application was prepared for funding from the Readiness and Environmental Integration (REPI) Program to secure development rights through easements on property bordering the airfield at Joint Base Charleston. The REPI Program protects military missions by helping remove or avoid land-use conflicts near installations and addressing regulatory restrictions that inhibit military activities. The application was successful, and the initial grant in the amount of $800,000 was announced, and subsequently appropriated in early 2022. This award was from the Office of the Secretary of Defense (OSD).

The REPI funds can be used to secure property restrictions within the Accident Potential Zones (APZs) of the runways, as well as within areas that are subject to noise levels of 65 dBA or higher resulting from Air Force flight operations. The program can help the Air Force reduce the extent of non-conforming land use within the APZs, or at least preserve land uses so the do not become less compliant. The REPI funds from OSD cannot be used for acquisition within the runway Clear Zones (CZs). Joint Base Charleston may pursue REPI funds from the Air Force for acquisitions on parcels within the CZs.

The acquisitions of property restrictions must be voluntary. Such restrictions cannot be acquired through eminent domain.

While the REPI program is not specifically related to the construction of PCP3, the acquisition of right of way, access management, and the relocation of public traffic out of the graded areas of the runways could be considered complementary to the REPI mission. **Figure 18** and **Figure 19** illustrate various types of property acquisition associated with the compliment of the PCP3 project (proposed road right of way) and the REPI program. Since REPI funds cannot be used to secure property restrictions within clear zones, Joint Base Charleston is currently looking to funding opportunities within other Air Force or DoD programs for those important areas. **Table 11** is a summary of the areas within the safety zones of Runways 15 and 21 corresponding to these figures that could be preserved through the purchase of rights.

Table 11: Area of Potential Acquisition and Preservation in Runway Safety Zones

Runway	Required PCP3 R/W			Advanced R/W Acquisition			In CZ, not R/W			REPI Optional		
	APZ 2 (acres)	APZ 1 (acres)	CZ (acres)	APZ 2 (acres)	APZ 1 (acres)	CZ (acres)	APZ 2 (acres)	APZ 1 (acres)	CZ (acres)	APZ 2 (acres)	APZ 1 (acres)	CZ* (acres)
Runway 15	15.39	14.46	2.49		29.98				2.30	25.50	8.66	
Runway 21			8.23						61.44		34.74	83.08
TOTALS	**15.39**	**14.46**	**10.72**	**0.00**	**29.98**	**0.00**	**0.00**	**0.00**	**63.74**	**25.50**	**43.40**	**83.08**

*Note: REPI funds currently awarded to Joint Base Charleston through the Office of the Secretary of Defense (OSD) may not be used for property within the runway clear zones. The Air Force has a separate REPI fund that may be used within Clear Zones that may be pursued by Joint Base Charleston.

The areas designated as PCP3 right of way reflect the areas required for the roadway. The REPI Optional areas (blue) are a suggested “starting point” based on coordination between Joint Base Charleston and Charleston County. Prioritizing these parcels will be determined by Joint Base Charleston.

Figure 19: Right of Way and Potential REPI Tracts – Runway 15 CZ and APZs

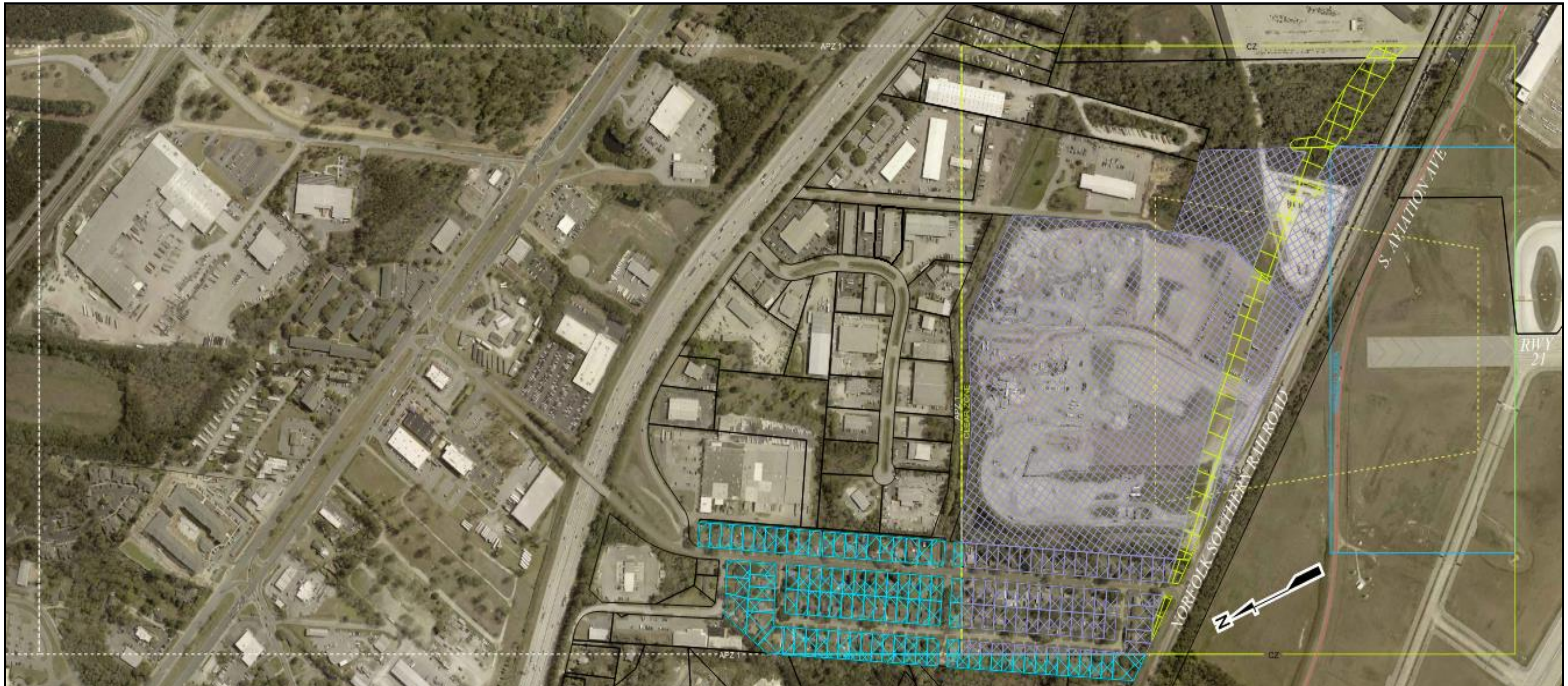
LEGEND

PURCHASED BY COUNTY FOR PCP3 RIGHT OF WAY & PRESERVATION	POTENTIAL OR SUGGESTED FOR PRESERVATION WITHIN APZ OR NOISE AREAS UNDER REPI
ADJACENT PARCELS WITHIN CLEAR ZONE NOT REQ'D FOR RIGHT OF WAY	ADDITIONAL RIGHT OF WAY REQUIRED FOR PCP3

RUNWAY 15 CLEAR ZONE AND ACCIDENT POTENTIAL ZONES
REQUIRED ROAD RIGHT OF WAY
AND
POTENTIAL PARCELS FOR JBC REPI PROGRAM

NOTE TO SCALE

Figure 20: Right of Way and Potential REPI Tracts – Runway 21 CZ and APZ



LEGEND

PURCHASED BY COUNTY FOR PCP3 RIGHT OF WAY & PRESERVATION

POTENTIAL OR SUGGESTED FOR PRESERVATION WITHIN APZ OR NOISE AREAS UNDER REPI

ADJACENT PARCELS WITHIN CLEAR ZONE NOT REQ'D FOR RIGHT OF WAY

ADDITIONAL RIGHT OF WAY REQUIRED FOR PCP3

RUNWAY 21 CLEAR ZONE AND ACCIDENT POTENTIAL ZONES REQUIRED ROAD RIGHT OF WAY AND POTENTIAL PARCELS FOR JBC REPI

NOTE TO SCALE

5.0 SUMMARY

The SCDOT 2014 Multimodal Transportation Plan states in its Interstate Plan that, in the Charleston area, the primary eastbound congestion point along I-26 occurs in the AM peak hour between the US 52 Connector and West Aviation Avenue, and the primary westbound congestion point along I-26 occurs between Montague Avenue and Ashley Phosphate Road.

The Berkeley Charleston Dorchester Council of Governments (BCDCOG) Long Range Transportation Plan (2015) summarizes the traffic level of service based on volume to capacity ratios for collector and arterial routes throughout the region. This plan indicated the following:

- I-26 was close to failure in 2015 prior to the 5.2% annual growth experienced over the past 4 years (22% total).
- Ashley Phosphate Road is beyond capacity.
- Rivers Avenue operated at acceptable LOS through 2014, but volume has grown by an annual rate of 4.3% (18% total).
- Cross County Road and Dorchester Road were beyond capacity through 2014. This is an alternative to traveling I-526 and I-26 south of Ashley Phosphate Road.

The SCDOT will construct capacity improvements along the I-526 corridor between Virginia Avenue and Paul Cantrell Boulevard with the 526 Lowcountry Corridor Project. That project, particularly the overhaul of the system-to-system interchange of I-26 and I-526, will help reduce congestion on I-26 between West Aviation Avenue and Montague Avenue. That project will not, however, reduce congestion between West Aviation and the US 52 Connector (Ashley Phosphate Road), or beyond to US 78. There are no provisions in the current Long-Range Transportation Plan (LRTP) to widen or otherwise add capacity to I-26 between West Aviation Avenue and US 78. A new parallel corridor is needed.

Palmetto Commerce Parkway was constructed in two phases between Ladson Road to Ashley Phosphate Road. The third and final phase of the project, PCP3 will complete the corridor by extending Palmetto Commerce Parkway from Ashley Phosphate Road to Remount Road.

The PCP3 project will provide a four-lane facility that the regional travel demand model indicates will draw approximately 45,000 vehicles per day from parallel corridors such as I-26 and Rivers Avenue, and from the arterials that carry traffic between them, such as Ladson Road/US 78 and Ashley Phosphate Road.

PALMETTO COMMERCE PARKWAY 3

TECHNICAL MEMORANDUM - Appendix A

Alternative Screening

CHARLESTON COUNTY
SOUTH CAROLINA

Stantec

June 2022

1.0 CORRIDOR ALIGNMENT ALTERNATIVES

A range of alternative alignments were developed using combinations of segments of existing roadway and new alignment and were screened based on two tier traffic operational criteria:

> **Traffic Tier 1 Criteria:** Extent to which the alignment alternative provided the intended relief to the congested corridors (I-26, Rivers Avenue, Ashley Phosphate Road.
>
> **Traffic Tier 2 Criteria:** The Level of Service (LOS) at the intersection with existing roadways, particularly the key connections at Ashley Phosphate Road, West Aviation Avenue and Remount Road.

A variety of alignments were evaluated to connect the western terminus near Ashley Phosphate Road to the eastern terminus at Remount Road using the CHATS model.

The first-tier screening determined the extent to which a given alignment would attract traffic from the corridors for which the project is intended to provide traffic relief, leading to three of the 16 preliminary alternative alignments being carried forward to the second-tier screening, each of which included a connection of PCP3 to Ashley Phosphate Road at a new intersection west of the existing Palmetto Commerce Parkway & Ashley Phosphate Road intersection, and an alignment that lies adjacent and generally parallel to the existing Norfolk Southern Railroad right-of-way.

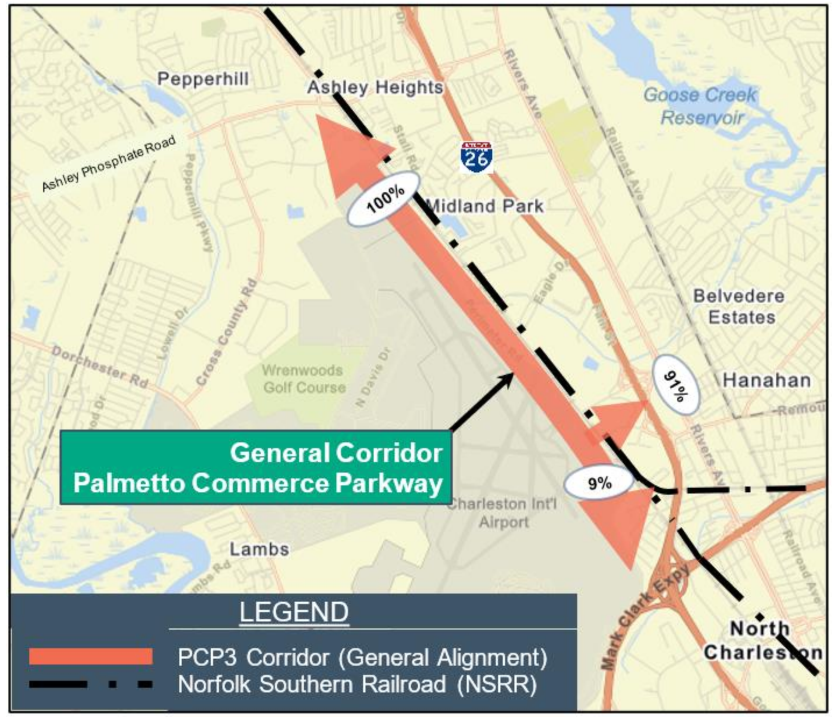


FIGURE 1: Ashley Phosphate to Remount Trip Distribution

The second-tier screening used a GIS-based desktop evaluation to compare the relative community and environmental impacts of the three alternative alignments carried forward from the first-tier screening process. The results of the second-tier screening showed that two alternatives, Alternatives D and D1, were suitable to be carried forward as reasonable alternatives. Alternatives D and D1 have very similar alignments – the difference being that Alternative D assumes the proposed PCP3 roadway will occupy a portion of the railroad right-of-way, while Alternative D1 assumes PCP3 is shifted to the east just out of the railroad right-of-way. The latter was developed to account for the possibility that an agreement is not reached with the railroad to share its right-of-way. From a traffic volume forecast and traffic analysis perspective, the two alternatives are identical.

TRAFFIC FORECAST

Existing condition AM and PM peak hour traffic volumes were collected at the 27 intersections in the study area in October of 2018. Using trip projections from CHATS travel demand model for the No-Build and Build condition, future traffic volumes for the design year (2045) No-Build and Build conditions were determined. These traffic volumes served as the basis for intersection design recommendations along the proposed PCP3 corridor as well as for the study area intersection capacity comparison between the No-Build and Build conditions.

PCP3 INTERSECTION DESIGN RECOMMENDATIONS

Traffic analysis was conducted at the various intersections along the proposed PCP3 corridor to recommend intersection design suitable to accommodate the Build condition traffic volume projections. These intersections included:

- At the Northern Terminus:
    - PCP3 & Ashley Phosphate Road
- Between the Northern & Southern Termini:
    - PCP3 & South Aviation Avenue
    - PCP3 & Midland Park Road
- At the Southern Terminus:
    - PCP3 & West Aviation Avenue
    - PCP3 & Remount Road
    - Remount Road & South Aviation Avenue
    - West Aviation Avenue & Core Avenue
    - Remount Road & Core Avenue

The following intersection configurations were determined to provide the best combination of traffic level of service (LOS) and least impacts to the community:

- PCP3 & Ashley Phosphate Road: A Single-Point-Urban-Interchange (SPUI) is proposed, with two lanes of PCP3 carried over Ashley Phosphate Road in each direction. Critical high volume turning movements include the northbound PCP3 to westbound Ashley Phosphate.

- PCP3 & South Aviation Avenue (or Arthur Drive) – providing access to Joint Base Charleston (JBC) – a pair of right-in/right-out intersections (taking advantage of the necessary grade separation over the rail line) were found to provide full access to JBC without introducing another signalized control along the corridor.

- At the intersection of PCP3 & Midland Park Road, it was found that a signalized intersection was necessary to accommodate the projected traffic demand volumes in the design year.
- At the intersection of PCP3 & Aviation Avenue, a “Green-T” intersection (such that southbound traffic was able to flow uncontrolled) was found to be necessary to accommodate the traffic demand volumes and eliminate queues which extended into the Airforce Clear Zone to the north.
- Given the proximity of the intersections of PCP3 & Remount Road and Remount Road & S. Aviation Avenue, it was deemed necessary to operate these two intersections with one signal controller, to enable traffic to flow freely between them.
- At the intersection of Aviation Avenue & Core Avenue, it was found to be necessary to improve the northbound and southbound approaches geometrically such that the split phasing of the signal can be removed. Additionally, the westbound left-turn was prohibited, and the exclusive eastbound left-turn phase was removed, in order to accommodate the significant through volumes at this intersection destined for PCP3.
- The intersection of Remount Road & Core Avenue was found to operate acceptably as a two-way stop-controlled intersection, the control that exists today.

2.0 CORRIDOR ALTERNATIVE ALIGNMENT SCREENING

The CHATS model was used to establish the logical termini of the PCP3 project. The northern terminus is intuitive, as the corridor currently ends at Ashley Phosphate Road. The southern terminus was originally considered to be International Boulevard. This was re-evaluated in the current version of the CHATS model, considering the 526 LCCW and ACR project to be completed. The CHATS model results indicate that, when PCP3 is extended to Remount Road and West Aviation Avenue, approximately 91% of the traffic on PCP3 is carried to or from the direction of I-26 on these two roads. The remaining traffic, connecting with South Aviation Avenue between Remount Road and International Boulevard, does not exceed the capacity of South Aviation Avenue.

Remount Road was therefore determined to be the logical southern terminus for the project purpose and need. The study area for the evaluation of alternative alignments was then established between I-26 and South Aviation Avenue, and between reasonable connection points on the existing Palmetto Commerce Parkway and Remount Road.

A range of 16 alternative alignments were developed using combinations of segments of existing roadway and new alignment. These alternative alignments are shown in **Figure 12** through **Figure 7**. A two-tier screening process was then used to screen the alternatives to determine the reasonable alternative alignments to carry forward, along which roadway and intersection designs were recommended.

2.1 TIER 1 SCREENING

The Tier-1 screening was a traffic-based screening which included four levels, each of which evaluated the traffic impacts of various distinctives between the 16 alternatives. **Table** 1 lists the 4 screening levels as well as the distinctives for each alternative for each.

Table 1: Distinctions of PCP3 Alternative Alignments

Screening Level	Description	Alternatives															
		A	B	C	D	D1	E	F	G	H	I	J	K	L	M	N	O
1	**Alignment South of Ashley Phosphate:** S. Aviation (**SA**) or New Alignment (**N**)	N	N	N	N	N	SA	N	N	N	N	N	N	N	N	SA	N
2	**Alignment South of Midland Park:** Parallel to I-26 (**I-26**) or S. Aviation (**SA**)	I-26	I-26	SA	SA	SA	SA	I-26	I-26	I-26	I-26	I-26	I-26	SA	SA	SA	SA
3	**Crosses Ashley Phosphate:** East (**E**) or West (**W**) of Railroad*	W	W	W	W	W	W	E	E	E	E	W	W	W	W	W	E
4	**Connection at Ashley Phosphate:** One-Way Pair (**OWP**) or Single-Point (**SP**)	SP	SP	SP	SP	SP	SP	SP	SP	SP	SP	OWP	OWP	OWP	OWP	OWP	SP

Figure 1: Preliminary Alignment A

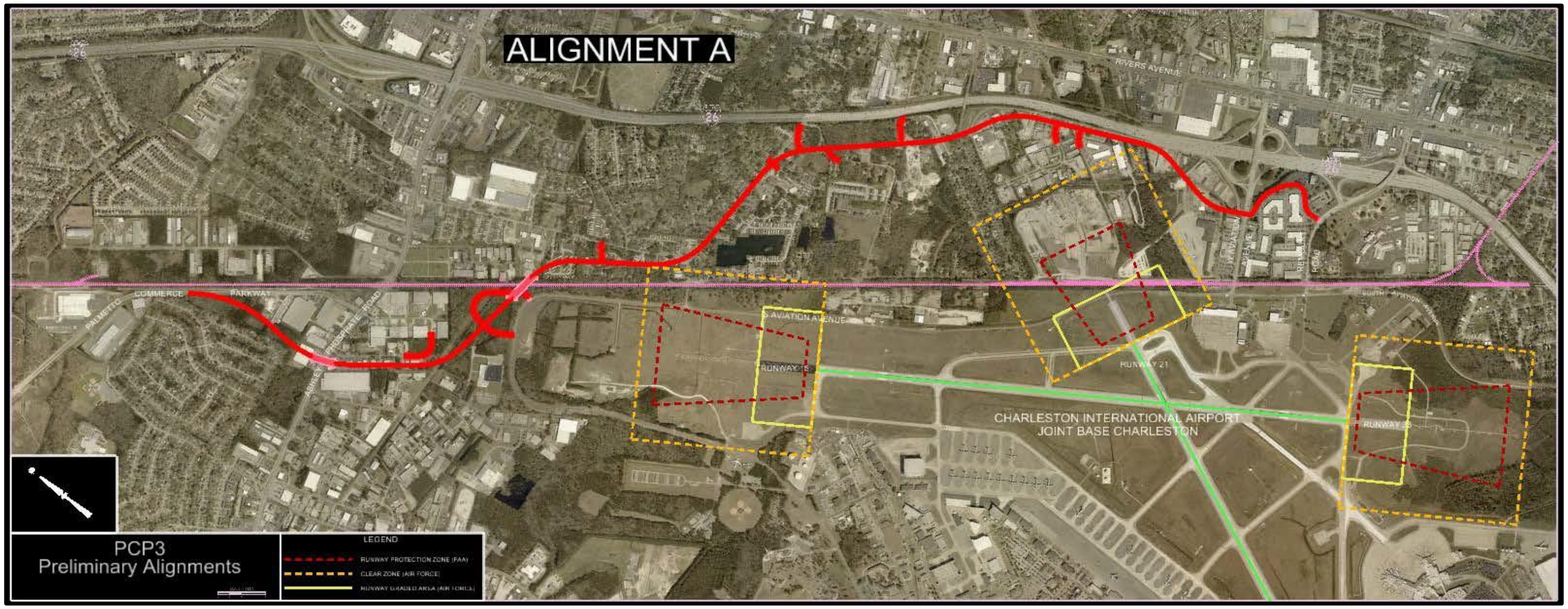
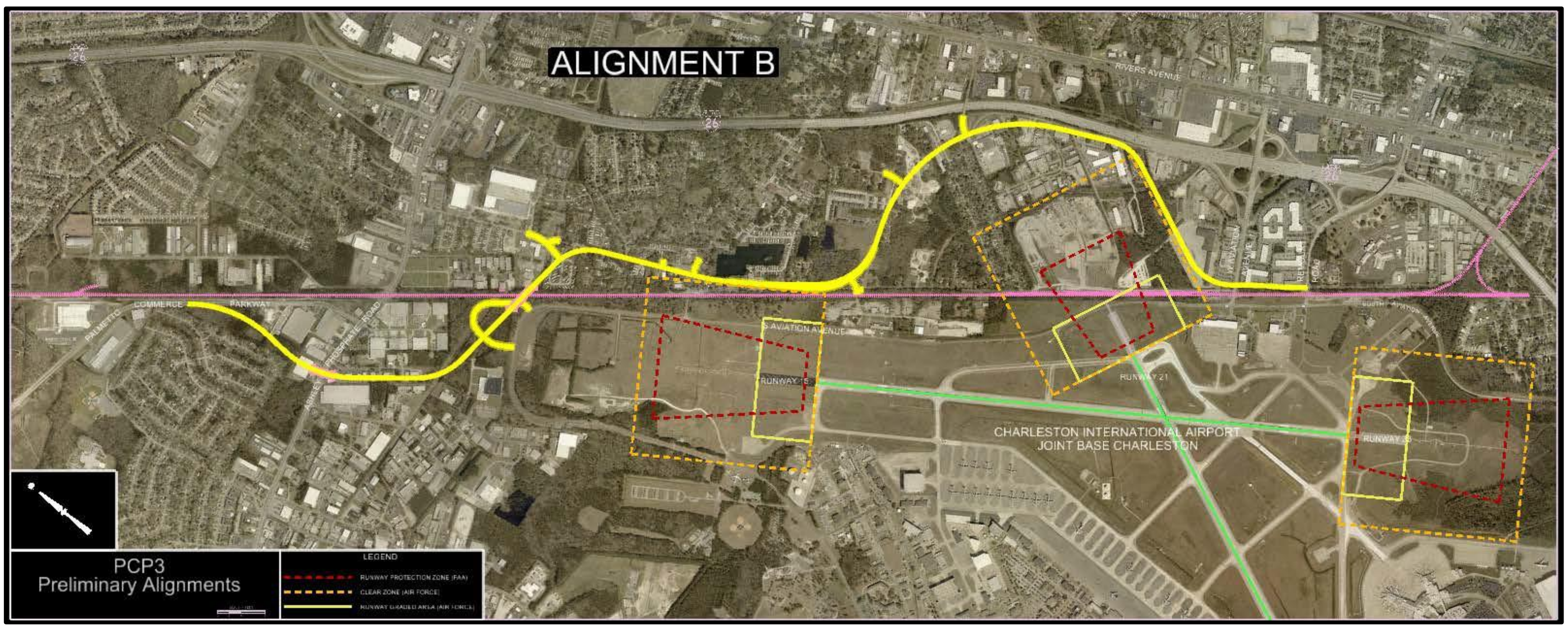


Figure 3: Preliminary Alignment B



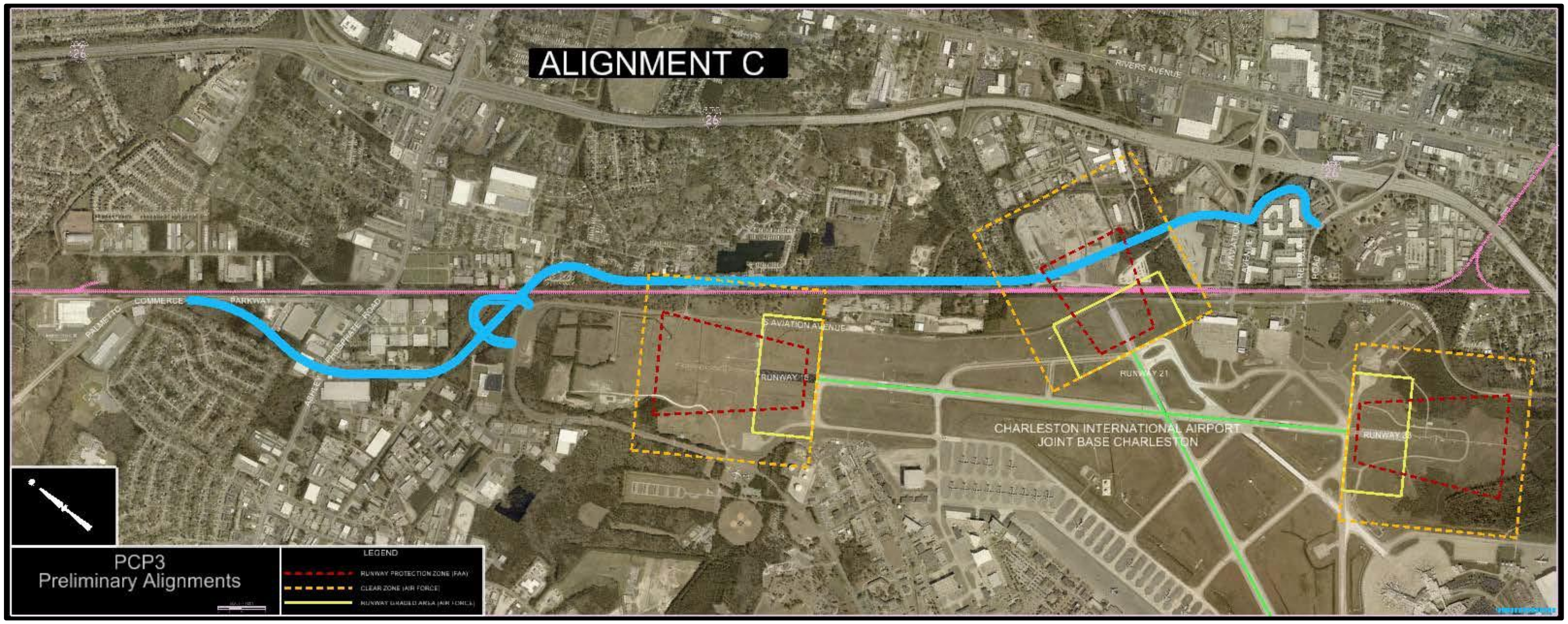


Figure 4: Preliminary Alignment C

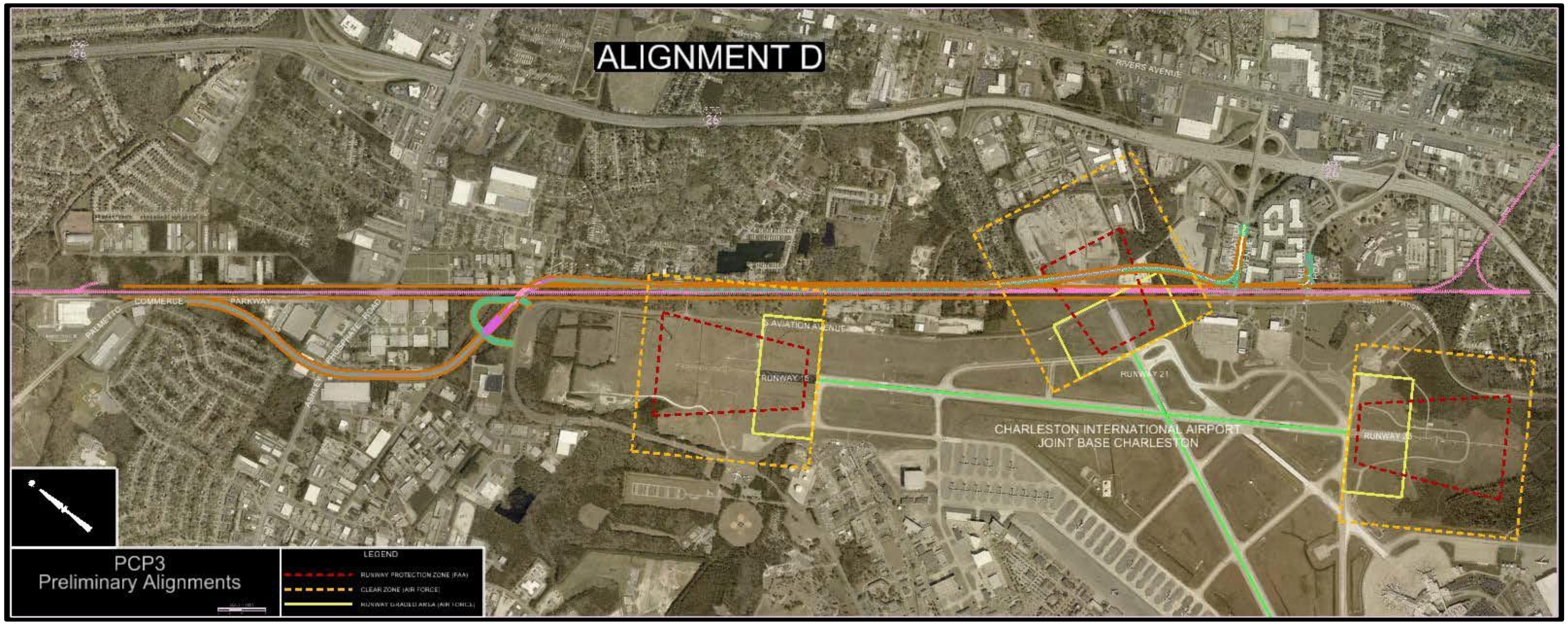


Figure 5: Preliminary Alignment D

Figure 6: Preliminary Alignment D1

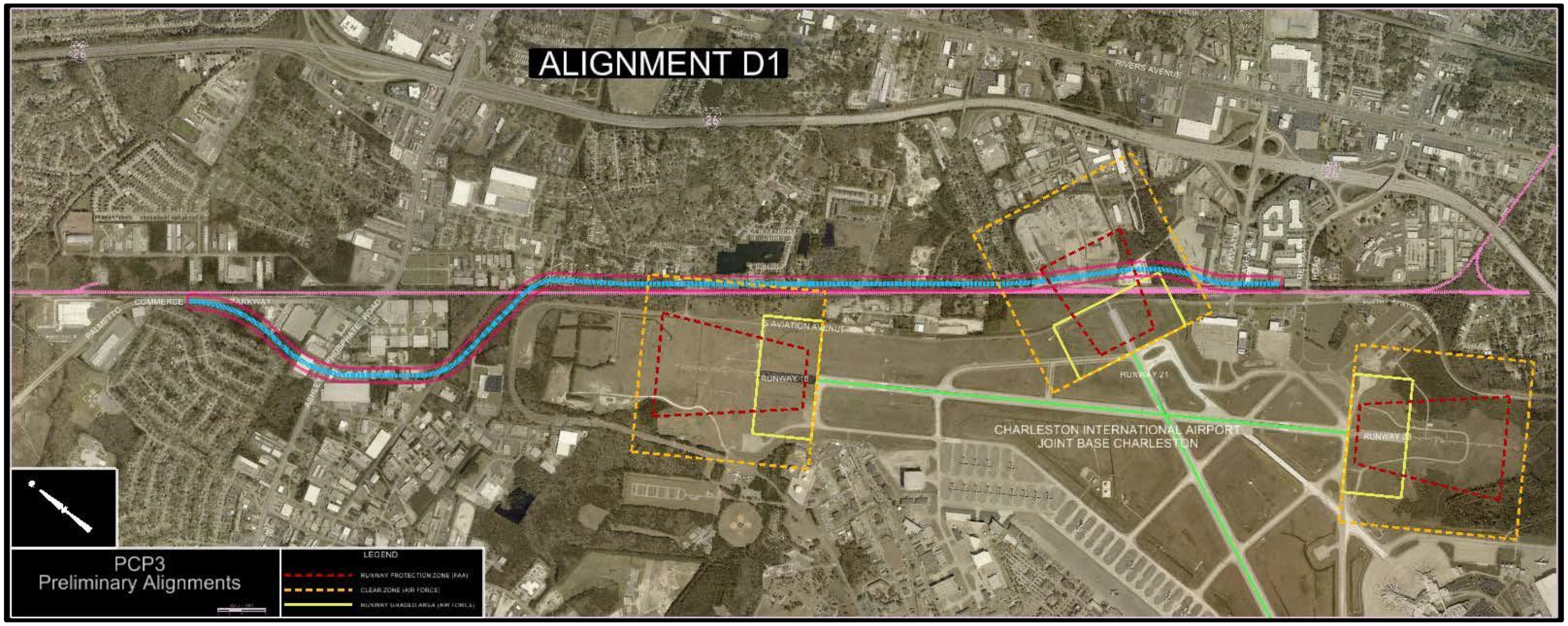


Figure 7: Preliminary Alignment E

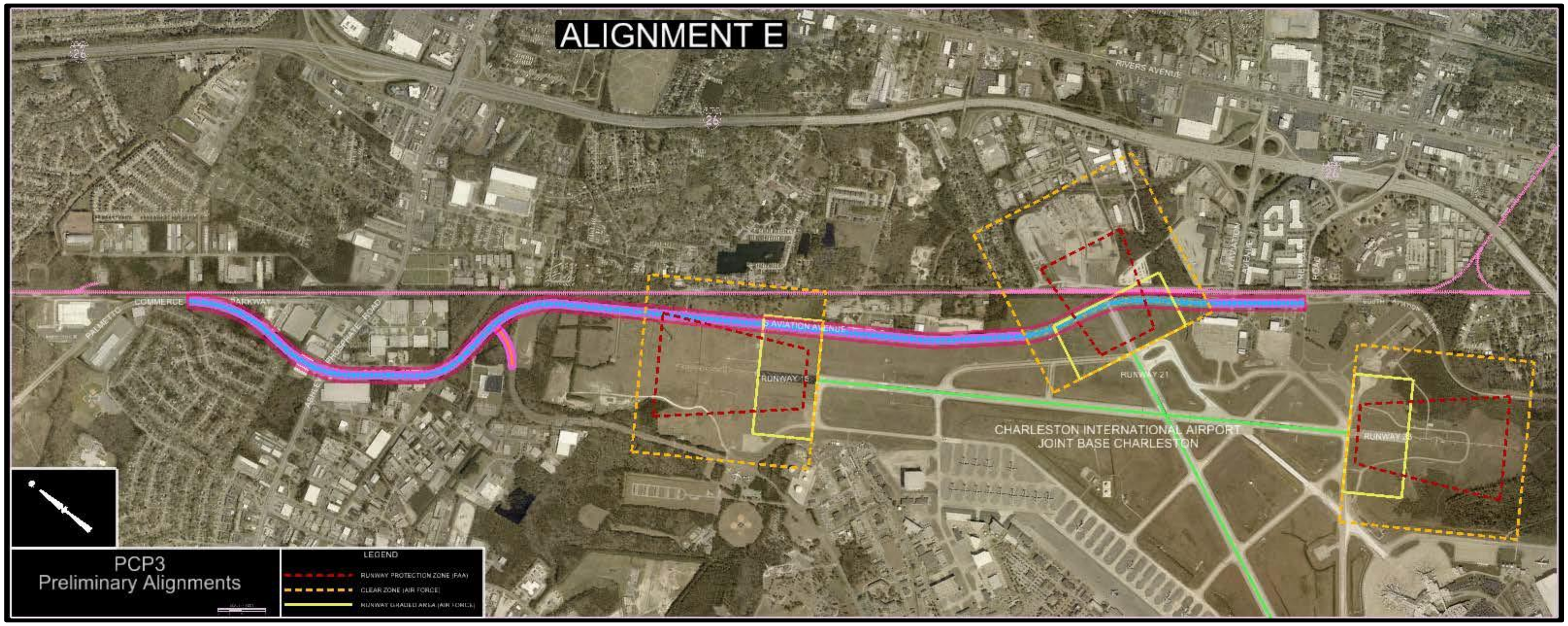


Figure 8: Preliminary Alignment F

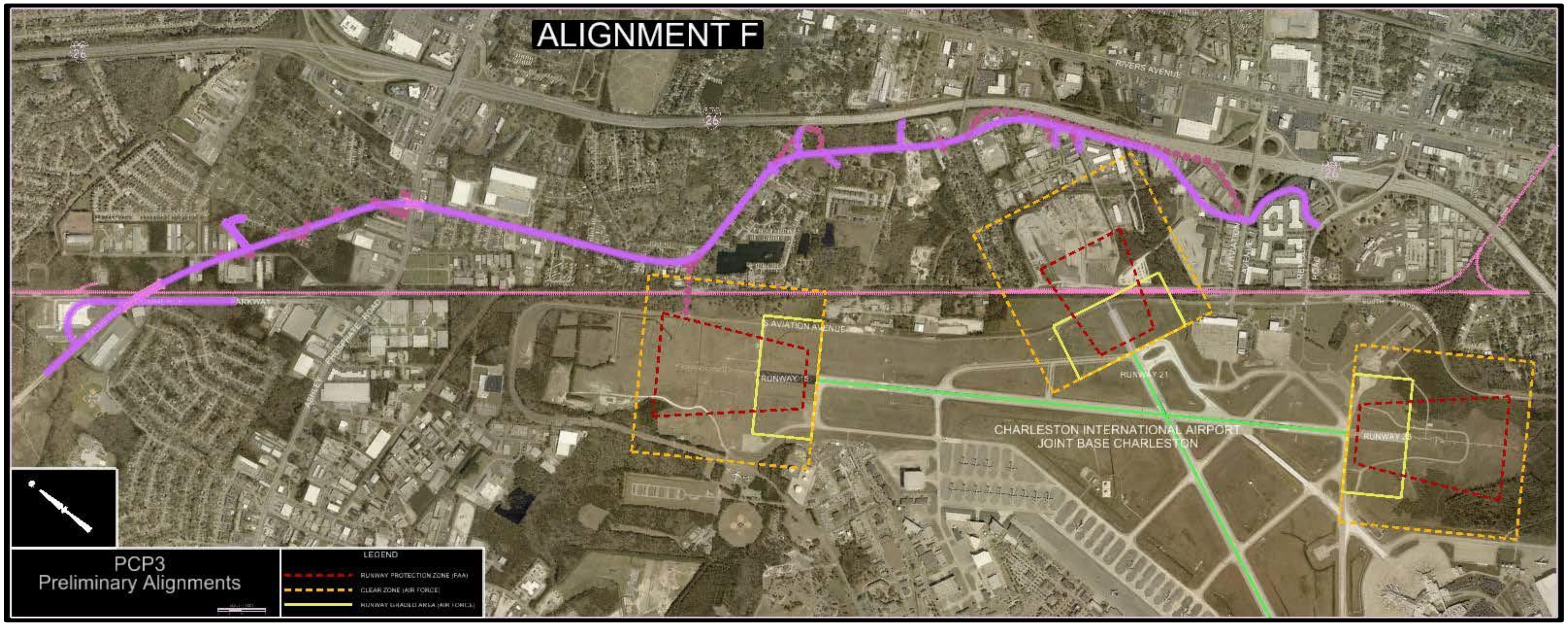


Figure 9: Preliminary Alignment G

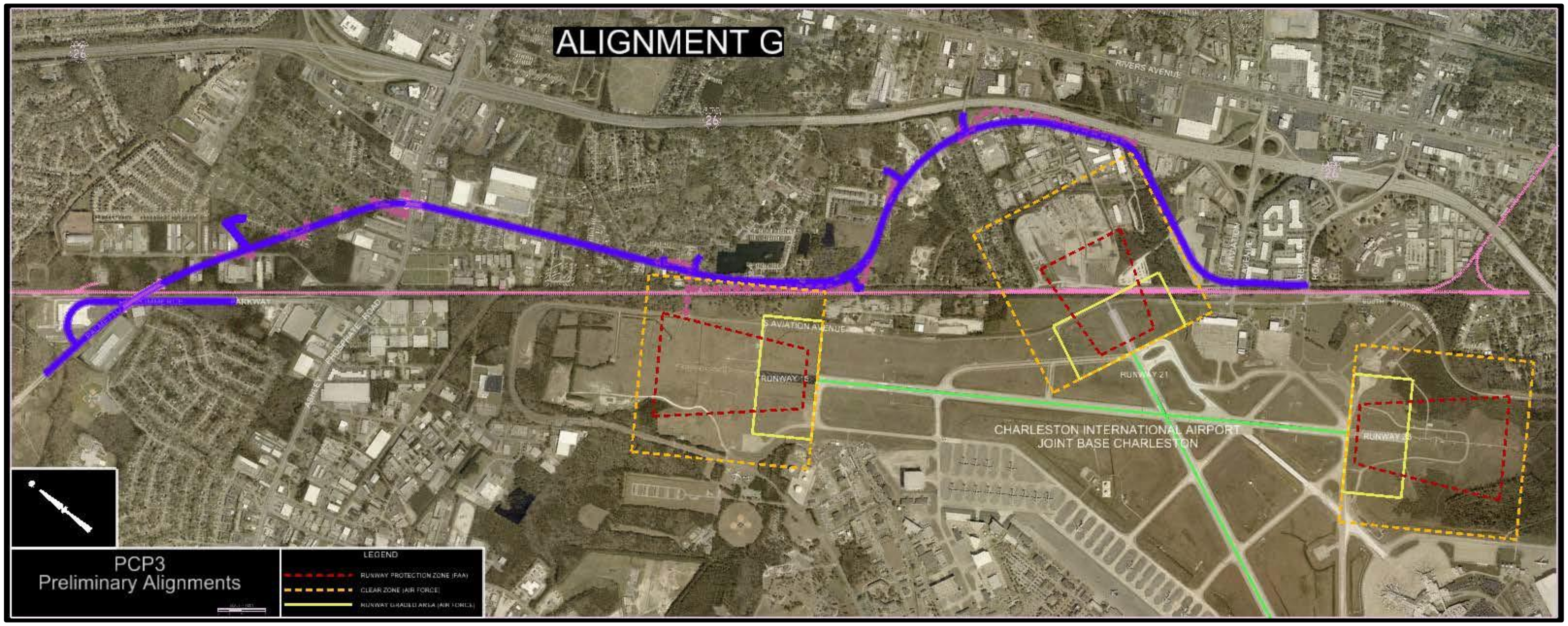


Figure 10: Preliminary Alignment H

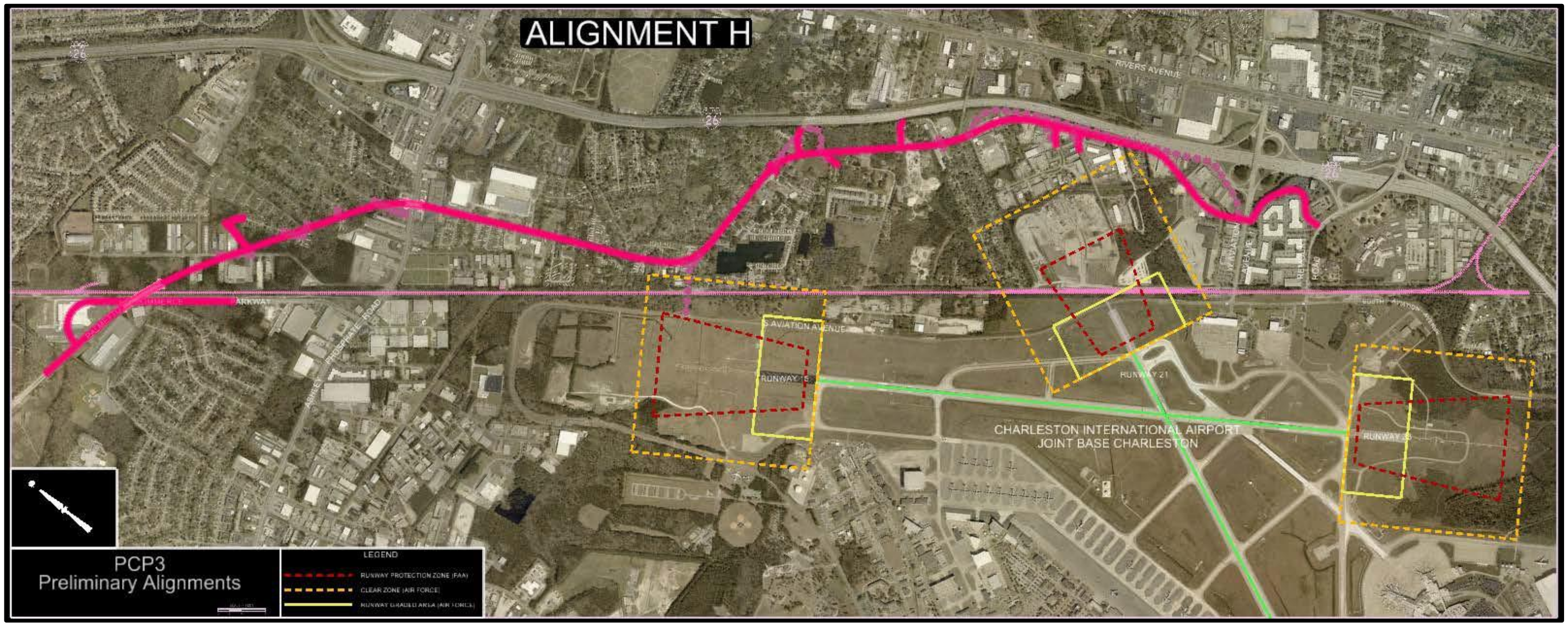


Figure 11: Preliminary Alignment I

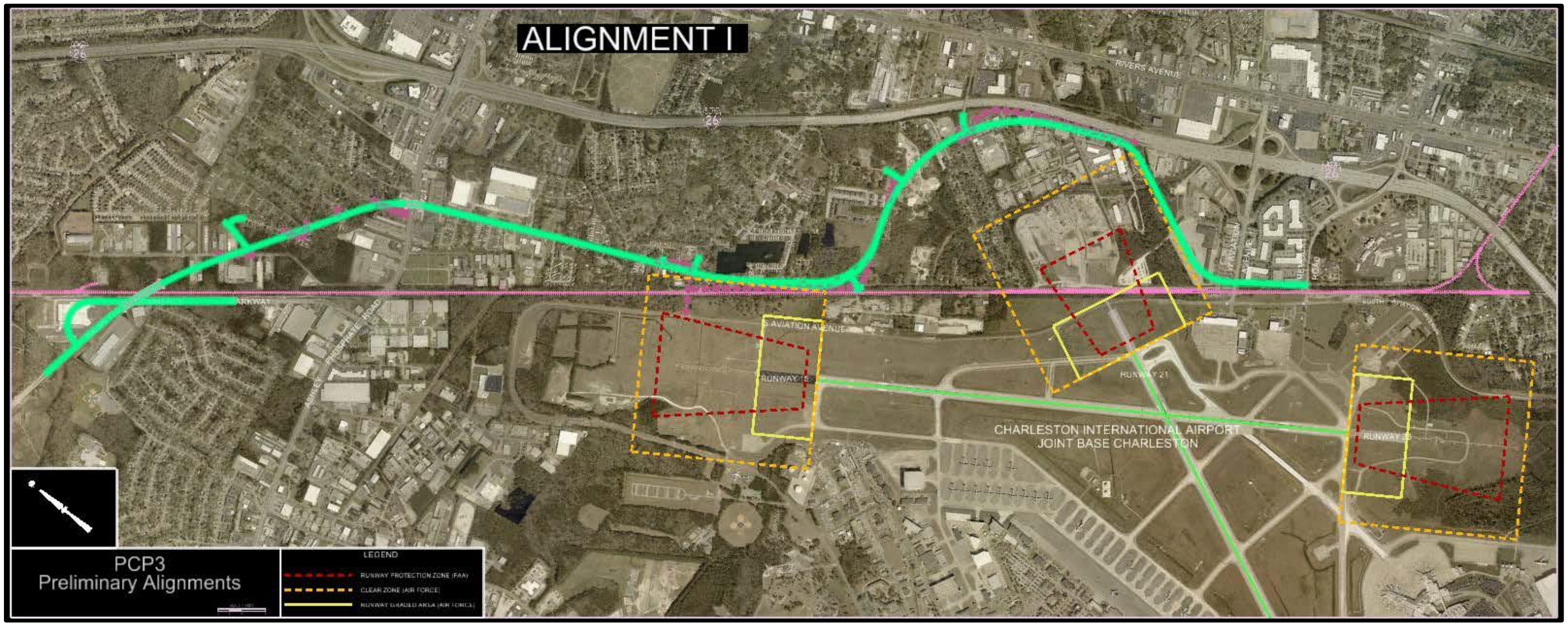


Figure 12: Preliminary Alignment J

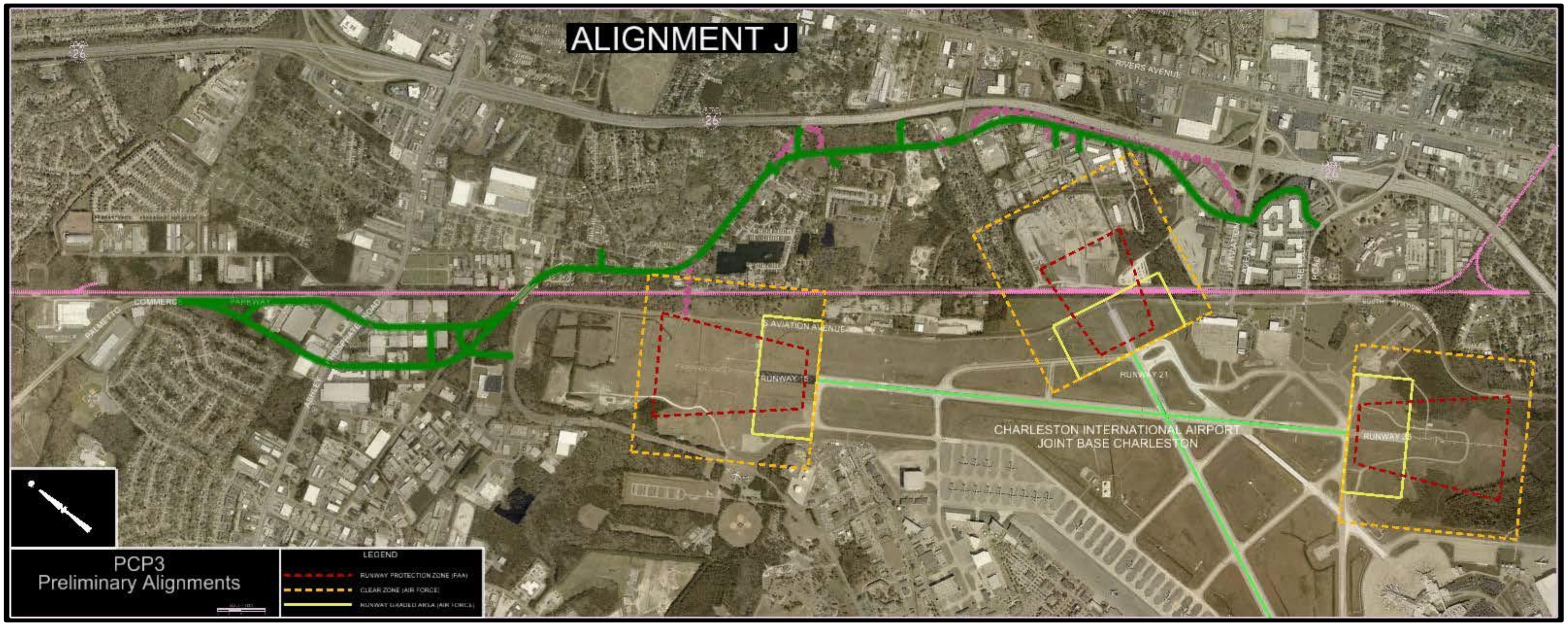
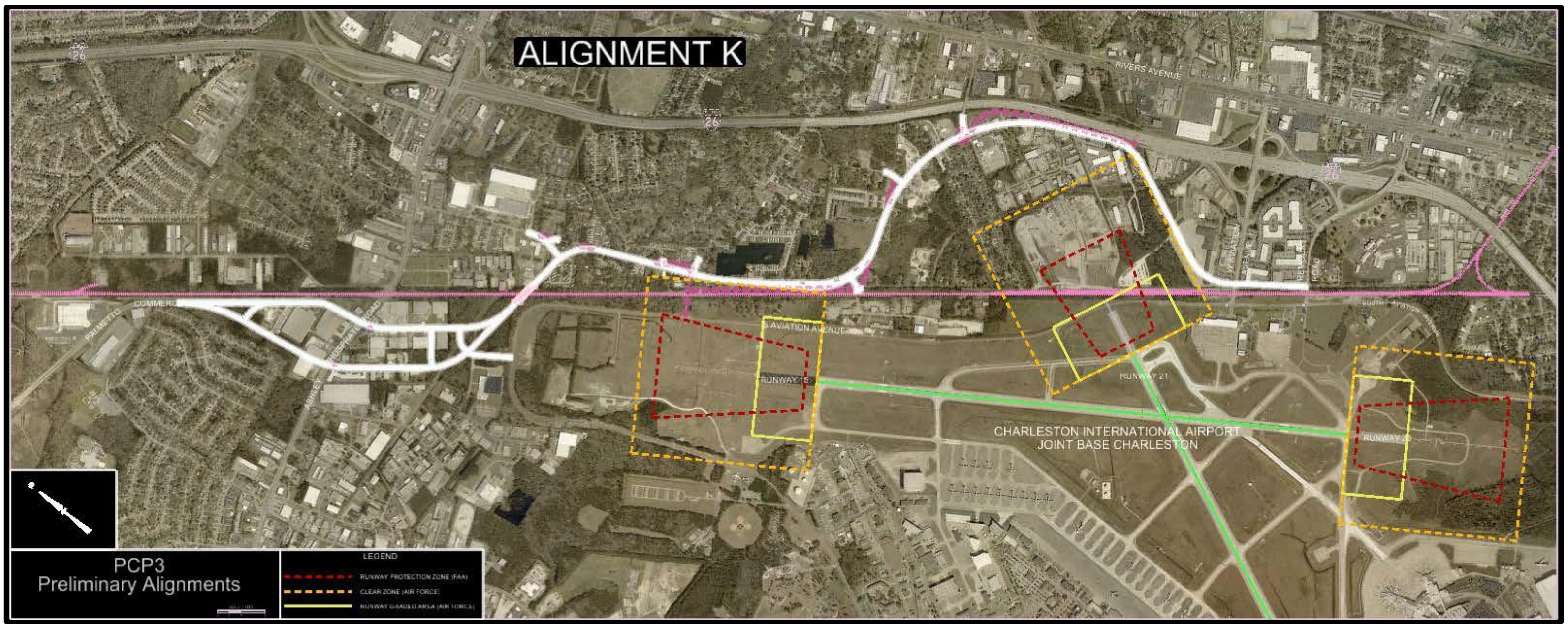


Figure 13: Preliminary Alignment K



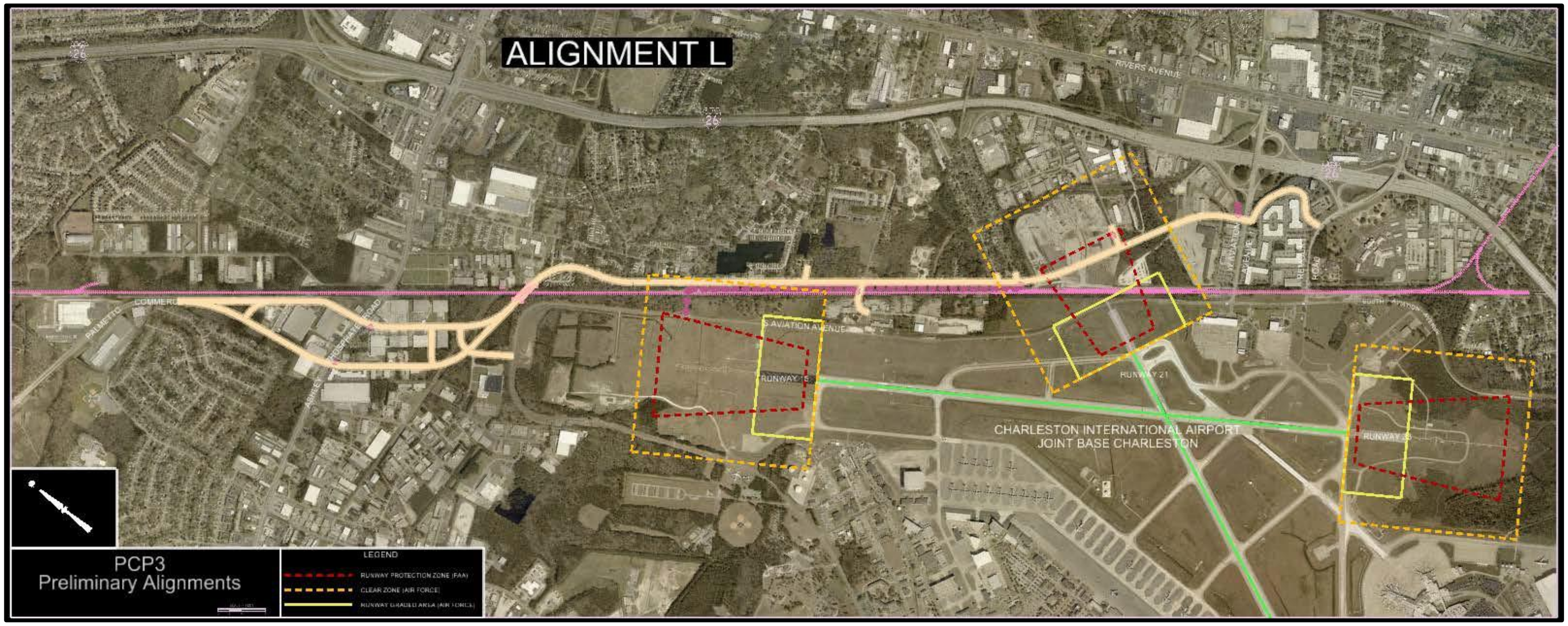


Figure 14: Preliminary Alignment L

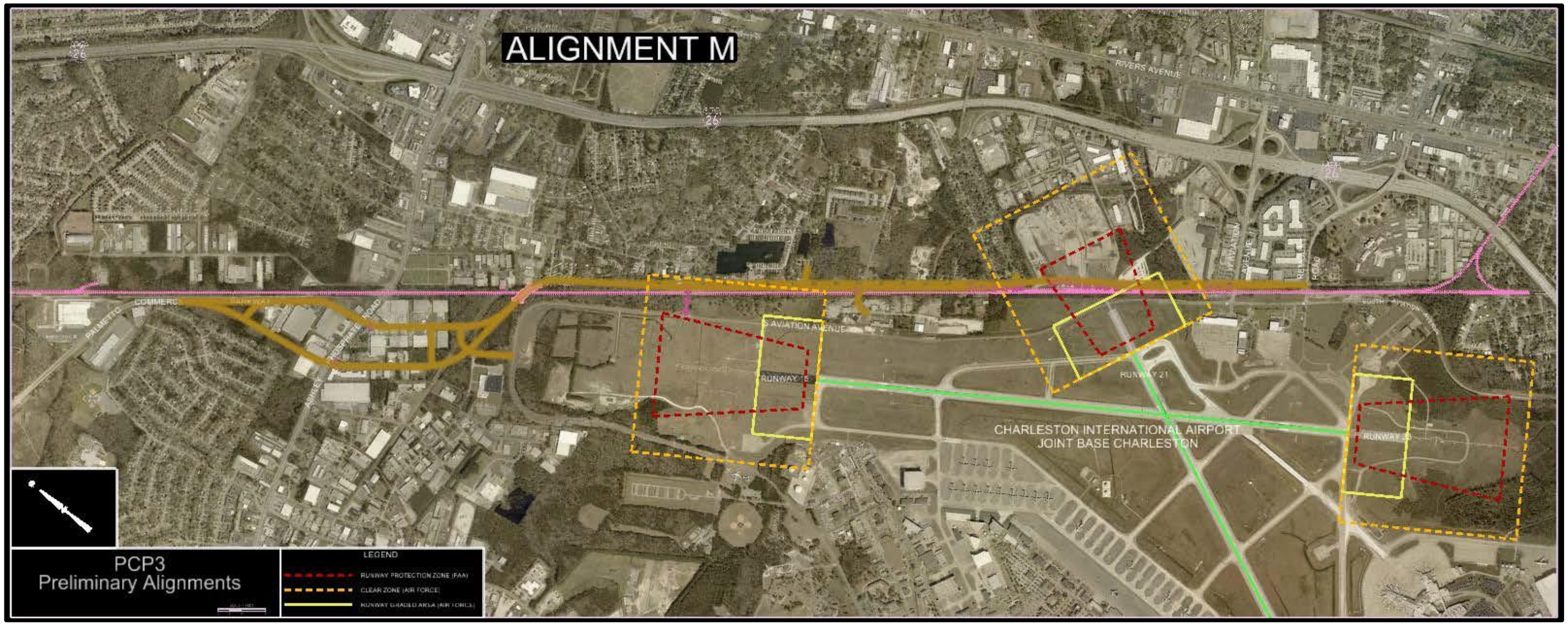


Figure 15: Preliminary Alignment M

Figure 16: Preliminary Alignment N

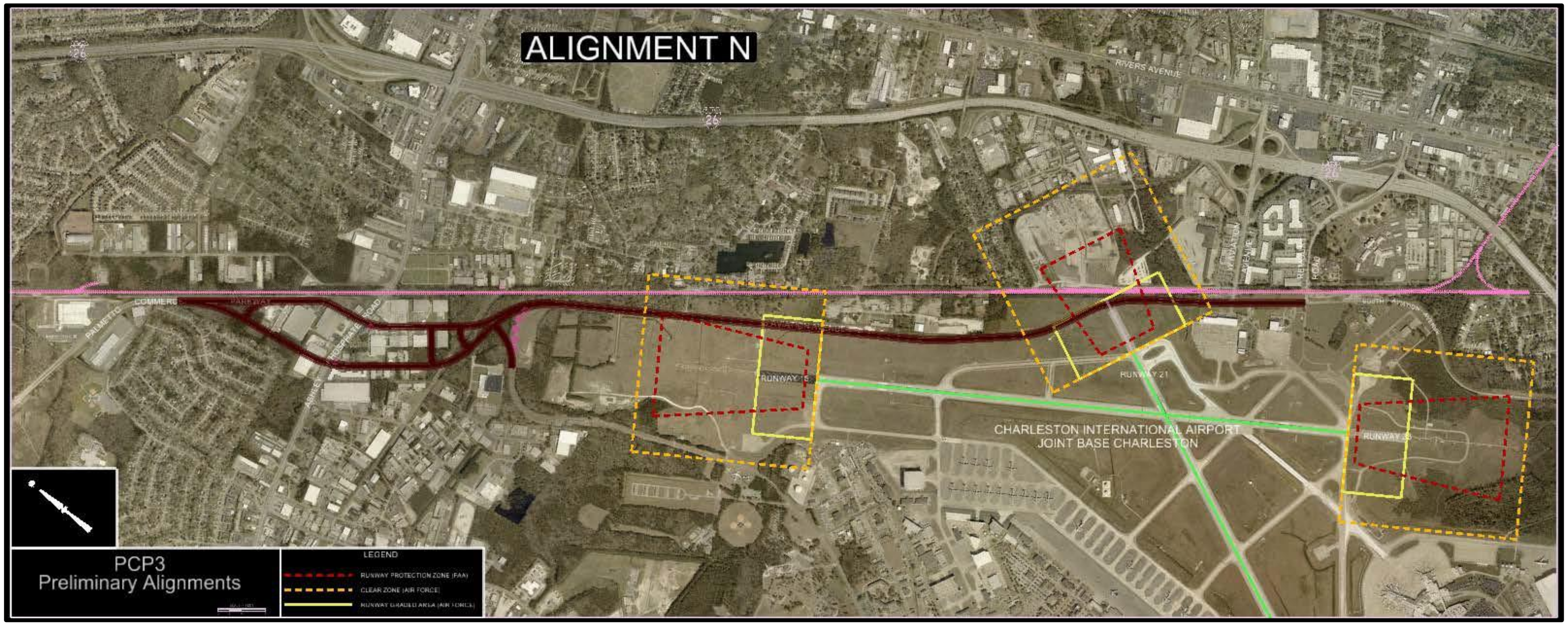
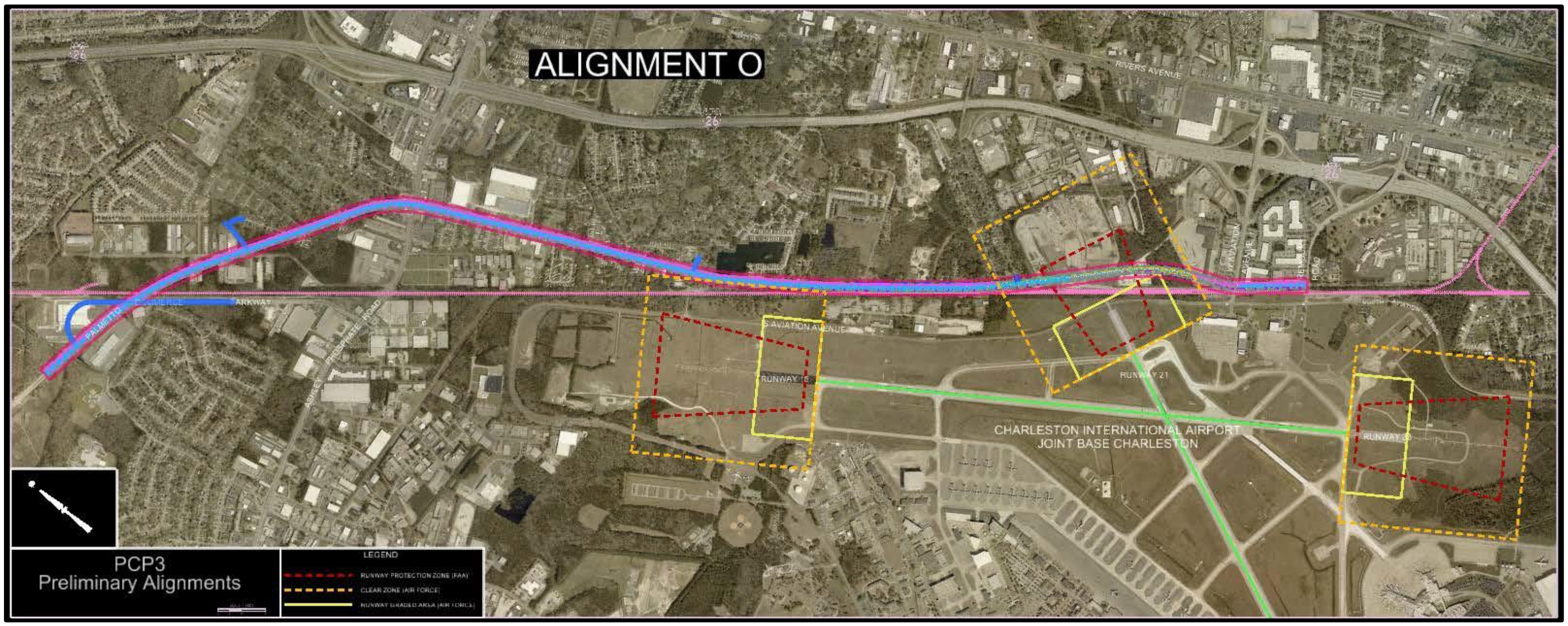


Figure 17: Preliminary Alignment O



Level 1: Alignment South of Ashley Phosphate Road

The first level of the Tier 1 screening evaluated the alignment of PCP3 south of Ashley Phosphate Road. As shown in **Table 1**, each of the 16 preliminary alternative alignments falls into one of two categories related to this screening level:

- ❖ Utilizes the existing alignment of S. Aviation Avenue, or
- ❖ Utilizes a new alignment east of S. Aviation Avenue.

As shown in the alignment figures above, two of the 16 alternatives utilize the existing S. Aviation Avenue alignment: Alternatives E and N. The remaining alternatives utilize new alignments east of S. Aviation Avenue and the existing railroad (which generally runs parallel to S. Aviation Avenue). **Figure** below indicates the alternative categories and distinctions, and also depicts the location of the existing railroad line. Two evaluation parameters were considered in this Tier 1, Level 1 screening, discussed in the sections on the following page.

Figure 18: Tier 1, Level 1 Screening Alternative Distinctions

Alternatives			
A	B	C	D
D1	E	F	G
H	I	J	K
L	M	N	O

Legend	
	Utilizes S. Aviation Avenue alignment, west of railroad
	Utilizes new alignment(s) east of railroad

2.1.1.1 Traffic Impacts Related to Interactions with Railroad Line

The CHATS model output of daily traffic volumes for the preliminary alternative alignments was used to determine approximate traffic volumes projected to utilize the new PCP3 corridor as well as where the desired origins and destinations of these new trips. The CHATS model indicates that for the alternatives which utilize the existing S. Aviation Avenue alignment (Alternatives N and E), the following daily traffic volumes are projected at various locations along the corridor in the design year:

- PCP3 South of Ashely Phosphate Road: ~47,000 veh/day
- PCP3 South of Midland Park Road: ~40,000 veh/day
- PCP3 North of W. Aviation Avenue: ~40,000 veh/day
- W. Aviation Avenue east of PCP3: ~21,000 veh/day
- PCP3 North of Remount Road: ~31,000 veh/day
- Remount Road East of PCP3: ~22,000 veh/day

The proximity of S. Aviation Avenue to the railroad at the major intersections with Midland Park Road, W. Aviation Avenue, and Remount Road would prohibit grade-separated crossings at these locations. Therefore, the volumes noted above indicate that 7,000 veh/day would cross an at-grade railroad crossing at Midland Park Road, 21,000 veh/day would cross an at-grade crossing at W. Aviation Avenue, and 22,000 vehicles/day would cross an at-grade railroad crossing at Remount Road, contributing to significant congestion both along PCP3 and along the perpendicular connecting roadways of Midland Park Road, Remount Road, and W. Aviation Avenue.

Conversely, for the other 14 alternatives which follow new alignments east of S. Aviation Avenue, the corridor is able to cross the railroad at a grade-separated crossing (either north or south of Ashley Phosphate Road), enabling these heavy traffic volumes to avoid the at-grade crossings present in the S. Aviation Avenue alignments of Alternatives N and E. Therefore, significant railroad crossing traffic impacts are anticipated with Alternatives N and E, which are avoided in the other 14 alternatives.

2.1.1.2 Conflicts with Joint Base Charleston Runway Graded Areas

In addition to the undesirable traffic impacts associated with Alternatives N and E, these alternatives also conflict with JBC runway graded areas of Runways 15 and 21, whereas the other 14 alternatives avoid these runway graded areas. The CHATS model indicates that the S. Aviation alignment alternatives (N and E) would place approximately 40,000 veh/day within approximately 750 feet of Runway 15 and approximately 70 feet of Runway 21. Conversely, of the other 14 alternatives, the alternative which passes closest to these runways (Alternative O), would place approximately 35,000 vehicles/day within approximately 1,360 feet (~2x distance of Alternatives E and N) feet of Runway 15 and 400 feet (~6x distance) of Runway 21.

Therefore, based on the two evaluation parameters for the Tier 1, Level 1 screening, Alternatives E and N were screened out of the reasonable alternatives and were not carried forward to the Tier 1, Level 2 screening, discussed below.

2.1.2 Level 2: Alignment South of Midland Park Road

Tier 1 Level 2 screening evaluated the alignment of PCP3 south of Ashley Phosphate Road. As shown in **Table 1**, each of the remaining 14 preliminary alternative alignments (after the Tier 1, Level 1 screening) falls into one of two categories related to this screening level:

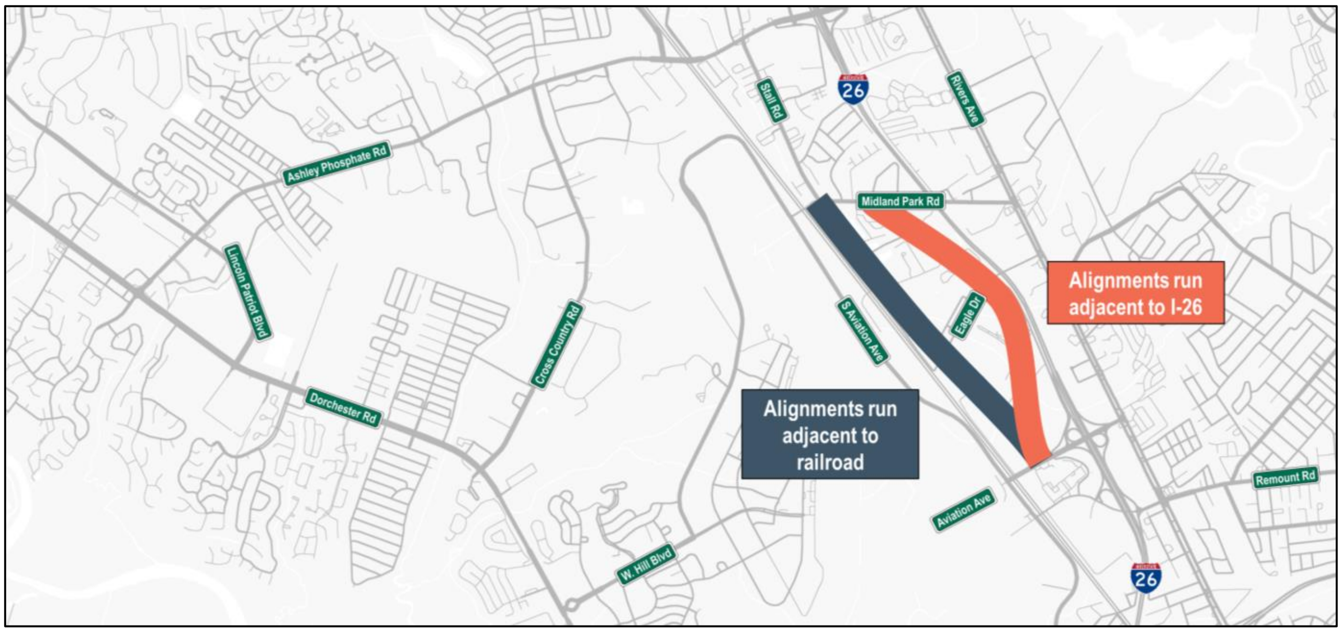
- Generally adjacent to I-26 (and thus avoids Runway 21 Clear Zone): A, B, F, G, H, I, J, and K
- Generally adjacent to railroad (and passes through Runway 21 Clear Zone): C, D, D1, L, M, and O

As shown in the alignment figures, 8 of the remaining 14 alternatives have alignments south of Midland Park Road which generally run adjacent to I-26 and 6 of the 14 run generally adjacent to the railroad. **Figure 19** below indicates the alternative categories and distinctions.

Alternatives			
A	B	C	D
D1	E	F	G
H	I	J	K
L	M	N	O

Legend	
	Alignment South of Midland Park Road adjacent to I-26
	Alignment South of Midland Park Road adjacent to railroad
	Screened Out in Level 1

Figure 19: Tier 1, Level 2 Screening Alternative Distinctions



As indicated in the alternative alignment figures, to avoid the Runway 21 Clear Zone, the PCP3 alignment must shift to the east such that it runs in close parallel to I-26 as opposed to running closely parallel to S. Aviation Avenue. This difference was shown to contribute to different levels of trip attraction to PCP3, based on the CHATS model daily traffic projections for the two groups of alternatives. Therefore, this evaluation served as the screening criteria for this Tier 1, Level 2 screening, as described below.

2.1.2.1 Projected Traffic Volumes along PCP3 and Adjacent Roadways

In order to screen between the two groups of alternatives (based on their general alignments south of Midland Park Road), the projected daily volumes in the design year were compared between the two groups. **Table 2** shows the projected volumes along PCP3 for each group and **Table 3** shows the projected volumes along adjacent roadways (both parallel routes and connecting roads) in the study area.

Table 2: Projected Daily Volumes Along PCP3

Location along PCP3	Alignment Adjacent to:	
	I-26	Railroad
South of Ashley Phosphate	42,000	48,000
South of Midland Park	38,000	44,000
North of W. Aviation	27,000	41,000

Table 3: Projected Daily Volumes Along Adjacent Roadways

Roadway/Location	Alignment Adjacent to:	
	I-26	Railroad
I-26 South of Ashley Phosphate	176,000	176,000
Stall South of Ashley Phosphate	9,000	5,000
Rivers South of Ashley Phosphate	44,000	47,000
Rivers South of Eagle	55,000	44,000
Midland Park East of I-26	8,000	7,000
Eagle Dr East of I-26	12,000	7,000

Along PCP3, higher volumes indicate greater volume reductions on parallel routes and therefore more favorable traffic performance, as the objective of the new roadway is to provide an alternative north-south route. The results shown in **Table 2** indicate that the alignments which run generally adjacent to the railroad are projected to carry 14% more traffic south of Ashley Phosphate Road, 16% more traffic south of Midland Park Road, and 52% more traffic just north of W. Aviation than the alternatives which generally run adjacent to I-26. The more significant difference in volume at the southern termini of the alignment indicates that for the alternatives adjacent to I-26, a higher percentage of traffic departs the new alignment for other parallel routes between Ashley Phosphate and the southern terminal, which is an undesirable outcome, based on the purpose and need of the project. The results shown in **Table 3** corroborate this, as volumes along Rivers Avenue south of Eagle Drive are 20% higher in the alternatives adjacent to I-26 than those adjacent to the railroad. Furthermore, volumes along Stall Road, Midland Park Road, and Eagle Drive are 44%, 13%, and 42% higher, respectively, indicating a less significant reduction along these parallel and connecting roadways for the alternatives which run adjacent to I-26.

Therefore, based on the objective of the project being to provide relief to congested corridors and roadways, the alternatives which run adjacent to the railroad were carried forward to the next level of Tier 1 screening, and those which run adjacent to I-26 were screened out.

2.1.3 Level 3: Location of Ashley Phosphate Road Crossing

The third level of the Tier 1 screening evaluated the location of the PCP3 crossing at Ashley Phosphate Road. As shown in **Table 1**, each of the remaining 6 preliminary alternative alignments (after the Tier 1, Level 1 and Level 2 screenings) falls into one of two categories related to this screening level:

- Crosses Ashley Phosphate Road East of the Railroad: O
- Crosses Ashley Phosphate Road West of the Railroad: C, D, D1, L, and M

As shown in the alignment figures, 1 of the remaining 6 alternatives crosses Ashley Phosphate Road east of the railroad and the other 5 cross west of the railroad. **Figure 0** below indicates the alternative categories and distinctions.

Figure 20: Tier 1, Level 3 Screening Alternative Distinctions

Alternatives			
A	B	C	D
D1	E	F	G
H	I	J	K
L	M	N	O

Legend	
(orange)	**Crosses Ashley Phosphate Road East of Railroad** (Utilizes the existing alignment of Stall Road south of Ashley Phosphate Road)
(dark blue)	**Crosses Ashley Phosphate Road West of Railroad** (Utilizes a new alignment west of W. Spartan Boulevard south of Ashley Phosphate Road)
(white)	**Previously Screened Out** (Not included in this screening level)

Two evaluation criteria were used to screen between these groups of alternatives, as discussed in the sections which follow.

2.1.3.1 Projected Traffic Along PCP3

As noted in the previous section, along PCP3, higher volumes indicate a more favorable traffic performance. The results shown in **Table 4** indicate that the alignments which cross Ashley Phosphate Road west of the railroad to carry 17% more traffic south of Ashley Phosphate Road and 29% more traffic south of Midland Park Road than the alignment which crosses east of the railroad.

Table 4: Projected 2045 Daily Volumes Along PCP3

Location along PCP3	Ashley Phosphate Crossing, Relative to Railroad:	
	East	West
South of Ashley Phosphate	41,000	48,000
South of Midland Park	34,000	44,000

2.1.3.2 Compatibility with Existing Access

In addition to the traffic attraction potential differences for each location of crossing Ashley Phosphate Road, the second evaluation parameter for this screening included compatibility with existing access. This is of importance because, as shown in **Figure** , the alignment which crosses Ashley Phosphate Road east of the railroad utilizes (and would widen) the existing alignment of Stall Road to the south. Stall Road is approximately 4,800 feet in length between Ashley Phosphate Road and Midland Park Road. In this length there are approximately 50 access points, consisting either of side streets or driveways. Some of the driveways serve mobile home parks, generating more turning movements than typical residential driveways. Because of the close driveway spacing and in order to maintain existing land use, this portion of Palmetto Commerce Parkway would require a flush median (two-way-left-turn-lane [TWLTL]) throughout the section to maintain access to the numerous existing properties. However, the projected daily traffic volumes along the roadway, according to the CHATS model, are 41,000 vehicles per day in the design year. Based on numerous state agency guidelines for maximum allowable daily volumes on five-lane TWLTLs shown in **Table 5**, 41,000 veh/day is well above the maximum allowable thresholds (ranging from 20,000 – 30,000 veh/day).

Table 5: TWLTL Guidelines

State Agency	Maximum TWLTL AADT (veh/day)
Florida	28,000
Georgia	24,000
Idaho	28,000
Kansas	20,000
Kentucky	24,000
Maine	25,000
Michigan	25,000
Mississippi	30,000
Missouri	28,000
Texas	20,000

Conversely, the alignments which cross Ashely Phosphate Road west of the railroad utilize a new alignment south of Ashley Phosphate Road which is access controlled and therefore would not require a flush median to provide access to adjacent properties.

Therefore, based on the lack of compatibility of Alternative O (which crosses Ashely Phosphate Road east of the railroad) with the existing access along Stall Road (which would become the new alignment of PCP3 in this alternative), this alternative alignment was screened out and the alignments which cross Ashley Phosphate Road west of the railroad were carried forward to the fourth, and final Tier 1 screening level.

2.1.4 Level 4: Connection at Ashley Phosphate Road

The fourth (and final) level of the Tier 1 screening evaluated the type of PCP3 crossing at Ashley Phosphate Road. As shown in **Table 1**, each of the remaining 5 preliminary alternative alignments (after the Tier 1, Level 1, 2, and 3 screenings) falls into one of two categories related to this screening level:

- ❖ Crosses Ashley Phosphate Road at two points (a One-Way Pair): L and M
- ❖ Crosses Ashley Phosphate Road at a Single-Point: C, D, and D1

As shown in the alignment figures, 2 of the remaining 5 alternatives cross Ashley Phosphate Road as a pair of one-way legs and the remaining three cross at a single point. **Figure 21** below indicates the alternative categories and distinctions. The reason for considering these two alternatives was that the "One-Way Pair" alternative would allow for the existing roadbeds of E. Spartan Boulevard and W. Spartan Boulevard to be utilized as the northbound and southbound pairs of the PCP3 connection with Ashley Phosphate Road, whereas the "Single-Point" alternatives would utilize a new alignment west of W. Spartan Boulevard, requiring obtaining of the properties/right-of-way in the proposed alignment.

Figure 2: Tier 1, Level 4 Screening Alternative Distinctions

Alternatives			
A	B	C	D
D1	E	F	G
H	I	J	K
L	M	N	O

Legend	
(orange)	**One-Way Pair** (at-grade crossings utilizing existing W. Spartan and E. Spartan Boulevard alignments)
(dark blue)	**Single-Point** (varying grade-separated interchange types – new alignment south of Ashley Phosphate)
(white)	**Previously Screened Out** (Not included in this screening level)

2.1.4.1 Traffic Performance of At-Grade Intersections

The intersection between PCP3 and Ashley Phosphate Road in the "single-point" Alternatives C, D, and D1 would be handled with a grade separated interchange of some kind, which offers flexibility in design to accommodate traffic volumes. However, the "one-way pair" Alternatives L and M would operate as at-grade intersections along Ashley Phosphate Road. Therefore, the evaluation criteria for this final level of the Tier 1 screening is the traffic operation and level of service (LOS) of these would be at-grade intersections between the one-way pairs of PCP3 and Ashely Phosphate Road in Alternatives L and M.

As the results shown in **Table 6** indicate, the one-way pair, at-grade intersections of Alternatives L and M are projected to operate at acceptable LOS D or better in the AM peak hour. However, both intersections are projected to operate at failing LOS F in the PM peak hour. Therefore, Alternatives L and M were screened out in this fourth level of the Tier 1 screening since they are not projected to provide acceptable traffic operations.

Table 6: Projected 2045 LOS of At-Grade Intersections in Alternatives L and M

Intersection	LOS/Delay (sec/veh)	
	AM Peak Hour	PM Peak Hour
PCP3 Southbound & Ashley Phosphate Road	**D/48.7**	**F/121.0**
PCP3 Northbound & Ashley Phosphate Road	**B/19.9**	**F/105.8**

2.1.5 Results of Tier 1 Screening

Based on the results of the four-level Tier 1 screening, summarized in **Table 7**, Alternatives **C**, **D**, and **D1** were carried forward to Tier 2 screening. In summary, the first-tier screening process determined the extent to which a given alignment would attract traffic from the corridors for which the project is intended to provide traffic relief. The results of this analysis concluded that the further the new roadway was located from I-26, the more trips it attracted from the other corridors. At a more detailed level, the traffic carried by PCP3 would create more congestion if it terminated close to the I-26 interchange ramp terminal intersections on West Aviation Avenue and Remount Road. The screening criteria considered results of the first-tier screening are found in **Table 8**, which shows the three preliminary alternative alignments which were carried forward to the second-tier screening (Alternatives C, D, and D1).

Level	Description	Alternatives																Alts. Screened Out:
		A	B	C	D	D1	E	F	G	H	I	J	K	L	M	N	O	
1	**Alignment South of Ashley Phosphate:** S. Aviation (SA) or New Alignment (N)	N	N	N	N	N	~~SA~~	N	N	N	N	N	N	N	N	~~SA~~	N	**E, N**
2	**Alignment South of Midland Park:** Parallel to I-26 (I-26) or S. Aviation (SA)	~~I-26~~	~~I-26~~	SA	SA	SA		~~I-26~~	~~I-26~~	~~I-26~~	~~I-26~~	~~I-26~~	~~I-26~~	SA	SA		SA	**A, B, F, G, H, I, J, K**
3	**Crosses Ashley Phosphate:** East (E) or West (W) of Railroad*			W	W	W								W	W		~~E~~	**O**
4	**Connection at Ashley Phosphate:** One-Way Pair (OWP) or Single-Point (SP)			SP	SP	SP								~~OWP~~	~~OWP~~			**L, M**
Carried Forward to Tier 2 Screening		**NO**	**NO**	**YES**	**YES**	**YES**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	

Table 7: Results of Tier 1 Screening

Table 8: Tier 1 Screening Summary

Screening Criteria		Alternatives															
		A	**B**	**C**	**D**	**D1**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**
Does the Alternative Meet the Overall Purpose & Need?	Provide Connection from Ashley Phosphate to Remount Road	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Relieve Congestion Along Parallel Roads	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	No	No	No	No	Yes
	Context Compatible with Existing Access (Driveways)	No	No	Yes	Yes	Yes	Yes	No	No	No	No	No	No	Yes	Yes	Yes	No
	Provides Grade Separation over NS Railroad for Major % of Traffic	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
	Facilitate Improved Access to Bike, Ped, and Transit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Conflicts with Joint Base Charleston (JBC) Runway Graded Areas		No	No	No	No	No	Yes	No	No	No	No	No	No	No	No	Yes	No
Provides Access to JBC Commercial Gate Without Crossing Clear Runway Graded Areas		Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes	No	No
Carried Forward to Tier 2 Screening?		**NO**	**NO**	**YES**	**YES**	**YES**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

2.2 TIER 2 SCREENING

The second-tier screening used a GIS-based desktop evaluation to compare the relative community and environmental impacts of the three alternative alignments carried forward from the first-tier screening process. The categories of impacts included:

Right of Way/Property Relocation, Waters of the US (Wetlands, Streams), Cultural Resources (Cemeteries, Michaux Gardens), Community Features, Floodplains, and Noise.

In addition to this evaluation of impacts, a traffic operations evaluation was also conducted. As shown in **Figure** , **Figure** , and **Figure** , the difference between Alternative C and Alternatives D and D1 is that Alternative C connects to W. Aviation Avenue and Remount Road at Core Avenue, while Alternatives D and D1 create a new alignment just east of S. Aviation Avenue. This Alternative D/D1 alignment includes PCP3 as one-way southbound between Aviation Avenue and Remount Road such that southbound traffic bound for I-26 or Rivers Avenue would depart PCP3 at Remount Road without the option to exit PCP3 at Aviation Avenue. Conversely, northbound traffic would enter PCP3 from Aviation Avenue without the option to enter PCP3 from Remount Road. This allows for Aviation Avenue and Remount Road (while remaining two-way) to operate as one-way pairs concerning traffic exiting and entering PCP3 and is projected to lead to acceptable intersection levels of service at the intersections in the southern terminal study area. However, due to the proximity of Core Avenue to the I-26 ramps, this same one-way pair configuration is not possible in Alternative C. In Alternative C, PCP3 must therefore be two-way between Aviation Avenue and Remount Road, which is projected to lead to acceptable levels of service at the PCP3 intersections in the AM peak hour but failing intersection LOS in the PM peak hour.

The results of the second-tier screening are found in **Table 9** and show that Alternatives D and D1 were carried forward as reasonable alternatives. Alternatives D and D1 have very similar alignments – the difference being that Alternative D assumes the proposed Palmetto Commerce Parkway 3 roadway travels in the railroad right-of-way, while Alternative D1 assumes PCP3 is shifted to the east just out of the railroad right-of-way. From a traffic volume projection and traffic analysis perspective, the two alternatives are identical. Therefore, henceforth, the traffic projections and analysis results for the “Build” scenario correspond to either the build of Alternative D and/or D1.

Table 9: PCP3 – Tier 2 Screening of Alternative Alignments

Screening Criteria		Alt. C	Alt. D	Alt. D1
Waters of the US Impact	**Streams (Linear Feet)**	437	264	265
	Wetlands (Acres)	12.68	12.00	12.07
	Floodplain Impacts (Acres)	0	0	0
Estimated Relocations	**Residential**	96	54	77
	Commercial	14	14	16
	Community Facilities	1	1	1
	Total	***111***	***69***	***94***
	Environmental Justice Impacts (Yes/No)	Yes	Yes	Yes
Cultural Resources Impacts	**Known Eligible Architectural Point**	0	0	0
	Known Eligible Architectural Polygon	0	0	0
	Known Eligible Archaeological Site	0	1	1
	Known Potential Cultural Resources	2	2	2
	Farmlands Impacts (Acres)	15.72	15.70	15.70
	Preliminary Noise – Number of Impacted Receivers	149	122	128
	Protected Lands, Parks, or Mitigations Sites	0	0	0
	Does the Alternative Conflict with Joint Base Charleston Clear Zone Areas?	Yes	Yes	Yes
	Acceptable Traffic Operations Projected at Southern Termini?	No	Yes	Yes
	Carried Forward to Reasonable Alternatives?	**NO**	**YES**	**YES**

PALMETTO COMMERCE PARKWAY 3

TECHNICAL MEMORANDUM - Appendix B

Peak Hour Design Volumes

CHARLESTON COUNTY
SOUTH CAROLINA

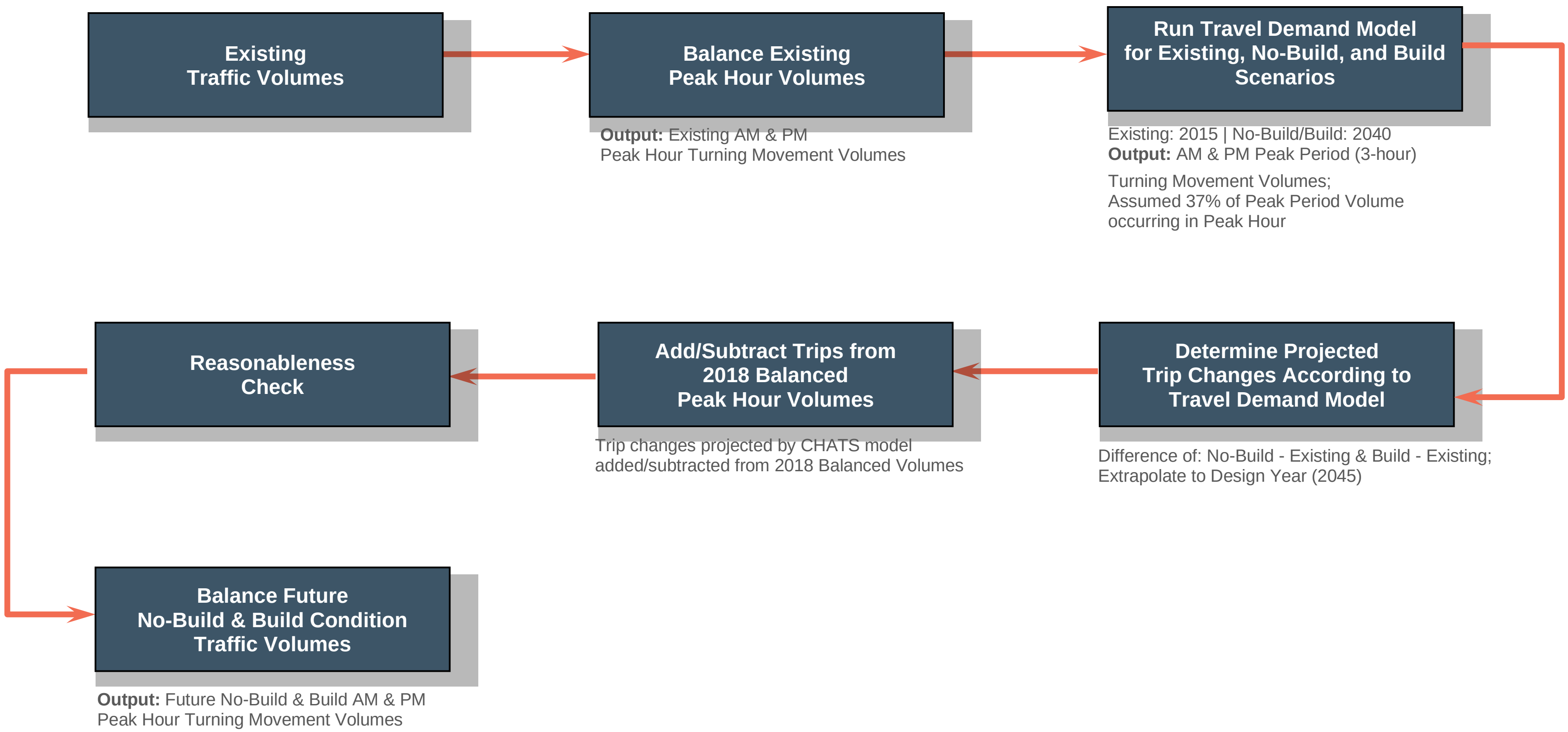
Stantec

June 2022

1.0 PEAK HOUR DESIGN VOLUMES

In order to develop Existing (2018) and Design Year (2045) peak hour volumes for No-Build and Build conditions to perform the traffic analysis for the recommended PCP3 alignment, the process shown in **Figure 1** was followed. Each step in this process is described in greater detail in the sub-sections that follow.

Figure 1: Traffic Volume Development Process



1.1 EXISTING TRAFFIC VOLUMES

Turning movement counts were collected on Thursday, October 4th, 2018 for the 27 study area intersections listed below:

1) Dorchester Road & W Hill Boulevard
2) Dorchester Road & Cross County Road
3) Dorchester Road & Lincoln Patriot Boulevard
4) Dorchester Road & Ashley Phosphate Road
5) Lincoln Patriot Boulevard & Ashley Phosphate Road
6) Cross County Road & Ashley Phosphate Road
7) Pepperdam Road & Ashley Phosphate Road
8) Palmetto Commerce Pkwy & Ashley Phosphate Road
9) Palmetto Commerce Pkwy & Weber Boulevard
10) Stall Road & Asley Phosphate Road
11) Northside Drive & Ashley Phosphate Road
12) I-26 SB Ramps & Ashley Phosphate Road
13) I-26 NB Ramps & Ashley Phosphate Road
14) Rivers Ave & Ashley Phosphate Road
15) S Aviation Avenue & Stewart Avenue
16) Stall Road & Midland Park Road
17) Rivers Avenue & Midland Park Road
18) Rivers Avenue & Aviation Avenue
19) I-26 NB Ramps & Aviation Avenue
20) I-26 SB Ramps & Aviation Avenue
21) Core Avenue & Aviation Avenue
22) S Aviation Avenue & Aviation Avenue
23) S Aviation Avenue & Remount Road
24) Core Avenue & Remount Road
25) I-26 SB Ramps & Remount Road
26) I-26 NB Ramps & Remount Road
27) Rivers Avenue & Remount Road

These counts were used to determine AM and PM peak hour turning movement volumes for analysis of existing conditions of the study area network. The raw AM and PM peak hour turning movement counts can be seen in **Appendix A** of this report.

1.2 BALANCE EXISTING TRAFFIC VOLUMES

Existing peak hour traffic volumes were balanced between intersections where appropriate (not balanced if intersections included large traffic generators, major access points, etc. in between them). The resulting 2018 Existing Condition peak hour turning movement volumes can be seen in **Figure 2**. These existing traffic volumes also formed the baseline from which future design year No-Build and Build Condition traffic volumes were forecast.

1.3 RUN TRAVEL DEMAND MODEL

With existing volumes established, it was necessary to estimate the change in number of trips anticipated in the network (either additional trips, reduced trips, or rerouted trips) in the design year. In order to estimate the magnitude and flow paths of new trips in the network, The Berkeley Charleston Dorchester Council of Government's (BCDCOG) Charleston Area Transportation Study (CHATS) travel demand model was utilized. Three versions of the travel demand model were run: 2015 (the most current base year of the model), 2040 No-Build (the most current horizon year of the model), and 2040 Build (incorporating the new alignment of PCP3). The output for each model provided AM peak period (6:00 – 9:00 AM) and PM peak period (4:00 – 7:00 PM) turning movement volumes.

The 2040 No-Build model included regional improvements anticipated to be complete prior to the design year, including:

- I-526 widening & I-26/I-526 interchange improvement project
- Dorchester Road widening
- Airport Connector Road

The 2040 Build Model included the No-Build network with the addition of the new PCP3 alignment which intersects Ashley Phosphate between the existing intersections of Palmetto Commerce Pkwy & Pepperdam Avenue at the northern terminus of the project and intersects Aviation Avenue and Remount Road west of S. Aviation Avenue at the southern terminus of the project. Both Build Alternatives D and D1 (the alternatives carried forward from the screening process) produced the same turning movement volumes due to the similarity of their alignments. Therefore, the results from these CHATS model runs represented the Build condition. These alignments (D and D1) consider PCP3 to transition to one-way southbound south of Aviation Avenue, such that northbound traffic accesses PCP3 from Aviation Avenue and southbound traffic must exit PCP3 at the intersection with Remount Road.

As previously stated, the output from these travel demand models is peak period turning movement volumes, representing a three-hour window. However, the traffic analysis considers a one-hour peak hour for both the AM and PM design hour analysis. Therefore, the peak period turning movement volumes from the CHATS model runs had to be converted to a peak hour value. Based on daily traffic volume counts conducted throughout the study area, it was determined that on average, approximately 37% of total peak period traffic occurred during the peak hour. Therefore, a factor of 0.37 was applied to the CHATS model peak period turning movement volumes to determine the CHATS model peak hour turning movement volumes. The resulting CHATS travel demand model peak hour turning movement volumes for the 2015 Base Year, 2040 No-Build, and 2040 Build conditions are provided in Volume 2 of this report, respectively.

1.4 DETERMINE CHATS MODEL PROJECTED TRIP CHANGES

The peak hour turning movement volumes for each future scenario CHATS model run were compared to the peak hour turning movement volumes for the 2015 Base Year CHATS model run to determine the change in turning movement volumes at each intersection throughout the network, as estimated by the CHATS travel demand model.

For both the 2040 No-Build and the 2040 Build model runs, the CHATS model predicted increases in volumes at most locations throughout the network. However, there were locations where the model predicted decreases in volumes compared to the 2015 Base Year model. Therefore, in order to estimate the additional trips throughout the network predicted by the model, the difference between the future conditions (No-Build and Build Alternative D, respectively) and the 2015 Base Year Model were calculated. If the change for a particular movement was positive, this value was taken as is. However, if the change was negative, in order to avoid a situation where the number of trips reduced was more than the actual existing trips at the movement, the number of reduced trips was taken to be the ratio of trips reduced in the CHATS model, multiplied by the 2018 Existing volume. For both positive and negative changes in volume projected by the CHATS model, this value was extrapolated to represent the new number of trips between the existing year for this analysis (2018) and the design year. Since the CHATS model has a base year of 2015 and horizon year of 2040, this extrapolation required two steps:

(1) The three-year gap between the base year for the CHATS model (2015) and the base year for this analysis (2018) was accounted for by applying a factor of 0.88 (22/25) to the predicted number of additional or reduced trips from the CHATS output. In other words, of the increase or reduction in trips, 3 years of it was assumed to have already occurred; and (2) The five-year gap between the horizon year of the CHATS model (2040) and the design year for this analysis (2045) was accounted for by extrapolating the number of trips (already factored to account for the gap in base year) out linearly by five years.

The increased number of trips between the 2018 Existing Conditions and the 2045 No-Build Conditions, according to the methodology described above, can be seen in Volume 2. Similarly, the increased/ decreased number of trips between the 2018 Existing Conditions and the 2045 Build Conditions can be seen in Volume 2. Please note that in these appendices, a green shaded value indicates a movement for which trips are anticipated to increase. A red shaded value, on the other hand indicates a movement for which trips are anticipated to decrease. In the green shaded values, the whole numbers represent the magnitude of additional number of trips. In the red shaded values, the decimal indicates by what factor the existing volume is reduced.

1.5 ADD/SUBTRACT TRIPS FROM 2018 EXISTING VOLUMES

Once the increase or decrease in trips for the No-Build and Build conditions was determined in the previous step, these increases or decreases were applied to the 2018 Existing peak hour turning movement volumes.

1.6 REASONABLENESS CHECK

Upon applying the increases or decreases in traffic volumes estimated by the model, a reasonableness check of the volumes estimated from the CHATS model was conducted to verify that the travel origin-destination (OD) assumptions and routing was appropriate based on local knowledge of the region as well as knowledge of the project, leading to the following corrections based on inappropriate routing decisions identified in the model.

- It was found that the CHATS model assigned a significant volume of traffic traveling along I-26 eastbound north of Aviation Avenue destined for I-526 eastbound to exit at the I-26 eastbound collector-distributor (CD) road using Aviation Avenue and Rivers Avenue to access I-526 eastbound. However given signage and actual preferred routes, this traffic would remain on I-26 eastbound and use the ramp at the system-to-system interchange to access I-526 eastbound. Therefore, the magnitude of the volume taking this errant path in the model was rerouted manually in development of final peak hour volumes.

- Furthermore, the CHATS model did not have a movement through the system-to-system interchange of I-26 & I-526 to accommodate traffic desiring to travel from Aviation Avenue/Remount Road west of I-26 to I-526 eastbound via the interstate, as this movement was not accommodated in the new system-to-system interchange design included in the latest version of the model. Therefore, in the CHATS model, traffic with this origin/destination pattern was forced to complete this path via Rivers Avenue. However, in updates to the I-526 improvements project, an additional ramp has been included in the system-to-system interchange to accommodate this movement. Therefore, this traffic was rerouted such that it utilized the I-26 CD road and the system-to-system interchange rather than Rivers Avenue.

1.7 BALANCE NO-BUILD AND BUILD TRAFFIC VOLUMES

The peak hour traffic volumes were balanced between intersections where appropriate for the same intersections that were balanced between for the 2018 Existing Conditions. The resulting 2045 No-Build and 2045 Build Condition AM and PM peak hour turning movement volumes can be seen in **Figure 3** and **Figure 4** respectively. These peak hour volumes, along with the 2018 Existing Condition peak hour volumes shown in **Figure 2**, are the volumes utilized in the capacity analysis for the Existing and No-Build Conditions, as well as the capacity and alternative geometry analysis for the Build Conditions, in the following sections of this report.

Peak hour factors (PHF) for each intersection were determined based on the existing peak hour factors observed in the counts collected in the study area, with a minimum of 0.90 and maximum of 0.95 assumed for peak hour factors for future conditions. Similarly, heavy vehicle percentages were determined based on existing heavy vehicle percentages observed in the counts collected in the study area, with a minimum of 2% assumed throughout.

Figure 2: 2018 Existing Peak Hour Traffic Volumes

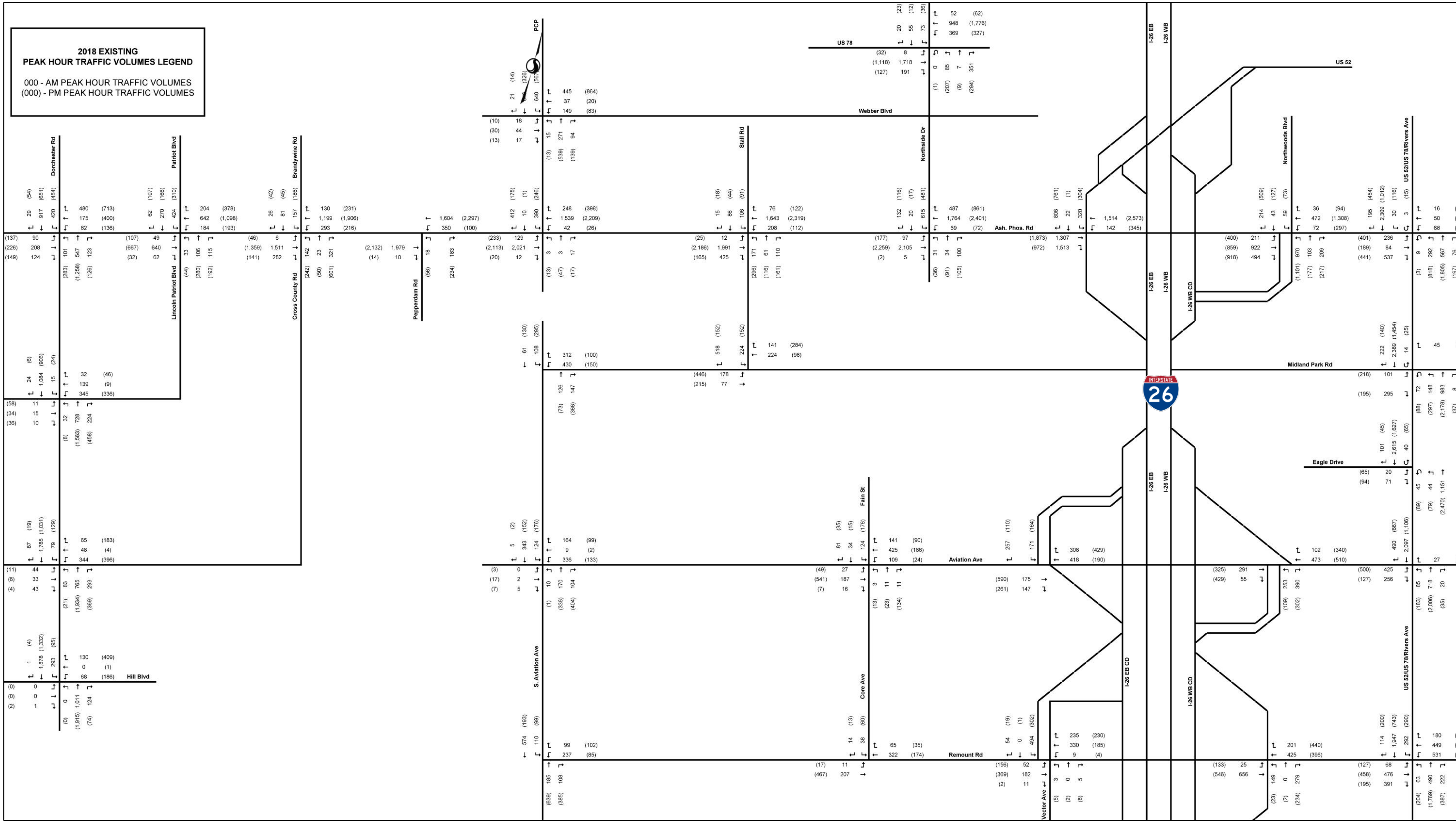


Figure 3: 2045 No-Build Peak Hour Traffic Volumes

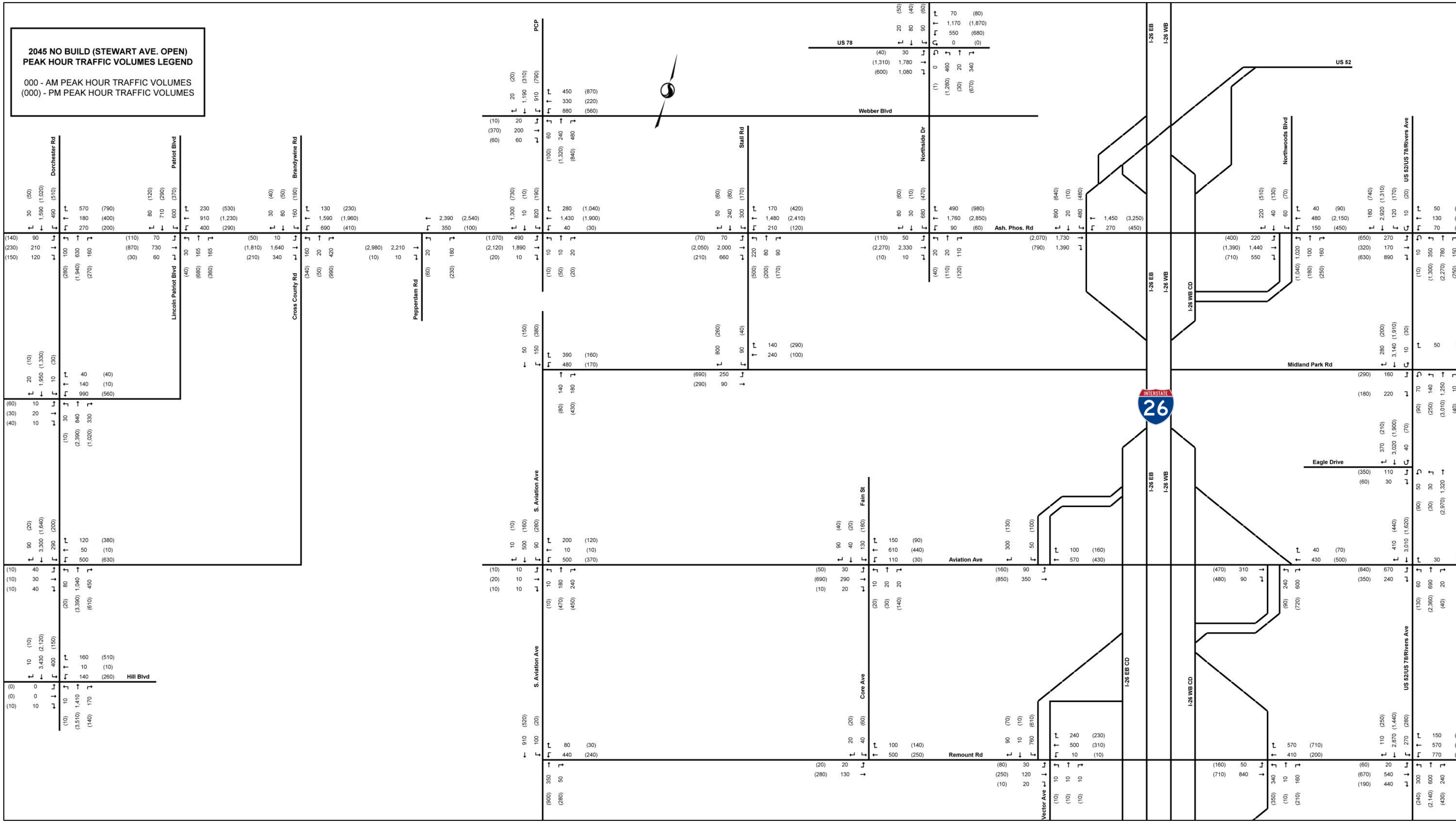
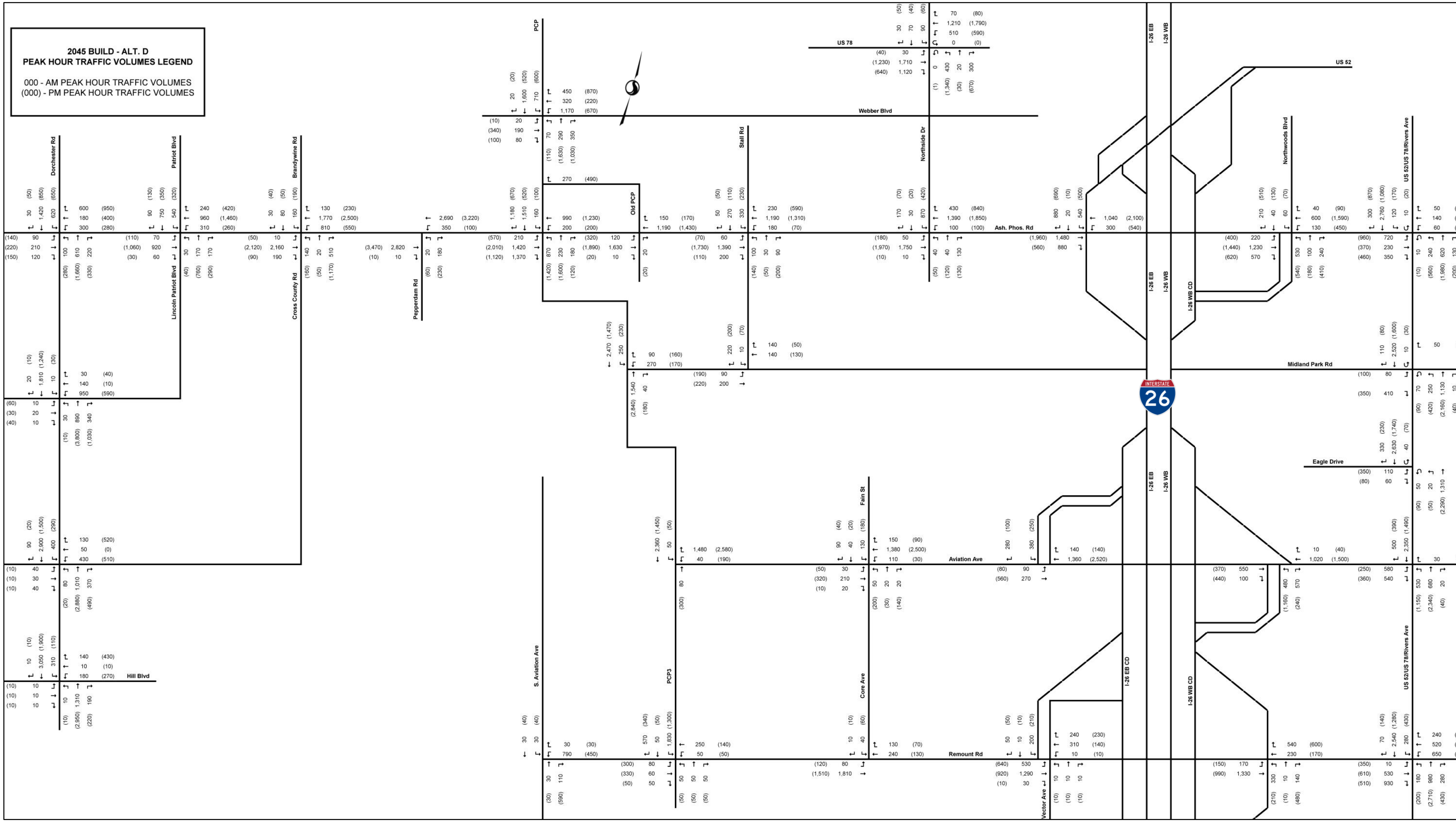


Figure 4: 2045 Build Peak Hour Traffic Volumes



PALMETTO COMMERCE PARKWAY 3

TECHNICAL MEMORANDUM - Appendix C

Intersection Design Alternatives

CHARLESTON COUNTY
SOUTH CAROLINA

Stantec

June 2022

1.0 INTERSECTION DESIGN ALTERNATIVES

In order to analyze the build alternative, design alternatives at key intersections along the corridor and in the study area needed to be evaluated. For the sake of discussion in this report, the intersections evaluated have been organized into three categories: those in the northern terminal of the proposed alignment, those between the northern and southern termini, and those in the southern terminal. These intersections, organized and listed below, are those intersections for which alternative geometries are proposed as part of the PCP3 project. Other intersections in the study area not listed below are assumed to have the same geometries as in the No-Build conditions. The following sections of this chapter detail the designs at each of these intersections to accommodate the projected peak hour traffic volumes as shown in **Appendix B.**

- Northern Terminus:
  - PCP3 & Ashley Phosphate Rd
- Between Northern & Southern Terminus:
  - PCP3 & S. Aviation Ave
  - PCP3 & Midland Park Rd
- Southern Terminus:
  - PCP3 & Aviation Ave/PCP3 & Remount Rd/Remount Rd & S. Aviation Ave
  - Aviation Ave & Core Ave
  - Remount Rd & Core Ave

Table 1: Intersection HCM 2010 LOS Criteria

	Control Delay (sec/veh)	
LOS	**Unsignalized**	**Signalized**
A	**< 10**	**< 10**
B	**> 10-15**	**> 10-20**
C	**> 15-25**	**> 20-35**
D	**> 25-35**	**> 35-55**
E	**> 35-50**	**> 55-80**
F	**> 50**	**> 80**

The capacity analysis for intersections in the remainder of the report is based on methodologies and guidelines contained in the Transportation Research Board's HCM 2010 Highway Capacity Manual (HCM, 2010). These methodologies describe the operational conditions in terms of a Level of Service (LOS), defined as: *"…a quality measure describing operations conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience. Six LOS are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions and the driver's perception of those conditions. Safety is not included in the measures that establish service levels." Trafficware*'s *Synchro* (Version 10) software and simulation package (*SimTraffic*) were used in performing the analyses. The LOS for signalized intersections is based on the average control delay per vehicle of the intersection overall, whereas the LOS for unsignalized intersections is based on the average control delay for the worst approach, the thresholds for which are shown in **Table 1**. In addition to LOS analysis, 95th percentile queueing analysis was also conducted for intersections as needed to adequately assess their operation. This queueing analysis was conducted utilizing *SimTraffic*. Microsimulations were run 10 times, with a 15-minute seeding interval (to load the network with vehicles), followed by a 60-minute recorded simulation time (from which output was retrieved). Reported queues represented the average 95th percentile queues recorded from the 10 model runs.

1.1 NORTHERN TERMINUS

1.1.1 PCP3 & Ashley Phosphate Road

Based on the traffic projections discussed in the previous section, the 2045 horizon year AM and PM design hour traffic demand volumes at the intersection of PCP3 & Ashley Phosphate Road are shown in **Figure 1**. These volumes served as the inputs for the first-tier screening of interchange type alternatives analysis at this intersection. This first-tier screening was performed in the FHWA *Capacity Analysis for Planning of Junctions* software, Version 3.0, October 2018. The results of this analysis yielded nine potential alternatives. These are shown in **Table 2** below, along with their respective AM and PM peak hour overall intersection volume-to-capacity (v/c) ratios as well as any notes concerning potential disadvantages of the interchange type.

The Diverging Diamond Interchange, Partial Displaced Left-Turn, and Split Intersection alternatives presented capacity concerns based upon the CAP-X analysis, particularly in the PM Peak Hour conditions. These were therefore not carried forward for detailed analysis. The Partial Cloverleaf A and Partial Cloverleaf B were found to have significant impacts to the surrounding area relative to the other alternatives analyzed and were therefore not carried forward for detailed analysis. The Echelon and Center-Turn Overpass alternatives presented constructability limitations and were therefore not carried forward for detailed analysis. Finally, the Displace Left-Turn alternative, while projected to operate well, presented access issues to surrounding land uses. It was also not carried forward for detailed analysis.

From this first-tier screening, which included an evaluation of capacity, impacts, constructability, and ability to provide access within the area, led to the Single Point Urban Interchange (SPUI) alternative being carried forward for detailed analysis.

Figure 1: 2045 Build Peak Hour Traffic Volumes at Ashley Phosphate Road & PCP3

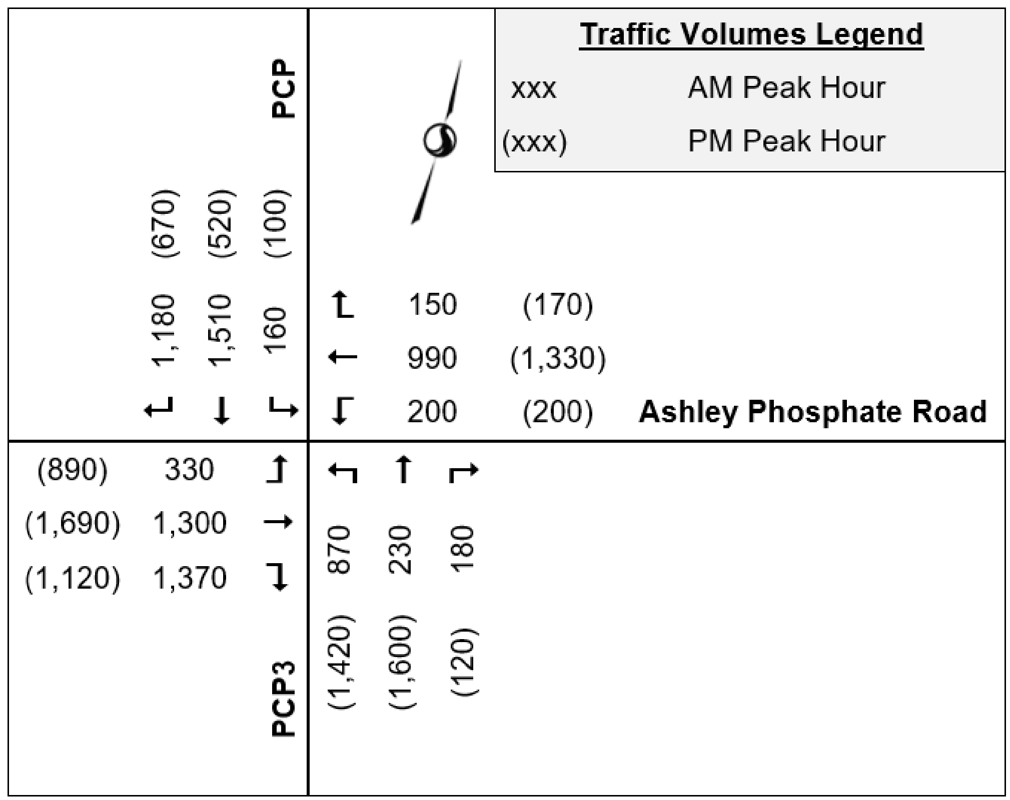


Table 2: CAP-X v/c Results for Interchange Types at Ashley Phosphate Road & PCP3

	Interchange Type	AM v/c Ratio	PM v/c Ratio	Disadvantages	Carried Forward?
1	Partial Cloverleaf A	0.48	0.69	Impacts to surrounding area	**No**
2	Echelon	0.67	0.69	Constructability and access issues	**No**
3	Partial Cloverleaf B	0.55	0.94	Impacts to surrounding area and access issues	**No**
4	Displaced Left-Turn	0.74	0.77	Access issues	**No**
5	Single Point Urban Interchange	0.74	0.91		**Yes**
6	Diverging Diamond Interchange	0.74	0.98	Capacity concerns, impacts to surrounding area, access issues	**No**
7	Center-Turn Overpass	0.89	0.83	Constructability and access issues	**No**
8	Partial Displaced Left-Turn	0.81	0.98	Capacity concerns	**No**
9	Split Intersection	0.88	1.02	Capacity concerns	**No**

Synchro Version 10 was used to test various approach lane assignments and storage lengths to best process the anticipated volumes shown in **Figure 1**. The Single Point Urban Interchange design considered the northbound and southbound movements along Palmetto Commerce Parkway to be grade separated over Ashley Phosphate Road and thus free flow. The critical movements at the intersection included the southbound right-turn, the northbound left-turn, the eastbound right-turn, and the eastbound left-turn. Based on the magnitude of volumes for these movements, an initial interchange design was tested which provided dual turning lanes for each. This design provided an acceptable level of service at the interchange in the AM peak hour; however, the operation of the interchange was poor and over-capacity with unacceptable level of service in the PM peak hour. Through iterative testing of various approach lane assignments at the intersection, it appeared that triple left-turn lanes were required for both the eastbound left-turn and the northbound left-turn to provide acceptable level of service.

Considering first the proposition of triple left-turns at the eastbound approach, it was determined that this design would be undesirable due to the considerable additional widening of Ashley Phosphate Road necessary to provide these turn lanes. Therefore, in order to accommodate the significant eastbound left-turning volume at the approach, a concept was tested which retained the existing intersection of Palmetto Commerce Parkway to the east, such that the north and south legs of the intersection (old Palmetto Commerce Parkway and E Spartan Boulevard) were converted to right-in/right-out only and the eastbound through movement proceeded uncontrolled. This allowed for a two-phase signalized intersection with the only controlled conflicts being the eastbound left-turn and the westbound through. The proximity of the intersection to the proposed interchange would allow for coordination of the westbound phases such that additional queueing in the westbound direction along Ashley Phosphate was mitigated. This concept would allow for additional processing of eastbound left-turn volumes along Ashley Phosphate Road as well as westbound right-turns by merging the existing Palmetto Commerce Parkway into the proposed Palmetto Commerce Parkway north of Ashley

Phosphate Road through an acceleration lane. In short, this would serve as the additional capacity when needed during peak hours of the day. In order to test this alternative, it was assumed that 35% of the eastbound left-turn volume (120 veh/hr in the AM and 320 veh/hr in the PM peak hour) would proceed through the proposed intersection of Ashley Phosphate Road & Palmetto Commerce Parkway and take a left at the existing location of this intersection to merge back into Palmetto Commerce Parkway north of Ashley Phosphate Road. This design mitigated the need for triple left-turns at the eastbound approach of the proposed intersection.

With the improvement to the eastbound approached described above, the need for triple left-turns at the northbound was reassessed. This analysis showed that with only dual left-turns provided at this approach, the level of service at the intersection overall was undesirable, leading to queues at the northbound approach that extended beyond the available storage reducing the capacity of the northbound through movement on PCP3 over Ashley Phosphate Road. Therefore, it was determined, given design year projected volumes, that triple left-turns at the northbound approach of the interchange were necessary. However, it was also noted that these triple left turns would not be needed immediately, as the intersection was just over capacity with dual left turns in the design year. Therefore, a year-of-failure analysis was conducted to forecast when the additional left-turn lane may be needed. This analysis considered linear growth in traffic volumes from the existing condition to the year-of-failure. The results of the analysis indicated that the intersection operated under capacity with acceptable queueing through 2043, or 18 years after opening year. Since this is only two years removed from the design year, it is the recommended that the intersection be designed to allow for a future additional left-turn lane at the northbound approach when warranted but to be open with only dual left-turn lanes provided.

A summary of lane assignments and storage lengths resulting from the analysis described above is shown in **Table 3.** A plan view of the intersection design is also shown in **Figure 2** below.

Table 3: PCP3 & Ashley Phosphate Lane Assignments and Storage Lengths

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lanes	2	3	2	2	3	0	3	2	1	1	2	2
Storage (ft)	350	N/A	350	200	N/A	N/A	300	N/A	300	350	N/A	350

Note that while the design shown in **Figure 2** shows the northbound dual left-turn lanes provided, the design allows for future provision of a third northbound left-turn lane. Therefore, the reporting of future 2045 Build level of service and delay at the intersection assumes this third lane is provided, given that according to the traffic volume projections, it is required by the design year. That being said, **Table 4** shows the AM and PM peak hour level of service and delay (according to Highway Capacity Manual (HCM) 2010 methodologies) at the intersection of Ashley Phosphate Road & Palmetto Commerce Parkway in the design year. As shown in **Table 4**, the design provides acceptable level of service at the proposed intersection and was therefore to provide acceptable operation for the interchange given the 2045 demand volumes.

Figure 2: Ashley Phosphate Rd & PCP3 Interchange Design

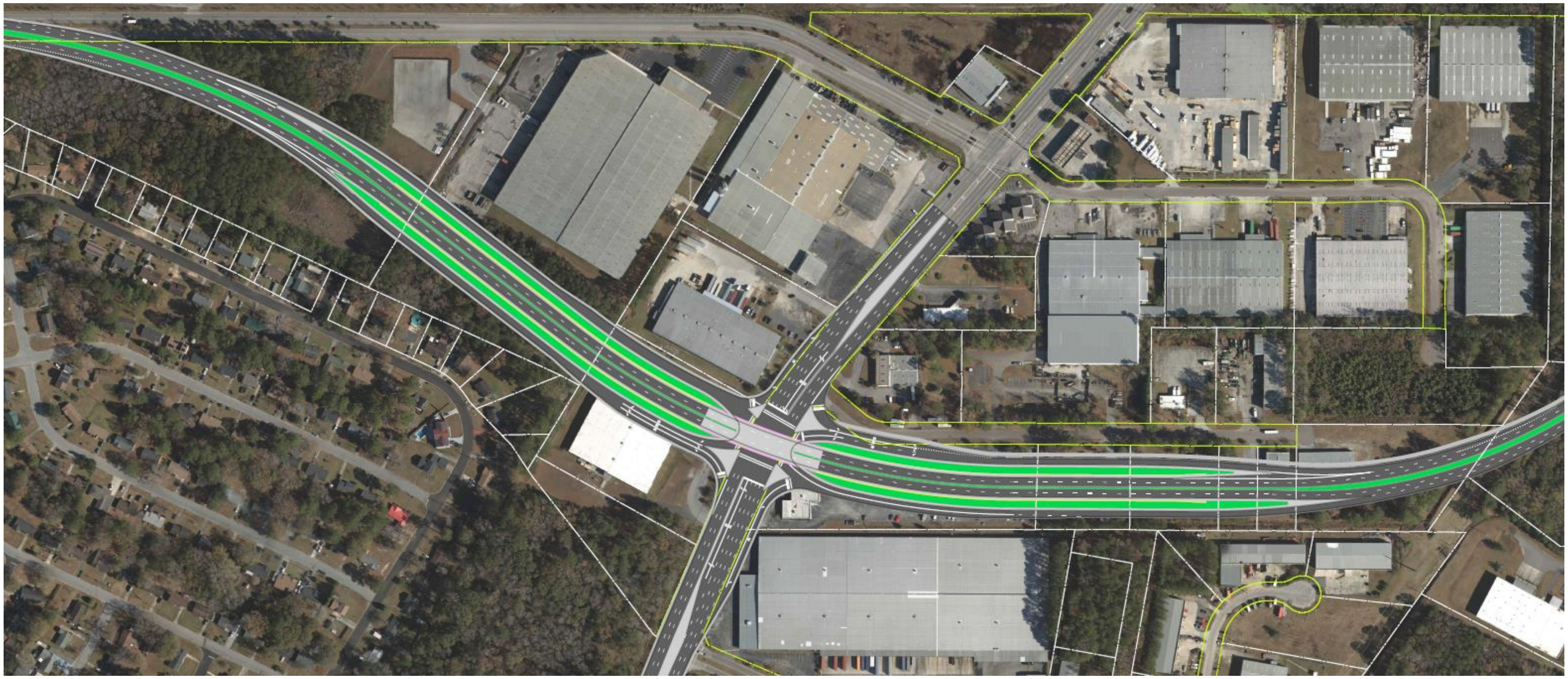


Table 4: 2045 Build Conditions LOS at PCP3 & Ashley Phosphate Road

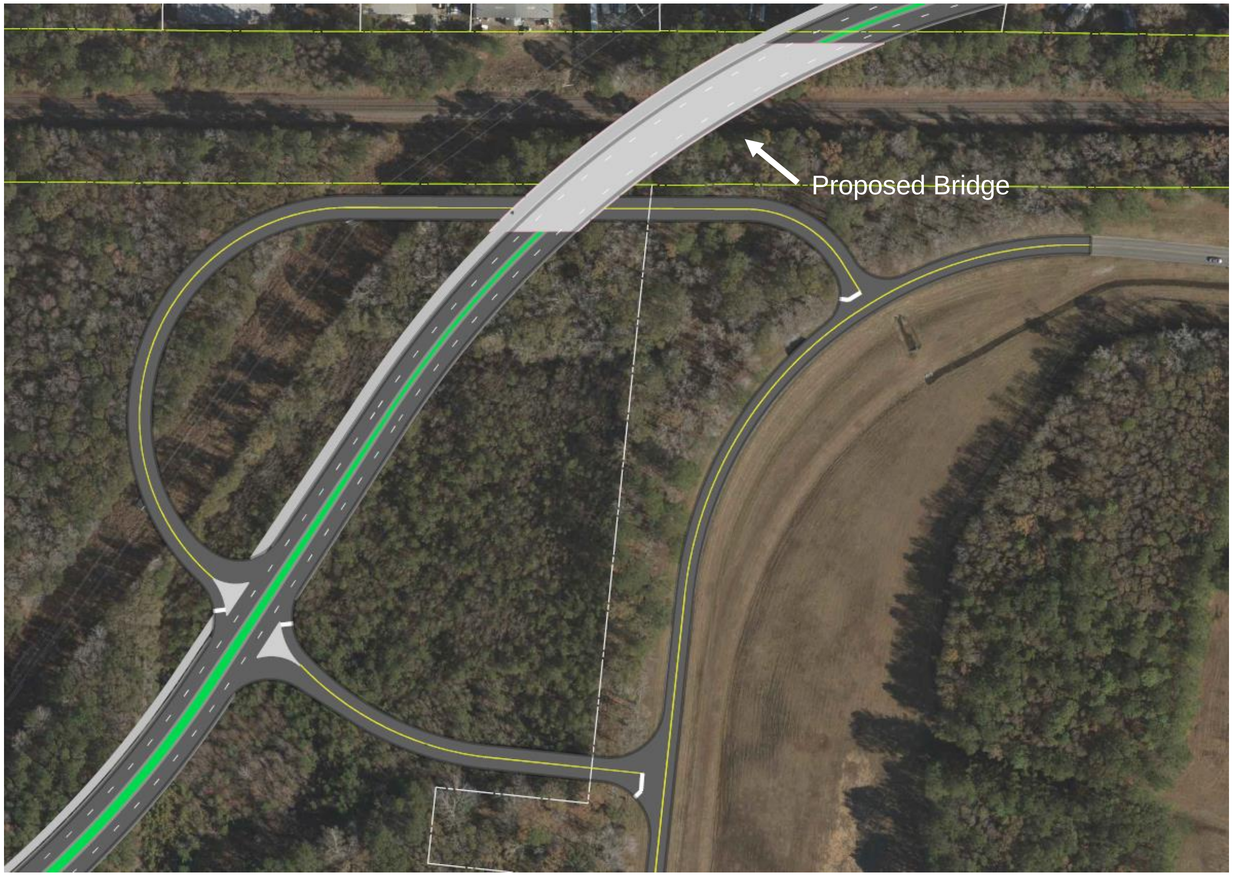
Intersection	AM Peak Hour	PM Peak Hour
PCP3 & Ashley Phosphate Rd	C/30.8	D/42.0

1.2 BETWEEN NORTHERN AND SOUTHERN TERMINUS

1.2.1 PCP3 & S. Aviation Avenue

Access to S. Aviation Avenue and thus Joint Base Charleston will be provided along PCP3. In order to minimize the signalized access points along the proposed corridor, access to S. Aviation Avenue is proposed to be provided through two right-in/right-out driveways just south of Ashley Phosphate Road. This access is proposed in order to take advantage of the grade separation necessary to clear the existing rail line which runs parallel to the proposed PCP3 corridor. Since PCP3 is required to elevate above this rail line, a spur loop from S. Aviation Avenue allows for full access to S. Aviation Avenue as shown in **Figure 3**. From a traffic perspective, these right-in/right-out driveways have very minimal impact to the operation of PCP3, with any delay being experienced only by outbound trips from Joint Base Charleston.

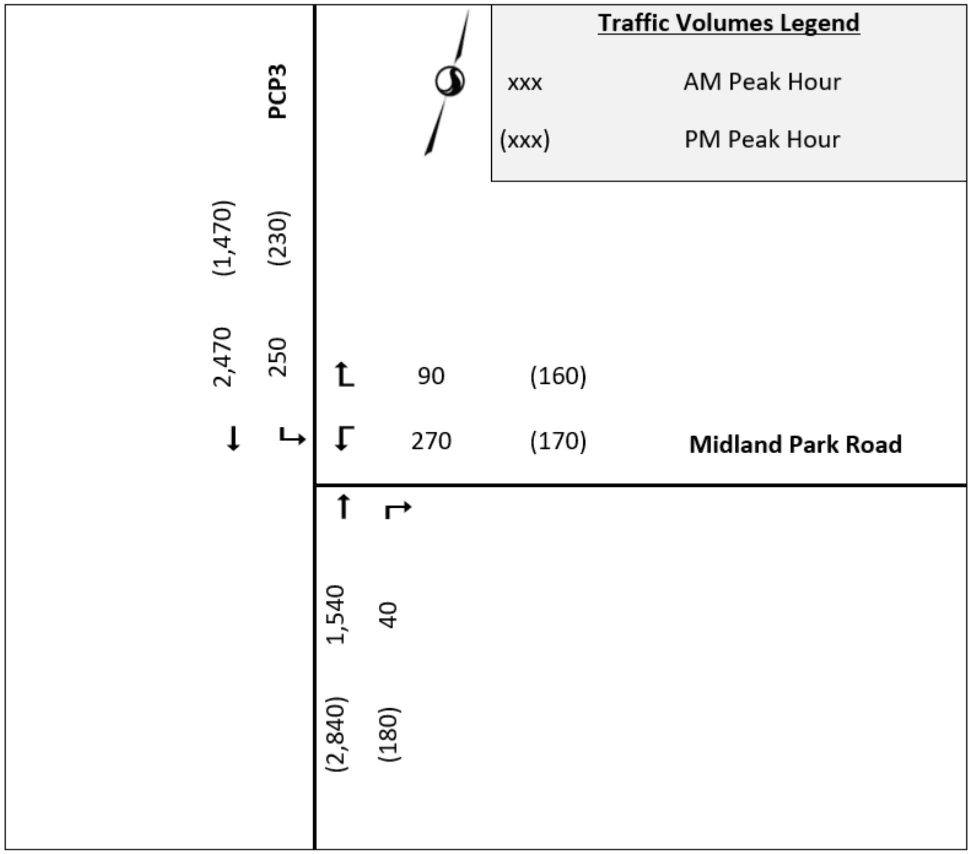
Figure 3: Palmetto Commerce Parkway & S. Aviation Proposed Access



1.2.2 PCP3 & Midland Park Road

Based on the traffic projections, the 2045 AM and PM design hour traffic demand volumes at the intersection of PCP3 & Midland Park Road are shown in **Figure 4**.

Figure 4: 2045 Build Peak Hour Traffic Volumes at PCP3 & Midland Park Road



Comparing the No-Build and Build traffic projections at the intersection of S. Aviation Avenue & Midland Park Road and this intersection, the new alignment of PCP3 reduces the demand to and from the Midland Park Road leg. However, given the considerable volumes along PCP3, three intersection types were analyzed to determine the appropriate control at this intersection to accommodate the traffic volumes shown above: *Stop-Controlled*, *Roundabout*, and *Signalized*. Synchro Version 10 was used to test the stop controlled and signalized intersection types while *SIDRA* Version 6 was used to test the Roundabout intersection type.

<u>Stop-Controlled Intersection</u>

A stop-controlled intersection with two southbound through lanes and a southbound left turn lane, two northbound through lanes and a northbound right turn lane, and one westbound left turn lane and one westbound right turn lane was tested with only the westbound approach is stop-controlled. With this configuration and control type, the heavy through volumes along PCP3 are allowed to flow unimpeded, with no delay. However, due to the significant volumes along PCP3, southbound left-turning traffic from PCP3 onto Midland Park Road, and westbound left- and right-turning traffic from Midland Park Road onto PCP3 experience significant delays in both the AM and PM peak hours, leading to failing level of service at the intersection. Essentially, while the through traffic along PCP3 is free-flow, there are not enough gaps in traffic to provide reasonable access to and from Midland Park Road. **Table 5** shows the AM and PM peak hour level of service and delay (according to Highway Capacity Manual (HCM) 2010 methodologies) at the Midland Park & PCP3 intersection with two-way stop-control (TWSC) in the design year. The results of the analysis indicate that stop-controlled is not the appropriate intersection type at PCP3 & Midland Park Road.

Table 5: 2045 Build Conditions (TWSC) LOS at PCP3 & Midland Park Road

Peak Hour	Westbound Approach	Southbound Approach	Northbound Approach
AM	F/2252.1*	D/33.8[1]	A/0.0
PM	F/+	F/120.6[1]	A/0.0

[1] This reported delay is for the entire approach, even though much of the southbound through volume experiences zero delay. This value represents the southbound left-turn delay leading to queues well beyond available southbound left-turn storage, negatively impacting the southbound through movement as well.
** Synchro reports this value but with the caveat that it is greater than 300 s/veh and therefore well beyond capacity*
+ Synchro report this as "computation not defined". This error is reported when the delay and capacity is so significant that it cannot be accurately calculated.

Roundabout

A multilane roundabout intersection with two circulating lanes, two southbound approach lanes, two northbound approach lanes, and a westbound left- and right-turn lane was tested. **Table 6** below shows the resulting LOS and delay (according to HCM 2010 methodologies) for each approach of the roundabout for both the AM and PM peak hours. The results of the analysis indicate that with this roundabout intersection control, the westbound approach of Midland Park Road operates reasonably well, but to the detriment of the mainline southbound and northbound approaches along PCP3, leading to considerable delays in the AM and PM peak hours, respectively, and failing overall intersection LOS in both peak hours.

Table 6: 2045 Build Conditions (Roundabout) LOS at PCP3 & Midland Park Road

Peak Hour	Westbound Approach	Southbound Approach	Northbound Approach	Overall
AM	E/45.2	F/365.4	D/30.6	F/227.2
PM	D/25.4	F/52.5	F/425.2	F/273.6

Signalized Intersection

A signalized intersection with two southbound through lanes and a southbound left turn lane, two northbound through lanes and a northbound right turn lane, and one westbound left turn lane and one westbound right turn lane was tested as a signalized intersection. It was found that given the significant volumes along PCP3, that dual left-turn lanes at the westbound approach could minimize the length of the phase for that approach and provide more storage to minimize queues in the westbound direction.

This intersection control and configuration leads to the level of service and delays shown in **Table 7**, which shows acceptable LOS B in the AM peak hour but undesirable LOS E in the PM peak hour. Various timing plans were tested to determine if LOS D could be achieved in the PM peak hour at this intersection given the demand volumes. However, short of adding capacity to the northbound and southbound through movements (through additional laneage), no strategies were found to reduce the delay such that LOS D is achieved. Therefore, in addition to the HCM 2010 level of service output, Synchro's SimTraffic micro-simulation tool was used to observe the operation of the intersection to determine if queues at the approaches of the intersection cleared reasonably throughout the peak hour to justify this design.

Table 7: 2045 Build Conditions (Signalized) LOS at PCP3 & Midland Park Road

AM Peak Hour	PM Peak Hour
B/17.3	E/63.6

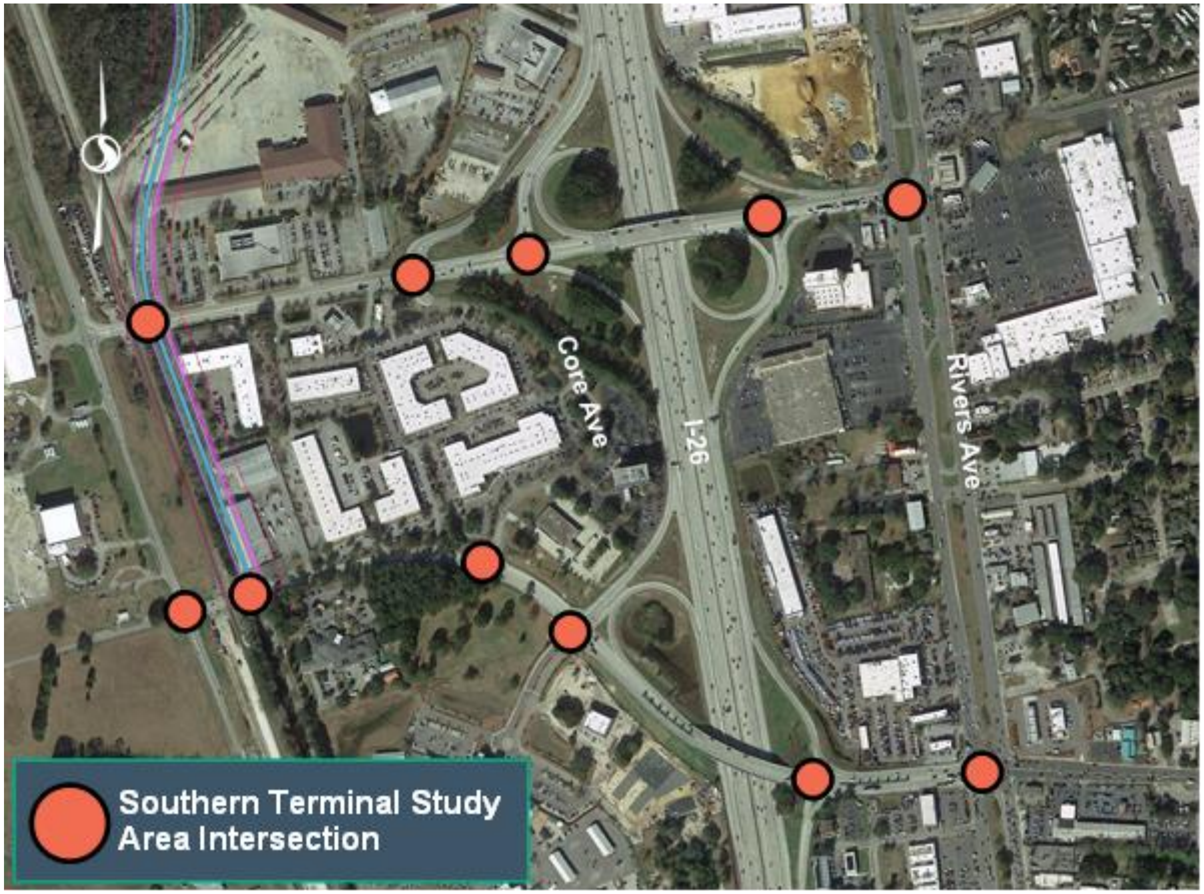
1.3 SOUTHERN TERMINUS

Analysis of the southern terminal of PCP3 included intersection alternative design for PCP3 & Aviation Avenue, PCP3 & Remount Road, Remount Road & S. Aviation Avenue, Aviation Avenue & Core Avenue, and Remount Road & Core Avenue. Additionally, due to the close spacing of intersections along Aviation Avenue and Remount Road, as well as the critical nature of the operation of Rivers Avenue to the operation of PCP3, the analysis of the southern terminal included verifying that all intersections in the study area in this area operated acceptably, from both a LOS and queueing perspective.

In addition to the intersections listed above, this analysis also included the following intersections highlighted in **Figure 5**.

- Aviation Avenue & I-26 EB Ramps
- Aviation Avenue & I-26 WB Ramps
- Aviation Avenue & Rivers Avenue
- Remount Road & I-26 EB Ramps
- Remount Road & I-26 WB Ramps
- Remount Road & Aviation Avenue

Figure 5: PCP3 Southern Terminal Study Area



1.3.1 PCP3 & Aviation/PCP3 & Remount/Remount & S. Aviation

The three intersections of PCP3 & Aviation Avenue, PCP3 & Remount Road, and Remount Road & S. Aviation Avenue were analyzed together due to the connectivity of traffic between the three intersections.

The Alternative D/D1 alignment included PCP3 as one-way southbound between Aviation Avenue and Remount Road such that southbound traffic bound for I-26 or Rivers Avenue would depart PCP3 at Remount Road without the option to exit PCP3 at Aviation Avenue. Conversely, northbound traffic would enter PCP3 from Aviation Avenue without the option to enter PCP3 from Remount Road, as shown in **Figure 6**. This allowed for Aviation Avenue and Remount Road (while remaining two-way) to operate as one-way pairs concerning traffic exiting and entering PCP3.

Figure 6: PCP3 Major Traffic Movement Schematic

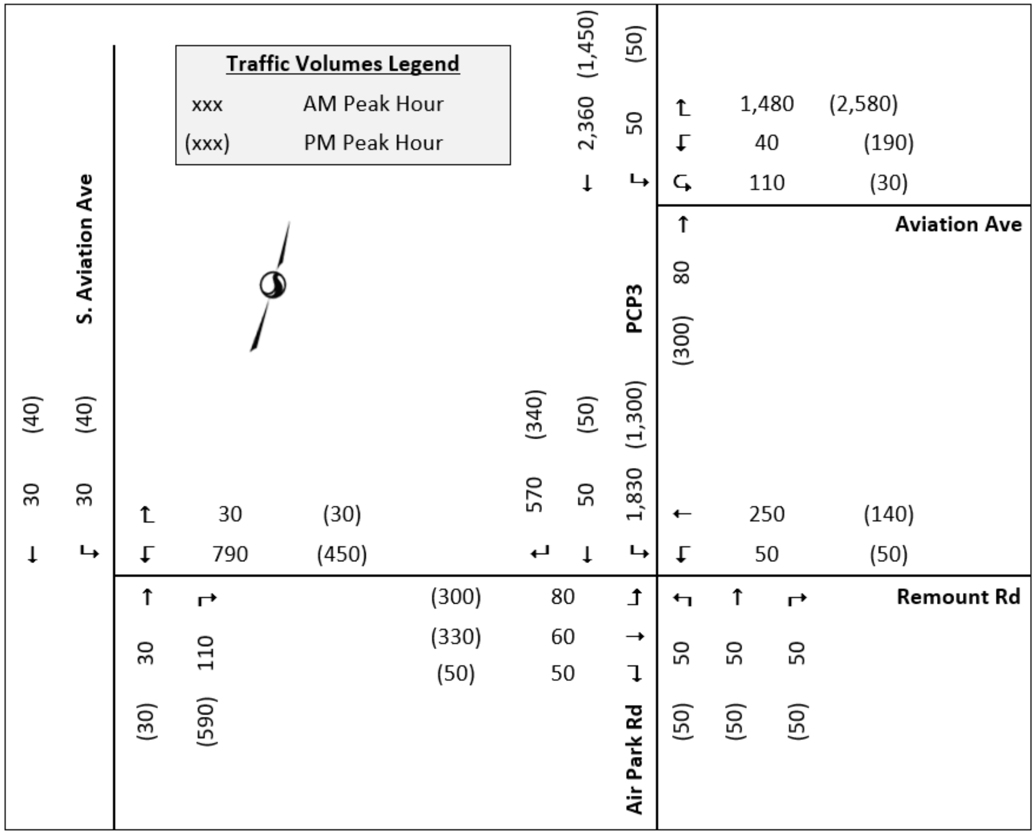
With these major movements provided for as described above, several additional access improvements were made to the concept to accommodate local traffic movements. A northbound lane along PCP3 between Remount Road and Aviation Avenue was included to allow northbound access from Air Park Road and S. Aviation Avenue. Additionally, a southbound left-turn lane was provided at the PCP3 & Aviation Avenue intersection to provide access to local sites along Aviation Avenue between PCP3 & Core Avenue, including the Dominion Energy site. Finally, the westbound left-turn at the intersection of Aviation Avenue & Core Avenue created capacity issues at this intersection. Given the improvements to be made at the PCP3 & Aviation Avenue intersection, prohibition of left turns at Aviation Avenue & Core Avenue was tested such that this movement was accommodated as a U-turn at PCP3 & Aviation Avenue. This led to the concept shown in **Figure 7**, which served as the basis for the traffic analysis for these intersections, to verify their operation given the hourly demand volumes shown in **Figure 8**.

Figure 7: PCP3 & Aviation Avenue/Remount Road Intersections

PCP3 & Aviation Avenue

In the concept shown above in **Figure 7** and highlighted again in **Figure 9** the intersection of PCP3 & West Aviation Avenue functions as two separated signalized intersections operated with one controller, to allow the northbound throughs at the southern-most intersection and the northbound lefts at the northern-most signal to have green indication simultaneously. The southbound through traffic along PCP3 is able to flow freely without control as they are median-separated from the eastbound left-turns, which are entering northbound PCP3. This "Green-T" operation was necessary to eliminate queues that might extend into the clear zone of Runway 21 to the north. The southbound left-turns are controlled at the signal, conflicting only with the northbound through and eastbound left/U-turn movement. Given this configuration, the two signalized intersections at the PCP3 & Aviation Avenue intersection are anticipated to operate at the levels of service shown in **Figure 9** and in **Table 8** in the design year.

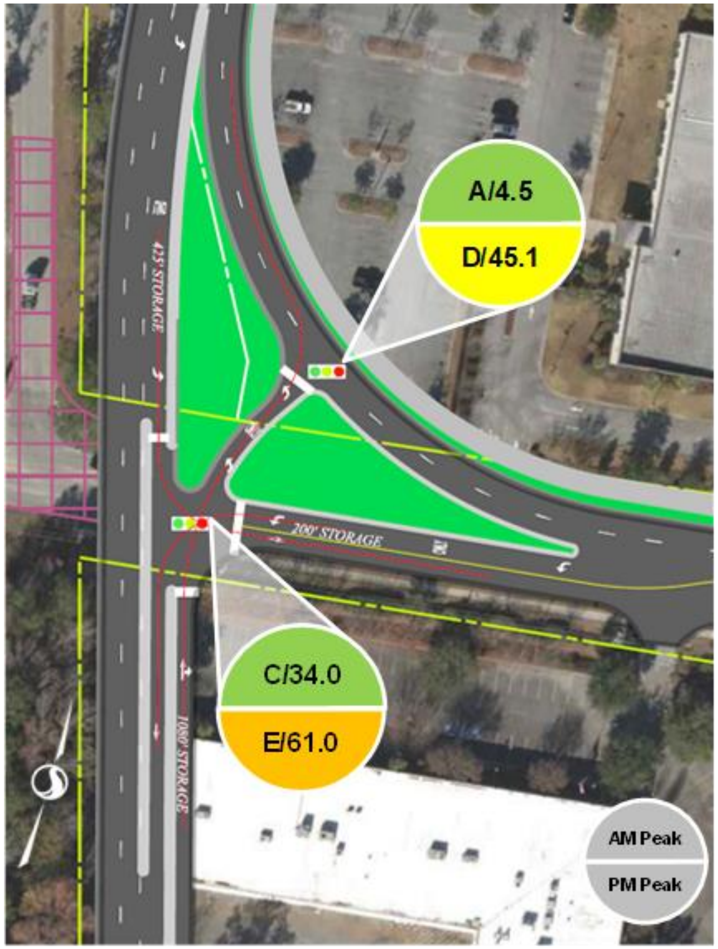
Figure 8: 2045 Build Peak Hour Traffic Volumes at PCP3 Intersections with W. Aviation Ave & Remount Road



The results of the analysis indicate that this intersection is anticipated to operate at acceptable level of service in the design year with the exception of the PM Peak Hour at the southern intersection (which accommodates southbound left turns, northbound throughs, and eastbound left-turns/U-turns). A detailed reporting of the Synchro delay at this intersection indicates that the overall intersection level of service E results primarily from delay at the northbound approach (with the southbound left and eastbound left/U-turn movements having acceptable delay.

To supplement the Synchro analysis, a microsimulation queueing analysis in SimTraffic was conducted to determine if the queues experienced at this approach adequately dissipated throughout the peak hour. The results of the queuing analysis indicated that the maximum observed queue at the northbound approach during the PM peak hour is anticipated to be 589 feet (or approximately 30 vehicles), with the average queue during the PM peak hour anticipated to be 323 feet (or approximately 16 vehicles). Based on observation of the simulations, these queues cleared intermittently throughout the peak hour and did not continue to increase indefinitely. In other words, the intersection was able to successfully process the

Figure 9: PCP3 & Aviation Avenue Intersection LOS



northbound demand volume throughout the peak hour. Furthermore, the simulation output indicated that the northbound through volume experienced an average of 73.5 sec/veh of delay throughout the peak hour, a LOS E for the approach, but that the intersection overall experienced an average delay of 47.3 sec/veh of delay, a LOS D. Therefore, based on this microsimulation analysis, the concept for the intersection of PCP3 & Aviation Avenue was considered to provide acceptable operation based on the projected demand volumes.

Table 8: 2045 Build Conditions LOS – PCP3 & Aviation Avenue

Intersection	AM Peak Hour*	PM Peak Hour*
Southern Intersection	C/34.0	E/61.0
Northern Intersection	A/4.5	D/45.1

** Results shown are Synchro LOS as HCM 2010 methodology does not support multiple intersections on one controller.*

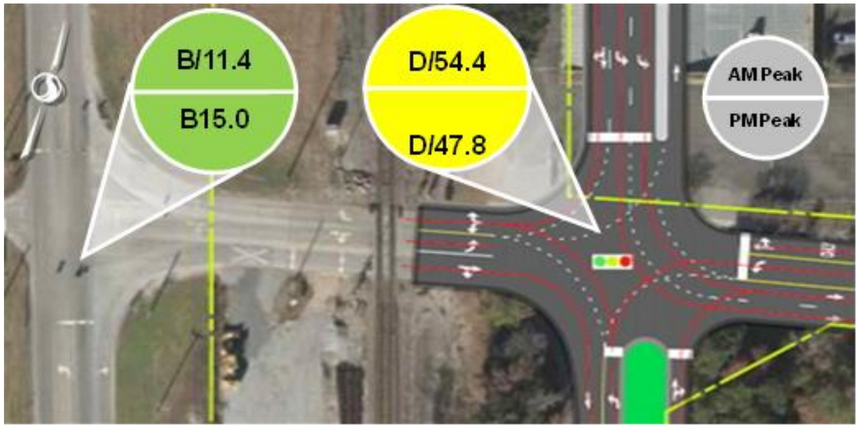
PCP3 & Remount Road/Remount Road & S. Aviation Avenue

In the concept shown above in **Figure 7** and highlighted again in **Figure 10,** the intersections of PCP3 & Remount Road and Remount Road & S. Aviation Avenue are proposed to function as two separated signalized intersections operated with one controller, due to their proximity, and to provide guaranteed processing of movements through both intersections. Therefore, the southbound right-turn at PCP3 & Remount Road would have green indication simultaneously with the westbound approach at Remount Road & S. Aviation Avenue. Similarly, the northbound approach at Remount Road & S. Aviation Avenue would have green indication simultaneously with the eastbound approach at PCP3 & Remount Road. Given this configuration, the two signalized intersections at PCP3 & Remount Road and Remount Road & S. Aviation Avenue are anticipated to operate at the levels of service shown in **Figure 10** in the design year. The results of the analysis, shown in **Table 19**, indicate that both intersections of PCP3 & Remount Road and Remount Road & S. Aviation Avenue are anticipated to operate at acceptable LOS in the design year. Therefore, the concept for these intersections was considered to provide acceptable operation based on the projected demand volumes shown in **Figure 8**.

Table 9: 2045 Build Conditions LOS at PCP3 & Remount Road

Intersection	AM Peak Hour*	PM Peak Hour*
PCP3 & Remount Rd	D/54.4	D/47.8
Remount Rd & S. Aviation Ave	B/11.4	B/15.0
* Results shown are Synchro LOS as HCM 2010 methodology does not support multiple intersections on one controller.		

Figure 10: PCP3 & Remount Road Intersections LOS



1.3.2 Aviation Avenue & Core Avenue

Due to the proximity of the intersection of Aviation Avenue & Core Avenue to the PCP3 corridor, as well as the additional demand volume in the westbound direction resulting from the proposed 'one-way pair' operation of Aviation Avenue and Remount Road, intersection improvements alternatives were analyzed at this intersection. The demand volumes for this intersection are shown in **Figure 37**.

In the existing condition, the intersection of Aviation Avenue & Core Avenue has split phasing for the northbound and southbound approach phases – all movements at the northbound approach are given green indication and then all movements at the southbound approach are given green indication separately such that northbound and southbound movements (throughs and lefts) do not run concurrently. This is likely due to sight-distance issues at these approaches. However, given the additional demand volume at the intersection resulting from PCP3, it is necessary to improve these approaches geometrically such that the split phasing can be removed. This significantly improves the level of service at the intersection. Furthermore, the existing westbound and eastbound exclusive left-turn phases cause increased delays at the intersection for the critical volumes (westbound through, eastbound through, northbound left and southbound left) in the 2045 Build Conditions. Therefore, in order to provide a higher green time/cycle length ratio for the critical movements, the westbound left was prohibited (and accommodated through U-turn at the downstream intersection of PCP3 & Aviation Avenue followed by an eastbound right-turn at this intersection) and the exclusive eastbound left-turn phase was removed to provide permitted left-turning only for this movement (which has relatively low hourly demand volumes). These improvements resulted in acceptable levels of service and delay, as shown in **Table 10.**

Figure 11: Aviation Ave & Core Ave / Fain St Hourly Demand Volumes

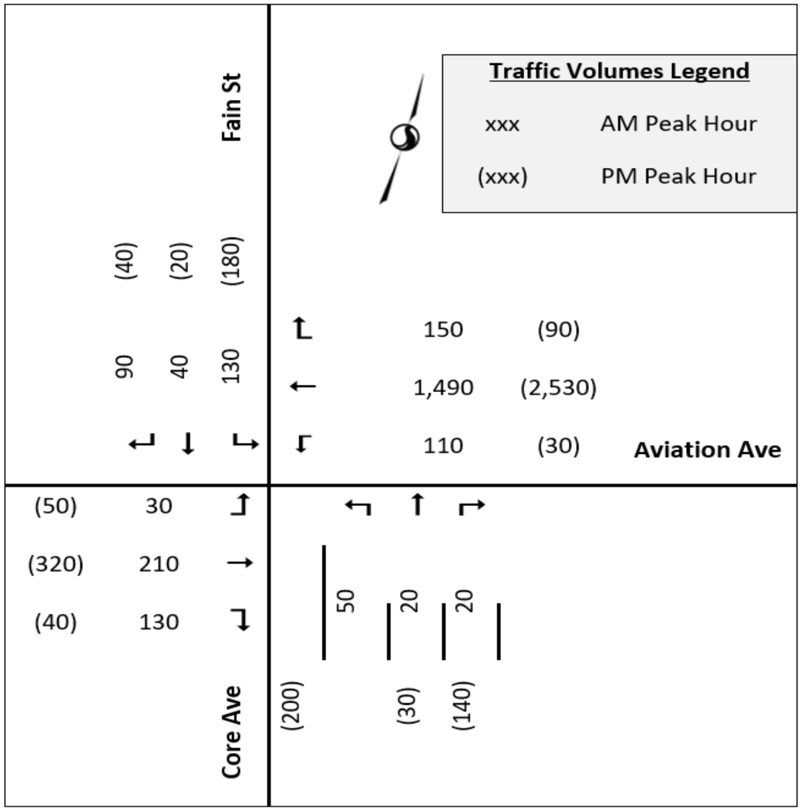


Table 10: 2045 Build Conditions LOS at Aviation Avenue & Core Ave/Fain Blvd

Intersection	AM Peak Hour*	PM Peak Hour*
Aviation Avenue & Core Avenue/Fain Boulevard	B/15.1	D/49.4

** Results shown are Synchro LOS to provide consistency with the reporting of the intersections along PCP3*

1.3.3 Remount Road & Core Avenue

Similarly, the intersection of Remount Road & Core Avenue was reviewed for the need for intersection improvements. The demand volumes for this intersection are shown in **Figure 38**.

The existing intersection of Remount Road & Core Avenue is a two-way stop-controlled intersection. Based on the demand volumes shown above, the intersection is anticipated to operate at an acceptable level of service in the design year, as shown in **Table 11.** Therefore, no additional improvements to this intersection are recommended.

Figure 12: Remount Rd & Core Ave Hourly Demand Volumes

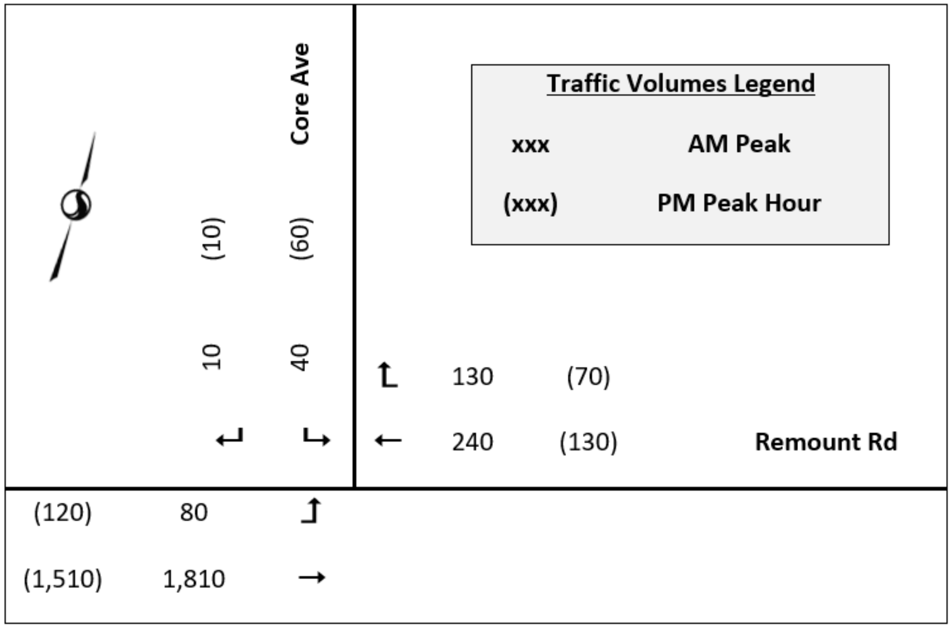


Table 11: 2045 Build Conditions LOS at Remount Road & Core Avenue

Intersection	AM Peak Hour*	PM Peak Hour*
Remount Road & Core Avenue	**C/22.7 (SB)**	**C/23.7 (SB)**
** Results shown are Synchro LOS to provide consistency with the reporting of the intersections along PCP3*		

1.3.4 Southern Terminus Traffic Operation Summary

As mentioned previously, in addition to determining the most appropriate intersection geometries for the intersections along and adjacent to the PCP3 corridor, analysis of the southern terminal of the PCP3 project included all intersections along Aviation and Remount Road, to ensure that traffic could successfully enter and exit the PCP3 corridor. The results of the Synchro analysis for these intersections is shown below in **Table 12**. Note that the intersection of Remount Road & Rivers Avenue considers an improvement to the intersection providing alternative left-turns through U-turns north and south of the intersection. The results of the intersection capacity analysis indicate that the intersections along Aviation Avenue and Remount Road are anticipated to operate at an acceptable level of service in the design year under build conditions, with the exception of PCP3 & Aviation Avenue, the detailed operation of which was discussed previously.

Table 12: 2045 Build Conditions LOS at PCP3 Southern Terminus Intersections

Intersection	AM Peak Hour*	PM Peak Hour*
PCP3 & Aviation Ave (Southern)	**C/34.0**	**E/61.0**
PCP3 & Aviation Ave (Northern)	**A/4.5**	**D/45.1**
Aviation Ave & Core Ave/Fain Blvd	**B/15.1**	**D/49.4**
Aviation Ave & I-26 EB Ramps	**B/20.2**	**D/42.9**
Aviation Ave & I-26 WB Ramps	**B/16.1**	**D/50.7**
Aviation Ave & Rivers Avenue	**D/42.1**	**D/52.4**
PCP3 & Remount Rd	**D/54.4**	**D/47.8**
Remount Rd & S. Aviation Ave	**B/11.4**	**B/15.0**
Remount Rd & Core Ave	**C/22.7 (SB)**	**C/23.7 (SB)**
Remount Rd & I-26 EB Ramps	**C/22.1**	**C/21.1**
Remount Rd & I-26 WB Ramps	**B/11.8**	**A/8.7**
Remount Rd & Rivers Ave	**C/25.5**	**C/29.9**

** Synchro LOS shown to provide consistency with the reporting of the intersections along PCP3*

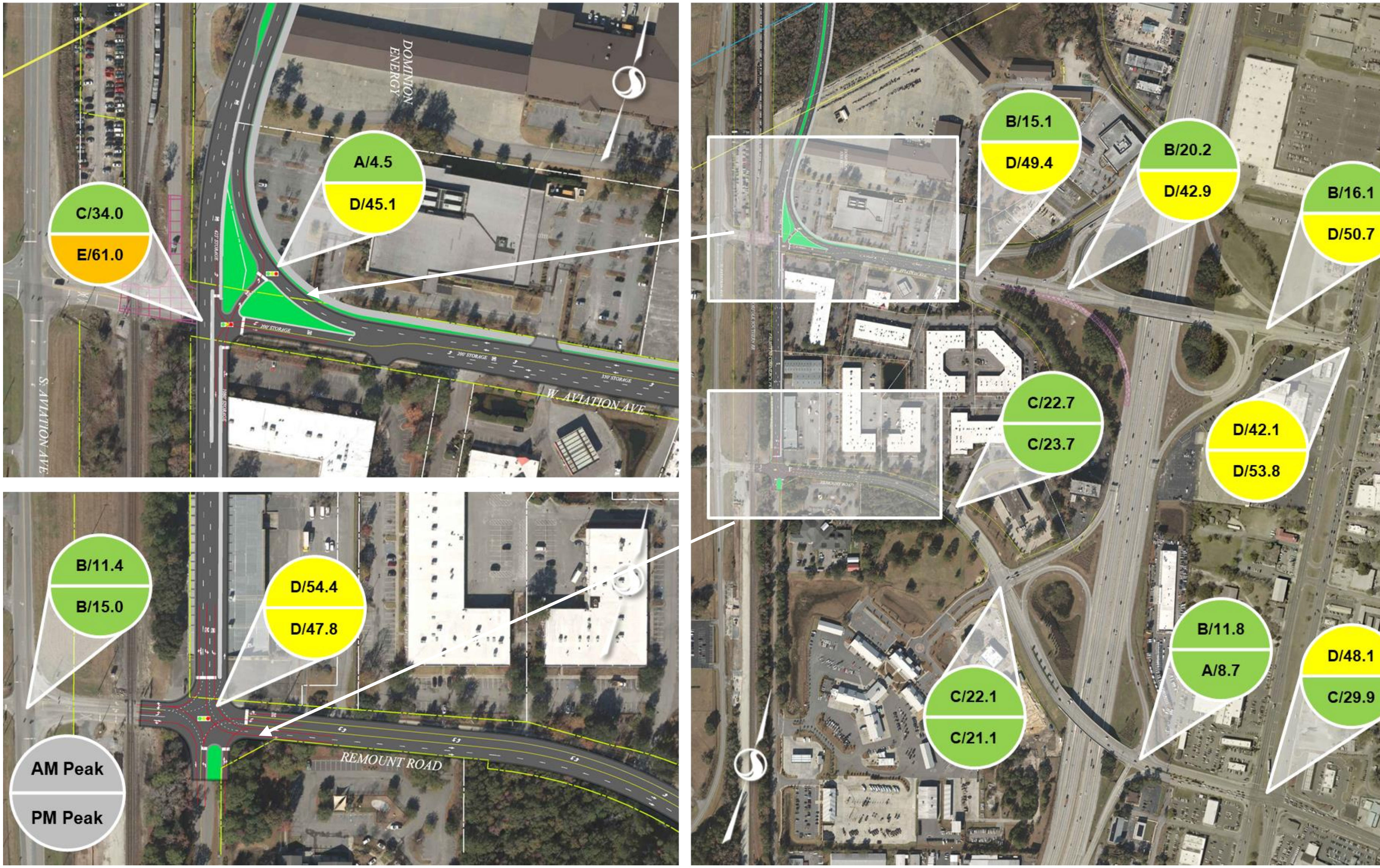
In addition to the capacity analysis of the intersections along Aviation Avenue and Remount Road, the queuing at the I-26 ramp terminal intersections was of particular importance, to verify that 95th percentile queues did not extend back onto I-26 during the peak hours thus affecting the operation of the I-26 C-D roads. A SimTraffic queueing analysis was conducted for these intersections, the results of which are shown in **Table 13.** The results of the queueing analysis indicate that the 95th percentile queues at the ramp terminals do not extend beyond the available ramp storage length onto I-26. Based on the results of the intersections along the proposed PCP3 corridor and along Aviation Avenue and Remount Road, the Build Conditions geometry for the southern terminal was considered to provide acceptable traffic operation in the study area given 2045 Build Conditions traffic demand.

Table 13: 2045 Build Conditions 95th Percentile Queues at I-26 Ramp Terminals

Intersection	Available Storage (ft)	95th Percentile Queue (ft)			
		AM Peak Hour		PM Peak Hour	
Aviation Ave & I-26 EB Ramps	**950**	**321**	✓	**287**	✓
Aviation Ave & I-26 WB Ramps	**975**	**717**	✓	**654**	✓
Remount Rd & I-26 EB Ramps	**720**	**172**	✓	**186**	✓
Remount Rd & I-26 WB Ramps	**800**	**354**	✓	**236**	✓

**Results based on average of 10 simulation runs with 15-minute seeding and 60-minute runtime*

Figure 13: Southern Terminus Level of Service Summary



PALMETTO COMMERCE PARKWAY 3

TECHNICAL MEMORANDUM - Appendix D

Proposed Roadway Easement

CHARLESTON COUNTY
SOUTH CAROLINA

Stantec

June 2022

1.0 PROPOSED EASEMENT FOR ROADWAY

Figure 1 is a location view of a parcel that is owned by the United States Government. The Charleston County Parcel Identification Number is 475-00-00-024.

Figure 2 is a schematic view of the proposed easement boundaries.

Figure 3 is an excerpt from a boundary survey of the US Government-owned parcel. This was provided by Joint Base Charleston.

Figure 1: US Government Parcel 475-00-00-024

Figure 2: Schematic of Proposed Road Easement on Parcel 475-00-00-024

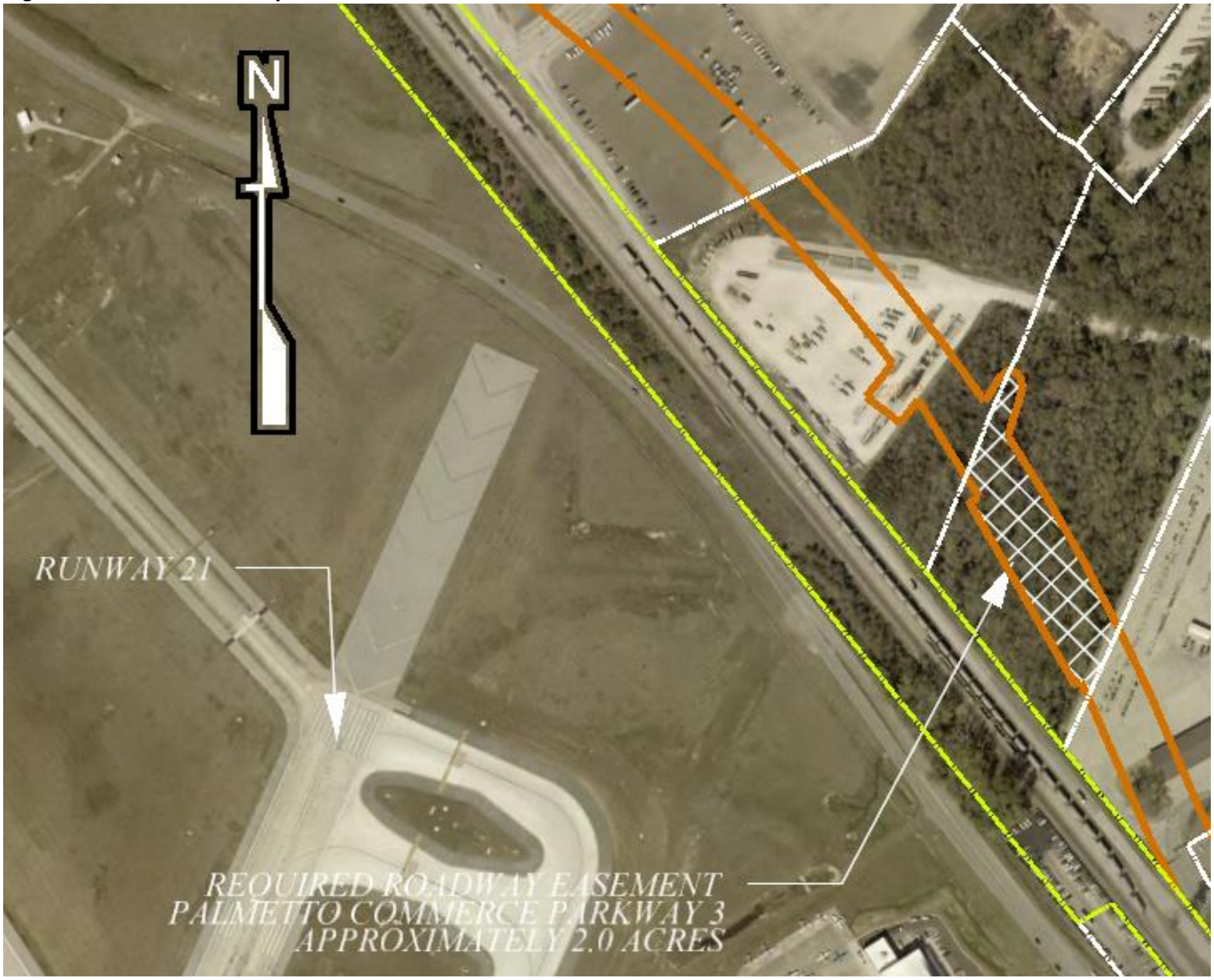


Figure 1: Excerpt from Boundary Survey of Parcel 475-00-00-024