

Appendix A

I-526 AT LONG POINT ROAD DESIGN HOUR VOLUMES TECHNICAL MEMORANDUM -- APRIL 2022

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TECHNICAL MEMORANDUM:
I-526 AT LONG POINT ROAD
DESIGN HOUR VOLUMES

FINAL

Prepared for:



Prepared by:



May 2022

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1.0 I-526 AT LONG POINT ROAD DESIGN HOUR VOLUMES

1.1 INTRODUCTION

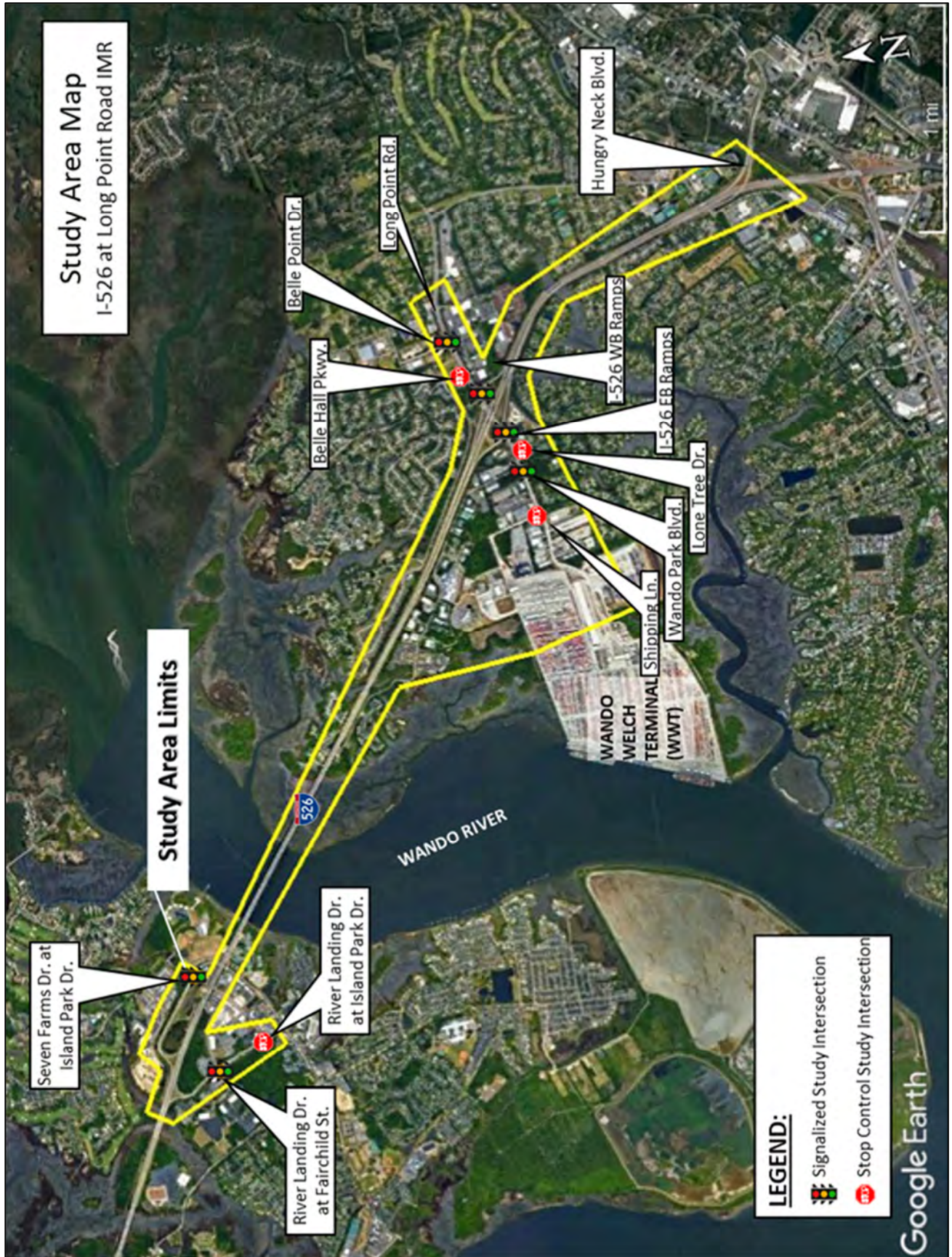
The purpose of this technical memorandum is to present Design Hour Volumes (DHV) for the Long Point Road Interchange Justification Report (IJR) or Interchange Modification Report (IMR) being prepared for the South Carolina Department of Transportation (SCDOT). The following sections describe the data collected and used for this process, the determination of peak hours, the selection of an appropriate design hour, determination of growth rates and adjustment factors, and the preparation of the DHVs for existing and horizon years. The horizon years for the Long Point Road IJR or IMR are in alignment with the previous I-526 Low Country Corridor EAST (LCC EAST) Planning and Environmental Linkages (PEL) Study (2022 existing, 2030 year of opening and 2050 design year).

This memorandum utilizes information, data, and analysis from reports developed for the LCC EAST study. That study involved a detailed analysis of I-526 from the US 17 interchange on the east to the North Rhett Avenue interchange on the west. Later, the I-526 LCC EAST PEL Study area was reduced by assigning the North Rhett Avenue and Virginia Avenue interchanges to the I-526 LCC WEST project.

1.2 STUDY AREA

In keeping with the FHWA IJR or IMR requirements, the study area includes the Seven Farms Drive interchange to the west of Long Point Road, the Long Point Road interchange, and the directional ramps leading to US 17 on the east end of I-526. **Figure 1** depicts the study area along with intersection traffic control devices. Because of the Wando River, the Seven Farms Drive and Long Point Road interchanges are only connected by I-526; a local road system does not exist tying these two roads together. This is relevant because improvements to the Seven Farms Drive interchange will not divert traffic from the Long Point Road interchange.

Figure 1: IJR or IMR Study Area Map



1.3 2017 REPORTS FROM I-526 LCC EAST PEL STUDY

The following I-526 LCC EAST reports are relevant to this Long Point Road IJR or IMR. Note that the I-526 LCC EAST PEL study focused on the I-526 mainline; whereas, the updated analysis adds more detail for the Long Point Road specifically.

I-526 CHATS Model Modification Report- This technical memorandum documented the appropriate uses of and modifications made to the Charleston Area Transportation Study (CHATS) Interim Travel Demand Model (TDM) for the I-526 LCC EAST analysis. This report is provided in the **Appendix**.

I-526 Traffic Model (TM) Growth Factor Justification Report- This technical memorandum presented the recommended rates of traffic volume growth for the I-526 LCC EAST project. Estimated Average Annual Daily Traffic (AADT) volumes from SCDOT station locations were used to determine historic trends, and these were compared to forecasts from the CHATS TDM. This report proposed that a 1.6% annual compounded growth rate be applied to I-526 mainline traffic to estimate 2030 and 2050 traffic volumes. Moreover, it proposed that a 1.0% annual compounded growth rate be applied to traffic on Long Point Road north of I-526, and that a 1.2% annual compounded growth rate be applied on Long Point Road south of I-526. This report is provided in the **Appendix**. Because the CHATS Interim TDM was the traffic forecasting tool used in the PEL document, it is also recommended for use in the Long Point Road interchange study. Hence, CDM Smith proposes the growth rates developed from the CHATS Interim TDM for the I-526 LCC EAST PEL document be applied to 2022 base traffic volumes to project 2030 and 2050 DHVs.

Design Hour Volume Technical Memorandum - This technical memorandum presented a methodology to adjust October 10, 2017, traffic counts to existing Design Hour Volumes (DHVs) as part of the I-526 LCC EAST PEL Study. A DHV Adjustment Factor of 1.10 was recommended for eastbound I-526 between North Rhett Avenue and Long Point Road. Westbound in the same section of I-526, a 1.125 DHV Factor was recommended. Between Long Point Road and US 17, no DHV Adjustment Factor was recommended because the October 10 counts were at the 30th highest hour, based on ATR 90 traffic volume analysis. This conclusion is also supported by the 2019 hourly traffic volume analysis performed for this Long Point Road IJR or IMR. The methodology used in this DHV memo was repeated for the Long Point Road IJR or IMR. This report is provided in the **Appendix**.

I-526 Data Collection Report- This technical memorandum includes the DHV memorandum content and provides the 2017 peak hour traffic volumes collected as part of the I-526 LCC EAST PEL study. Because of its length, this report is not provided in the **Appendix**.

Traffic Projections and LOS Report- This technical memorandum was developed as part of the I-526 LCC EAST PEL study. It included the 2017 and 2050 DHVs as well as Highway Capacity Software freeway Level of Service (LOS) analysis. It also provided analysis of the impact of adding 1 versus 2 new I-526 mainline lanes. Because of its length, this report is not provided in the **Appendix**. The 2017 DHVs utilized in the traffic analysis documented in the I-526 LCC EAST Traffic Projections Report differ slightly from the 2017 peak hour volumes found in the I-526 Data Collection Report because the peak hour volumes were further adjusted with balancing and smoothing techniques.

1.4 2022 DATA COLLECTION

For the Long Point Road study, new traffic count data were collected on Long Point Road, the existing interchange and I-526 on the following dates:

- Wednesday February 2, 2022
- Tuesday February 22, 2022
- Wednesday February 23, 2022

The intersection turning movement counts (TMCs) and segment count locations are shown in **Figure 2**, **Figure 3**, and **Figure 4**. In the I-526 LCC EAST PEL Study, the focus was on the mainline, so only one signalized intersection on both sides of the ramp terminals were counted. All the segment and intersection counts included vehicle classifications because it was important to quantify all truck traffic, but especially that related to Wando Port Terminal.

For this Long Point Road IJR or IMR, additional intersection counts were made along Long Point Road, so that a thorough analysis could be undertaken including impacts from anticipated Wando Port expansion. Vehicles entering and exiting the Wando Port were recorded at 15-minute intervals at the Main and Shipping Lane Gates. A TMC was made at the intersection of Seacoast Parkway and Shoals Drive because at least one of the concepts being considered will impact that junction, but it will not be part of the IJR or IMR analysis intersections.

Figure 2: 2022 Traffic Data Collection at Daniel Island Interchange

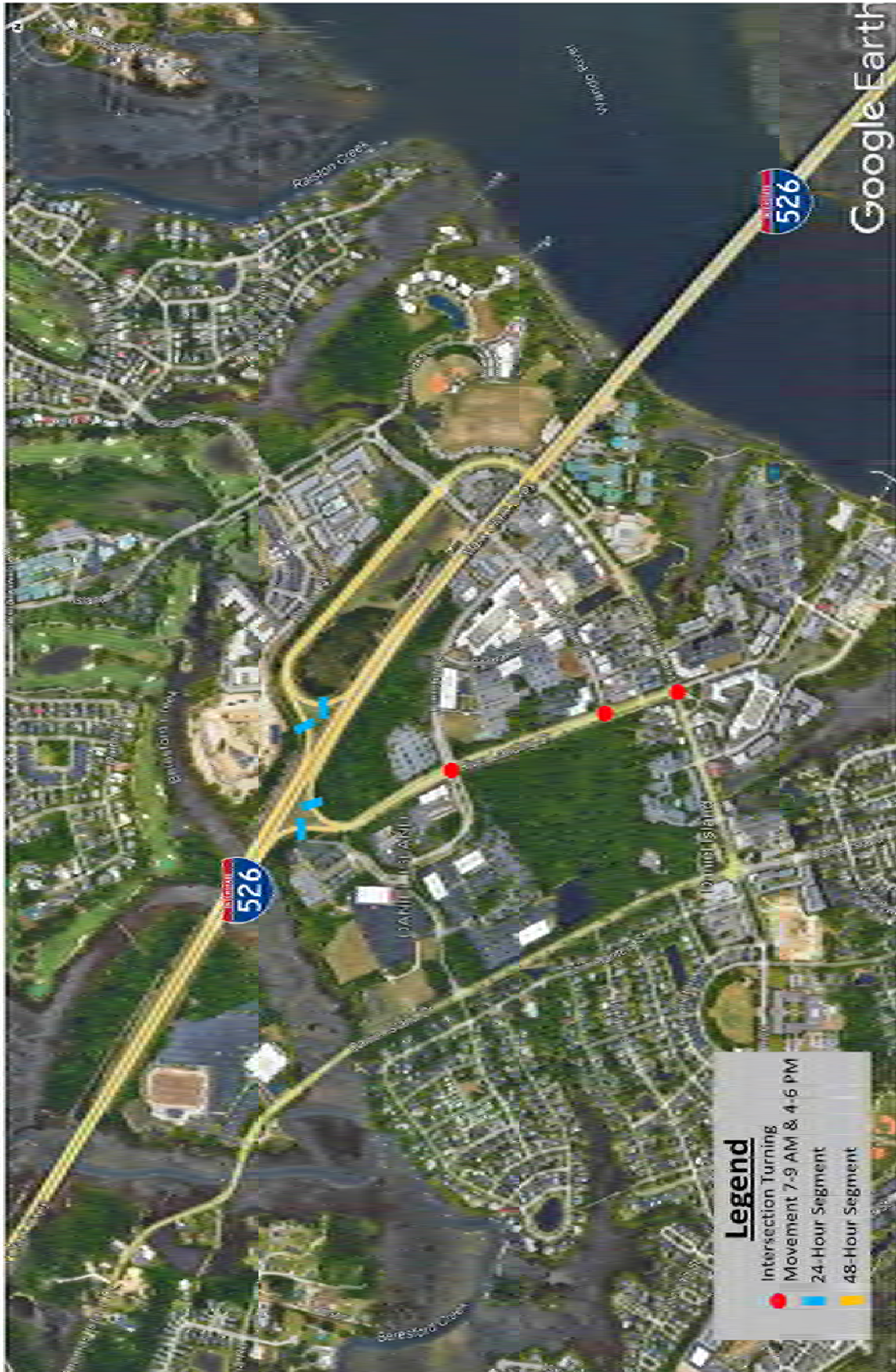


Figure 3: 2022 Traffic Data Collection at Long Point Road Interchange

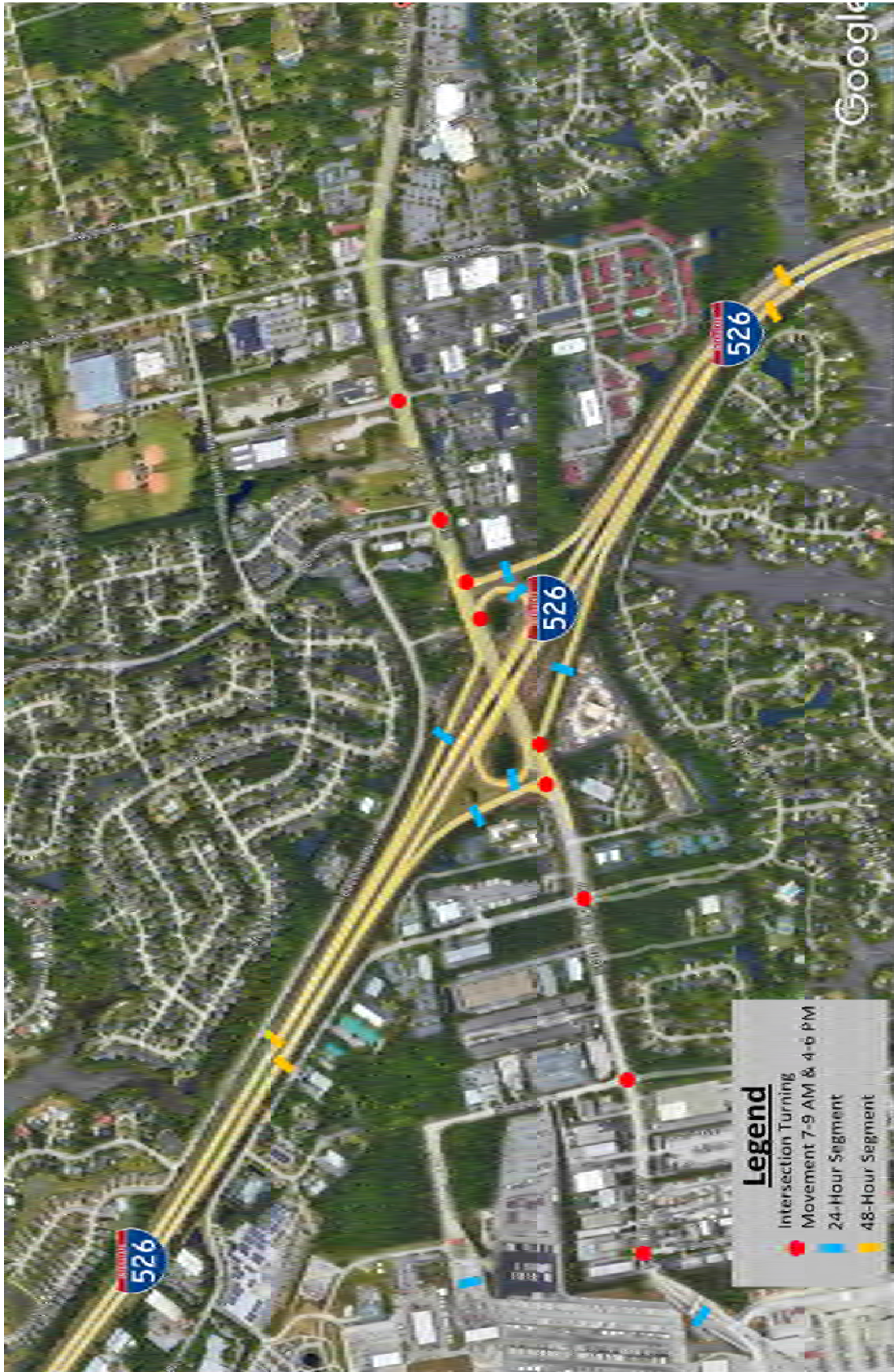
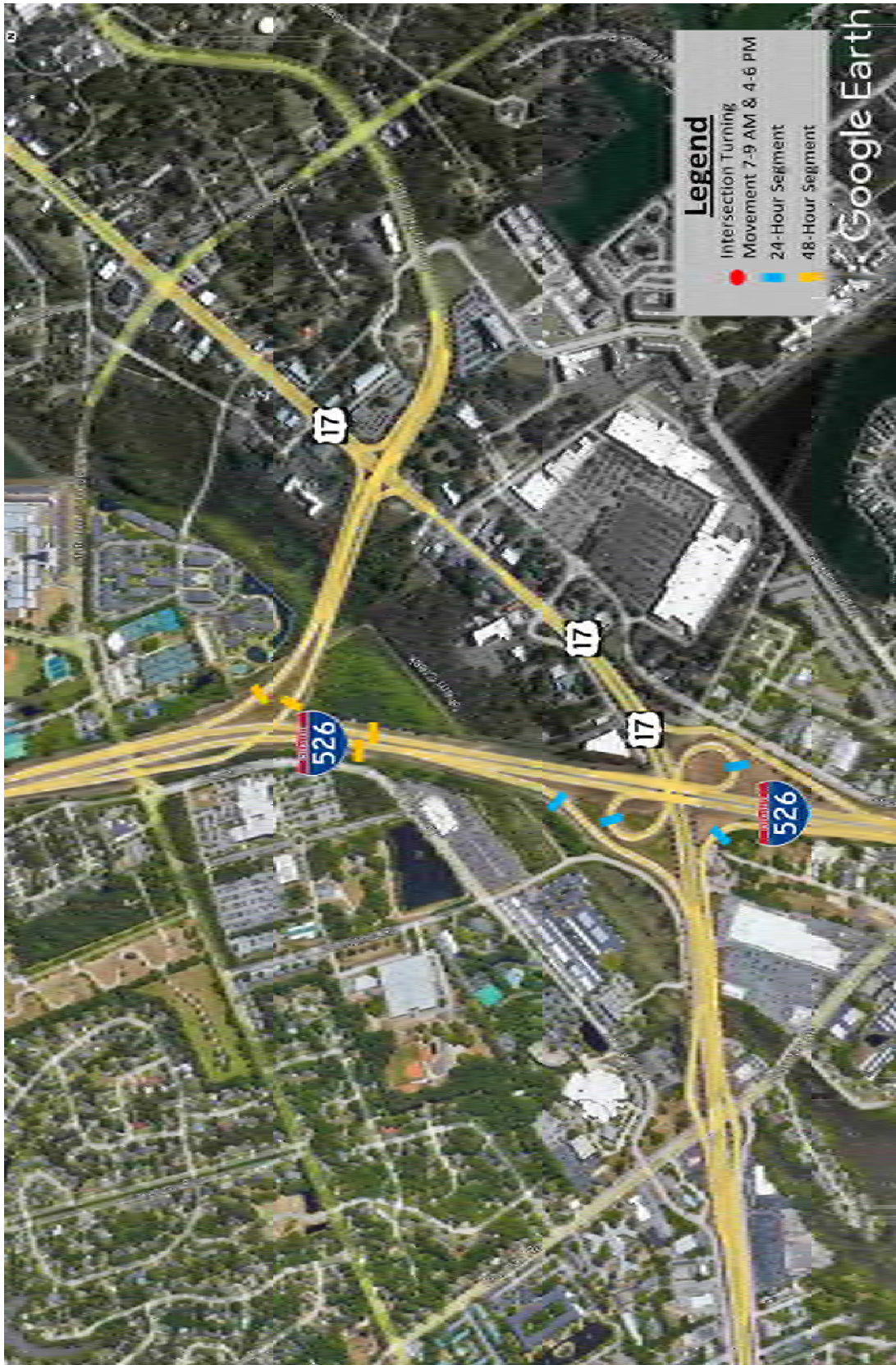


Figure 4: 2022 Traffic Data Collection at Hungry Neck Boulevard Interchange



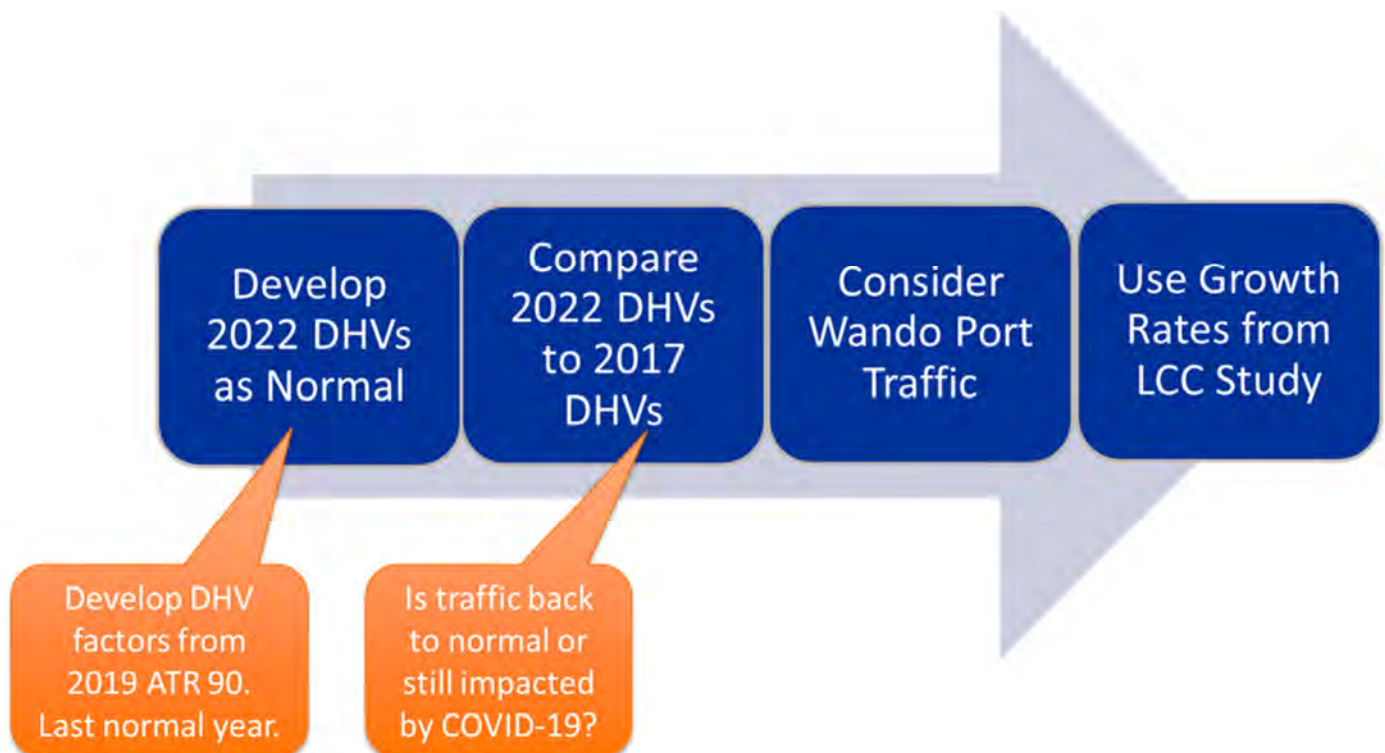
Because queues have been observed backing up from the eastbound I-526 off ramp to Long Point Road onto I-526, a queuing analysis was performed at this ramp on February 2, 2022.

The South Carolina State Port Authority provided data for 2019, 2020, and 2021 Wando Terminal entering and exiting truck activity for every day by hour for all entering and exiting gates. Additionally, they provided 2018 through 2021 annual pier container moves and projected 2022 through 2030 projected pier container moves. Note that freight processed by the Port increased each year and set record amounts in 2021.

1.5 OVERALL DHV METHODOLOGY

Figure 5 presents a diagram of the DHV development methodology followed in this study. Because of atypical traffic conditions in 2020 and 2021 due to COVID-19, 2019 was utilized to establish 30th highest hour mainline I-526 volumes and to develop DHV factors that were applied to February 2022 counts along Long Point Road and Seven Farms Drive. The process followed was to develop 2022 DHVs using FHWA's standard best practices methodology. In addition to following FHWA's best practices, CDM Smith determined and applied a COVID-19 factor, since February 2022 traffic is still not all back to normal. Separately, a comprehensive Wando Port truck traffic analysis was performed with the understanding that they are poised to grow in the future. Their current truck activities also impact the Long Point Road interchange and I-526.

Figure 5: Design Hour Volume Methodology

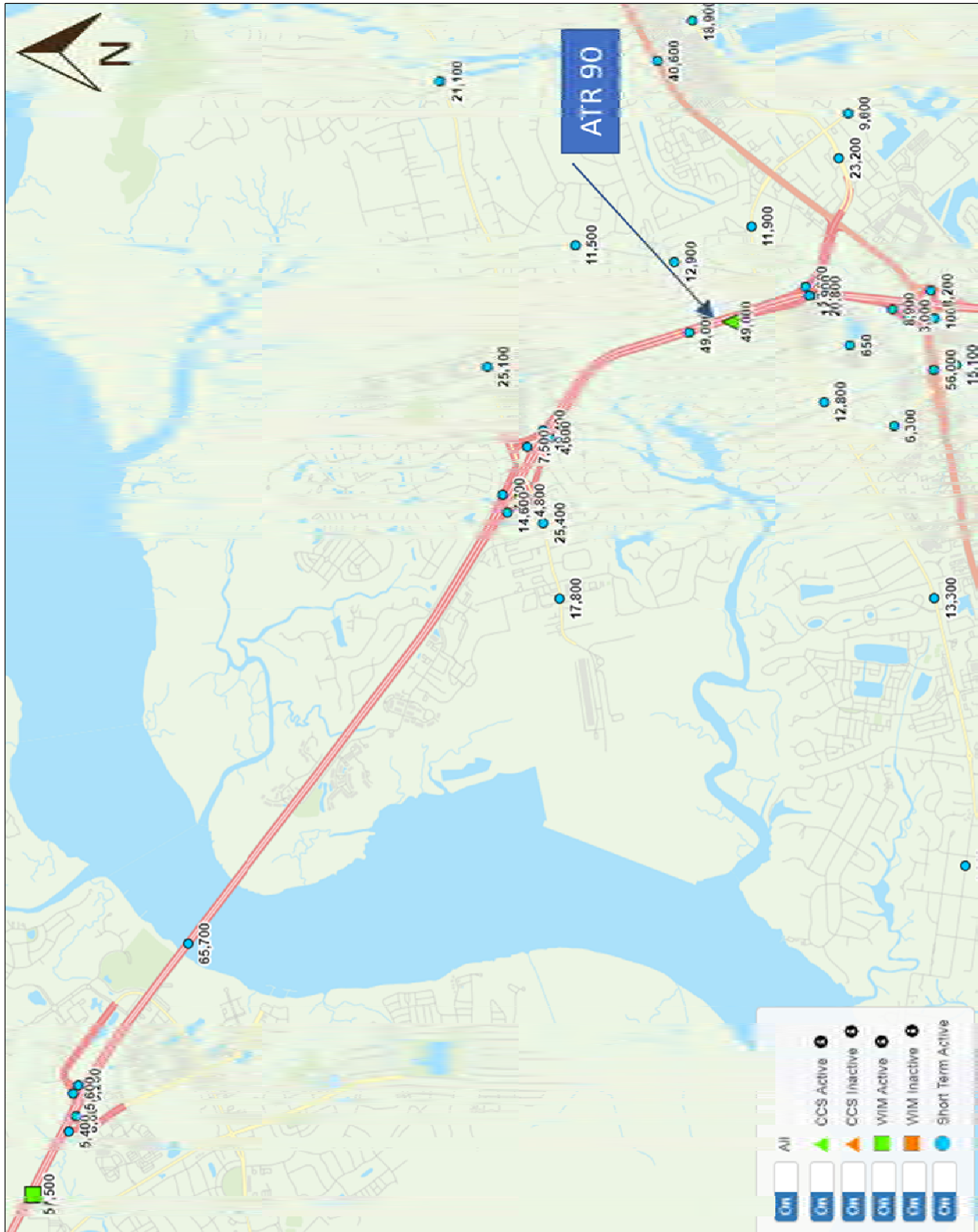


1.6 JUSTIFICATION OF USING 2019 ATR 90 HOURLY VOLUMES AND RESULTS

1.6.1 Top 150 Hours at ATR 90

At ATR 90 (located on I-526 east of the Long Point Road interchange), a systematic review of the highest peak hours of operations on I-526 was conducted. It was discovered that the top 145 highest count days in 2019 are almost all from 5:00 to 6:00 PM. The location of ATR 90 is shown in **Figure 6**. The exception is that a few of the top 145 occur between 4:00 and 5:00 PM. The **Appendix** of this report includes hourly traffic count data for the top 200 busiest days at ATR 90 on I-526 east of Long Point Road. The highest ranked AM peak hour was the 146th highest volume hour of the year in 2019 and occurred between 7:00 and 8:00 AM.

Figure 6: SCDOT Daily Count Stations



1.6.2 COVID-19 Impact on I-526

Table 1 presents ATR 90 traffic count data from 5:00 to 6:00 PM for the first and second Thursdays in October from 2017 through 2021. Those two Thursdays generally represent the 30th highest volume day

of the year. This data shows the impact of COVID-19 in 2020 and 2021 and how traffic volumes have rebounded in 2021, but not back to 2019 levels. October 11, 2018, was an anomaly with only 4,232 vehicles counted from 5:00 to 6:00 PM. In general, PM peak hour traffic was growing between 2017 and 2019 before COVID-19 hit, then it declined.

Table 1: I-526 ATR 90 Annual PM Peak Hour Average Traffic Volumes (2017-2021)

| PM Peak Two-Way Volume on First and Second Thursday at ATR 90 | | | |
|--|------|--------|--------------|
| Date | Year | 5-6 PM | Average |
| 5-Oct | 2017 | 5,664 | |
| 10-Oct | 2017 | 5,622 | 5,643 |
| 4-Oct | 2018 | 5,301 | |
| 11-Oct | 2018 | 4,232 | 4,767 |
| 3-Oct | 2019 | 5,750 | |
| 10-Oct | 2019 | 5,786 | 5,768 |
| 1-Oct | 2020 | 5,108 | |
| 8-Oct | 2020 | 5,436 | 5,272 |
| 7-Oct | 2021 | 5,649 | |
| 14-Oct | 2021 | 5,415 | 5,532 |

Table 2 presents ATR 90 traffic count data from 7:00 to 8:00 AM for the second and third Mondays after Labor Day in September. The second and third days were selected for analysis because the top 2019 AM peak hour at ATR 90 occurred on the second Monday after Labor Day. In 2017 the second Monday in September was unusually low, so the third and fourth Mondays (highlighted in red) were used instead. The trend discovered for the PM peak hours also held true for the AM peak hours in that traffic growth occurred from 2017 through 2019, then COVID-19 caused substantial declines in traffic volumes in 2020. The primary difference between the AM and PM peak hours is that a more substantial drop in traffic occurred in the AM peak hour and the traffic has not rebounded as much as the PM peak hour.

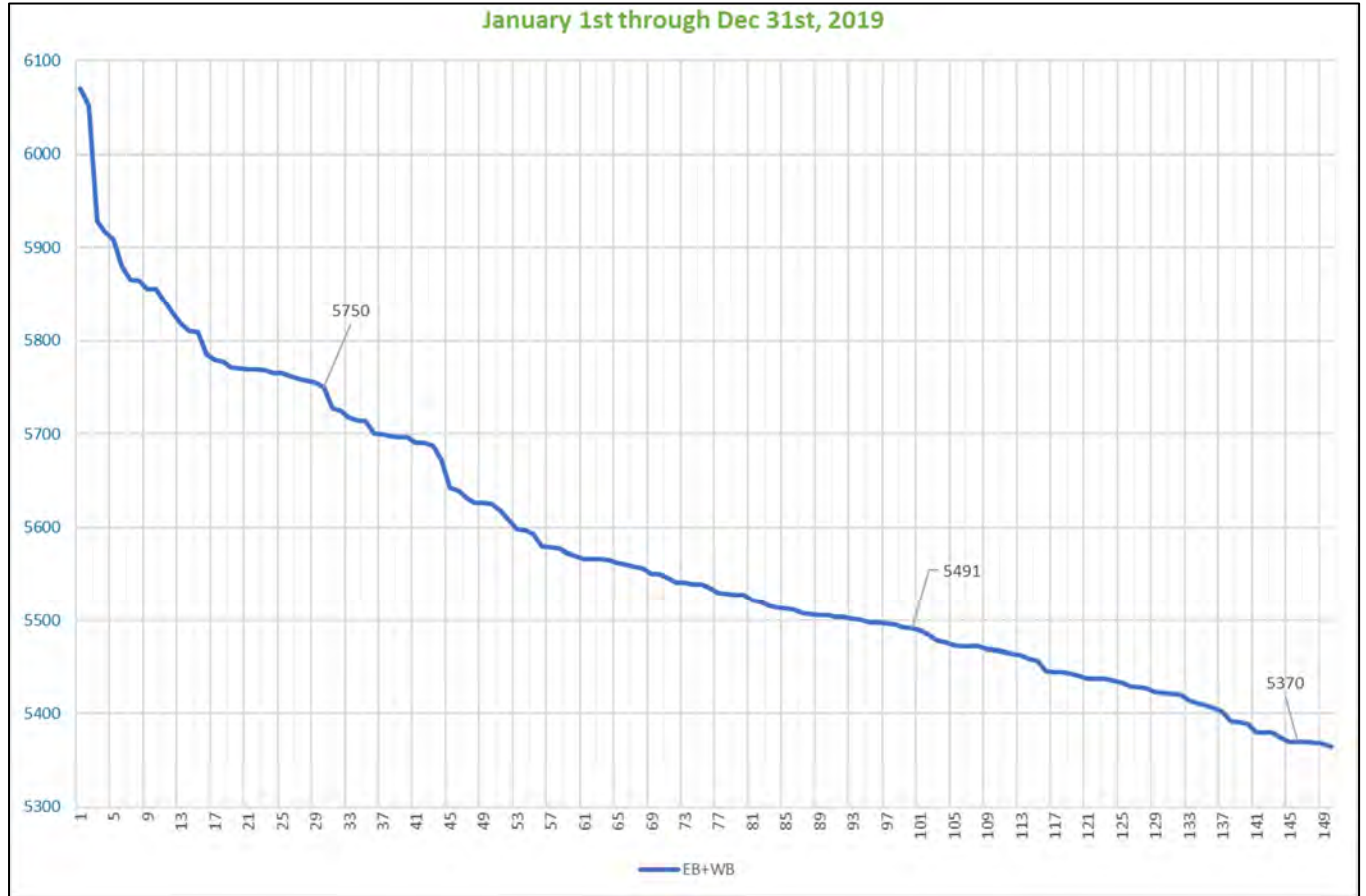
Table 2: I-526 ATR 90 Annual AM Peak Hour Average Traffic Volumes (2017-2021)

| AM Peak Two-Way Volume on Second and Third Monday at ATR 90 | | | |
|--|--------------|--------------|--------------|
| Date | Year | 7-8 AM | Average |
| 25-Sep | 2,017 | 4,891 | |
| 18-Sep | 2017 | 4,810 | 4,851 |
| 10-Sep | 2018 | 5,036 | |
| 17-Sep | 2018 | 4,929 | 4,983 |
| 9-Sep | 2019 | 5,370 | |
| 16-Sep | 2019 | 5,153 | 5,262 |
| 14-Sep | 2020 | 3,983 | |
| 21-Sep | 2020 | 3,891 | 3,937 |
| 13-Sep | 2021 | 4,543 | |
| 20-Sep | 2021 | 4,563 | 4,553 |

1.6.3 Selection of Appropriate Design Hour

A plot, in descending order, of the two-way volumes at ATR 90 is shown in **Figure 7**. The graph of count volumes confirms that the 30th highest hour is appropriate. There is a distinct “knee” at approximately the 5th highest hour, then there are sharp declines represented by a steep line slope. Another “knee” occurs at the 15th highest hour, then a normal slope occurs until the 30th highest hour. At the 30th highest hour another “knee” exists. Also note where the AM peak hour occurs on the curve for the first time at hour 146.

Figure 7: Top 150 Ranked Total Hourly Volumes – ATR 90



1.6.4 Peak Hours and Two-Way Volumes

Based on the traffic analysis of the top 150 hours at ATR 90, it is recommended that the PM peak hour of analysis be from 5:00 to 6:00 PM and that the AM peak hour of analysis be from 7:00 to 8:00 AM. On Thursday October 3, 2019, 5,750 vehicles per hour (vph) were recorded at ATR 90 in both directions, which represents the 30th highest hour in 2019. The 100th highest hour in 2019 occurred from 5:00 to 6:00 PM on Tuesday August 13, when 5,491 vph were recorded, which is 95% of the 30th highest hour. On Monday September 9, 2019, 5,370 vph were recorded at ATR 90 in both directions, which represents the highest recorded AM peak hour and the 146th highest total hour.

1.7 DESIGN YEARS

The following design years are recommended, which are consistent with the I-526 LCC EAST PEL project:

- Base: 2022
- Intermediate/Opening: 2030
- Horizon: 2050

1.8 GROWTH RATES

The following growth rates are proposed:

- I-526 Mainline: 1.6% compounded annually
- Long Point Road North of I-526: 1.0% compounded annually
- Long Point Road South of I-526: 1.2% compounded annually
- Seven Farms Drive: 1.5% compounded annually

The compounded equation and resulting growth factor that was applied to the 2022 DHVs for the traffic growth expected on I-526 mainline is as follows:

- Total Growth Rate = $(1 + \text{annual growth rate})^{(\text{number of years in future})}$
 - 2030 I-526 Growth Rate = $(1 + .016)^8 = 1.14$
 - 2050 I-526 Growth Rate = $(1 + .016)^{28} = 1.56$

Note that the I-526 LCC EAST PEL project developed 2017 and 2050 DHVs using these rates, which were approved by SCDOT, and are provided in the Traffic Projections and LOS Report. These compounded rates were applied to the 2017 DHVs in the I-526 LCC EAST PEL project, so 2050 DHVs have already been developed. This Long Point Road IMR used the 2017 established growth rates and applied them to 2022 DHV's. This produced slightly different 2050 DHV's because they were applied to 2022 DHV's whereas previously they were applied to 2017 DHV's. This methodology assures that traffic has not grown between 2017 and 2022, primarily due to COVID-19.

1.9 COVID-19 IMPACT AND FACTORS APPLIED TO LONG POINT ROAD COUNTS

From the 2017 through 2021 ATR 90 analysis presented in a previous section of this memorandum, the conclusion is that COVID-19 had and is still having a profound impact on I-526 travel and its interchanges. That analysis examined the 30th highest (PM peak) and 146th highest (AM peak) hours from 2017 through 2021. **Table 3** and **Table 4** present similar analysis, but for every Tuesday in February from 2019 through 2022. A Tuesday in February was selected to be consistent with the traffic counts that were collected on the first Tuesday in February 2022.

The tables provide two-way traffic volumes at ATR 90 for each Tuesday in February as well as the monthly averages. The benchmark is 2019, the last pre-COVID-19 year. The data suggest that I-526

mainline is back to pre-COVID levels in the PM peak hour, with an average traffic count of 5,285 vph in 2022 versus 5,275 vph in 2019. Conversely, the AM peak hour traffic is not back to pre-COVID-19 levels with the 7:00 to 8:00 AM average Tuesday being 4,673 in 2022 versus 5,125 in 2019. A difference of 10% less AM peak hour traffic in 2022 versus 2019, before COVID-19, was observed. Therefore, 2022 PM counts were not adjusted (i.e., assumed a 1.0 Covid factor) and 2022 AM counts were adjusted utilizing a 1.1 factor.

Table 3: PM Peak Hour COVID Factor based on Pre-COVID Conditions (2019-2022)

| 2019 | | 2020 | | 2021 | | 2022 | |
|--------------|--------------------|--------------|--------------------|--------------|--------------------|--------------|--------------------|
| Tuesday Date | 5-6 PM 2-Way Count | Tuesday Date | 5-6 PM 2-Way Count | Tuesday Date | 5-6 PM 2-Way Count | Tuesday Date | 5-6 PM 2-Way Count |
| 5-Feb | 5,473 | 4-Feb | 4,280 | 2-Feb | 4,720 | 1-Feb | 5,197 |
| 12-Feb | 5,177 | 10-Feb | 4,292 | 9-Feb | 4,711 | 8-Feb | 5,223 |
| 19-Feb | 4,943 | 18-Feb | 4,778 | 16-Feb | 5,008 | 15-Feb | 5,316 |
| 26-Feb | 5,506 | 25-Feb | 4,329 | 23-Feb | 5,007 | 22-Feb | 5,402 |
| Average | 5,275 | | 4,420 | | 4,862 | | 5,285 |
| COVID factor | | | 19% | | 9% | | 0% |

Table 4: AM Peak Hour COVID Factor based on Pre-COVID Conditions (2019-2022)

| 2019 | | 2020 | | 2021 | | 2022 | |
|--------------|--------------------|--------------|--------------------|--------------|--------------------|--------------|--------------------|
| Tuesday Date | 7-8 AM 2-Way Count | Tuesday Date | 7-8 AM 2-Way Count | Tuesday Date | 7-8 AM 2-Way Count | Tuesday Date | 7-8 AM 2-Way Count |
| 5-Feb | 5,185 | 4-Feb | 3,957 | 2-Feb | 4,233 | 1-Feb | 4,637 |
| 12-Feb | 5,109 | 10-Feb | 4,702 | 9-Feb | 4,260 | 8-Feb | 4,561 |
| 19-Feb | 5,147 | 18-Feb | 4,687 | 16-Feb | 4,178 | 15-Feb | 4,647 |
| 26-Feb | 5,060 | 25-Feb | 4,592 | 23-Feb | 4,360 | 22-Feb | 4,848 |
| Average | 5,125 | | 4,485 | | 4,258 | | 4,673 |
| COVID factor | | | 14% | | 20% | | 10% |

1.10 WANDO PORT TERMINAL - FUTURE TRUCK TRAFFIC

There are five reasons why the Wando Port Terminal truck activity was examined in detail:

- There is a substantial amount of truck traffic at the I-526 and Long Point Road interchange, much of it generated by the port terminal at the south end of Long Point Road.
- Truck percentages on I-526 drop substantially east of Long Point Road with count stations reflecting 14% of total traffic are trucks west of Long Point Road which drops to 4% trucks to the east of the interchange.
- Similarly, the mainline traffic volumes on Long Point Road is comprised of 24% trucks west of I-526 going towards the Port, as compared with only 2% trucks using Long Point Road east of the I-526 interchange.

- The port related traffic is expected to grow at a substantially higher annual rate than other traffic on I-526 and Long Point Road.
- Within the full range of alternatives for the IMR, at least two interchange alternatives have separate ramps connecting I-526 more directly to the gates of the Wando Port Terminal.

1.10.1 Background Information

The Wando Welch Terminal (WWT), referred to as the Wando Port Terminal, is South Carolina's largest container terminal with approximately 400 acres of space on the Wando River in Charleston, SC. On the land side, the WWT accommodates WB-40's, Over the Road (OTR) trucks with single and double sleeper cabs that carry 40- or 45-foot containers, and domestic 53-foot trailers for the Tradeport Warehouse Operations. Because WWT generates a high volume of large trucks, it has an impact of adding many tractor trailer trucks, creating slower travel speeds, and causing congestion on I-526 and its interchanges including Long Point Road. The bodies of water surrounding the WWT make it accessible by land from Long Point Road only, and the vast majority of trucks use I-526 to get to Long Point Road.

The gate hours of operation are currently 5:00 AM to 5:00 PM Monday-Friday and 6:00 AM to 5:00 PM on Saturday. The gates are open on some days as early as 3:00 AM and operate on some Sundays from 6:00 AM to 5:00 PM to alleviate the long queues at the entry plazas. **Figure 8** depicts the WWT site layout, including the location of the Main and Shipping Lane inbound gates and the Main outbound gate. The Main gate has two inbound Plazas (WWT 401 and WWT 442), and the Shipping Lane gate has one inbound plaza (WWT 455). Queuing at the Main and Shipping Lane inbound gates between 6:35 and 6:40 AM on Friday April 15, 2022, are shown in **Figure 9** and **Figure 10**.

Figure 8: Wando Welch Terminal Site Layout

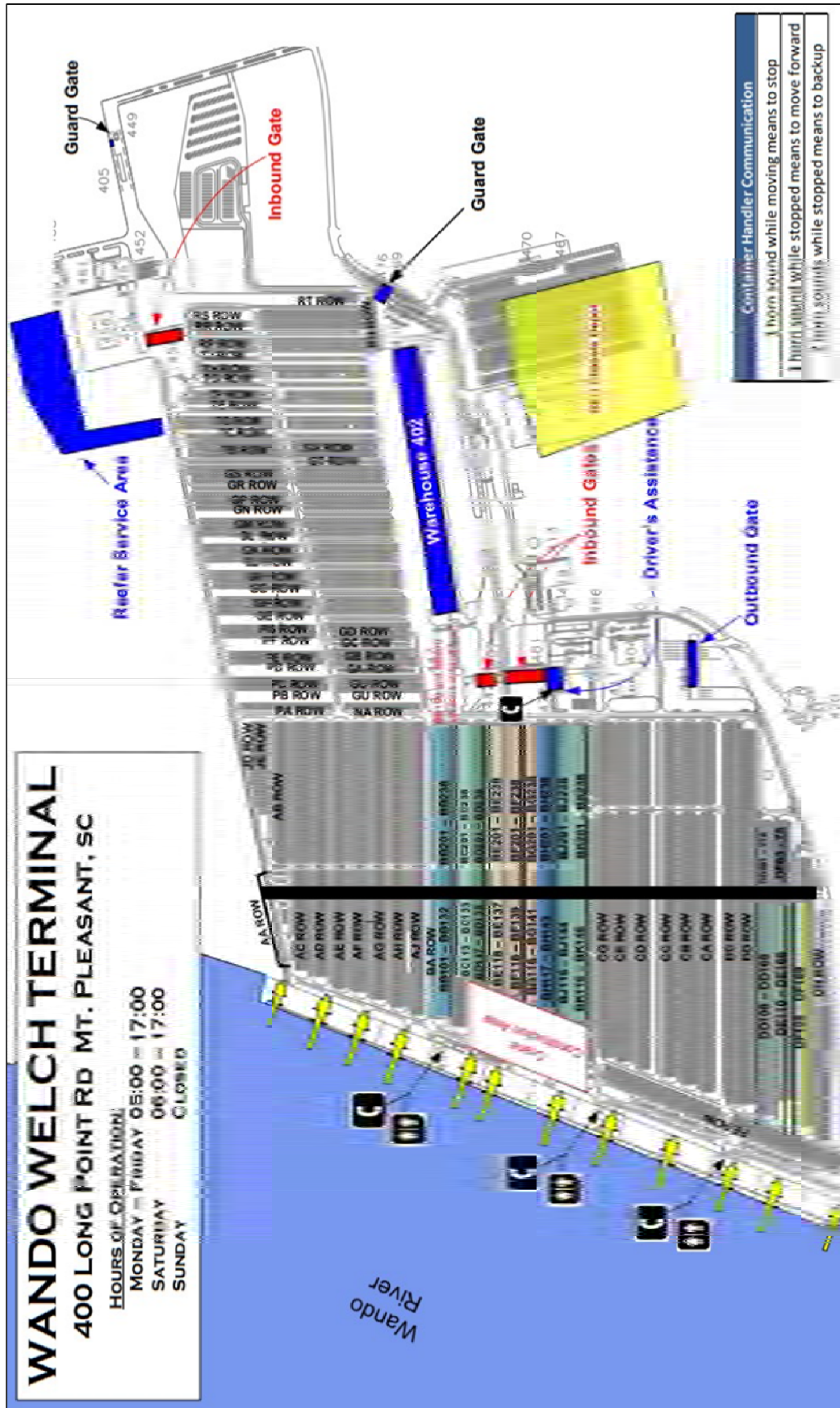


Figure 9: Main Gate Inbound at 6:36 AM on 15 April 2022



Figure 10: Shipping Lane Inbound at 6:40 AM on 15 April 2022



1.10.2 2019-2021 WWT Inbound and Outbound Truck Activity

Table 5 provides a summary of inbound and outbound WWT truck activity for 2019 through 2021. **Table 6** is a companion table presenting the truck activity as percentages instead of yearly truck totals. From 2019 through 2021 almost 3 million trucks entered and exited the WWT with nearly 1 million occurring each year. Over the 3-year period from 2019 through 2021, the Main WWT gate processed 71% of the

entering trucks whereas the Shipping Lane gate processed 29%. Plaza 401 has the greatest number of lanes, so it can serve the higher demand. Wando Port is evaluating electronic wayfinding signage for Long Point Road to direct the drivers in advance of arriving at the port to the plaza that has lesser wait times. No equipment has been installed at this time but is planned. All outbound trucks from WWT depart via the Main gate.

Table 5: Annual Sum of Truck Entries by Plaza (2019-2021)

| Hour | INBOUND FREIGHT | | | OUTBOUND FREIGHT |
|-------------|-----------------|---------|---------------|------------------|
| | WWT Main Gate | | Shipping Lane | WWT Main Gate |
| | WWT 401 | WWT 442 | WWT 455 | Outbound Gate |
| 2019 | 473,447 | 153,205 | 280,926 | 976,347 |
| 2020 | 503,390 | 199,287 | 248,361 | 994,741 |
| 2021 | 452,039 | 203,440 | 275,232 | 986,864 |
| Gate Total | 1,428,876 | 555,932 | 804,519 | 2,957,952 |
| Grand Total | 2,789,327 | | | 2,957,952 |

Table 6: Annual Percent Usage of Truck Entries by Plaza (2019-2021)

| Hour | INBOUND FREIGHT | | | OUTBOUND FREIGHT |
|-------------|-----------------|---------|---------------|------------------|
| | WWT Main Gate | | Shipping Lane | WWT Main Gate |
| | WWT 401 | WWT 442 | WWT 455 | Outbound Gate |
| 2019 | 52% | 17% | 31% | 100% |
| 2020 | 53% | 21% | 26% | 100% |
| 2021 | 49% | 22% | 30% | 100% |
| Average | 51% | 20% | 29% | 100% |
| Grand Total | 100% | | | |

Table 7 presents inbound and outbound WWT truck activity by hour separated by entering and exiting gates. The highway peak hours of 7:00 to 8:00 AM and 5:00 to 6:00 PM are highlighted. Truck volumes in red denote the WWT's peak entering activity, which occurs from 11:00 AM to 12:00 NOON, and its peak exiting activity, which occurs from 12:00 NOON to 1:00 PM. Entering truck gate activity from 7:00 to 8:00 AM is 81% of the peak hour between 11:00 AM and 12:00 NOON (245,228/301,515). Likewise, exiting truck activity from 7:00 to 8:00 AM is 86% of the peak hour from 12:00 NOON to 1:00 PM.

From 5:00 to 6:00 PM, however, truck volumes fall substantially with very little inbound and even less outbound truck movements at the end of the workday at WWT. Note, however, that this low PM peak volume is due to the current policy of closing operations at 5 PM. As a result, trucks must arrive by 4 PM to perform a combined unloading and reloading before close. Any extension of operational hours in the future could result in an overlap of higher port related truck volumes and the peak hour traffic on both Long Point Road and I-526.

Table 7: 3-Year Sum of Truck Volumes by Hour of Day at each Plaza

| Hour | INBOUND FREIGHT | | | | OUTBOUND FREIGHT |
|-------------|-----------------|---------|---------------|-----------|------------------|
| | WWT Main Gate | | Shipping Lane | TOTAL | WWT Main Gate |
| | WWT 401 | WWT 442 | WWT 455 | | Outbound Gate |
| 0 | 4 | NA | NA | 4 | 4 |
| 1 | 1 | NA | NA | 1 | 3 |
| 2 | 27 | 4 | NA | 31 | 1 |
| 3 | 1,103 | 320 | 199 | 1,622 | 952 |
| 4 | 1,993 | 630 | 753 | 3,376 | 2,246 |
| 5 | 70,617 | 27,986 | 42,769 | 141,372 | 62,141 |
| 6 | 117,507 | 46,697 | 62,848 | 227,052 | 189,870 |
| 7 | 128,466 | 49,636 | 67,126 | 245,228 | 260,201 |
| 8 | 136,282 | 51,106 | 63,884 | 251,272 | 265,576 |
| 9 | 146,533 | 56,019 | 78,705 | 281,257 | 280,247 |
| 10 | 141,569 | 55,051 | 81,781 | 278,401 | 283,688 |
| 11 | 151,127 | 59,326 | 91,062 | 301,515 | 290,248 |
| 12 | 139,592 | 54,244 | 85,710 | 279,546 | 301,568 |
| 13 | 133,940 | 52,750 | 83,109 | 269,799 | 295,194 |
| 14 | 120,890 | 47,420 | 73,771 | 242,081 | 285,713 |
| 15 | 87,614 | 34,512 | 50,231 | 172,357 | 235,520 |
| 16 | 46,911 | 18,632 | 21,504 | 87,047 | 160,723 |
| 17 | 4,423 | 1,461 | 1,024 | 6,908 | 42,703 |
| 18 | 39 | 23 | 20 | 82 | 840 |
| 19 | 70 | 50 | 22 | 142 | 159 |
| 20 | 71 | 33 | 1 | 105 | 167 |
| 21 | 44 | 15 | NA | 59 | 77 |
| 22 | 31 | 11 | NA | 42 | 58 |
| 23 | 22 | 6 | NA | 28 | 55 |
| Gate Total | 1,428,876 | 555,932 | 804,519 | 2,789,327 | 2,957,947 |
| Grand Total | 2,789,327 | | | | 2,957,947 |

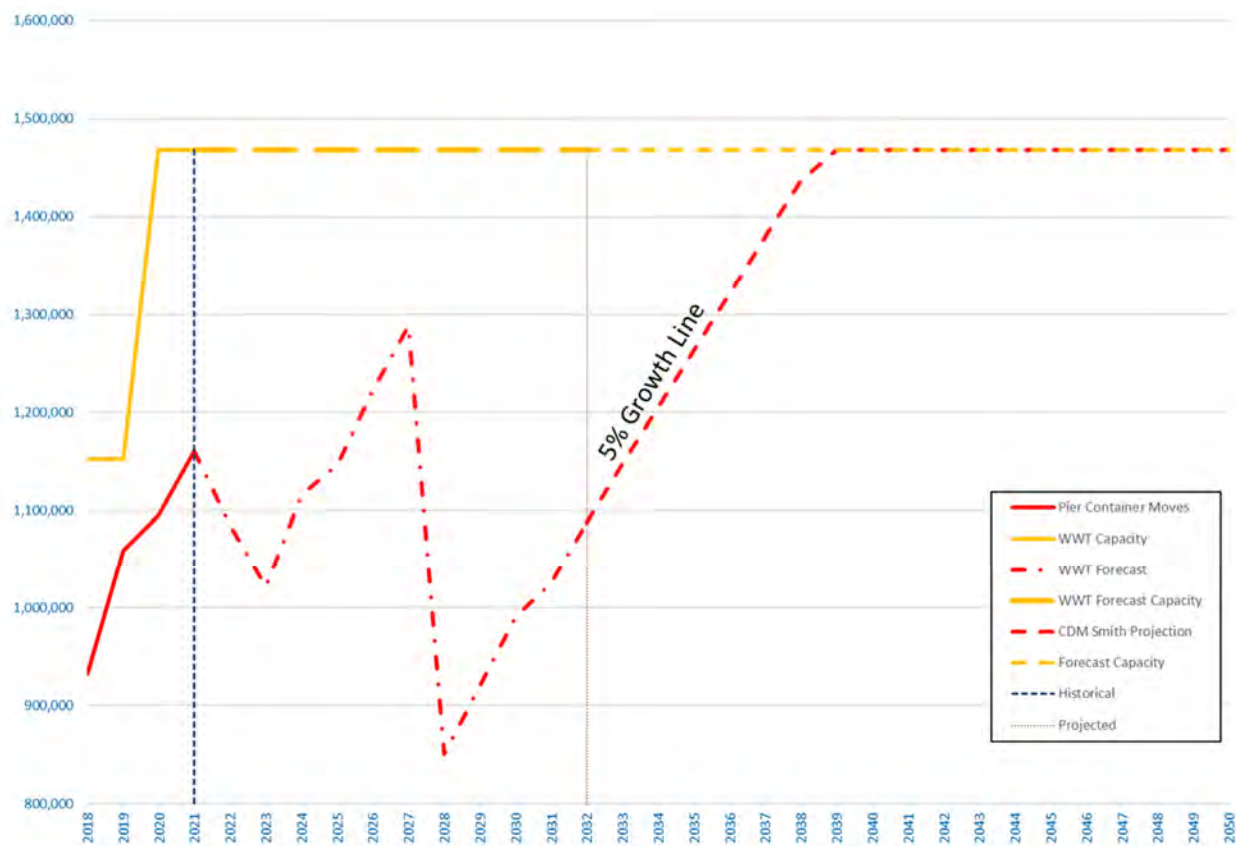
1.10.3 Historic and Projected Future WWT Pier Container Moves

The South Carolina State Ports Authority provided historic and projected pier container moves from 2018 through 2032. This data is plotted in the graph shown in **Figure 11**. This historical container movements reflect freight processed through 2019 before improvements occurred to the Wando Port to increase the capacity. In 2019, their pier container move capacity increased from 1.15 million to 1.47 million per year. In terms of actual pier container moves, the data WWT provided indicates historic growth from 2018 through 2021.

In the future, pier container moves are expected to temporarily decrease (provided the barge program is funded in 2022). It is forecasted that container movement will increase from 2022 to 2027, and then decrease again before experiencing a steady increase of 5% per year. The decrease in pier container moves anticipated between 2027 and 2028 is caused by the anticipated expansion of the Hugh Leatherman Terminal in North Charleston.

Given the uncertainty of Ports Authority programs that would cause a temporary decline in WWT activity, it was assumed that WWT activity will continue to grow from 2022 through the 2030 intermediate year. Because WWT’s growth rate, established by the Ports Authority, is projected to be 5% from 2022 through 2027, and 5% again from 2028 through 2039, it was determined that a 5% growth rate should be applied to WWT truck activity starting in 2022. At a steady rate of approximately 5.0% compounded, the current Wando Port terminal capacity will be reached in 2039 based on annual freight operations. Wando Port activity is assumed to operate at full capacity between the years of 2039 and 2050. The CHATS TDM used a 1.6% annual growth rate, which is not expected to reflect full Wando Port activity based on the WWT projections of 5.0% annual compounded growth. This information was used to project growth in WWT entering and exiting truck activity with the assumption that there would be a strong correlation between pier container moves and truck activity.

Figure 11: WWT Forecast and Capacity Information (2018-2050)



1.10.4 WWT 30th Highest Entering and Exiting Hours for Trucks

Previously shown in Table 7, the peak operations of WWT are midday for container moves. The AM and PM peak hours of the Long Point Road interchange facilitating work trips are not concurrent with WWT substantial truck traffic. For consistency and not to analyze the annual maximum value, the 30th highest hour was determined to be the most appropriate design hour to account for the total entering trucks.

Table 8 presents truck activity on Wednesday, February 13, 2019, which was the top 30th busiest entering truck volume for the 7:00 to 8:00 AM hours at the WWT in the 3-year period between 2019 and 2021. Likewise, Table 8 presents the same day’s data for exiting trucks. There were 337 entering and 306 exiting tractor trailer trucks during the 7:00 to 8:00 AM hour. A review of the 5:00-6:00 PM hours

determined that the processed entering of 25 tractor trailer trucks and exiting of 77 tractor trailer trucks traffic were not excessive, primarily due to operations at the Port concluding at 5 PM. This means that trucks must be processed by 4 PM to unload and reload on the same day.

Table 8: 30th Highest Hour Freight Activity during Peak Hours (2019)

| Wednesday, February 13, 2019 | | | | |
|------------------------------|---------|------------|---------------|------------|
| Hour | INBOUND | | OUTBOUND | |
| | Plaza | Total | Gate | Total |
| 7-8AM | WWT 401 | 171 | WWT Main Gate | 306 |
| 7-8AM | WWT 442 | 55 | | |
| 7-8AM | WWT 455 | 111 | | |
| Grand Total | | 337 | | 306 |
| 5-6PM | WWT 401 | 13 | WWT Main Gate | 77 |
| 5-6PM | WWT 442 | 6 | | |
| 5-6PM | WWT 455 | 6 | | |
| Grand Total | | 25 | | 77 |

1.10.5 Projected Growth of WWT Truck Activity

Estimating the projected growth of WWT trucks is an important component of the Long Point Road 2030 and 2050 volume development. Without this analysis, it would have to be assumed that WWT truck traffic will grow at the same rate as other traffic at the I-526 from and Long Point Road interchange- 1.6% annually on mainline I-526 and 1.0 or 1.2% on Long Point Road. However, based on the projected growth of pier container moves from the South Carolina Port Authority, WWT should grow at a faster 5.0% annual compounded rate as described in Section 1.10.3. This section examines the additional truck volumes that are added to the baseline turn movements developed for the I-526 LLC EAST PEL study.

Figure 12 illustrates a graph of 7:00-8:00 AM inbound truck growth through 2050 using a 1.6% annual compounded growth rate versus a growth rate based on pier container move projected growth. The starting point of the graph is the existing number of inbound trucks (337 but rounded to 340) coming to WWT. Using a 1.6% compounded rate, the number of additional WWT-oriented trucks should be 57 (397-340=57) in 2030 and 123 (463-340=123) in 2050. On the other hand, using the pier container move growth from WWT as the basis of projecting new truck traffic to and from the port, 190 (530-340=190) new entering trucks are projected in 2030 and 487 (827-340=487) in 2050.

Figure 12: Annual 7:00-8:00 AM Container Move Projections - Entering

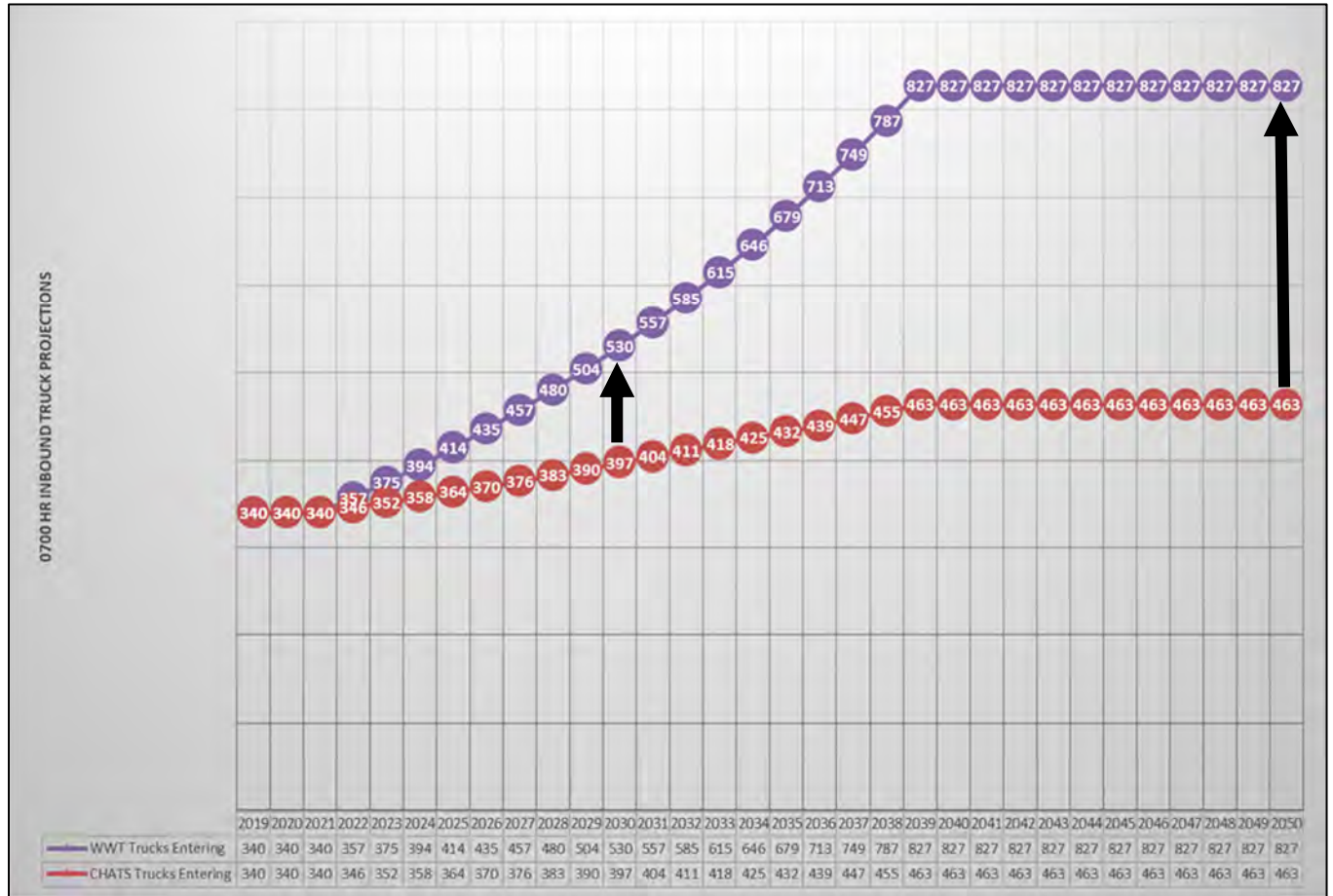
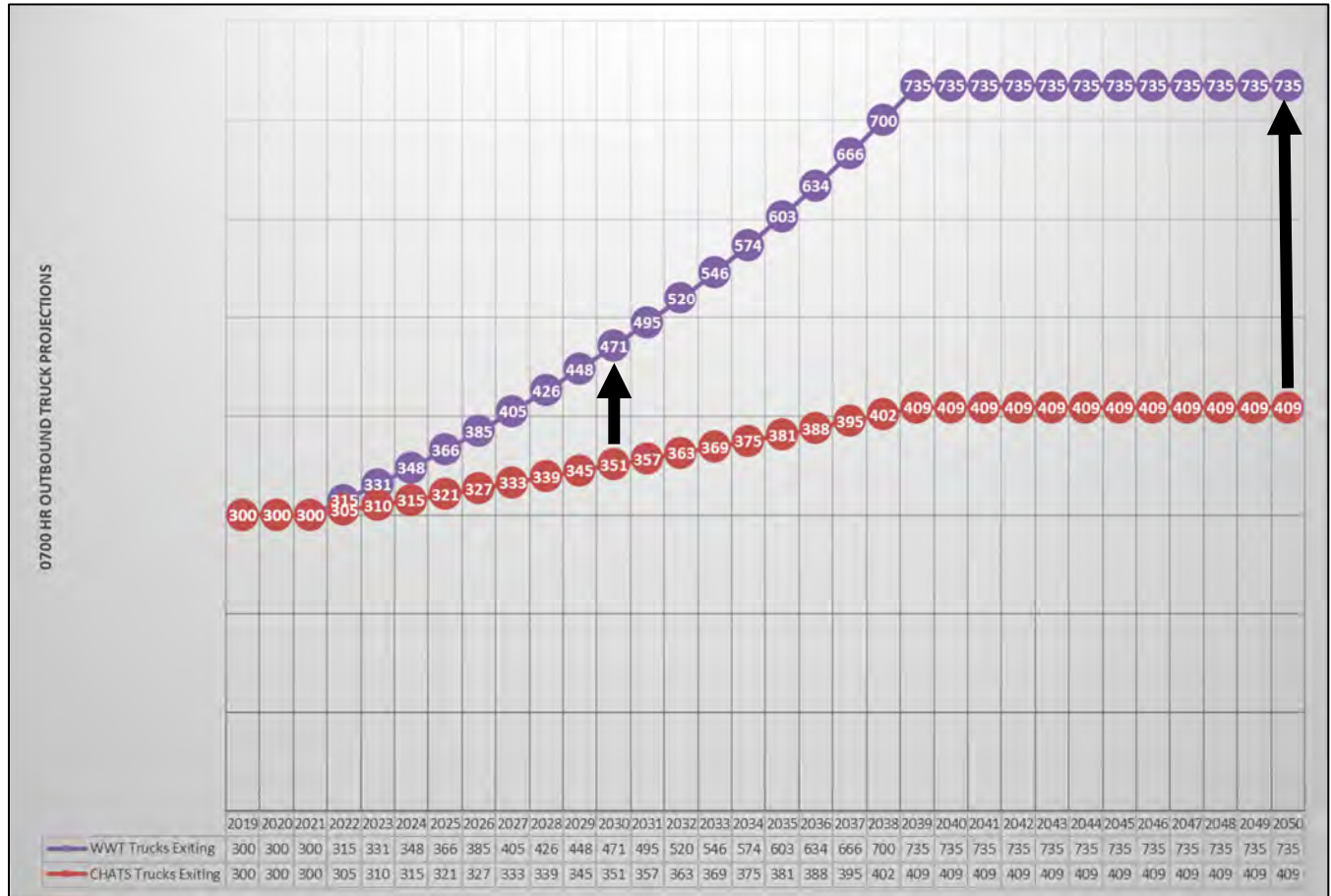


Figure 13 depicts the projected WWT 7:00-8:00 AM outbound truck movements through 2050. Using a 1.6% compounded rate, the number of additional WWT-oriented outbound trucks should be 51 (351-300=51) in 2030 and 109 (409-300=109) in 2050. On the other hand, using the pier container move growth from WWT as the basis of projecting new truck traffic to and from the port, 171 (471-300=171) new exiting trucks are projected in 2030 and 435 (735-300=435) in 2050.

The difference between the CHATS TDM growth rate and the WWT projections for 7:00-8:00 AM entering and exiting demand of tractor trailers results in 130 entering and 360 exiting in Year 2030 to increase to 120 entering and 330 exiting in 2050.

Figure 13: Annual 7:00-8:00 AM Container Move Projections - Exiting



As discussed in Section 1.10.2, truck volumes in the peak hour are much lower than truck volumes processed throughout the day because the current operating hours end at 5 PM. Currently, WWT has no plans to extend hours of operation. If extended hours were in place, demand between 5:00-6:00 PM could increase over the values determined at this time. However, AM peak hour truck activities will have more impact overall to the design alternative evaluation.

Figure 14 illustrates a graph of 5:00-6:00 PM inbound truck growth through 2050 using a 1.6% annual compounded growth rate versus a growth rate based on pier container move projected growth. The starting point of the graph is the existing number of 25 inbound trucks coming to WWT. Using a 1.6% compounded rate, the number of additional WWT-oriented trucks should be 9 (34-25=9) in 2030 and 18 (43-25=18) in 2050. On the other hand, using the pier container move growth from WWT as the basis of projecting new truck traffic to and from the port, 19 (44-25=19) new entering trucks are projected in 2030 and 49 (74-25=49) in 2050.

Figure 14: Annual 5:00-6:00 PM Container Move Projections - Entering

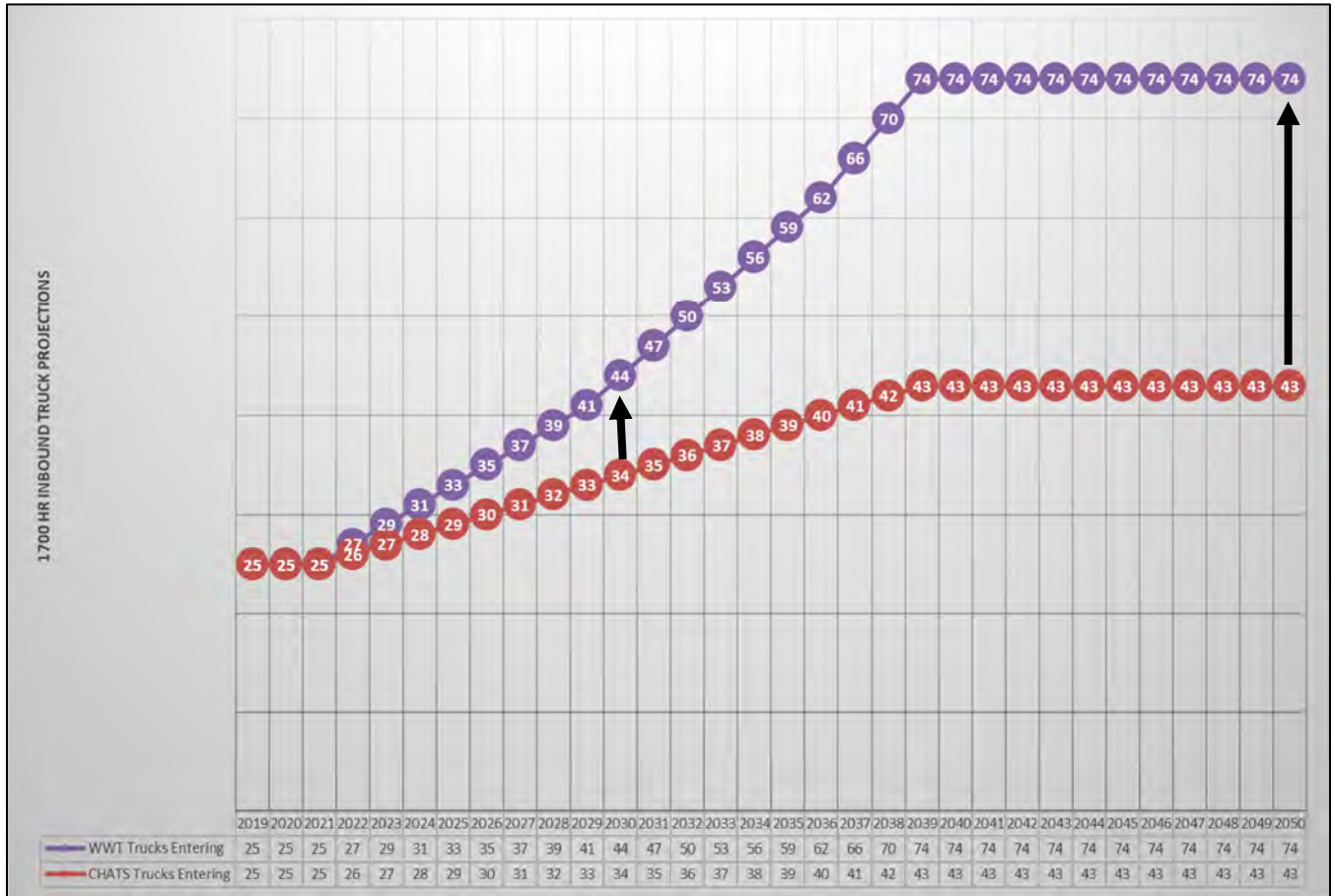
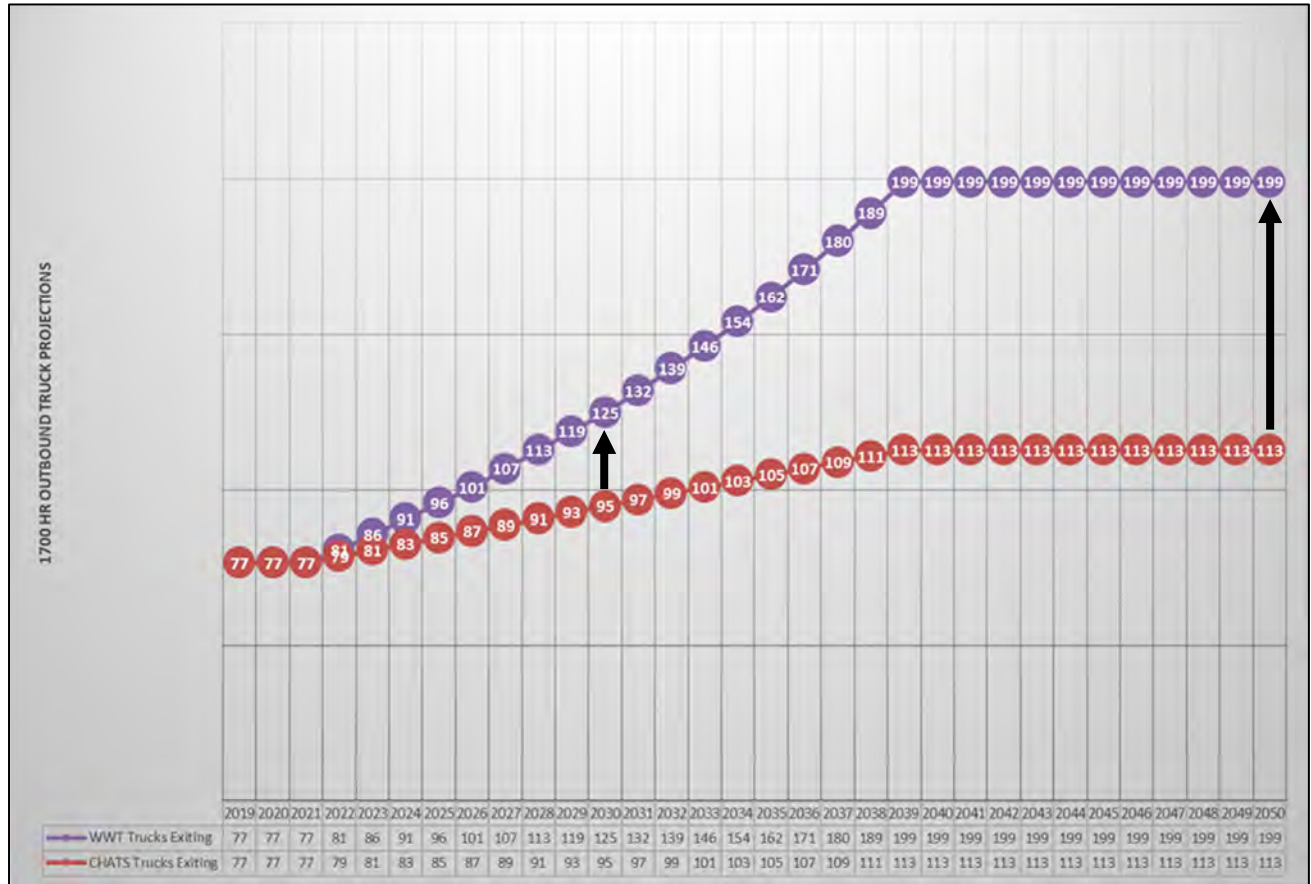


Figure 15 depicts the projected WWT 5:00-6:00 PM outbound truck movements through 2050. Using a 1.6% compounded rate, the number of additional WWT-oriented outbound trucks should be 18 (95-77=18) in 2030 and 36 (113-77=36) in 2050. On the other hand, using the pier container move growth from WWT as the basis of projecting new truck traffic to and from the port, 48 (125-77=48) new exiting trucks are projected in 2030 and 122 (199-77=122) in 2050.

The difference between the CHATS TDM growth rate and the WWT projections for 5:00-6:00 PM entering and exiting demand of tractor trailers results in 10 entering and 30 exiting in Year 2030 to increase to 30 entering and 90 exiting in 2050.

Figure 15: Annual 5:00-6:00 PM Container Move Projections - Exiting



The truck projection delta between the CHATS TDM generated growth rate of 1.6% and the WWT generated growth rate of 5% is as shown in **Table 9**. It is proposed that these additional trucks be added to the 2030 and 2050 DHVs, which were calculated from the CHATS TDM generated growth rates.

Table 9: Surcharge of Truck Activities for Future Years

| Net Difference in Truck Volume between 1.6% & 5.0% Compounded Growth | | |
|--|------|------|
| | 2030 | 2050 |
| 7-8AM | | |
| Inbound | 130 | 360 |
| Outbound | 120 | 320 |
| 5-6PM | | |
| Inbound | 10 | 30 |
| Outbound | 30 | 90 |

1.11 LONG POINT ROAD INTERCHANGE TRUCK TRAFFIC

Table 10 shows 2017 and 2022 vehicle classification data for all six Long Point Road interchange ramps. The ramps with the largest number of AM peak hour trucks are the eastbound off slip ramp from I-526 to southbound Long Point Road (towards WWT- 282 total trucks) and the westbound on loop ramp from northbound Long Point Road (from WWT- 253 total trucks) to westbound I-526. Truck traffic in the PM peak hour is modest except for the westbound on loop ramp from northbound Long Point Road (from WWT) to westbound I-526 where 121 and 120 tractor trailer trucks were recorded in 2017 and 2022, respectively. The majority of trucks will be tractor trailer trucks, as compared to single unit trucks, because of the nearby WWT.

Table 10: Truck Percentage at Long Point Road Interchange (2017 vs. 2022)

| Vehicle Classification | 2017 | | | | 2022 RAW COUNTS | | | | |
|-----------------------------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|--|
| | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent | |
| Cars (1-3) | 998 | 78.0 | 1483 | 97.6 | 702 | 72.7 | 1087 | 94.3 | |
| Single & Multiple Trailers (8-12) | 217 | 17.0 | 30 | 2.0 | 229 | 23.7 | 14 | 1.2 | |
| SU Trucks (4-7) | 65 | 5.1 | 7 | 0.5 | 34 | 3.5 | 52 | 4.5 | |
| TOTAL | 1280 | 100 | 1520 | 100 | 965 | 100 | 1153 | 100 | |

| Vehicle Classification | 2017 | | | | 2022 RAW COUNTS | | | | |
|-----------------------------------|-----------------|------------|-----------------|-----------------|-----------------|------------|-----------------|------------|--|
| | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent | |
| Cars (1-3) | 459 | 96.6 | 414 | 27.2 | 406 | 99.0 | 442 | 99.8 | |
| Single & Multiple Trailers (8-12) | 4 | 0.8 | 1 | 0.1 | 0 | 0.0 | 0 | 0.0 | |
| SU Trucks (4-7) | 12 | 2.5 | 8 | 0.5 | 4 | 1.0 | 1 | 0.2 | |
| TOTAL | 475 | 100 | 423 | 27.82895 | 410 | 100 | 443 | 100 | |

| Vehicle Classification | 2017 | | | | 2022 RAW COUNTS | | | | |
|-----------------------------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|--|
| | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent | |
| Cars (1-3) | 1341 | 96.8 | 755 | 94.4 | 890 | 95.3 | 637 | 95.9 | |
| Single & Multiple Trailers (8-12) | 6 | 0.4 | 11 | 1.4 | 15 | 1.6 | 8 | 1.2 | |
| SU Trucks (4-7) | 38 | 2.7 | 34 | 4.3 | 29 | 3.1 | 19 | 2.9 | |
| TOTAL | 1385 | 100 | 800 | 100 | 934 | 100 | 664 | 100 | |

| Vehicle Classification | 2017 | | | | 2022 RAW COUNTS | | | | |
|-----------------------------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|--|
| | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent | |
| Cars (1-3) | 242 | 48.9 | 330 | 68.0 | 130 | 36.3 | 219 | 57.8 | |
| Single & Multiple Trailers (8-12) | 233 | 47.1 | 121 | 24.9 | 200 | 55.9 | 120 | 31.7 | |
| SU Trucks (4-7) | 20 | 4.0 | 34 | 7.0 | 28 | 7.8 | 40 | 10.6 | |
| TOTAL | 495 | 100 | 485 | 100 | 358 | 100 | 379 | 100 | |

| Vehicle Classification | 2017 | | | | 2022 RAW COUNTS | | | | |
|-----------------------------------|-----------------|------------|-----------------|------------|-----------------|------------|-----------------|------------|--|
| | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent | |
| Cars (1-3) | 217 | 77.8 | 444 | 84.1 | 202 | 77.7 | 416 | 84.4 | |
| Single & Multiple Trailers (8-12) | 18 | 6.5 | 18 | 3.4 | 21 | 8.1 | 13 | 2.6 | |
| SU Trucks (4-7) | 44 | 15.8 | 66 | 12.5 | 37 | 14.2 | 64 | 13.0 | |
| TOTAL | 279 | 100 | 528 | 100 | 260 | 100 | 493 | 100 | |

| Vehicle Classification | 2017 | | | | 2022 RAW COUNTS | | | | |
|-----------------------------------|-----------------|------------|-----------------|------------|-----------------|-----------------|-----------------|------------|--|
| | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | AM Peak: 7-8 AM | | PM Peak: 5-6 PM | | |
| | Number | Percent | Number | Percent | Number | Percent | Number | Percent | |
| Cars (1-3) | 643 | 88.6 | 839 | 97.1 | 589 | 164.5 | 881 | 97.6 | |
| Single & Multiple Trailers (8-12) | 35 | 4.8 | 5 | 0.6 | 17 | 4.7 | 1 | 0.1 | |
| SU Trucks (4-7) | 48 | 6.6 | 20 | 2.3 | 17 | 4.7 | 21 | 2.3 | |
| TOTAL | 726 | 100 | 864 | 100 | 623 | 174.0223 | 903 | 100 | |

The AM peak hour truck data in **Table 10** are illustrated in **Figure 16** and **Figure 17**. Note how similar the number of trucks is between 2017 and 2022. The most notable truck volume is 200 or more tractor trailer trucks on the 25-mph design speed loop ramp from northbound Long Point Road to westbound I-526. That is an average of over one truck every 20 seconds and reflects over 40% trucks.

Figure 16: 2017 AM Truck Volumes at Long Point Road Interchange

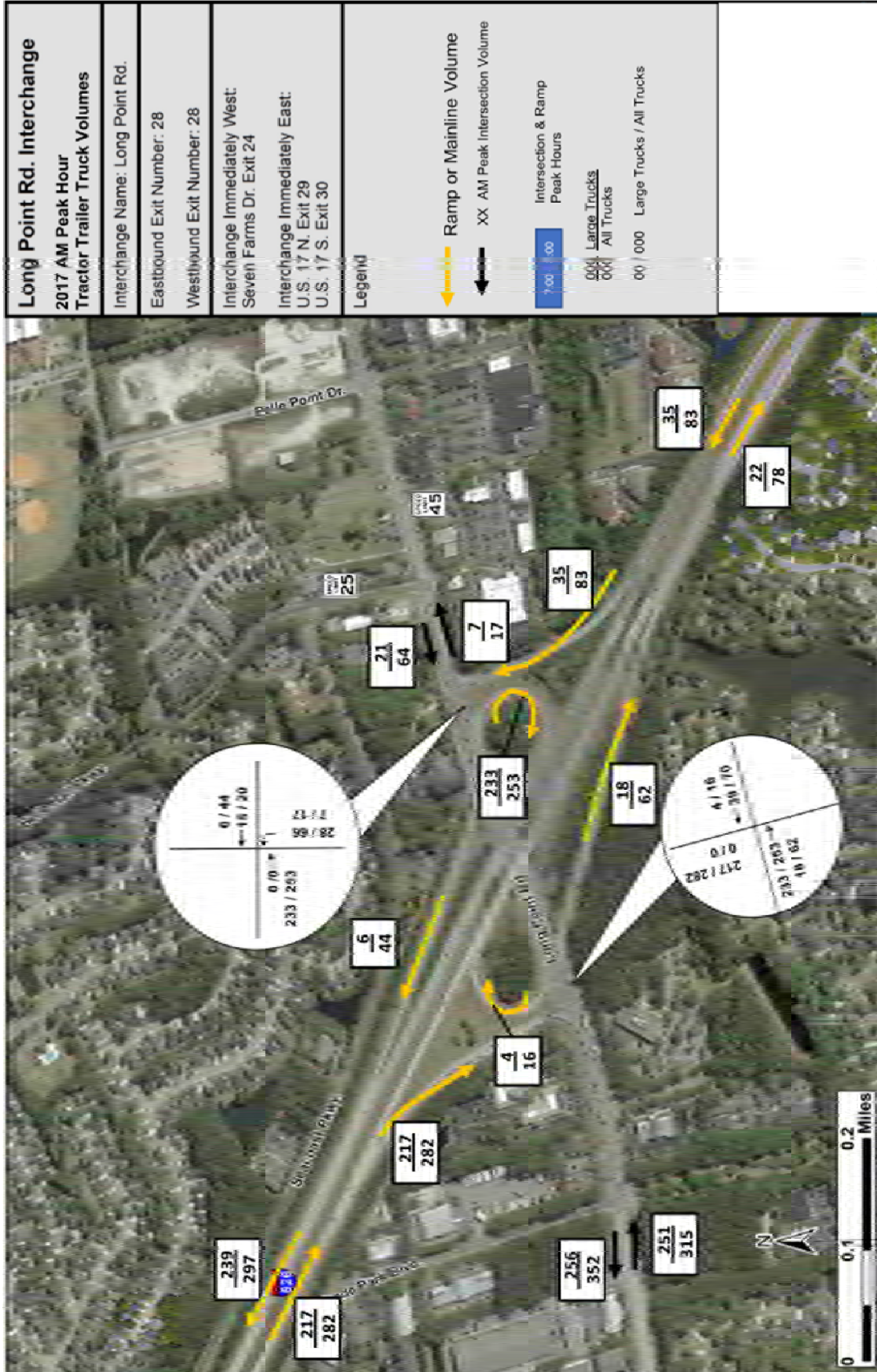


Figure 17: 2022 AM Truck Volumes at Long Point Road Interchange

