

Technical Memorandum

March 8, 2017

To: FDOT/District 7, Freight Coordinator (Brian Hunter)

Re: Public Rest Area Truck Parking

Tasking

FDOT is conducting a study of truck parking within the public rest areas located along Interstate 75 within District 7 in order to determine if and when overcapacity truck parking has occurred. In order to accomplish the task, the District needed to know the number of trucks entering and exiting the rest areas, which was then compared to the available parking. AECOM was tasked with collecting the raw count data to provide to Renaissance Planning Group (RPG) for further analysis.

The following three collection methods were discussed between FDOT and RPG to determine the pros and cons of each method:

- Bluetooth counts
- Video counts
- Tube counts

Bluetooth Collection

While Bluetooth technology provides extensive data, there are limitations, such as data collection only works for vehicles with Bluetooth emitters that are turned on when driving into or by the rest area, and also the range of sensitivity is such that data gets collected from every vehicle within range of the rest area and the mainline. Additionally, Bluetooth counters located at both ends of the rest area may show higher counts for both truck and vehicle counts, given the closeness of the entrance and exit and for the same reason as stated above. Finally, the cost was higher than tube and video collection, as the data would have to be sent to the equipment provider for further analysis. Therefore, Bluetooth technology was not recommended for use in this study.

Video Collection

Video collection also provides extensive and accurate count data. The number of trucks are determined by placing cameras at the entrance and exit ramps and if additional cameras are placed facing out towards the interstate, it could be determined if trucks were parking along the ramps. The cameras monitoring the parking areas offer a visual check of the actual occupancy of the areas, but this requires multiple cameras in order to video both the trucks parking in the correct locations, and the trucks parking on the ramps and/or in the designated car areas. Although the equipment is owned, review and interpretation of the data must be done by the software provider, which adds an extra cost per rest area. Based on this added cost and the fact that the equipment provider would have to do the analysis at an additional cost, video technology was not recommended.

Tube Collection

Tube collection was the most economical of the collection methods because the consultant already has the equipment on hand and their own staff can review the data. Issues with tube counts being accurate can result from cut tubes or tubes being pulled up from the road surface due to trucks crossing at a slow speed or at an improper angle. Due to the cost savings and ease of application this collection method was recommended for the truck parking study.

Count Locations and Data Collection

AECOM conducted traffic counts at several public rest areas (**Table 1**) along I-75 and I-4 in order to assess the number of trucks using these facilities throughout the day. In particular, if and when capacities at these rest areas were exceeded and by approximately how much. In addition to the four rest areas located within District 7, AECOM was tasked with collecting data from nearby rest areas in Polk and Sumter Counties, as well as, at the Weigh-In-Motion (WIM) stations along I-4 in Hillsborough County. The purpose for the additional counts was to account for all the truck parking in the immediate vicinity of major truck destinations within the Tampa Bay area. The raw data collected was provided to FDOT for consideration and RPG for analysis.

The data (**Table 2**) includes a total of 108,429 one-minute count intervals for both inbound and outbound ramps over a three- to four-day period for eight rest areas and two WIM locations. **Attachment 1** lists vehicle category classifications. AECOM also provided FDOT and RPG 7,228 fifteen-minute interval counts, which are not discussed in this document. Recounts were conducted at two sites due to cut tubes. Aerial views of each of the rest areas are shown in **Attachment 2**.

**TABLE 1
REST AREA LOCATIONS AND DATES OF COUNTS**

Facility	County	Direction	Location	Dates
I-75	Hillsborough	SB	South of SR 674	11/14 – 11/17/2016
I-75	Hillsborough	NB	South of SR 674	11/28 – 12/2/2016
I-75	Pasco	SB	North of SR 56	11/14 – 11/17/2016
I-75	Pasco	NB	North of SR 56	11/28 – 12/2/2016
I-75	Sumter	SB	North of SR 50*	11/28 – 12/2/2016
I-75	Sumter	NB	North of SR 50	11/28 – 12/2/2016
I-4	Hillsborough	WB	WB WIM facility East of CR 579*	11/28 – 12/2/2016
I-4	Hillsborough	EB	WB WIM facility East of CR 579	11/28 – 12/2/2016
I-4	Polk	WB	West of CR 557 (Old Grade Rd)	11/14 – 11/17/2016
I-4	Polk	WB	West of CR 557 (Old Grade Rd)	11/28 – 12/2/2016

*Recount due to broken hose during the date interval of 11/14 – 11/17/2016

**TABLE 2
REST AREA COUNTS**

Location	1-Minute Counts	Rest Area Totals
Hillsborough NB IN	4,159	19,740
Hillsborough NB Out	4,151	
Hillsborough SB IN	5,723	
Hillsborough SB Out	5,707	
Pasco NB In	5,678	20,386
Pasco NB Out	5,626	
Pasco SB In	4,547	
Pasco SB Out	4,535	
Polk EB In	5,704	19,648
Polk EB Out	5,697	
Polk WB In	4,127	
Polk WB Out	4,120	
Sumter NB In	5,590	21,893
Sumter NB Out	5,577	
Sumter SB In	5,570	
Sumter SB Out	5,156	
WIM EB In	4,494	13,397
WIM EB Out Parking	4,423	
WIM EB Out Scales	4,480	
WIM WB In	4,421	13,365
WIM WB Out Parking	4,461	
WIM WB Out Scales	4,483	
Total		108,429

Anecdotal Data

In addition to the counts provided, FDOT requested that we complete a visual assessment of the parking within the rest areas, as well as, on the exit ramps along the corridors. This was accomplished during the evening hours between approximately 9:00 p.m. and 12:00 a.m. Additional visits by AECOM were conducted at four District 7 rest areas during the early morning hours between approximately 5:30 a.m. and 6:30 a.m. to assess overcapacity parking.

Methodology

- The counts were conducted over a three- to four-day period in order to determine any patterns of use and periods of overcapacity parking.
- A pre-count was conducted prior to affixing the inbound counters in order to establish a base line of vehicles parked in the facility.

- Two traffic count hoses were affixed three feet apart at the entrances and exits of the facilities in order to determine a classification/type of vehicle count.
- All the southbound and westbound facilities were counted during the first date interval and the northbound and eastbound facilities were counted during the second date interval (as shown in **Table 1**). Recounts of the southbound Sumter and the westbound WIM facilities were also conducted during the second date interval due to broken tubes which negated the initial counts.
- The raw one-minute interval count data grouped in vehicle categories 1-13 was provided to FDOT and RPG for evaluation. AECOM also processed the raw data into fifteen-minute groupings that were provided to FDOT and RPG but are not discussed in this document.
- Additionally, AECOM conducted a second evaluation of the fifteen-minute raw data counts after issues with the counts were identified by RPG.

AECOM Assessment of Data

In addition to FDOT’s and RPG’s evaluation of data counts, AECOM independently evaluated the four rest areas located within FDOT District 7 (Hillsborough and Pasco County locations except for the WIM facilities). For each rest area, AECOM evaluated vehicle categories 4-6 (large trucks plus) and categories 7-13 (large trucks only). The net inbound vs. outbound for each fifteen-minute period for the vehicles of interest was calculated first in an effort to establish a pattern of over counts. Next a running total of the vehicle utilization was calculated (pre-count plus the inbounds, minus the outbounds). Finally, a running fifteen-minute count assessment of the available parking slots vs. the overcapacity parking was calculated and the results were plotted. The main observation in the graphs (**Attachments 3-5**) is the pattern of use and the time of day when the lots approached or exceeded capacity. **Table 3** below shows the total available parking slots for large vehicles (commercial trucks and recreational vehicles) for each of the four rest areas that were used to determine if parking exceeded capacity.

**TABLE 3
LARGE VEHICLE PARKING CAPACITY**

Location	Truck-Only Capacity	RV Capacity	Total Large Vehicle Capacity
SB Hillsborough	19	22	41
NB Hillsborough	19	15	34
SB Pasco	52	27	79
NB Pasco	58	26	84

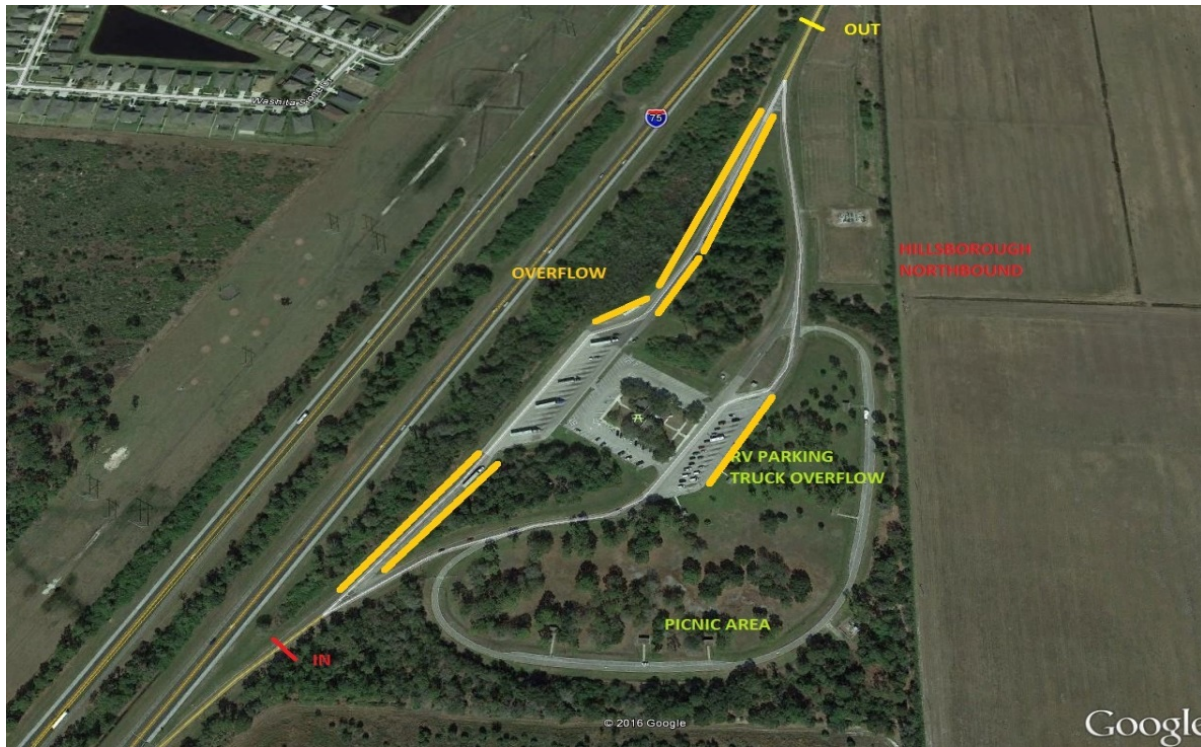
The following paragraphs discuss the results of the four District 7 rest areas AECOM reviewed and visited.

Hillsborough Northbound

The Hillsborough northbound rest area is located approximately 3 miles south of SR 674 (Sun City Center Blvd). There are two graphs located in **Attachment 3**. The first includes both the truck-only plus RV spaces, and the second shows the truck-only spaces.

Both graphs show a clear pattern of limited to overcapacity parking between the hours of approximately 8:00 p.m. and 8:00 a.m. (shown in red). The blue lines show the number of available large vehicle parking slots during the various time periods. Note that the maximum number of available large vehicle spaces in this rest area is 36 even though the graphs might indicate more availability. The excesses are due to counting errors that affected the totals. Except for a lengthy period of time from mid Tuesday morning to later that evening, the truck parking was at or above capacity for the 19 available spaces. As a result, some trucks were probably parked in the RV area and others were parked on the inbound and outbound shoulders as shown on **Figure 1**.

FIGURE 1
NORTHBOUND HILLSBOROUGH REST AREA OVERFLOW PARKING



On 12/1/2016 this rest area was visited at approximately 6:00 a.m. in order to validate parking overages and determine where the trucks were illegally parked. At that time 54 trucks were counted within the rest area and on the inbound and outbound shoulders within the truck parking area as shown in **Figure 1** above. The available truck spaces were exceeded by 35 vehicles and the total large vehicle parking was exceeded by 18 vehicles.

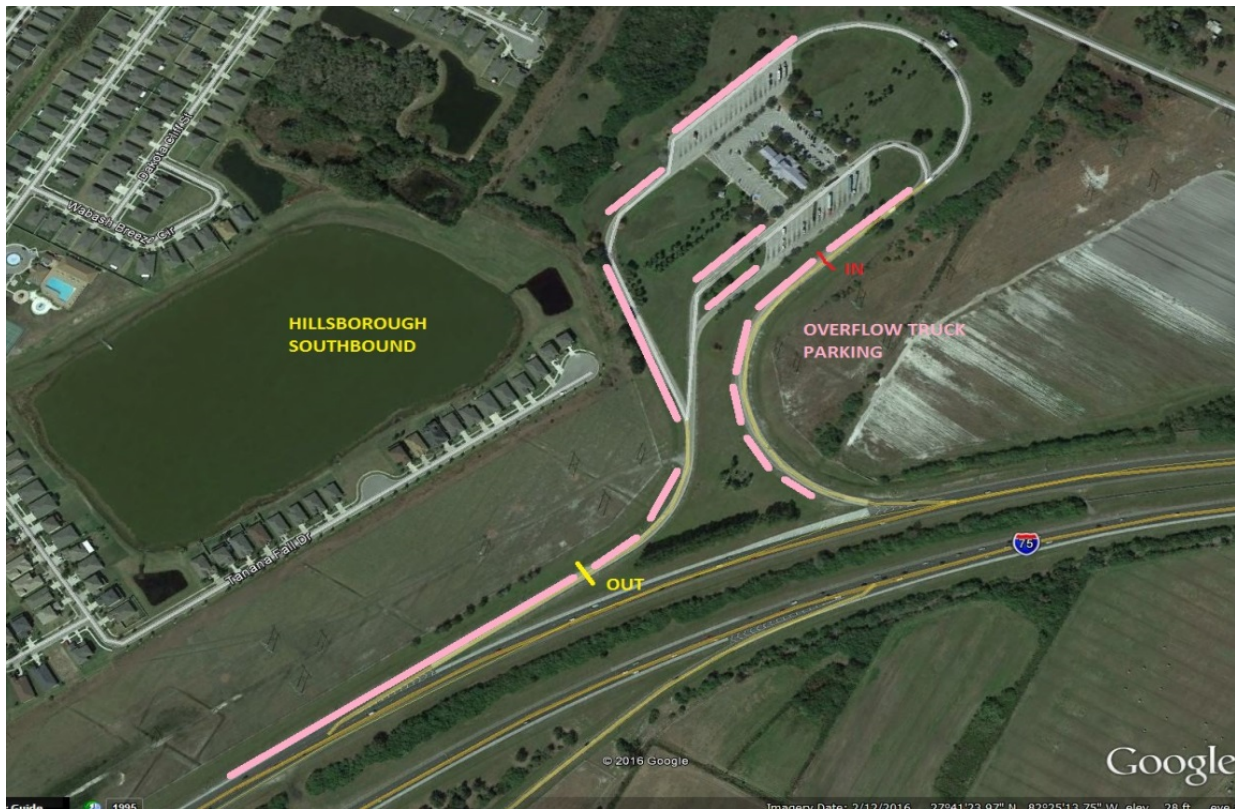
Hillsborough Southbound

The Hillsborough Southbound rest area is located approximately 2.5 miles south of SR 674. The two graphs associated with this rest area are shown in **Attachment 4**. Both the large vehicle parking and the truck-only parking graphs show a similar pattern to the Hillsborough Northbound rest area with overcapacity parking during the late evening to early morning hours and a large amount of spaces available during the daytime hours. However, the truck-only graph shows a much different story than

the Northbound rest area, with trucks exceeding the available truck spaces throughout the entire day especially during the heavy use hours. The worst case conditions suggest that trucks exceeded all available parking by as many as 30 trucks.

The field team noted several trucks parked on the inbound shoulder within the rest area at the time of tube deployment (11/14/2016 between 10:50 a.m. - 11:10 a.m.), even though there appeared to be several open spaces in the truck parking area. The assumption is that these trucks arrived in the early morning hours when the lot was full and remained for their required rest period after the usual morning departures. The day the count tubes were retrieved, there were still trucks parked on the shoulder as far south as the merge lane to SB I-75 (11/17/2016 from 8:10 a.m. - 8:30 a.m.). Note that there is a lot more available shoulder parking in the Southbound rest area than in the Northbound area (**Figure 2**).

**FIGURE 2
SOUTHBOUND HILLSBOROUGH REST AREA OVERFLOW PARKING**



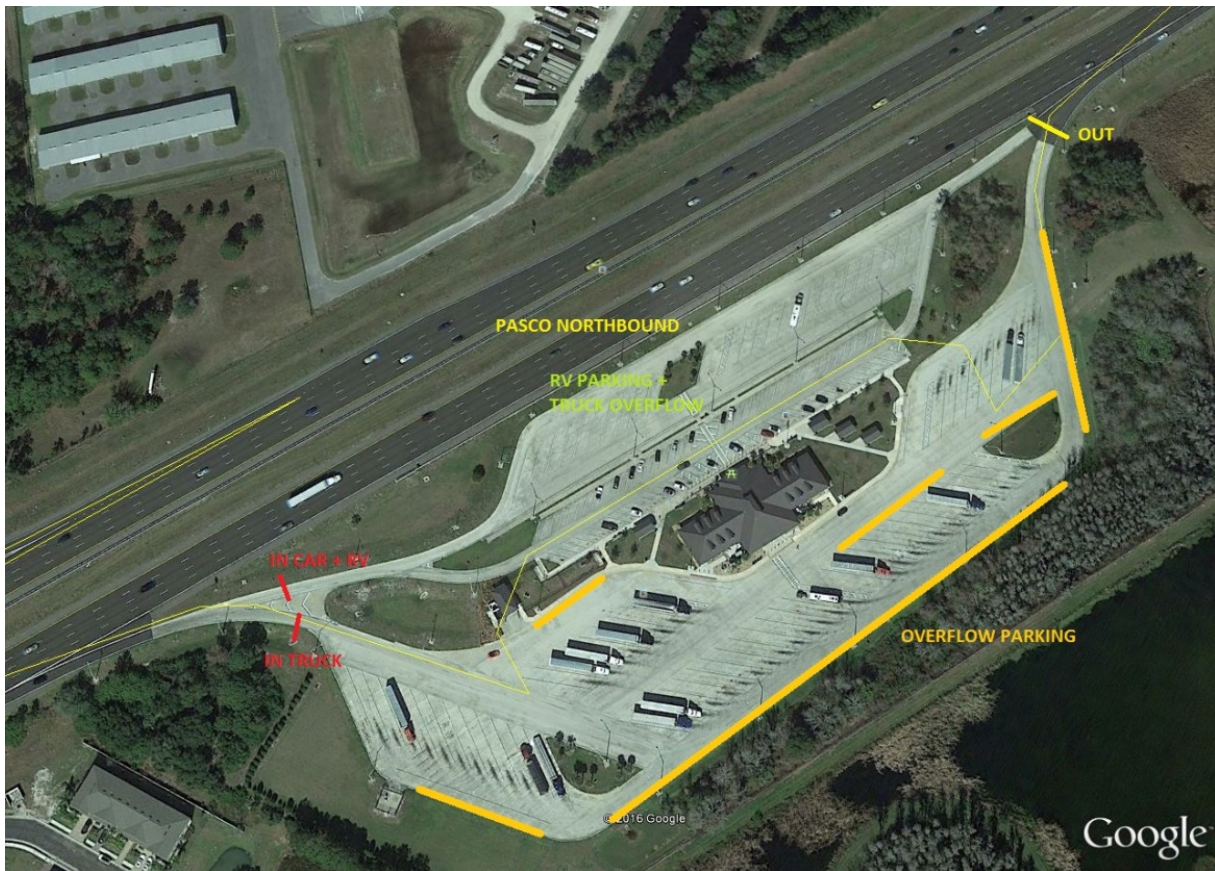
A visit on 12/1/2016 at 5:40 a.m. revealed 71 trucks parked in available spaces along the inbound and outbound ramps, along the back shoulder of the RV parking area, and on the exit ramps to SB I-75. The total trucks exceeded all the available large vehicle parking by 30 vehicles.

Northbound Pasco

The northbound Pasco rest area is located approximately 1.7 miles north of SR 56. This rest area replaced an older area further to the north and includes a significantly larger number of truck parking spaces compared to other local rest areas. There are 57 spaces available for commercial vehicle parking

and an additional 26 spaces for RVs for a total large vehicle capacity of 83 spaces. **Attachment 5** shows that even with this number of parking spaces, capacity is routinely exceeded. However, unlike the Hillsborough rest areas, the overcapacity periods were from the late afternoon to early morning. During the count period, there appears to be a small anomaly from Tuesday evening to Wednesday morning where the lot was crowded but capacity was not exceeded. Static counts taken at the time of counter deployment and pick up both during the late morning were 20 and 37, respectively. **Figure 3** shows where the overflow parking occurs in addition to the RV spaces.

**FIGURE 3
NORTHBOUND I-75 PASCO REST AREA OVERFLOW PARKING**



Additional visits were made on 12/6/2016 at 5:15 a.m. and on 12/28/2016 at 10:30 p.m. During the first visit, the truck lot was not full (38 vehicles). However, a maintenance worker interviewed in the rest area stated that the truck parking is completely full by 2 a.m. daily. The second visit resulted in a truck count of 69 vehicles. Within the truck-only area, four trucks were illegally parked in back of the trucks occupying legal spaces and one truck was parked in the deceleration lane about two-hundred feet from the entrance. The remaining seven trucks were parked in the RV area.

Southbound Pasco

The Southbound Pasco rest area is located approximately 1.3 miles north of SR 56. Like the Northbound rest area, it was constructed to replace an older area to the north and contains a high number of parking spaces for commercial vehicles. The total large vehicle capacity is 79 (52 trucks and 27 RVs). The

pattern for illegally parked vehicles appears to follow a regular pattern from approximately 8:00 p.m. to 8:00 a.m.; however, there was a counting error introduced in the Southbound Pasco rest area where the inbound counts were higher than the outbound, which compounded as the time period progressed. For this reason, graphics of the Southbound truck parking are not presented. Also, the Southbound counts were conducted on a different set of days than the counts at the other Southbound rest areas. This was due to a hose failure during the original counts. The Southbound Pasco rest area shows a similar pattern to that of the Northbound rest area with overflows occurring between early evening and early morning the following day. From mid-morning to mid-afternoon there are plenty of truck spaces available. **Figure 4** shows where most of the overflow parking occurs in addition to the RV spaces.

FIGURE 4
SOUTHBOUND I-75 PASCO REST AREA OVERFLOW PARKING



The rest area was visited on 11/28/2016 at 11:15 p.m. and on 12/6/2016 at 5:35 a.m. to validate the excessive truck parking indicated during the count period. During the first visit, there were 58 trucks parked within the rest area including three parked parallel behind the legally parked trucks, three on the shoulder, and one on the shoulder south of the southbound merge lane to I-75. At the time of the second visit, 70 trucks were parked within the rest area including 12 parked in the RV area, five parked parallel behind the legally parked trucks, one on the shoulder, and one on the main line merge shoulder.

Assessment of Data issues

During their analysis RPG noted several instances where the total number of parked vehicles went below zero. This means the total number of outbound vehicles exceeded the total number of inbound vehicles in various categories, especially in categories 4-13, which are truck-related.

Table 4 below shows the count categories and the total net differences of the inbound vs. outbound counts. The shaded data cells indicate a disparity of ± 50 vehicles or more.

TABLE 4
TRUCK NET IN vs. OUT TOTALS

Category	*4	5	6	7	8	9	10	11	12	13	14
SB Hillsborough	-5	8	3	5	-7	-49	11	-3	0	11	24
NB Hillsborough	2	-29	-8	3	-17	-29	1	1	6	0	0
SB Pasco	75	24	-13	2	100	84	-104	-2	2	25	23
NB Pasco	-2	-4	-19	1	13	-5	-2	1	2	0	0
SB Sumter	7	59	14	4	62	45	3	8	8	9	0
NB Sumter	-5	-9	1	6	-15	247	6	-4	-7	-1	-2
WB Polk	21	32	12	-4	37	-84	-19	-4	3	3	25
EB Polk	7	22	2	1	3	-10	0	-1	4	-4	-7

*Cat 4 includes busses because they also use truck parking spaces

The largest discrepancies occurred at the Southbound Pasco County rest area for truck categories 8-10. A possible explanation of this is the location of the inbound traffic count tubes. For a consistent count, the vehicles should cross the tubes as close to perpendicular as possible. For this to occur, the tubes need to be positioned on a long straight stretch of roadway. In the case of this rest area, the inbound ramp was too short and the vehicles were approaching at a speed that made it nearly impossible to cross perpendicularly. The positioning of the outbound tubes was satisfactory and the exit speeds were lower as the vehicles approached them. A similar issue occurred at the Northbound Sumter rest area, which included a reverse curve and high speed (greater than the 25 mph posted speed for the exit) approach which introduced a higher error. Additionally, it is possible that vehicle counts in adjacent categories were interrupted incorrectly and placed in the wrong category. When calculating the IN minus OUT, these errors compounded. This affected the parked capacity of the rest area. Even smaller errors will affect the capacity counts because there is a fixed amount of parking in each area. The compounding of over counts may indicate much more illegal truck parking than actually occurs while undercounts tend to indicate more available parking even when most of the spaces are occupied.

Final Observations

A noteworthy observation is the layout of the rest areas, there is no internal circulation. Vehicles do not have the opportunity to go around if they reach the end of the parking areas and all spaces are filled, or if they passed an open space looking for another space further down the parking area. Trucks in particular have no recourse but to park illegally when they must stop due to time of operation constraints. Therefore, truck drivers reach a decision point upon entrance to the rest area. Do they continue on to the truck-only parking area and take a chance on an open space or choose to use the RV parking area spaces if available? With either option, if there are no available spaces for large vehicles, they must either continue on to the next rest area, or park illegally.

Also note that some rest areas have a shared use truck and RV area with limited spaces. For this study the only area where this was a problem was the Northbound Sumter County rest area. Finally, there is the issue of cars and light trucks parking in the commercial truck parking area because the drivers think it is safer, security-wise, parking between the large trucks rather than in the intended parking area. This takes away a truck parking space that is not reciprocated within the small vehicle parking area.

FDOT should consider, where feasible, providing a “go-around” for trucks that pass through the truck-only parking area to access the additional large vehicle parking spaces in the RV area when available to reduce the illegal parking on ramp areas and on the mainline.


















Another consideration should be adding hard shoulders within the rest areas to provide for legal overcapacity parking. Additionally, in deference to the trucking industry, the truck-only parking areas should be signed as “**Commercial Trucks Only-Strictly Enforced**” and the RV areas should be signed to permit truck overflow.

Finally, FDOT should adopt a method to notify drivers in advance of available parking as they approach a rest area either by variable messaging signs or some other technology. Whichever method is adopted, it should be standardized state-wide for consistency as well as for truck driver familiarity and economies of scale.

Attachment 1

Vehicle Classifications

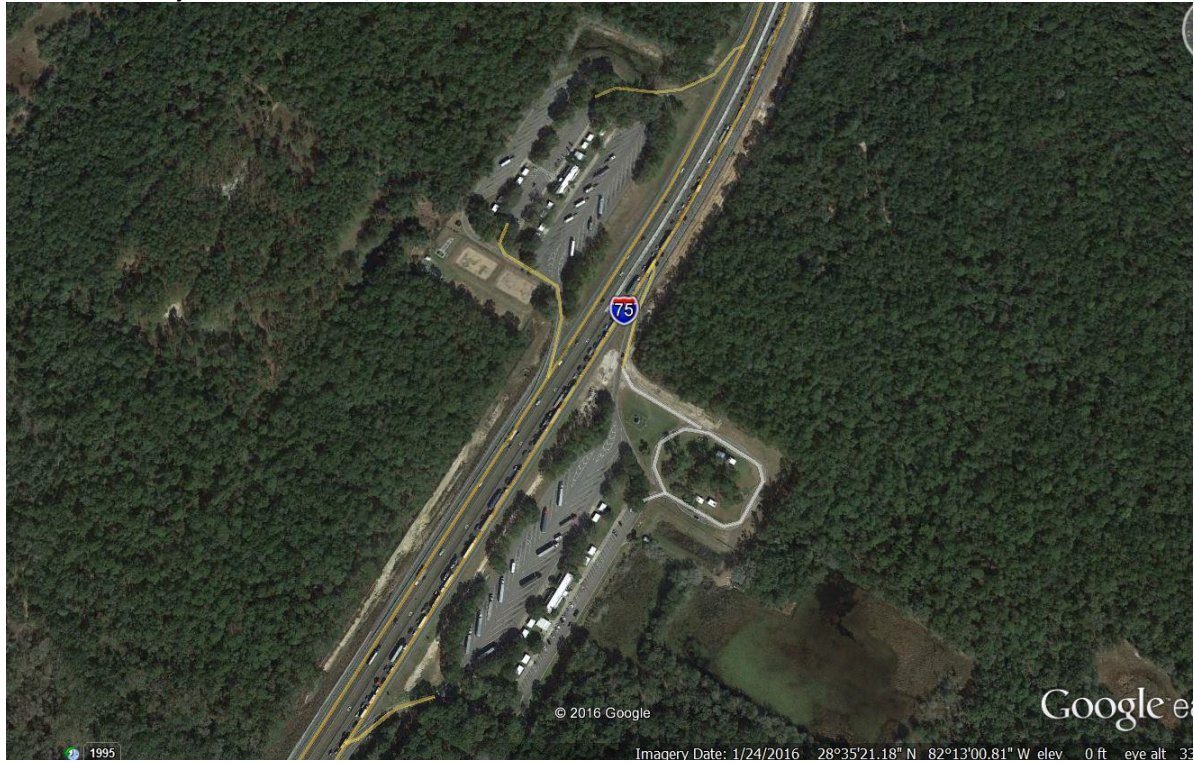
CLASS.
GROUP

CLASS. GROUP	DESCRIPTION	NO. OF AXLES
1		2
2		ALL CARS
		CARS W/ 1-AXLE TRLR
		CARS W/2-AXLE TRLR
3		PICK-UPS & VANS 1 & 2 AXLE TRLRS
4		BUSES
5		2-AXLE, SINGLE UNIT
6		3-AXLE, SINGLE UNIT
7		4-AXLE, SINGLE UNIT
8		2-AXLE TRACTOR, 1-AXLE TRLR(2S1)
		2-AXLE TRACTOR, 2-AXLE TRLR(2S2)
		3-AXLE TRACTOR, 1-AXLE TRLR(3S1)
9		3-AXLE TRACTOR, 2-AXLE TRLR(3S2)
		3-AXLE TRUCK, W/2-AXLE TRLR
10		TRACTOR W/ SINGLE TRLR
11		5-AXLE MULTI- TRLR
12		6-AXLE MULTI- TRLR
13	ANY 7 OR MORE AXLE	7 or more

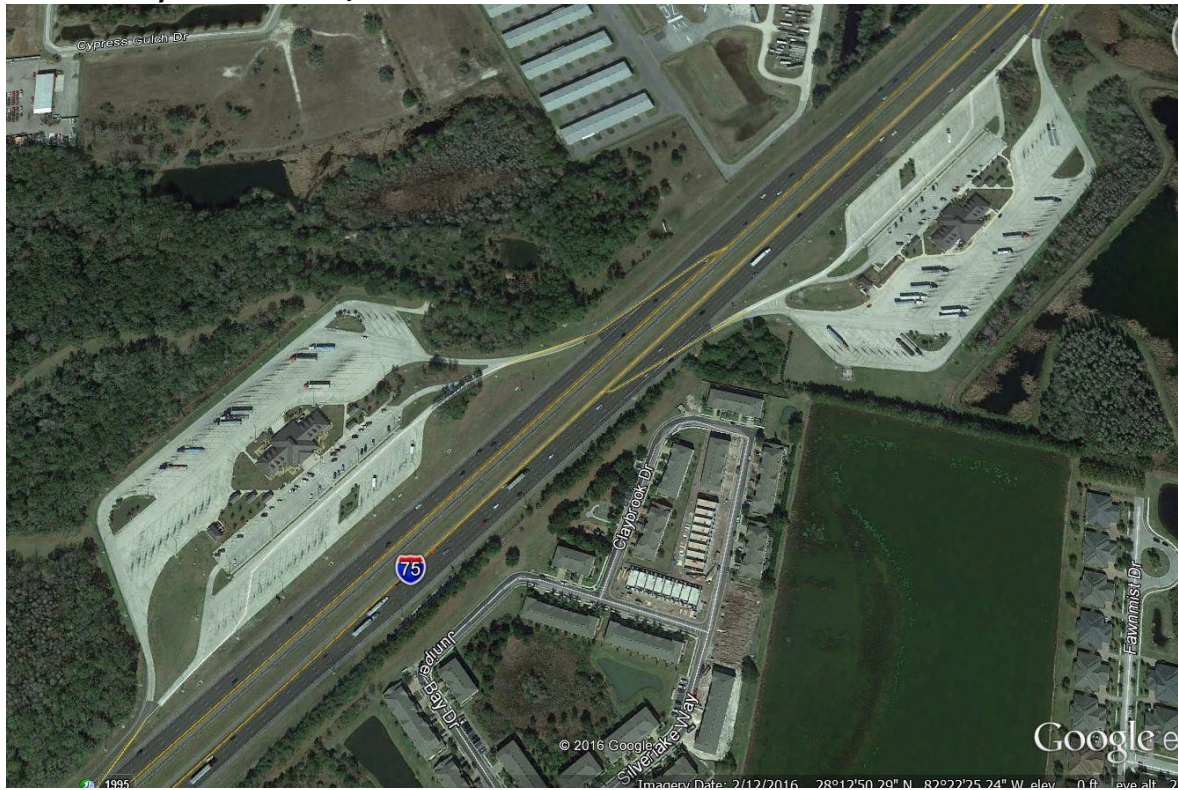
Attachment 2

Rest Area Aerial Imagery

Sumter County Rest Areas NB/SB



Pasco County Rest Areas NB/SB



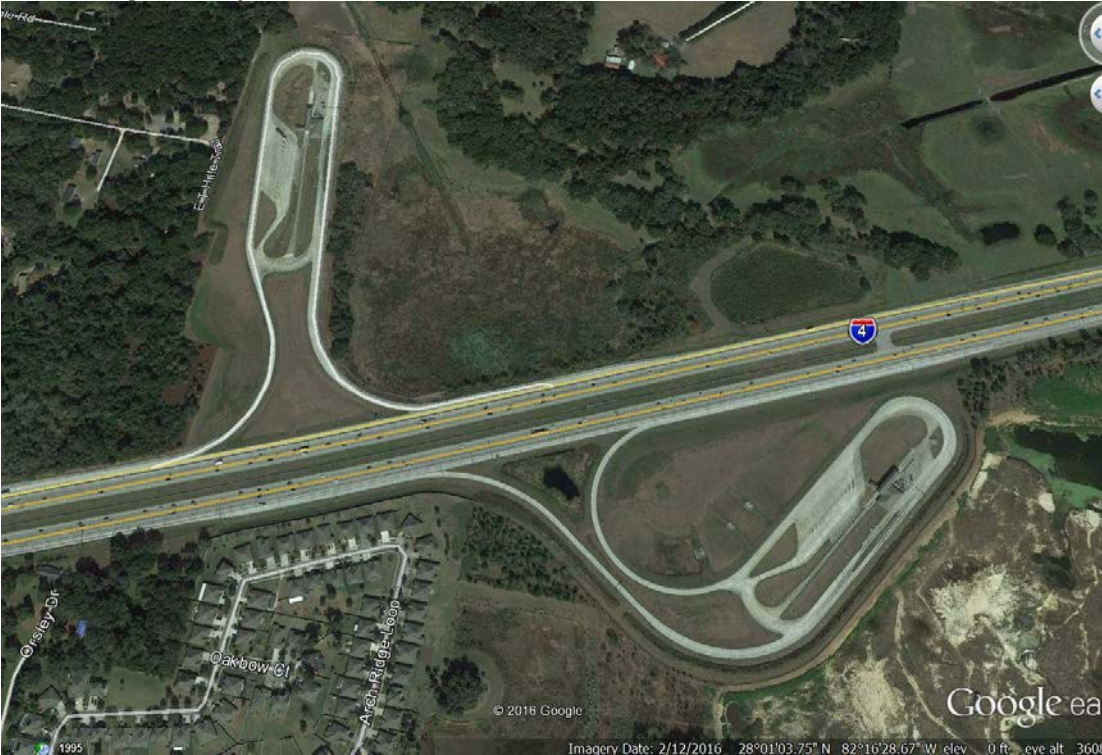
Hillsborough County I-75 Rest Area SB



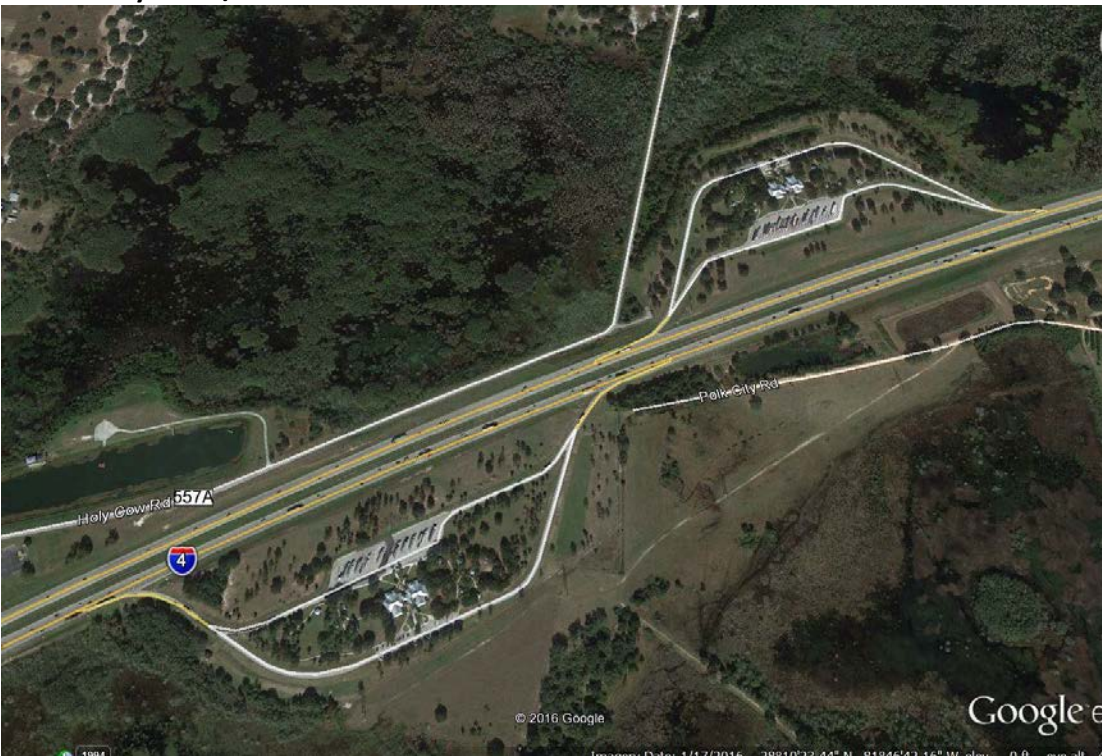
Hillsborough County I-75 Rest Area NB



Hillsborough County I-4 WIM EB and WB



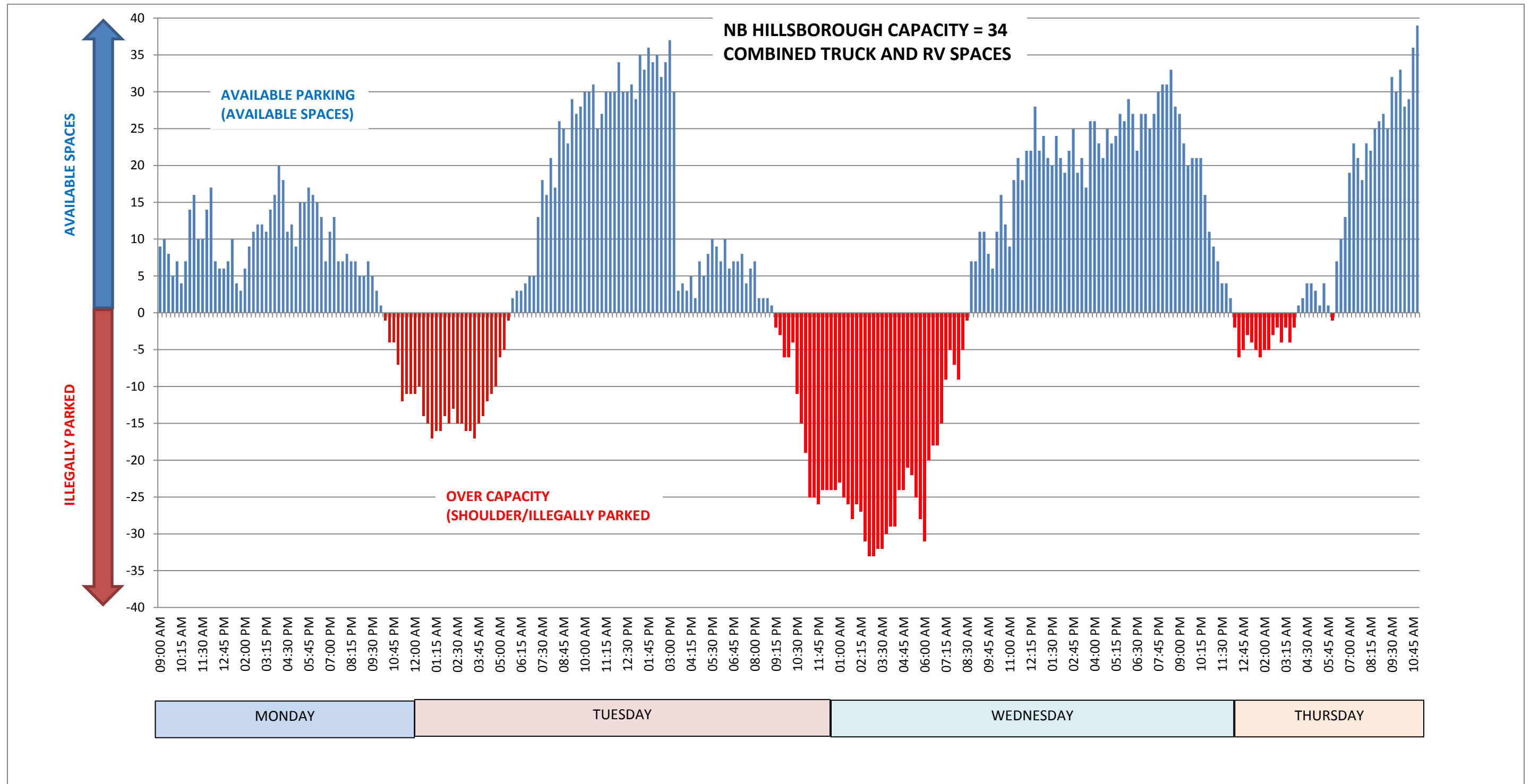
Polk County I-4 EB/WB



Attachment 3
Northbound Hillsborough County

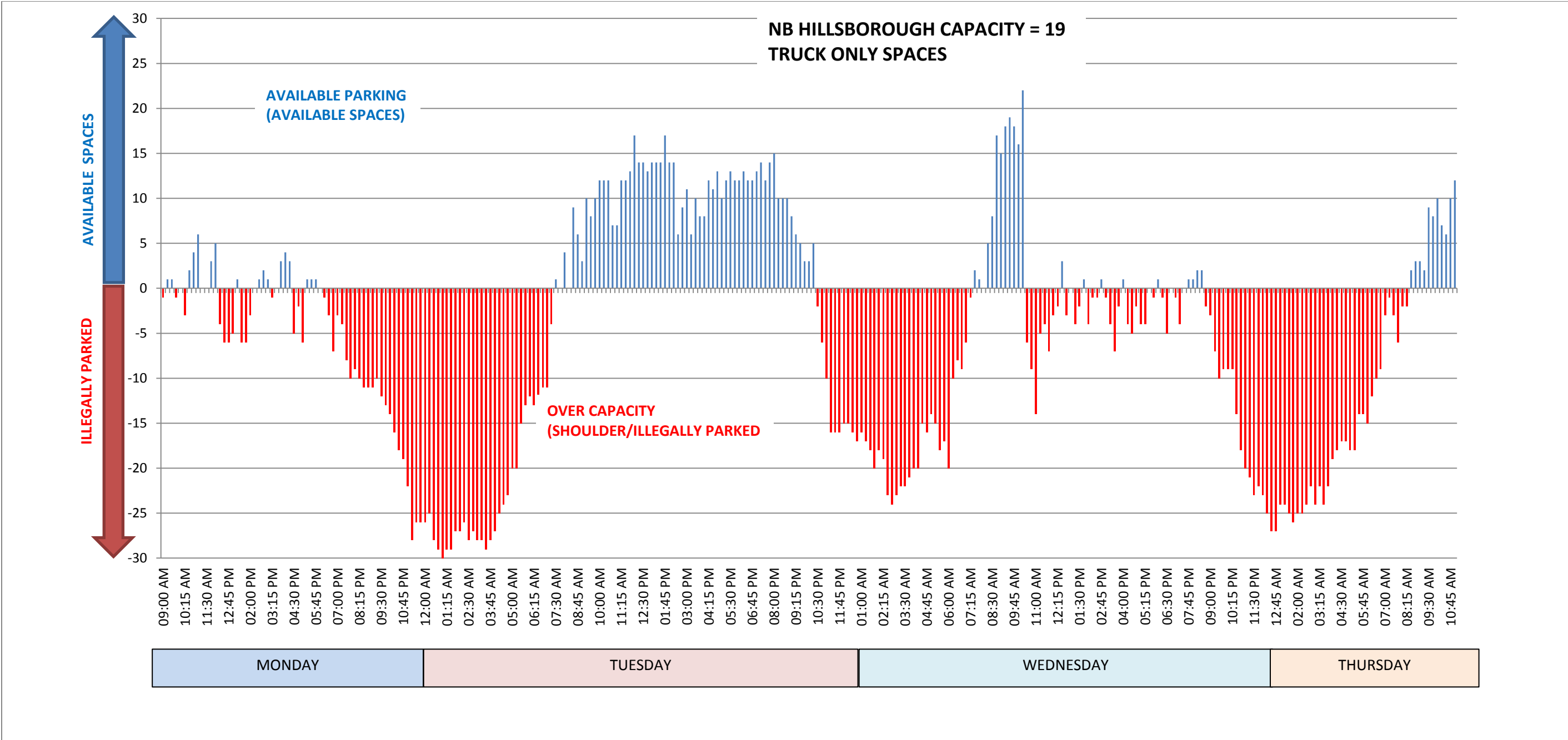
NORTHBOUND HILLSBOROUGH REST STOP

11/28/2016 - 12/1/2016 (9:00 AM - 10:45 AM)



NORTHBOUND HILLSBOROUGH TRUCK ONLY PARKING

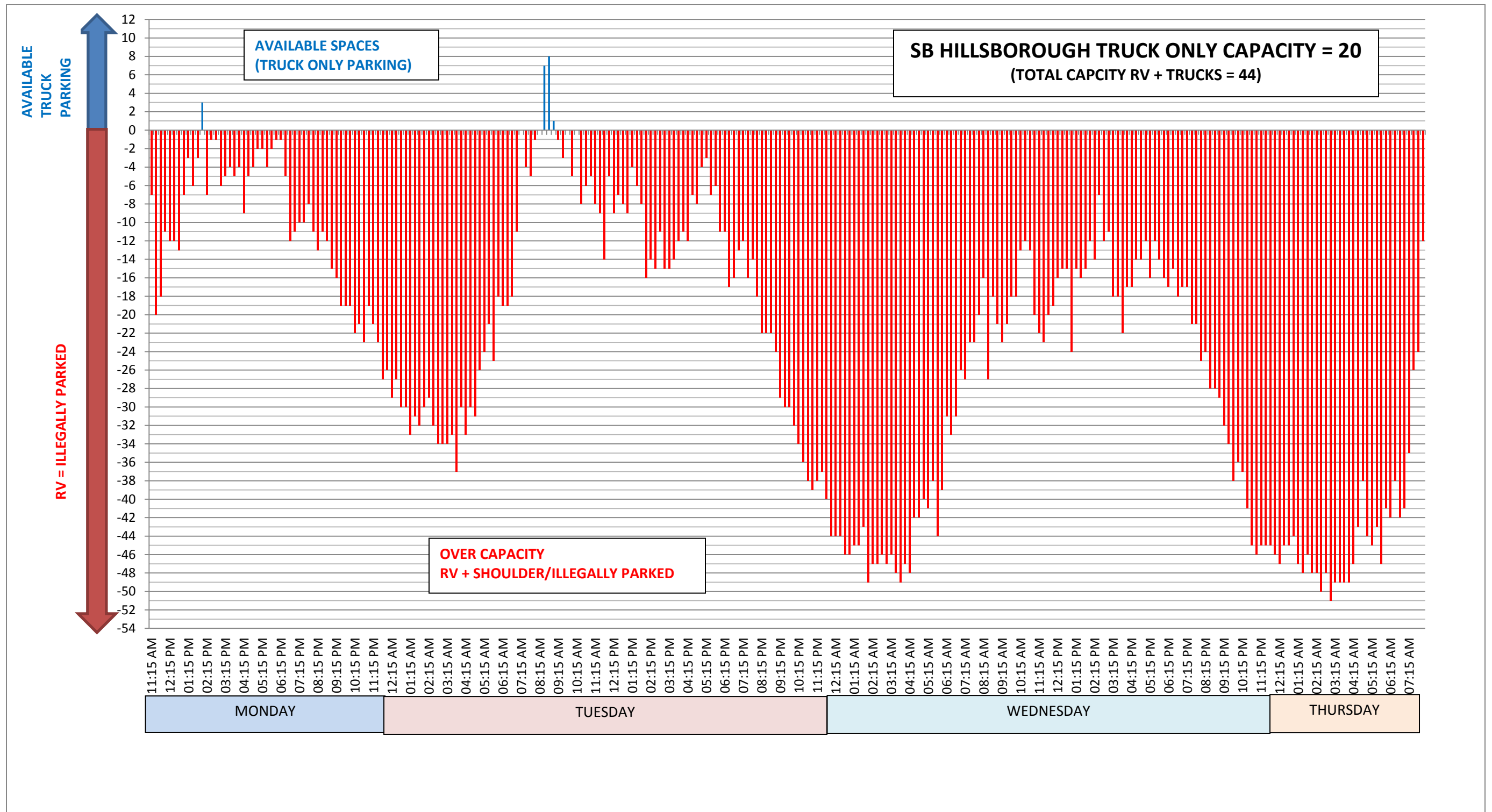
11/28/2016 - 12/1/2016 (9:00 AM - 10:45 AM)



Attachment 4
Southbound Hillsborough County

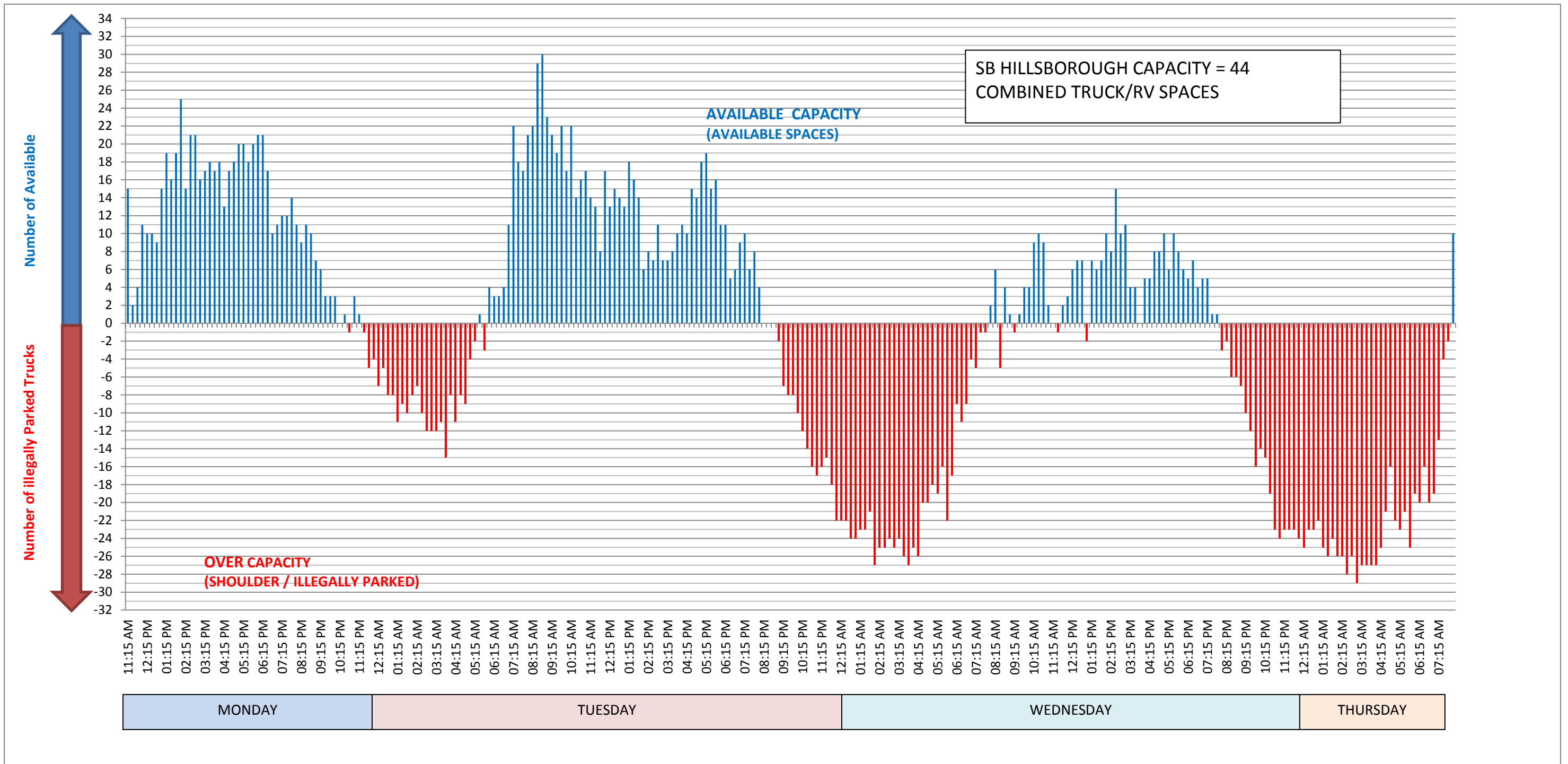
SOUTHBOUND HILLSBOROUGH TRUCK ONLY PARKING

11/14/2016 - 11/17/2016 (11:00 AM- 8:00 AM)



SOUTHBOUND HILLSBOROUGH REST AREA

11/14/2016 - 11/17/2016 (11:00 AM - 8:00 AM)

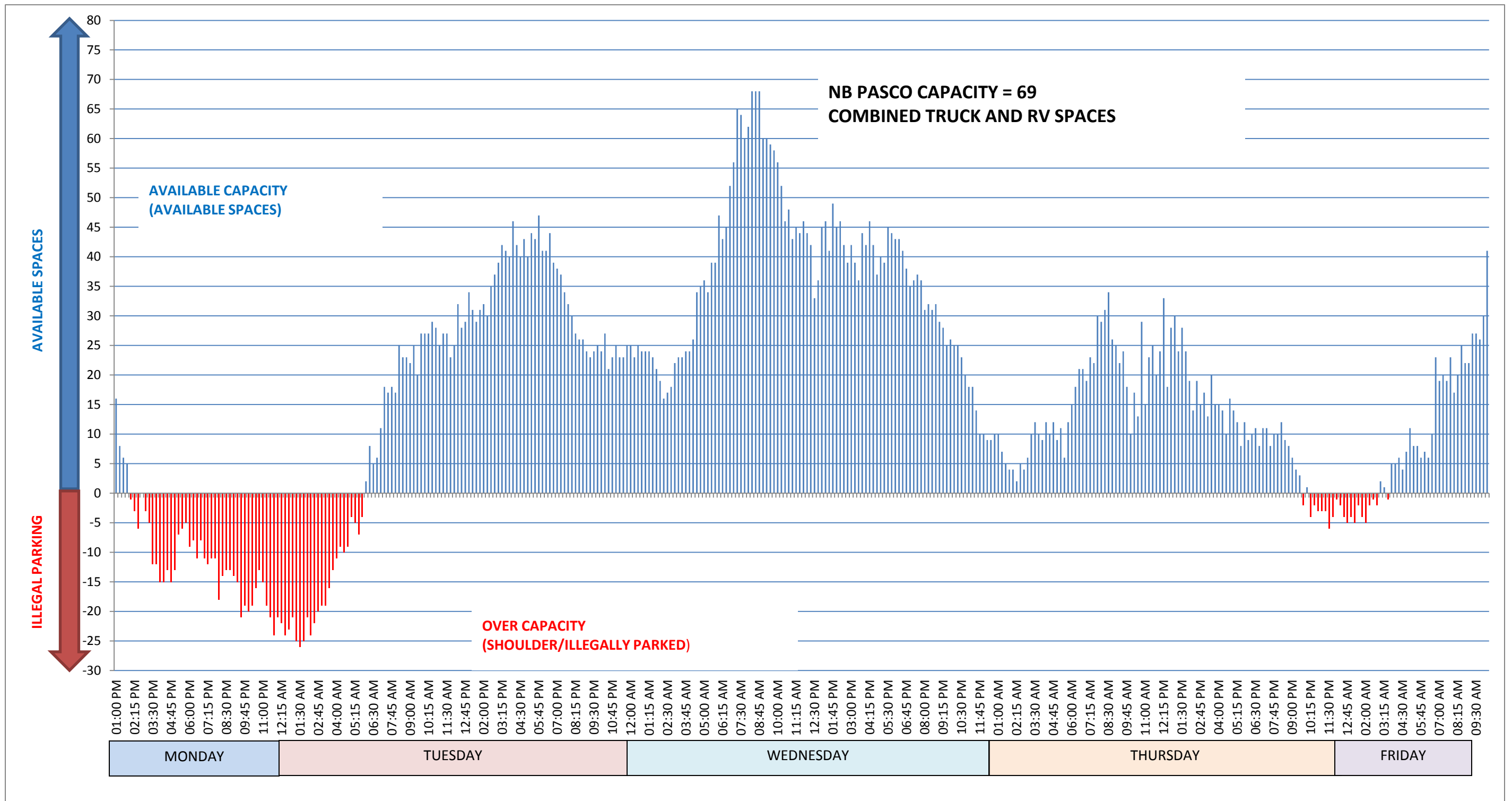


Attachment 5

Northbound Pasco Count

NORTHBOUND PASCO REST AREA

11/28/2016 - 12/2/2016 (1:00 PM - 9:30 AM)



NORTHBOUND PASCO REST AREA TRUCK ONLY SPACES

11/28/2016 - 12/2/2016 (1:00 PM - 9:30 AM)

NB PASCO CAPACITY = 57 TRUCK ONLY SPACES
TOTAL CAPACITY TRUCK + RV = 69 SPACES

