TRAFFIC IMPACT ANALYSIS

Colonial Downs Off-Track Betting at Power Plant Parkway SUP

Power Plant Parkway

Hampton, Virginia

October 9, 2018



Traffic Impact Analysis for Colonial Downs Off-Track Betting at Power Plant Parkway SUP

Hampton, Virginia

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1.0 EXECUTIVE SUMMARY

This traffic impact analysis (TIA) examined the potential impacts associated with the proposed Colonial Downs Off-Track Betting (OTB) development located in Hampton, Virginia. The proposed Colonial Downs OTB development will include an approximate 27,000 square foot (sf) gaming floor area, bar, and restaurant. This space is exclusive from the approximate 8,500 sf of miscellaneous space identified for offices, storage, and/or other gathering areas. In addition to the proposed expansion and redevelopment of currently vacant space in the Power Plant of Hampton Roads shopping center, it is anticipated that approximately 1.2 million visitors per year will destined to the envisioned Colonial Downs OTB at Power Plant development with peak activity occurring during Friday and Saturday evening. The proposed development site is generally bounded by I-64 to the north, Power Plant Parkway to the south, Pine Chapel Road to the east, and Mercury Boulevard to the west. Access to/from the proposed development will predominantly be through three (3) site access driveways located along Power Plant Parkway.

Based on the results of the traffic analysis, the future impacts associated with the proposed development are anticipated to be minimal overall, with minor deterioration in operations anticipated at the signalized and unsignalized intersections providing access to/from the site along Power Plant Parkway. Therefore, major improvements involving geometric and/or traffic control modifications are not being proposed. Out of the three (3) intersections studied, the Power Plant Parkway at Lowe's/BJ's Site Access Driveway/Hilton Garden Inn/Spring Hill Suites Site Access Driveway intersection has the potential for moderate right-turn queueing exiting the proposed development. If exiting (i.e., southbound) right-turn queueing becomes a concern in the future, the southbound approach could be reconfigured to consist of a shared through/left-turn lane and an exclusive right-turn lane. This improvement would not only provide a dedicated lane to the right-turn movement, but would also provide an ability for potential traffic signal phasing improvements with the implementation of a right-turn overlap phase.

A summary of the improvements being recommended from this study are provided below.

Power Plant Parkway (State Route 415)

- The City of Hampton should continue to monitor and optimize traffic signal phasing and timing plans to accommodate peak hour and off-peak traffic volumes along Power Plant Parkway
- Coordinated signal timing optimization should occur upon construction, operation, and occupancy of the Colonial Downs OTB development to facilitate the progression of traffic along Power Plant Parkway

<u>Power Plant Parkway at Lowe's/BJ's Site Access Driveway/Hilton Garden Inn/Spring Hill Suites Site</u> Access Driveway

No improvements are being proposed at this intersection

Power Plant Parkway at BJ's/Cold Stone/Proposed Colonial Downs OTB Site Access Driveway

Southbound BJ's/Cold Stone/Proposed Colonial Downs OTB Site Access Driveway

Restripe approach to clearly reflect an exclusive left-turn lane and an exclusive right-turn lane

Power Plant Parkway at Bass Pro Shop Site Access Driveway

No improvements are being proposed at this intersection

Beyond the above-mentioned improvements, no additional offsite geometric or traffic control improvements are recommended as part of the proposed Colonial Downs OTB at Power Plant development.



2.0 INTRODUCTION

Kimley-Horn and Associates, Inc. (Kimley-Horn) was retained to perform a traffic impact analysis (TIA) for a proposed Off-Track Betting (OTB) development within the Power Plant of Hampton Roads Shopping Center in Hampton, Virginia. The proposed development will include an approximate 27,000 square foot (sf) gaming floor area, bar, and restaurant. This space is exclusive from the approximate 8,500 sf of miscellaneous space identified for offices, storage, and/or other gathering areas. In addition to the proposed expansion and redevelopment of currently vacant space in the Power Plant at Hampton Roads shopping center, it is anticipated that approximately 1.2 million visitors per year will destined to the envisioned Colonial Downs OTB at Power Plant development with peak activity occuring during Friday and Saturday evening. The proposed development site is generally bounded by I-64 to the north, Power Plant Parkway to the south, Pine Chapel Road to the east, and Mercury Boulevard to the west. Access to/from the proposed development will be through site access driveways located along Power Plant Parkway. A conceptual site plan is included in **Appendix A**.

This project is a part of a Special Use Permit (SUP) application. Based on conversations with the City of Hampton, it was determined that a TIA would be required for the SUP application. The purpose of this TIA is to examine existing and future traffic conditions to understand anticipated impacts resulting from traffic associated with the proposed development. Study area limits, data collection requirements, as well as TIA assumptions and methodologies are based on our understanding of typical TIA requirements of the City of Hampton.

3.0 PROJECT BACKGROUND

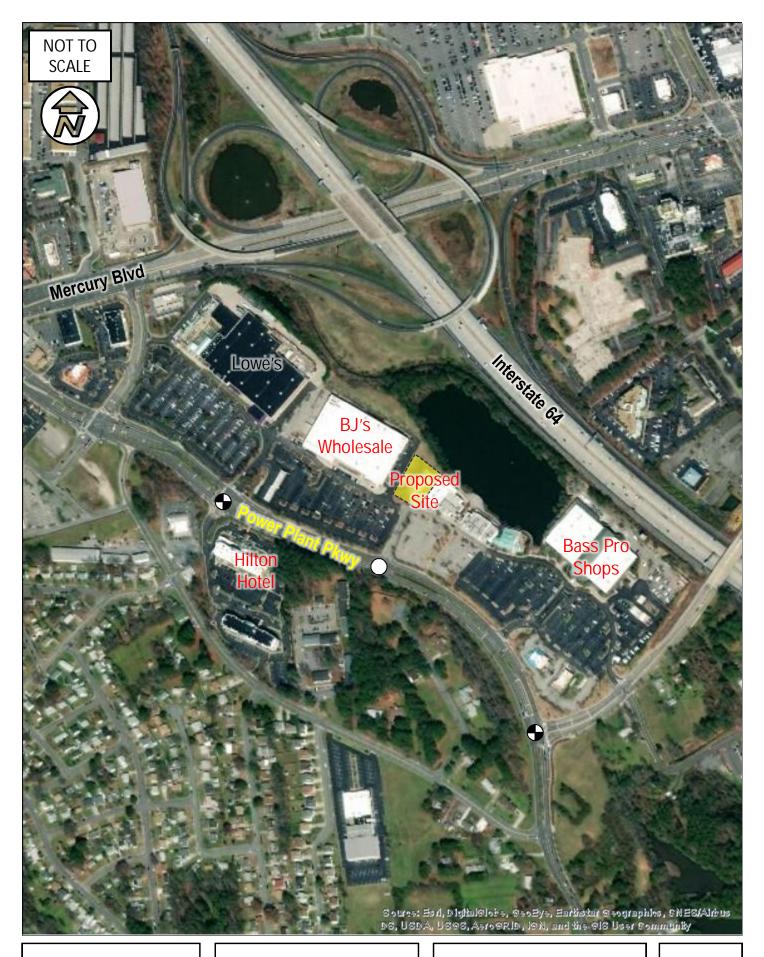
3.1 STUDY AREA

The study area for this TIA includes three existing intersections along Power Plant Parkway, as illustrated in **Figure 1**:

- Power Plant Parkway at Lowe's/BJ's Site and Hilton Garden Inn/Spring Hill Suites Site Access Driveway (signalized)
- Power Plant Parkway at BJ's/Cold Stone/PBR Site Access Driveway (unsignalized)
- Power Plant Parkway at Bass Pro Shop Entrance (signalized)

All study area roadways and intersections were identified and agreed to with the City of Hampton.

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Colonial Downs TIA Hampton, VA

Project Study Area

FIGURE

3.2 EXISTING CONDITIONS

Figure 2 depicts existing lane designations, posted speed limits, and full-width storage and taper lengths for exclusive turn lanes at each study area intersection. Power Plant Parkway (State Route 415) is a four-lane, median divided, minor arterial within the limits of the study area. Oriented in an approximate east-west direction within the study area, Power Plant Parkway has a posted speed limit of 45 MPH. While overall, Power Plant Parkway is a north-south oriented facility, it is being referred to as an east (i.e., south) – west (i.e., north) facility for the purposes of this study due to its physical orientation within the study area. Based on 2017 Average Weekday Daily Traffic (AWDT) volumes reported by VDOT, this section of Power Plant Parkway carries approximately 17,000 vehicles per day (vpd).

3.3 EXISTING TRAFFIC VOLUMES

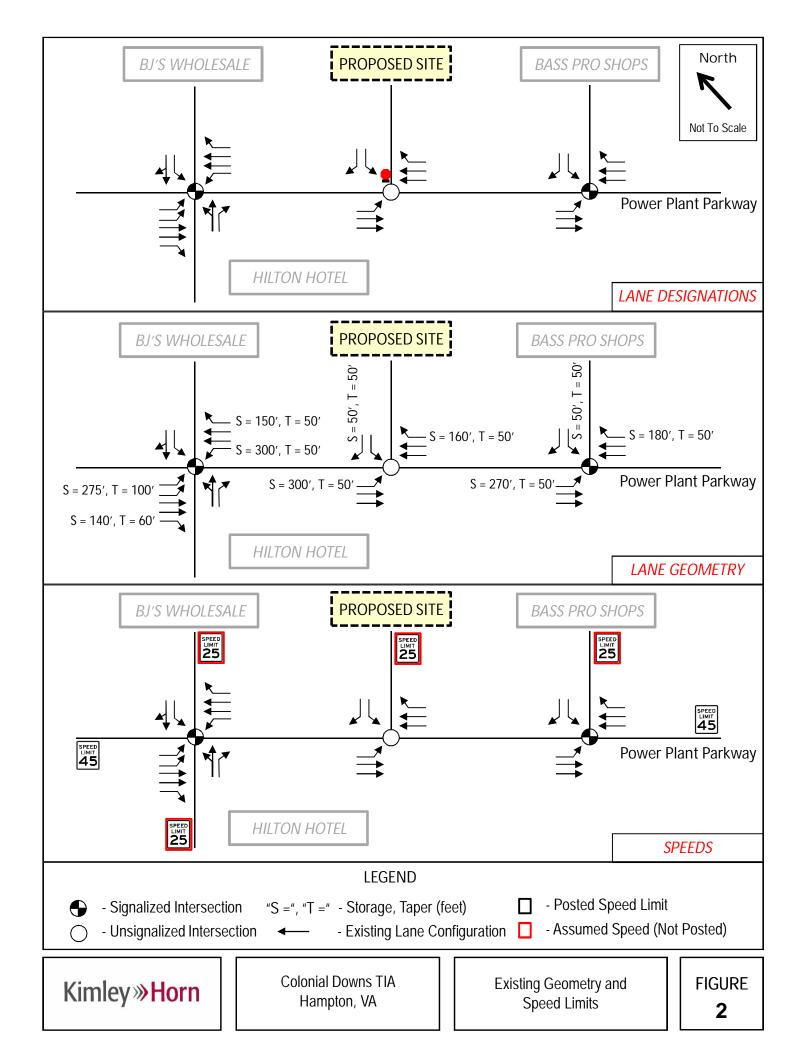
Per direction from City of Hampton Public Works staff, existing turning movement count (TMC) data was collected at each study intersection from 4:00 PM to 9:00 PM on September 27 (Thursday), September 28 (Friday), and September 29 (Saturday). All raw traffic count data are provided in **Appendix B**.

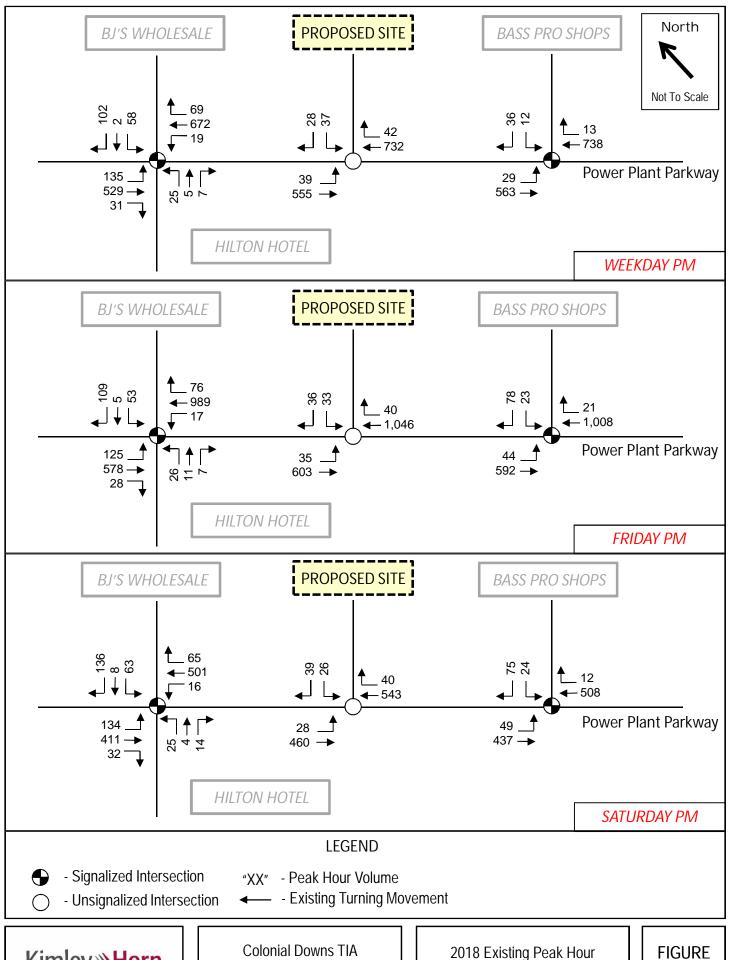
Uniform PM peak hour periods were established for all three study intersections under Weekday, Friday, and Saturday conditions. Based on the TMC data, the following uniform peak hours of the adjacent streets were determined:

Weekday PM Peak Hour: 4:30 PM to 5:30 PM
Friday PM Peak Hour: 4:45 PM to 5:45 PM
Saturday PM Peak Hour: 4:00 PM to 5:00 PM

Peak hour heavy vehicle percentages were calculated for each individual intersection movement, while overall intersection peak hour factors were calculated and then applied to each intersection movement. Balanced existing Weekday, Friday, and Saturday PM peak hour traffic volumes are illustrated in **Figure 3**.

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2018 Existing Peak Hour Traffic Volumes FIGURE **3**

4.0 PROJECTED TRAFFIC VOLUMES

In addition to 2018 Existing Conditions, this study includes the analysis of two (2) Future Year (i.e., 1) No Build and 2) Build) scenarios. The proposed development is anticipated to open fully operational in 2021; therefore, the future year scenarios will consist of 2021 No Build and 2021 Build. A summary of general traffic conditions anticipated with each of the two future year scenarios are included below:

- 2021 No Build Build-out year traffic conditions with a future growth rate applied, but <u>without</u> traffic volumes generated by the proposed Colonial Downs OTB development
- **2021 Build** Build-out year traffic conditions with a future growth rate applied, and <u>with</u> traffic volumes generated by the proposed Colonial Downs OTB development

4.1 BACKGROUND TRAFFIC GROWTH

Based on historical AWDT volume data along Power Plant Parkway, as shown in **Table 1**, little to no growth has occurred over the last 6 years. Therefore, a conservative 0.5% growth rate per year was used for this TIA to account for general growth across the region. Background (i.e., No Build) 2021 peak hour traffic volumes were developed by applying a compounding 0.5% growth rate to 2018 existing traffic volumes over 3 years.

 2012
 2013
 2014
 2015
 2016
 2017

 Between Mercury Blvd and Pine Chapel Road
 17,000
 16,000
 15,000
 16,000
 17,000
 17,000

Table 1: Power Plant Parkway Historical AWDT

Source: VDOT – Traffic Engineering Division, Annual Average Daily Traffic Volume Estimates by Section of Road

4.2 PROPOSED TRIP GENERATION, DISTRIBUTION, AND ASSIGNMENT

Traffic generation potential for the proposed development was obtained using *ITE Trip Generation 10th Edition* (2017). Trip generation rates for Land Use Code 473 – Casino/Video Lottery Establishment were used in the trip generation calculations for the proposed development. Per data provided by the applicant, peak visitation at similar OTB facilities consistently occur between 8:00 PM and 10:00 PM on Thursday, Friday, and Saturday evenings. Along Power Plant Parkway, existing traffic volumes are significantly lower between 8:00 PM and 10:00 PM, as compared to between 4:00 PM and 5:00 PM. To provide for a conservative analysis, this TIA analyzed site trips associated with peak operations of the development

ITE trip generation methodologies for Land Use 473 only provide weekday PM peak hour rates based on gross floor area (GFA). To determine trip generation potential for Friday and Saturday evening peak conditions, ratios were developed from data provided by the applicant for similar facilities. Per data provided by the applicant, Friday evening peak visitation is approximately 120% greater than that occurring during a weekday. Similarly, Saturday evening peak visitation is approximately 170% greater than that of a weekday.

Table 2 presents trip generation potential for the proposed development during Weekday, Friday, and Saturday evening peak operations.

		,			- 1					
Land Use (ITE	Size (sf)	Weekday PM Peak Hour			Friday PM Peak Hour			Saturday PM Peak Hour		
Code)		Total	56% Enter	44% Exit	Total	56% Enter	44% Exit	Total	56% Enter	44% Exit
Casino/Video Lottery Establishment (473)	27,000	364	204	160	437	245	192	619	347	272
Net New Development Trips		364	204	160	437	245	192	619	347	272

Table 2: Trip Generation for Proposed Development

Table 2 indicates that the proposed development has the potential to generate 364 weekday trips, 437 Friday trips, and 619 Saturday trips.

The directional distribution and assignment of trips generated by the proposed development is consistent with the following agreed-to distributions:

- 45% to/from the north/west on Power Plant Parkway
- 55% to/from the south/east on Power Plant Parkway

It is anticipated that proposed development trips will enter/exit at the existing Power Plant Parkway at each of the three study area intersections, as illustrated in **Figure 4**. These distributions were developed with an understanding that vehicles would tend to use an access point intersection that would be convenient (i.e., signalized versus unsignalized), as well as close in proximity to where they will be parking.

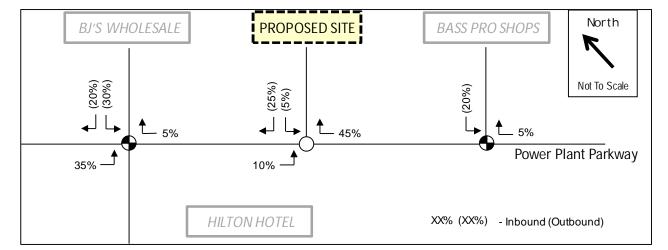
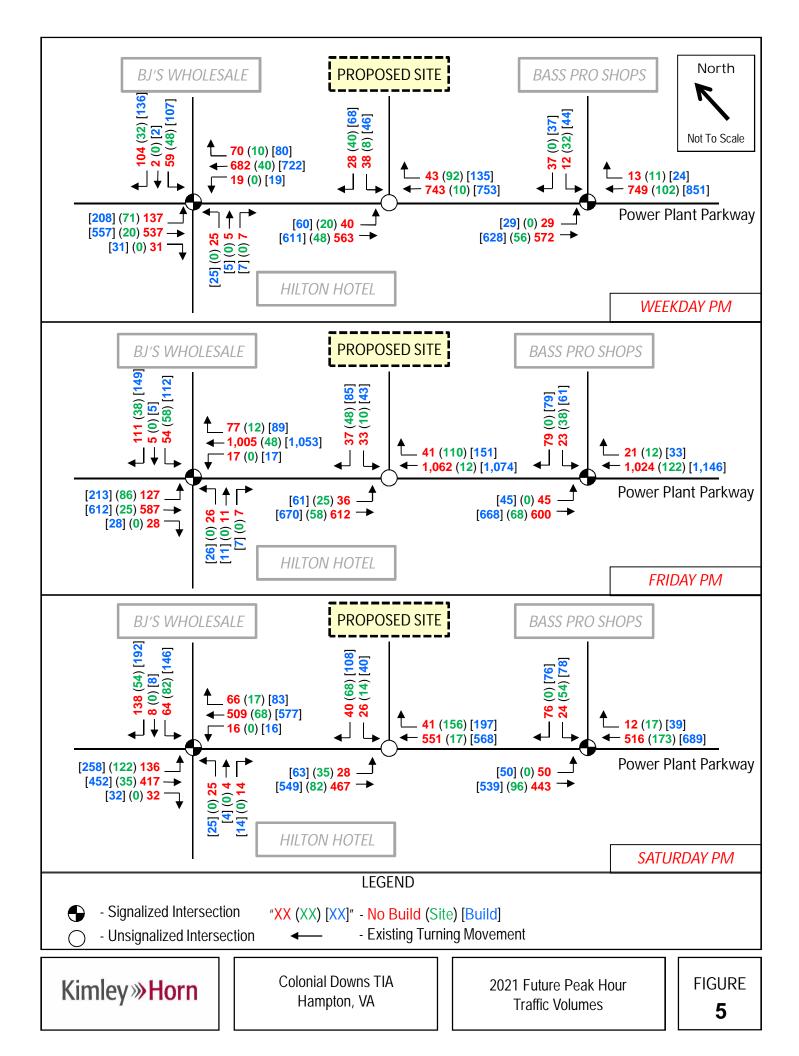


Figure 4: Proposed Inbound/Outbound Driveway Distributions

Peak hour trip assignments were calculated by multiplying the net new trips expected with the proposed development by the agreed-to trip distributions. The resulting peak hour trip assignments were then added to future background traffic volumes (i.e., No Build) to develop 2021 Build traffic volumes.

Future Weekday, Friday, and Saturday PM peak hour traffic volumes are summarized in Figure 5.



5.0 TRAFFIC ANALYSIS

5.1 INTERSECTION OPERATIONAL ANALYSIS

Capacity analyses for all study intersections were performed under Weekday, Friday, and Saturday PM peak hour conditions for the following scenarios:

- 2018 Existing Conditions
- 2021 Future Year No Build
- 2021 Future Year Build

All signalized and unsignalized intersection capacity analyses were completed using *Synchro Professional* (*Version 10.1*) and *SimTraffic*, which is the microsimulation companion tool of *Synchro*. The City of Hampton provided existing traffic signal timing data to replicate current signal operations, while the future condition analyses reflect optimized traffic signal timings to account for increases in future traffic volumes (i.e., either due to background traffic growth and/or additional development related traffic). Two measures of effectiveness (MOE) were analyzed in the intersection capacity analyses – average vehicle delay (in seconds per vehicle) and maximum queue lengths (in feet, rounded up to the nearest 5 feet). Average vehicle delays were obtained using *2010 Highway Capacity Manual (HCM)* methodologies contained within *Synchro*, while maximum queue lengths were obtained by averaging results from 10 individual *SimTraffic* simulation runs under each scenario. Accompanying HCM vehicle delays are HCM level of service (LOS) designations. LOS ranges from A to F— "A" indicating a condition of little or no congestion and "F" a condition with severe congestion, unstable traffic flow, and stop-and-go conditions. **Table 3** summarizes LOS thresholds for both signalized and unsignalized intersection operations.

Table 3: LOS Control Delay Thresholds

LOS	Signalized Intersections Control Delay Per Vehicle [sec/veh]	Unsignalized Intersections Average Control Delay [sec/veh]	Relative Delay				
А	≤ 10 Free-flow traffic operations at averagin ability to maneuver. Minimal dela	≤ 10 ge travel speeds. Vehicles completely unimpeded y at signalized intersections.					
В	> 10 – 20 > 10 – 15 Reasonably unimpeded traffic operations at average travel speeds. Vehicle maneuverability slightly restricted. Low traffic delays.						
С	> 20 – 35 Stable traffic operations. Lane char reduced to half of average free flow						
D	>35 – 55						
E	>55 – 80 > 35 – 50 Significant delays. Travel speeds reduced to one third of average free flow travel speed.						
F	> 80 Extremely low speeds. Intersection queues at intersections.	> 50 congestion. Long delays. Extensive traffic	Long Delays				

Source: Highway Capacity Manual, Transportation Research Board, Washington, D.C., 2010

Throughout this chapter, LOS (based on average vehicle delay) and maximum queue length results for each intersection movement are summarized in graphical format with accompanying text narratives. Refer to **Appendix C** for detailed software output results in tabular format. In the queue length result figure, queue lengths have been **bolded** if either of the following conditions are anticipated to occur:

- 1) For exclusive turn lanes, anticipated queue lengths could extend into adjacent mainline lanes
- 2) For non-exclusive lanes, anticipated queue lengths could extend to the next upstream intersection or primary parking lot drive aisle

Both bolded queue lengths and vehicle movements anticipated to experience a deterioration in LOS between Existing and No Build conditions, and/or between No Build and Build, are discussed in the accompanying text narratives.

Intersection operational analysis results are presented in the following figures:

- Figure 6: Peak Hour LOS Results (Weekday, Friday, and Saturday)
- Figure 7: Peak Hour Queueing Results (Weekday, Friday, and Saturday)

5.2 INTERSECTION OPERATIONAL ANALYSIS FINDINGS

Under exiting conditions, all three study intersections operate at an overall LOS C or better. Additionally, all movements operate at a LOS D or better except during the Friday PM peak hour where the southbound left-turn movement at the Power Plant Parkway and BJ's/Cold Stone/Proposed Colonial Downs OTB Site Access Driveway intersection operates at a LOS F with a delay of approximately 54 seconds per vehicle. This delay is primarily due to unsignalized traffic control and left-turning vehicles needing to find adequate gaps in traffic along Power Plant Parkway. Although each left-turning vehicle is experiencing delays of approximately 1 minute, the corresponding traffic volume and queue length for the movement is low with only 33 left-turning vehicles over the entire peak hour resulting in a queue of approximately 70 feet (i.e., approximately 3 vehicles).

Under 2021 No Build conditions, traffic growth is minimal, with most turning movement volumes increasing by less than 10 vehicles over each peak hour. No Build vehicle delays and queue lengths are anticipated to remain consistent with those from existing conditions, with delays fluctuating by less than 3 seconds and queues fluctuating by approximately 1-2 vehicles.

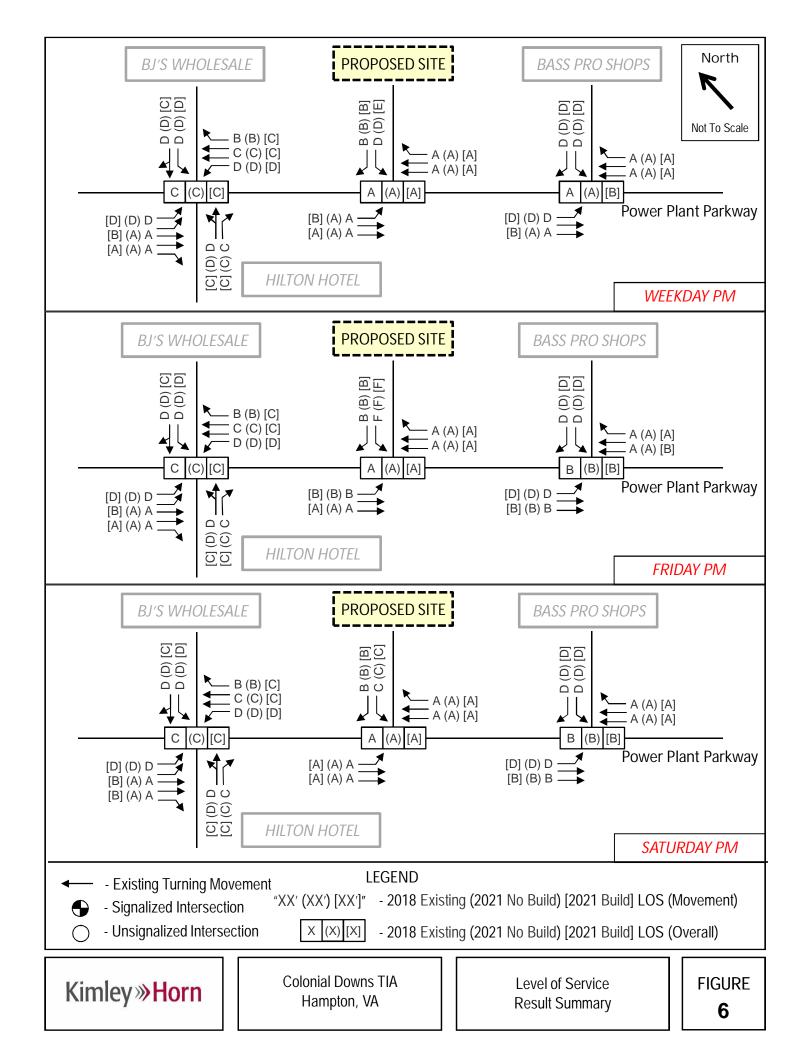
Under 2021 Build conditions, with proposed trips associated with the development, overall intersection LOS is expected to remain LOS C or better from 2021 No Build conditions. Additionally, individual turning movements are also expected to remain consistent with those from No Build, with a few movements changing one letter grade from LOS C to LOS D, or LOS D to LOS C, at the Power Plant Parkway at Lowe's/BJ's Site Access Driveway/Hilton Garden Inn/Spring Hill Suites Site Access Driveway intersection. These changes are primarily due to reallocating green time from Power Plant Parkway to the southbound approach to accommodate proposed site traffic. These changes in LOS also have corresponding changes in queue length, with queues along Power Plant Parkway anticipated to increase by approximately 2-3 vehicles in length. The westbound right-turn movement is showing anticipated queue lengths of 200 feet during the Friday PM peak hour, which would indicate that queues are anticipated to exceed available turnlane storage. This numeric result is due to the westbound through gueue length blocking the right-turn lane. In SimTraffic, queue lengths for turn-lanes are determined based on the physical location of the turning vehicle in relation to the approach stop bar, regardless if there is available storage in the physical turn lane. In this study, it is important to note that there is adequate turn-lane storage for the westbound right-turn movement, and that queues are not expected to fill the entire turn lane and impede traffic traveling in the mainline through lanes.

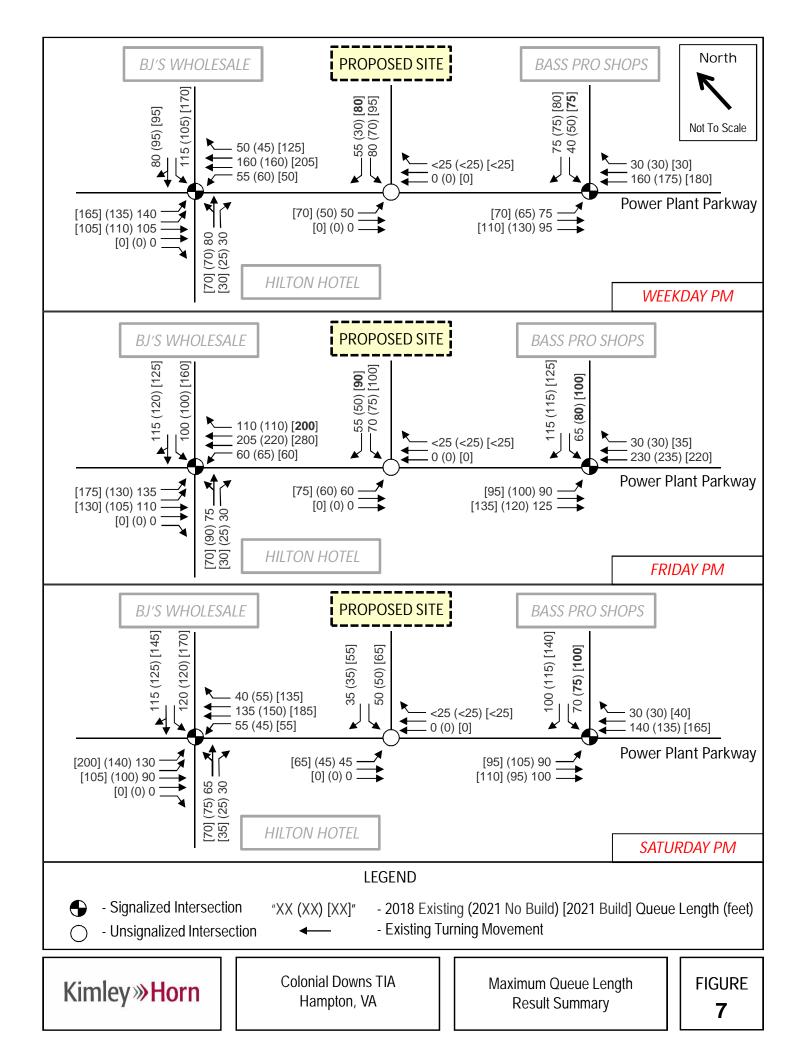


Along each of the three (3) southbound intersection approaches, proposed site trips are expected to moderately increase volumes and delays. The southbound left-turn movement at the BJ's/Cold Stone/Proposed Colonial Downs OTB Site Access Driveway intersection is expected to experience a delay increase from approximately 1 minute per vehicle under both Existing and No Build conditions, to approximately 1.5 minutes under Build. While southbound movement LOS are expected to increase, queue lengths are anticipated to be less than 100 feet in length (i.e., approximately 4 vehicles).

The only exception is at the Power Plant Parkway at Lowe's/BJ's Site Access Driveway/Hilton Garden Inn/Spring Hill Suites Site Access Driveway intersection where southbound left-turn queues are expected to extend up to 170 feet. While this represents an approximate 65-foot increase (i.e., approximately 3 vehicles) from No Build conditions, it is largely due to queuing in the adjacent shared through/right-turn lane blocking access to the left-turn lane. Southbound left-turn delays are only expected to increase up to 4 seconds per vehicle between No Build and Build conditions.

It is important to note that each of the Build condition queue lengths that are bolded in **Figure 7** are not due to turn lane storage lengths being inadequate, but rather are due to queue lengths in adjacent lanes blocking turning vehicles from accessing the storage lane (i.e., adjacent lane queues are longer than the length of the turn lanes). In all anticipated instances in this study, the impacts were to approximately 1-2 turning vehicles, and the conditions were not sustained over the entire peak hour(s).





6.0 CONCLUSIONS AND RECOMMENDATIONS

This traffic impact analysis (TIA) examined the potential impacts associated with the proposed Colonial Downs OTB development located in Hampton, Virginia. The proposed Colonial Downs OTB development will include an approximate 27,000 square foot (sf) gaming floor area, bar, and restaurant. This space is exclusive from the approximate 8,500 sf of miscellaneous space identified for offices, storage, and/or other gathering areas. In addition to the proposed expansion and redevelopment of currently vacant space in the Power Plant of Hampton Roads shopping center, it is anticipated that approximately 1.2 million visitors per year will destined to the envisioned Colonial Downs OTB at Power Plant development with peak activity occuring during Friday and Saturday evening. The proposed development site is generally bounded by I-64 to the north, Power Plant Parkway to the south, Pine Chapel Road to the east, and Mercury Boulevard to the west. Access to/from the proposed development will predominantly be through three (3) site access driveways located along Power Plant Parkway.

Based on the results of the traffic analysis, the future impacts associated with the proposed development are anticipated to be minimal overall, with minor deterioration in operations anticipated at the signalized and unsignalized intersections providing access to/from the site along Power Plant Parkway. Therefore, major improvements involving geometric and/or traffic control modifications are not being proposed. Out of the three intersections studied, the Power Plant Parkway at Lowe's/BJ's Site Access Driveway/Hilton Garden Inn/Spring Hill Suites Site Access Driveway intersection has the potential for moderate right-turn queueing exiting the proposed development. If exiting (i.e., southbound) right-turn queueing becomes a concern in the future, the southbound approach could be reconfigured to consist of a shared through/left-turn lane and an exclusive right-turn lane. This improvement would not only provide a dedicated lane to the right-turn movement, but would also provide an ability for potential traffic signal phasing improvements with the implementation of a right-turn overlap phase.

A summary of the improvements being recommended from this study are provided below.

Power Plant Parkway (State Route 415)

- The City of Hampton should continue to monitor and optimize traffic signal phasing and timing plans to accommodate peak hour and off-peak traffic volumes along Power Plant Parkway
- Coordinated signal timing optimization should occur upon construction, operation, and occupancy of the Colonial Downs OTB development to facilitate the progression of traffic along Power Plant Parkway

<u>Power Plant Parkway at Lowe's/BJ's Site Access Driveway/Hilton Garden Inn/Spring Hill Suites Site</u> Access Driveway

No improvements are being proposed at this intersection

Power Plant Parkway at BJ's/Cold Stone/Proposed Colonial Downs OTB Site Access Driveway

Southbound BJ's/Cold Stone/Proposed Colonial Downs OTB Site Access Driveway

Restripe approach to clearly reflect an exclusive left-turn lane and an exclusive right-turn lane

Power Plant Parkway at Bass Pro Shop Site Access Driveway

No improvements are being proposed at this intersection

Beyond the above-mentioned improvements, no additional offsite geometric or traffic control improvements are recommended as part of the proposed Colonial Downs OTB at Power Plant development.

