

***CAPITAL DRIVE-KINGSTON PIKE
RETAIL DEVELOPMENT
KNOX COUNTY, TENNESSEE***

TRANSPORTATION IMPACT ANALYSIS



***Prepared for:
ALL ELEVEN GENERAL PARTNERSHIP***

Prepared by:

**CDM
Smith**

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**CAPITAL DRIVE-KINGSTON PIKE
RETAIL DEVELOPMENT
KNOX COUNTY, TENNESSEE
TRANSPORTATION IMPACT ANALYSIS**

Prepared for

**All Eleven General Partnership
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Knoxville, Tennessee 37919**



**May 2021
Revised November 2021**

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EXECUTIVE SUMMARY

CDM Smith is pleased to submit this report to address the transportation impact analysis and access requirements of the proposed retail developments at the intersection of Kingston Pike (S.R. 1) and Capital Drive, in Knox County, TN. The basis of this study required the collection of traffic data, generation of anticipated traffic volumes for the proposed site and development of projected traffic volumes for normal growth and from the potential site. Analyses of the resulting traffic projections were conducted to determine the capacity and levels of service for the intersection of Capital Drive and Kingston Pike.

This transportation impact analysis follows guidelines and procedures as recommended by the Institute of Transportation Engineers (ITE), Knoxville-Knox County Planning (formerly MPC), Knox County Engineering and Public Works (EPW), the City of Knoxville Traffic Engineering Department, and the Tennessee Department of Transportation (TDOT). The study of this development required the collection of traffic data, development of future traffic volumes, generation of anticipated traffic volumes to and from the proposed development, analysis of the resulting traffic conditions, and the development of necessary recommendations to mitigate any resulting traffic impacts.

This study evaluated existing and projected traffic conditions with and without the proposed site. Background traffic was determined using a 1.0-percent compounded annual growth rate until the horizon buildout year of 2026. Trip generation for the proposed buildout of a 2,500 square foot (SF) coffee/donut shop with a drive-through window and two-10,000 SF retail developments was determined using the ITE Trip Generation, 10th Edition. Capacity and level of service (LOS) analysis for the projected turning movements were conducted using Synchro, version 10, and the Highway Capacity Manual 6th Edition methodologies.

Analysis results of existing conditions for 2021 found that the study intersection currently operates at acceptable levels of service during the AM peak hour but declines to failing conditions during the PM peak hour, likely due to the high volumes of northbound left-turning vehicles from Capital Drive. Analysis of 2026 projected conditions provided results that indicates acceptable operation of the study intersection can be attained through mitigation measures of exclusive turn lanes, phasing modification, and signal split optimization.

With the recommendations of this report and its addenda, the impact of this proposed retail developments can be minimized and manageable. The analyses conducted identified the following recommendations:

- Construct approximately 400 feet of a three-lane roadway north of Kingston Pike (S.R. 1) to provide access to the existing GemStore jewelry store, proposed coffee/donut shop, and the two proposed retail developments.
- Provide 100-foot storage for a left-turn lane on the new connector stub road at the southbound approach to Kingston Pike.
 - Ensure there are no driveway openings to the GemStore and proposed retail developments within this storage length.
- Maintain the existing configuration of the northbound approach on Capital Drive to provide a shared left-through lane and a separate right-turn lane.
 - Maintain the split-phased operation for the northbound and southbound approaches.
 - Maintain existing Do Not Block Driveway sign (R10-7 mod) and STOP bar striping at the existing access to the Broadway Carpets business on Capital Drive.
 - Ensure adequate distance between the turning path of the proposed northbound left-through lane and the STOP bar locations of the eastbound travel lanes.
- Provide a minimum 50-foot westbound right-turn lane on Kingston Pike via appropriate striping.
- Any sidewalks constructed within the proposed site along the connector stub road will require the construction of ADA-compliant curb ramps on any connecting corners of site driveways.
- Post STOP signs (R1-1) for exiting traffic from the GemStore, proposed coffee/donut shop, and proposed retail strip development driveways located along the new connector road north of Kingston Pike.
- Modify signal operations of existing span-wire system to include appropriate signal parameters to facilitate the proposed connector stub road, and recommended turn lanes, which include:
 - Provide protected-permissive phasing for eastbound left-turn with additional signal heads and phasing and timing updates.
 - Provide protected-permissive phasing for northbound left-turn with additional signal heads and phasing and timing updates.
 - Provide the appropriate signal heads and phasing and timing updates for the northbound and southbound split-phased operations.
- Implement recommended timing and phasing plans for signals at the intersections of Kingston Pike and Sherway Road, Capital Drive, and Mabry Hood Road as provided in the **Appendix** with the Addendum #2 Supporting Documents.
- Minimize landscaping, using low growing vegetation, and signing at the proposed street access to insure that safe sight distance is maintained.
- Intersection and roadway design should conform to the recommended standards and practices of TDOT, the American Association of State Highway and Transportation

Officials (AASHTO), ITE, the City of Knoxville Traffic Engineering Department, and Knox County EPW.

INTRODUCTION

CDM Smith is pleased to submit this report to address the traffic impact and access requirements of the proposed retail developments at the intersection of Kingston Pike (S.R. 1) and Capital Drive, in Knox County, TN. The basis of this study required the collection of traffic data, generation of anticipated traffic volumes for the proposed site and development of projected traffic volumes for normal growth and from the potential site. Analyses of the resulting traffic projections were conducted to determine the capacity and levels of service for the intersection of Capital Drive and Kingston Pike.

Project Description

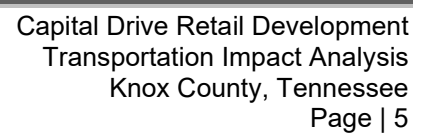
The proposed project consists of a 2,500 square foot (SF) coffee/donut shop with drive-through, and two 10,000 SF retail developments, whose specific retail types are unknown at this time. A three-lane southbound intersection approach is proposed to be constructed between the existing GemStore jewelry store and the southeastern boundary of the site, where the proposed coffee/donut shop will be located; thereby, providing a defined access to the front two business units. Access to the proposed coffee/donut shop is proposed to have two points with one access to the south near Kingston Pike and with one at the north western property boundary. The modified access to the existing GemStore will be located to the rear northeast corner of the parcel. The two proposed retail developments will be located north of the proposed coffee/donut shop and will be provided access by an approximate 400-ft northward extension of Capital Drive. **Figure 1** displays the proposed overall concept plan.

There is an additional approximate 25 acres of undeveloped land to the north of the development site which may have a future connection to Parkside Drive. The undeveloped 25 acres will not be considered as a background land-use as there are no known plans for this property. Based on the current status, the background and buildout conditions were evaluated within this study as year 2026, and this study assesses the impacts without and with the proposed coffee/donut shop and two retail developments.

Site Location

The proposed developments will be located along a newly constructed, north segment of Capital Drive at the intersection of Kingston Pike, just east of the I-140 and Kingston Pike interchange. **Figure 2** illustrates the site location relative to local and regional access.

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INSTR #201409050013870





LOCAL ACCESS

Local Access

The proposed coffee/donut shop will have two driveway connections to the three-lane connector road that is proposed to be constructed between it and the existing GemStore jewelry store across from Capital Drive. The two proposed retail developments will have driveway connections to the extended three-lane connector road. All proposed developments will have access to Kingston Pike through the proposed connector road. Kingston Pike is a five-lane major arterial with a 2020 AADT (annual average daily traffic) of approximately 29,865 vehicles per day (VPD).

EXISTING TRAFFIC CONDITIONS

Existing Geometry, Traffic Control and Speed

Kingston Pike is a five-lane roadway in the vicinity of the proposed site. The south segment of Capital Drive is a three-lane facility. At the intersection with Kingston Pike, the median is landscaped and contains a monument sign for businesses on Capital Drive. The intersection of Capital Drive and Kingston Pike is controlled by a traffic signal which also provided signal phases for the existing site access driveway. Posted speed limit of Kingston Pike is 45 MPH. **Figure 3** depicts existing traffic control and intersection geometry.

Sight Distance Evaluation

Sight distance was measured at the southbound approach of the proposed connector stub road of Capital Drive at Kingston Pike. All stop bar locations from the remaining approaches are visible from the existing stop bar location at the southbound approach, and there are no obstructions of a driver's view in any direction. Due to the traffic signal control, there is no concern regarding the sight distance for left-turning vehicles from this approach. For right-turns, specifically right-turns-on-red, the desired sight distance is 500 feet. This distance is achieved and surpassed, as visibility looking left extends over 1,000 feet to Sherway Drive. Kingston Pike is a five-lane section at Capital Drive with eastbound and westbound left-turn lanes that line up directly opposite each other, which is desirable in terms of sight distance with permissive left-turn movements onto Capital Drive. The westbound approach has a protected-permissive phase whereas the eastbound approach does not contain a separate left-turn phase. Photos of the intersection sight distance from the southbound approach are provided in the **Appendix**.

Existing Traffic Volumes

CDM Smith conducted AM and PM turning movement counts at the intersection of Capital Drive and Kingston Pike in May 2021. Due to the impact of COVID-19 on traffic volumes, Knox County recommends a COVID factor be applied to the measured turning movement counts. The observed peak hour volumes have been factored by an increase of 20-percent. These factored volumes were compared to the projected volumes at this intersection from a previous study and were found to be appropriate. The AM and PM peak hours were 8:00 to 9:00 AM and 4:30 to 5:30 PM. **Figure 3** also illustrates the existing, adjusted 2021 AM and PM peak hour traffic volumes at the intersection of Capital Drive and Kingston Pike. Raw traffic counts are provided in the **Appendix**.

Existing Capacity and Level of Service

In order to evaluate the current operations of the traffic control devices, capacity and level of service were calculated using the Transportation Research Board's (TRB) Highway Capacity Manual (HCM) 6th Edition methodologies of the Synchro, Version 10 software. With Synchro, signalized and unsignalized intersections are evaluated based on estimated intersection delays, which are related to level of service (LOS).

Level of service and capacity are the measurements of an intersection's ability to accommodate traffic volumes. Levels of service for intersections range from A to F. LOS A is the best, and LOS F is failing. For signalized intersections, a LOS of A has an average estimated intersection delay of less than 10 seconds, and LOS F has an estimated delay of greater than 80 seconds. A LOS of C and D are typical design values. Within urban areas, a LOS D, delay between 35 and 55 seconds, is considered acceptable by the Institute of Transportation Engineers (ITE) for signalized intersections.

2021 INTERSECTION GEOMETRY & PEAK HOUR TRAFFIC VOLUMES Capital Drive Retail Development Knoxville, TN



NOTE: Adjusted traffic volumes due to COVID-19.

LEGEND

- TRAFFIC LANE
- TRAFFIC CONTROL
- XXX AM PEAK HOUR
- (XXX) PM PEAK HOUR

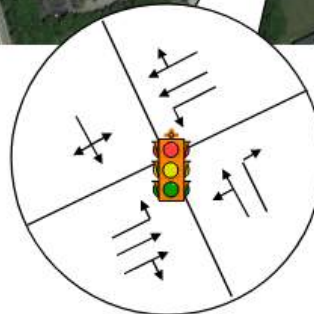


Figure 3

Unsignalized intersection levels of service have lower thresholds of delays. A LOS of F exceeds estimated delays of 50 seconds. For urban arterials, minor approaches may frequently experience levels of service E. A full level of service description for an unsignalized and signalized intersection is presented in **Tables 1 and 2**, respectively.

**TABLE 1
LEVEL-OF-SERVICE (LOS) DESCRIPTION
FOR UNSIGNALIZED INTERSECTIONS**

Level of Service	Average Control Delay per Vehicle (seconds)
A	≤ 10.0
B	> 10.0 and ≤ 15.0
C	> 15.0 and ≤ 25.0
D	> 25.0 and ≤ 35.0
E	> 35.0 and ≤ 50.0
F	> 50.0

SOURCE: Highway Capacity Manual, TRB Special Report 209

**TABLE 2
LEVEL-OF-SERVICE (LOS) DESCRIPTION
FOR SIGNALIZED INTERSECTIONS**

LOS	Average Control Delay per Vehicle (seconds)	Description
A	≤ 10.0	Very low delay with extremely favorable progression. Most vehicles don't stop.
B	> 10.0 and ≤ 20.0	Generally good progression. Increase number of stops from that described for LOS "A" resulting in higher delays
C	> 20.0 and ≤ 35.0	Fair progression with increased delay. Number of stopping vehicles become significant; however, many still pass through the intersection without stopping. Stable flow.
D	> 35.0 and ≤ 55.0	The influence of congestion becomes more noticeable. Longer delays resulting from unfavorable progression, longer cycles, or high V/C ratios. Approaching unstable flow.
E	> 55.0 and ≤ 80.0	Limit of acceptable delay. Long delays associated with poor progression, long cycles, or high V/C ratios.
F	> 80.0	Unacceptable operation resulting from oversaturation (flow rates exceed capacity). Poor progression, long cycles, and high V/C ratios.

SOURCE: Highway Capacity Manual, TRB Special Report 209

An additional measurement of an intersection's ability to accommodate traffic volumes is the volume-to-capacity (v/c) ratio. V/C ratios exceeding 0.9 suggest unstable conditions which can lead to significant increases in delay. V/C ratios less than 0.8 are typically stable traffic conditions, while ratios between 0.8 and 0.9 suggest an inefficient use of intersection geometry.

Analyses of the existing condition were conducted using Synchro, version 10, developed by Trafficware. The existing signal and timing plans were provided by the City of Knoxville. The analyses conducted found that the signalized intersection of Capital Drive and Kingston Pike operates at an overall LOS A and F during the AM and PM peak hours, respectively. Capacity ratios are 0.61 during the AM peak hour and worsen to 3.17 in the PM peak hour. The failing conditions during the PM peak hour are due to the high volumes of northbound left-turning vehicles from Capital Drive. **Table 3** presents the capacity and levels of service for the study intersection. Synchro analyses reflect signal system timing parameters that are based on current system operation and measured peak hour factors. Worksheets documenting the Synchro analysis are located in the **Appendix**.

Table 3
2021 EXISTING
CAPACITY AND LEVEL OF SERVICE

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	V/C	DELAY	LOS
Capital Drive at Kingston Pike	SIGNAL	AM	0.61	8.2	A
		PM	3.17	124.2	F

Note: Average vehicle delay estimated in seconds. V/C ratios reported from worst-case movement.

BACKGROUND TRAFFIC CONDITIONS

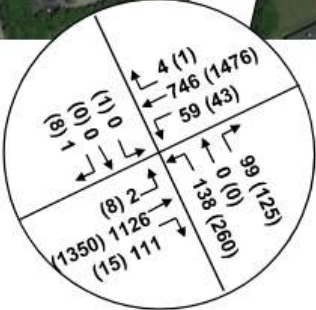
Background traffic is traffic that can be anticipated regardless of the proposed development. Traffic within the study area should continue to grow due to other development as well as the continued growth through the study area. This background traffic must be analyzed and evaluated for the purpose of establishing a future baseline traffic condition.

Background Growth Traffic Volumes

Historical traffic data for Kingston Pike were reviewed to determine traffic growth trends in the study area, and a horizon year of 2026 was assumed for the analysis of this study. The growth trend for Kingston Pike has wavered over the past ten years, and historical traffic data indicates an annual compounded growth rate of 1.0-percent. Historical traffic counts and projected growth calculations are provided in the **Appendix**. Traffic projections used for background conditions at the intersection of Kingston Pike and Capital Drive assumed an annually compounded growth rate of 1.0-percent. **Figure 4** presents the turning movement volumes with the annual growth of the background network in the AM and PM peak hour. The 2021 adjusted turning movement volumes were grown by a factor of 1.05 to illustrate the project 2026 background traffic volumes. The undeveloped acreage north of the site is not vested; therefore, only historical traffic growth is considered for this study.

2026 BACKGROUND PEAK HOUR TRAFFIC VOLUMES

Capital Drive Retail
Development
Knoxville, TN



LEGEND
XXX AM PEAK HOUR
(XXX) PM PEAK HOUR



Figure 4

Background Capacity and Level of Service

Analyses were performed with the grown traffic volumes and are presented in **Table 4**. If traffic continues to grow as expected, the intersection of Capital Drive and Kingston Pike will only be slightly impacted. The average delay will increase by a small amount during the AM and PM peak hours. However, the overall LOS will maintain as a LOS A in the AM peak hour and a LOS F for the PM peak period. Capacity ratios for both peak hour periods will increase slightly to 0.62 for the AM peak and 3.32 for the PM peak, and the northbound left-turn vehicles remain the cause of being over capacity during PM peak hour. Synchro analyses are based on current signal system operations, and traffic signal cycle splits and offsets have not been optimized. This study utilized the existing peak hour factors for all future analyses, which is conservative and provides more of a worst-case scenario by analyzing a higher peak hour demand of traffic than would be expected. Worksheets documenting the Synchro analysis are located in the **Appendix**.

**Table 4
2026 BACKGROUND
CAPACITY AND LEVEL OF SERVICE**

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	V/C	DELAY	LOS
Capital Drive at Kingston Pike	SIGNAL	AM	0.62	8.4	A
		PM	3.32	131.9	F

Note: Average vehicle delay estimated in seconds. V/C ratios reported from worst-case movement.

PROJECT IMPACTS

Project conditions are developed by generating traffic based on the proposed land uses and distributing the trips to the transportation network, and again conducting analyses for capacity and level of service.

Trip Generation

Project traffic was estimated using the data and methodologies of the publication, **Trip Generation, 10th Edition**, a reference published by the Institute of Transportation Engineers (ITE) that represents national data collected for many different land uses including industrial, residential, and commercial uses. The study estimated traffic for a 2,500 square-foot coffee/donut shop with a drive-through window using the Land Use Code (LUC) 937. Because the specific retail types are unknown for the two 10,000 SF retail developments, the study used the estimated trip generation of a 20,000 SF shopping center using LUC 820.

Some trip generation studies have included surveys addressing pass-by traffic. This is traffic already on the adjacent street that is attracted to the proposed development. Studies conducted for pass-by traffic have suggested that a percentage of the traffic generated by commercial retail, such as the land use at hand, may originate from the existing traffic flow; therefore, the project does not necessarily introduce all new traffic to the transportation system.

Pass-by traffic percentages differ relative to specific land uses and their densities. Some studies have shown varied results; however, the ITE publications, **Transportation and Land Development** by Virgil G. Stover and Frank J. Koepke, and **Trip Generation, 10th Edition**, have combined these studies to suggest uniform rates for given land uses. These rates range from 14-percent for hardware stores to 60-percent for neighborhood shopping centers, gross leasable area less than 100,000 square feet. Service stations and fast-food restaurants also exhibit high pass-by rates of 58-percent and 45-percent, respectively.

With the above in mind, a 35-percent pass-by rate was assumed for the coffee/donut shop, and a 25-percent pass by rate was assumed for the two retail developments. From the trip generation calculations, the proposed site will generate approximately 4,060 daily trips. After the consideration of pass-by traffic, approximately 2,840 primary, or new daily trips, would be generated. **Table 5** presents the trip generation of this proposed site. Worksheets documenting the trip generation are provided in the **Appendix**.

Table 5
TRIP GENERATION

Land use	ITE Code	Density	Daily Traffic	AM Peak Hour		PM Peak Hour	
				Enter	Exit	Enter	Exit
Coffee/ Donut Shop with Drive-Through Window	937	2,500 SF	2,051	113	109	54	54
Shopping Center	820	20,000 SF	2,012	100	61	79	87
TOTAL			4,063	213	170	133	141
Primary Trips, 65% Coffee/ Donut Shop; 75% Shopping Center			2,842	148	117	94	100
Pass-by Trips, 35% Coffee/ Donut Shop; 25% Shopping Center			1,221	65	53	39	41

Trip Distribution and Assignment

Using the turning movement count for the Kingston Pike and Capital Drive intersection and the local roadway network, generated trips were distributed to the street network. This distribution resulted in the primary trips as 40-percent from the east, 5-percent from the south, and 55-percent from the west on Kingston Pike. Pass-by trips were distributed based on the directional flow of traffic. **Figure 5** illustrates the primary traffic distribution for the AM and PM peak hours. **Figure 6** illustrates the pass-by traffic distribution for the AM and PM peak hours.

Project Traffic Volumes

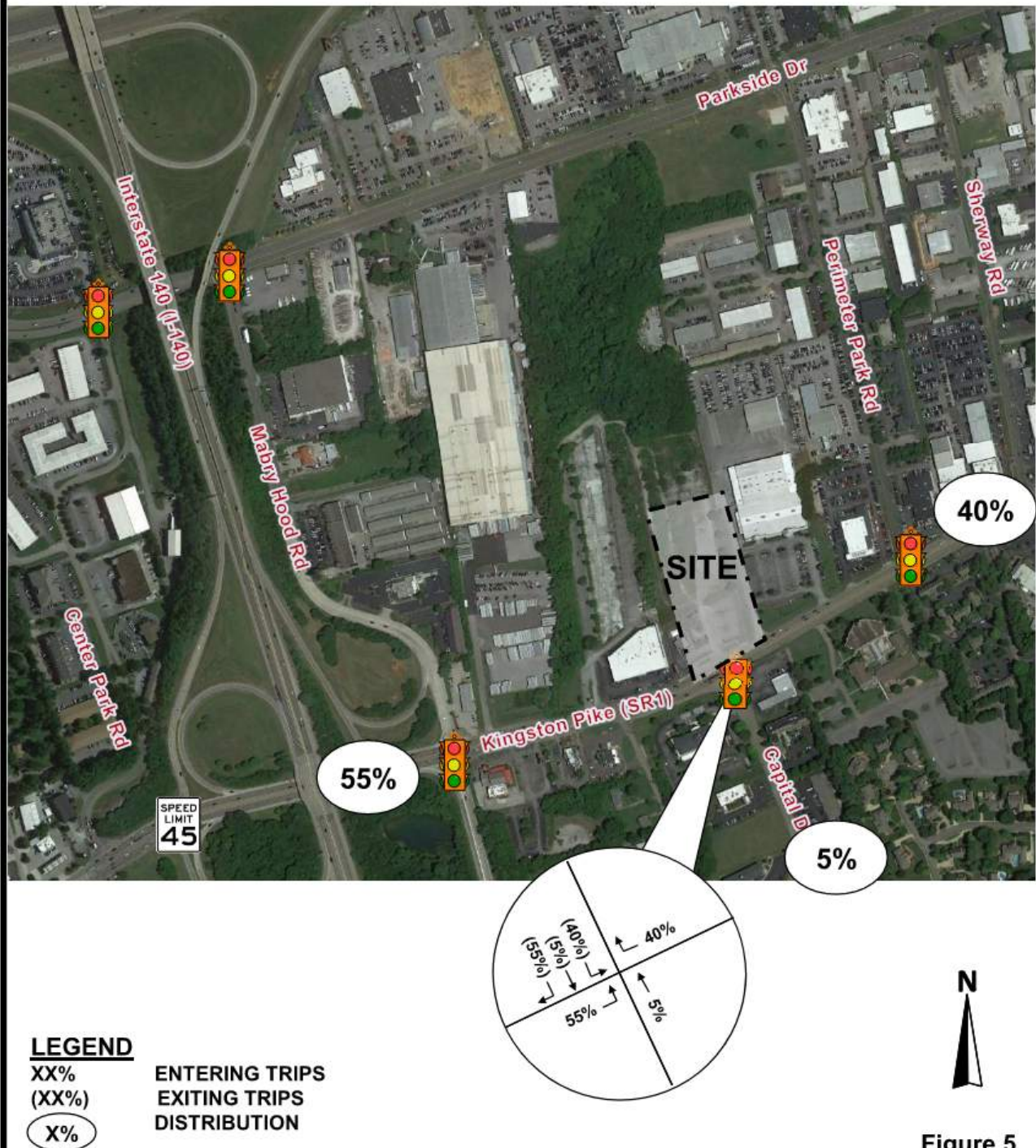
By combining the primary trips and pass-by trips generated by the respective assignment, the project traffic volumes were determined for the AM and PM peak hours. **Figures 7A and 7B** illustrate the primary and pass-by trips for the site, and **Figure 7C** illustrates the resulting total project traffic volumes associated with the proposed development.

Total Projected Traffic Volumes

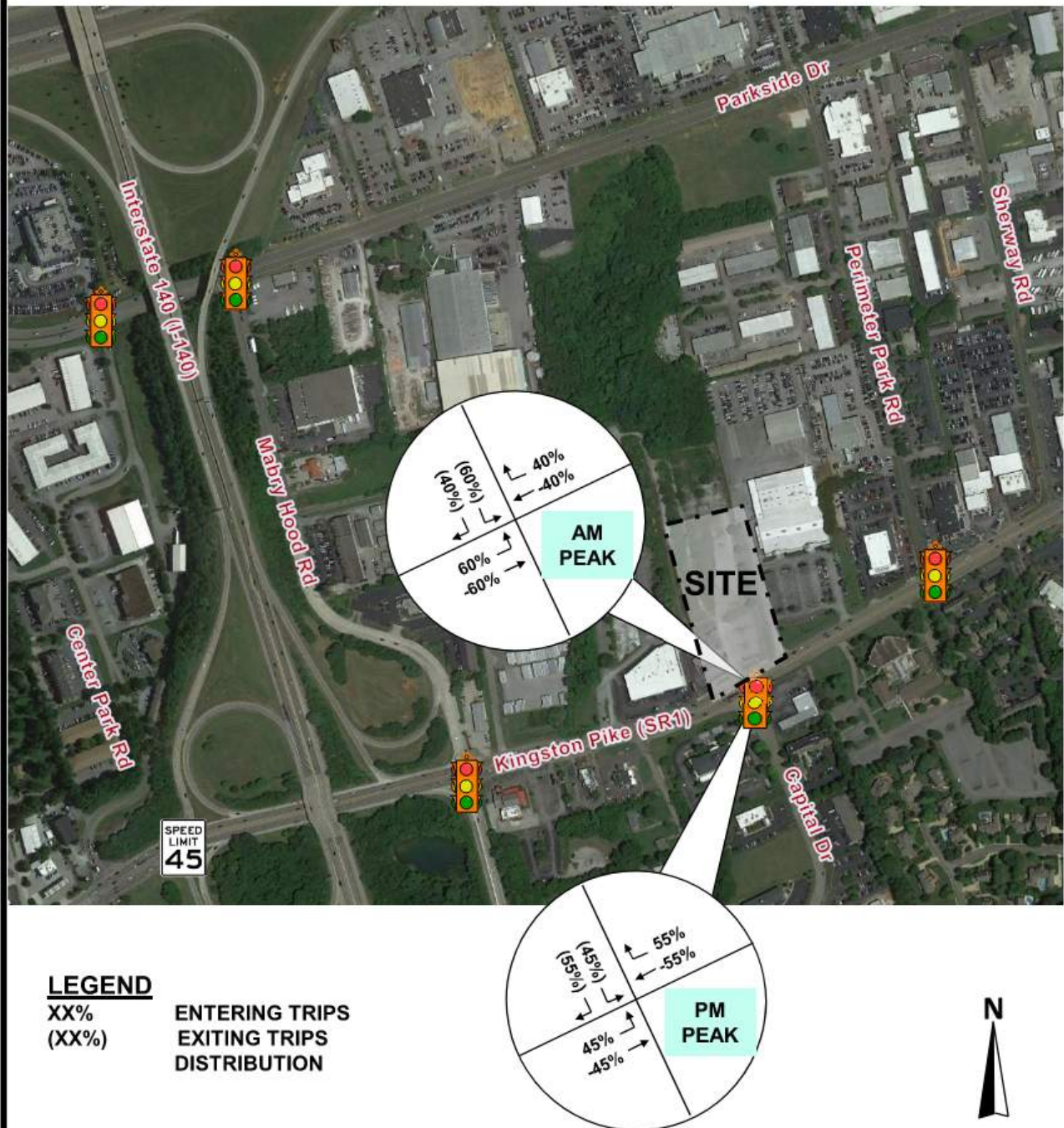
Background and project traffic volumes were summed to obtain post-development traffic volumes for the year 2026. **Figure 8** illustrates the 2026 projected traffic volumes at buildout. Using these volume projections, mitigation measures including traffic control devices and modifications to the roadway and intersection geometry can be evaluated.

PRIMARY TRIP DISTRIBUTION & ASSIGNMENT

Capital Drive Retail
Development
Knoxville, TN

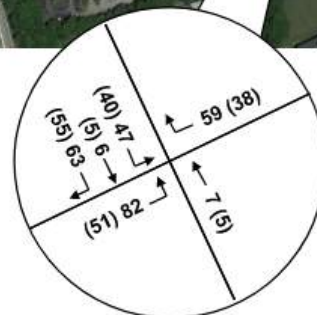


**PEAK HOUR
PASS-BY TRIP
DISTRIBUTION**
Capital Drive Retail
Development
Knoxville, TN



PRIMARY PROJECT TRIPS

Capital Drive Retail
Development
Knoxville, TN



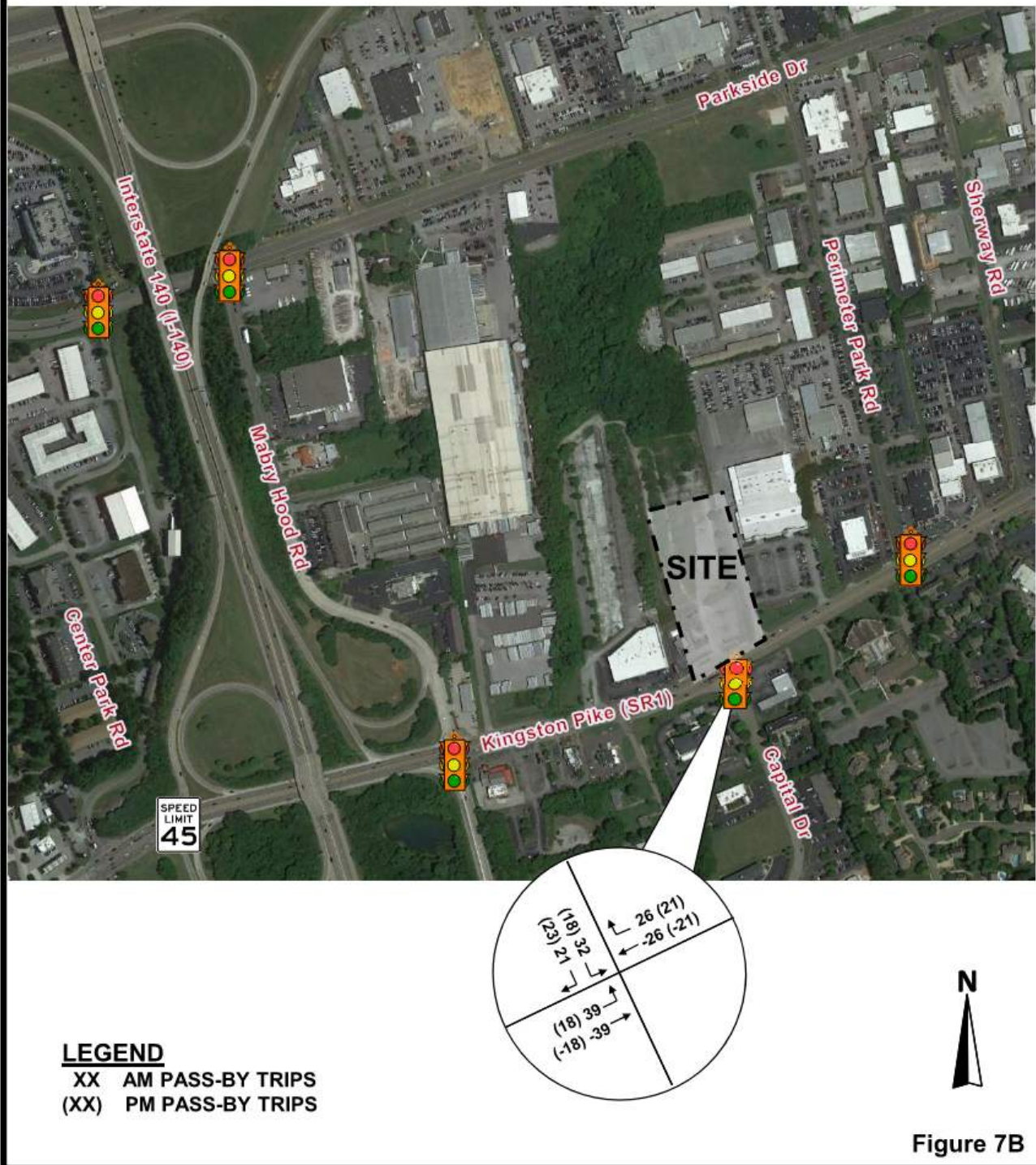
LEGEND

XXX AM PROJECT TRIPS
(XXX) PM PROJECT TRIPS

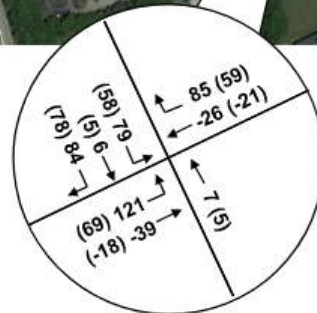


Figure 7A

**PASS-BY
PROJECT TRIPS**
Capital Drive Retail
Development
Knoxville, TN



**TOTAL
PROJECT TRIPS**
Capital Drive Retail
Development
Knoxville, TN



LEGEND

XXX AM PEAK HOUR
(XXX) PM PEAK HOUR



Figure 7C

**2026 PROJECTED
PEAK HOUR
TRAFFIC VOLUMES**
Capital Drive Retail
Development
Knoxville, TN

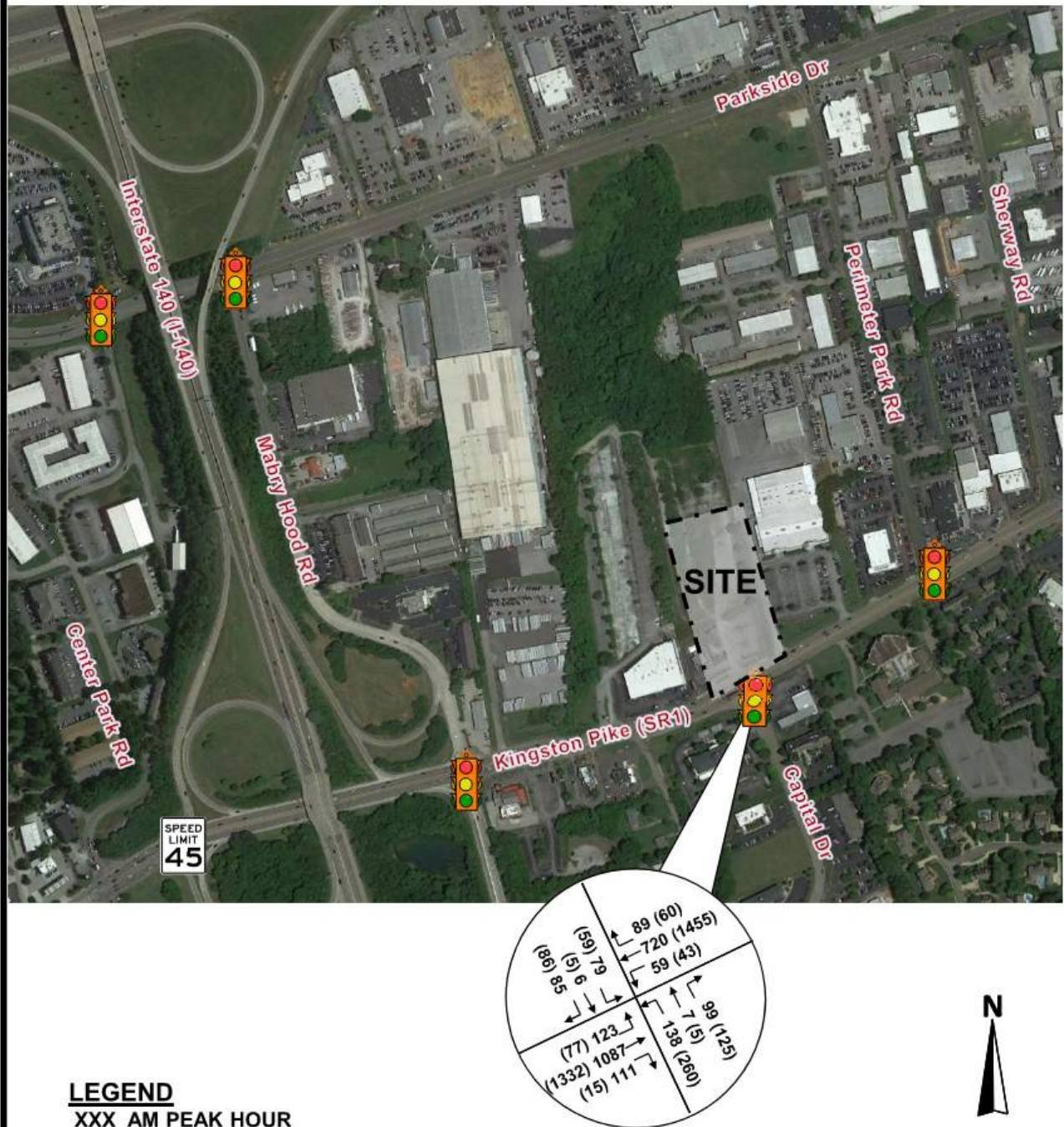


Figure 8

Projected Capacity Level of Service

The analyses conducted for the projected 2026 horizon year with the proposed development are presented in **Table 6**.

Table 6
2026 PROJECTED TRAFFIC
CAPACITY AND LEVEL OF SERVICE

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	V/C	DELAY	LOS
Capital Drive at Kingston Pike	SIGNAL	AM	3.20	81.9	F
		PM	3.36	119.6	F
Exclusive NBL Turn Lane and SBL Turn Lane, Phasing Modification and Split Optimization	<i>SIGNAL Mitigation</i>	<i>AM</i>	<i>0.65</i>	<i>12.6</i>	<i>B</i>
		<i>PM</i>	<i>0.99</i>	<i>35.2</i>	<i>D</i>

Note: Average vehicle delay estimated in seconds. V/C ratios reported from worst-case movement.

The proposed development analyses found that without improvements the intersection of Capital Drive and Kingston Pike will decline to a LOS F for the AM peak hour and will maintain a LOS F for the PM peak hour. The identified critical lane groups are the northbound left-through lane and southbound approach. V/C ratios for the southbound approach is projected to exceed capacity (v/c greater than 1.00) during both peak hours, while the northbound left-through lane will exceed capacity during the PM peak.

The failing conditions of the northbound and southbound approaches illustrate the need for an exclusive left-turn lane with appropriate signal phasing in both directions. By modifying the left-turn phasing to allow for protected-permissive turns and optimizing the signal's split timings, the intersection will operate at an acceptable LOS B during the AM peak hour and LOS D during the PM peak hour. The v/c ratio for the southbound through-right movement is reduced to 0.99, and the v/c ratio for the northbound left-turn movement are reduced significantly to 0.54 and 0.86 during the AM and PM peak hours, respectively. Synchro analyses are based on current signal system operations, except where phasing is modified and splits are optimized, and this study utilized the existing, observed peak hour factors for all analysis periods. For the AM peak hour volumes at the southbound approach, a peak hour factor of 0.92 was utilized to highlight the new trips from the proposed retail developments. The PM peak hour at the southbound approach consists of exiting volumes from the existing GemStore; therefore, the existing peak hour factor was applied. Worksheets documenting the Synchro analysis are located in the **Appendix**.

Additional analysis was conducted to determine the feasibility of a three-lane configuration at the northbound approach of Capital Drive as a left, through, and right-turn approach in comparison to

a two-lane approach with an exclusive left-turn lane and shared through-right lane as previously discussed. This three-lane configuration also allows the same tapering development of the right-turn lane as currently exists. With the three lane approach and modifying the signal's split timings, the intersection will operate at nearly identical conditions as with a two-lane approach, as there are minimal volumes for the northbound through movement during both peak periods. The AM peak hour will operate at LOS B, and the PM peak hour will operate at LOS D. The v/c ratio for the northbound right turns is expected to decrease from 0.58 to 0.51 in the AM peak hour and from 0.55 to 0.51 in the PM peak hour. The analyses results comparison is presented in **Table 7**. Worksheets documenting the Synchro analysis are located in the **Appendix**.

Analyses was performed with the northbound approach operating as a left, shared through-left, and right lane configuration to improve conditions for northbound left turns. This geometry will distribute the high volume left turns across two lanes, and the signal will utilize split-phased operation for the northbound and southbound approaches. Due to the intersection's proximity to the I-140 (Pellissippi Parkway) and Kingston Pike interchange, the lane distribution for the double left-turns was not evenly split. It was assumed that 75-percent of left turning traffic would use the inside turn lane to easily access I-140, and the remaining 25-percent would use the outside, left-most lane. The lane utilization factors in Synchro were modified to illustrate the imbalance of traffic between these two lanes.

With the new three lane configuration and split-phased operation using the existing cycle lengths, minimal changes are expected during both peak hours. It is important to note that the shared lane configuration cannot be analyzed using HCM 6th methodologies as previously used throughout the report; thus, the analysis results are presented using HCM 2000 methodologies. The AM peak hour will maintain a LOS B, and the PM will slightly improve from LOS D to LOS C. Overall intersection delays for the AM peak hour will increase almost 8 seconds, while the PM peak hour intersection delays will be similar as without the split-phasing. The v/c ratio for the northbound center lane is expected to increase from 0.03 to 0.43 in the AM peak hour and from 0.02 to 0.59 in the PM peak hour.

With the assumed lane imbalance favoring the center lane, queues will maintain for the left-turn and right-turn lanes and lengthen in the center lane. Queues will extend nearly 100 feet in the AM peak hour in the center lane and extend approximately 175 feet in the PM peak hour. Though there is slight improvement to delays and v/c ratios with the split-phased operation, queueing conditions worsen for the northbound approach. Also, if lane distributions vary more evenly than our assumptions, additional queueing may occur at this approach. In terms of

comparison, the first three lane configuration with exclusive left, through, and right lanes is a more favorable option. The analysis results are shown in **Table 7**, and worksheets documenting the Synchro analysis are located in the **Appendix**.

Table 7
2026 PROJECTED TRAFFIC CAPACITY AND LEVEL OF SERVICE
WITH NORTHBOUND APPROACH IMPROVEMENTS

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	V/C	DELAY	LOS
Capital Drive at Kingston Pike	SIGNAL	AM	3.20	81.9	F
		PM	3.36	119.6	F
Exclusive NBL Turn Lane and SBL Turn Lane, Phasing Modification and Split Optimization	<i>SIGNAL Mitigation</i>	<i>AM</i>	<i>0.65</i>	<i>12.6</i>	<i>B</i>
		<i>PM</i>	<i>0.99</i>	<i>35.2</i>	<i>D</i>
Exclusive NBL, NBT, NBR, and SBL Turn Lanes; Phasing Modification and Split Optimization	<i>SIGNAL Mitigation</i>	<i>AM</i>	<i>0.65</i>	<i>12.5</i>	<i>B</i>
		<i>PM</i>	<i>0.99</i>	<i>35.1</i>	<i>D</i>
Exclusive NBL, NBL-T, NBR, and SBL Turn Lanes; NB/SB Split-Phased Operation	<i>SIGNAL Mitigation</i>	<i>AM</i>	<i>0.61</i>	<i>20.1</i>	<i>B</i>
		<i>PM</i>	<i>0.92</i>	<i>31.0</i>	<i>C</i>

Note: Average vehicle delay estimated in seconds. V/C ratios reported from worst-case movement.

Scenarios with split-phased operation analyzed using HCM 2000 methodologies.

Auxiliary Turn Lane Analysis

This study investigated the addition of an exclusive lane for the westbound right-turns at the study intersection. Currently, there exists a paved and unmarked area that can accommodate 50 feet of storage and a 50-foot taper length on Kingston Pike. Levels of service for the westbound approach are acceptable and do not indicate the need for a separate right-turn lane. Additionally, queues for the westbound approach are likely to extend beyond this paved, unmarked area, thus prohibiting the opportunity for storage. However, the use of this shoulder area for right-turning vehicles provides relief for right-turning vehicles approaching a green signal along with heavy flows of through traffic volumes and is likely to be used if not formalized.

Queue Analysis

The analyses also examined queues that may impact the operation and progression of traffic along Kingston Pike. Currently, there is one exclusive eastbound and one exclusive westbound left-turn lane on Kingston Pike at Capital Drive, and both provide 200 feet of storage. Based on the HCM 6th Edition methodologies of Synchro, the 95th Percentile queues are shown in **Table 8** for the eastbound and westbound left-turn lanes on Kingston Pike during the background and buildout conditions. Queues within 90-percent or more of existing storage lengths are highlighted in red in **Table 8**. Worksheets documenting the queue analysis are located in the **Appendix**.

Table 8
2026 PROJECTED 95TH PERCENTILE QUEUES
WITH AND WITHOUT MITIGATION

Approach & Direction		Peak Hour	Available Storage (ft)	95th Percentile Queue (ft) ¹		
				2026 Background	2026 Build with Partial Mitigation ²	2026 Build with Full Mitigation ²
Kingston Pike	EB-L	AM	200	3	108	60
		PM	200	11	188	81
Kingston Pike	WB-L	AM	200	21	33	34
		PM	200	23	31	34

1. Partial Mitigation includes exclusive NBL/T/R and SBL turn lanes, NB/SB phase modification and signal split optimization.
Full Mitigation includes the partial mitigation improvements and EBL protected-permissive phasing.

Two stages of mitigation measures are shown in **Table 8** that consider the partial mitigations as detailed in previous paragraphs, without the split-phased operation, and additional improvements necessary to reduce queues within the eastbound left-turn lane on Kingston Pike. The eastbound approach currently operates the exclusive left-turn lane as a permissive-only phase, while the opposing westbound exclusive left-turn lane operates with a protected-permissive phase. By providing the eastbound left-turn lane with a protected-permissive phase with similar timing parameters as the opposing left-turn then optimizing the signal's split timings, the left-turn queues on Kingston Pike can be reduced to manageable lengths for both peak hour periods.

Table 9 presents a summary of all LOS analyses conducted for this study, including the analysis of the full buildout of improvements at the intersection of Capital Drive and Kingston Pike which includes exclusive northbound and southbound left-turn lanes, an exclusive westbound right-turn lane, phasing modification for protected-permissive left-turns at all approaches, and signal split optimization. With the full mitigation, the intersection can be expected to operate at an acceptable LOS B during the AM peak hour and LOS D during the PM peak hour. Conditions slightly worsen for intersection delays during both peak hours due to the added left-turn phasing; however, there are improvements to the v/c ratio for the northbound left-turns as well as reductions in the eastbound left-turn queues, particularly for the PM peak hour, that are acceptable trade-offs for this scenario.

Internal Traffic Queues

The proposed extension of Capital Drive north of Kingston Pike will be extended approximately 400-foot as a three-lane roadway. Traffic queues were reviewed to determine if driveway impacts would occur during the AM and PM peak hours with the full buildout in 2026. In 2026 at full

buildout, Synchro 95th percentile queues for the southbound left-turn lane are estimated to be 100 feet in the AM peak hour and 71 feet in the PM peak hour from the stop line at Kingston Pike. Synchro 95th percentile queues for the southbound through-right lane are predicted to be 61 feet in the AM peak hour and 23 feet in the PM peak hour from the stop line at Kingston Pike. The queues from the southbound approach lanes will be accommodated by the proposed Capital Drive extension. Driveways should be located to the most extreme property limits to minimize the number of events where queues block access during the peak hours, and acceptable sight distances for the site driveways should be provided.

Alternative Modes

There are no multi-modal facilities along Kingston Pike for bicyclists or pedestrians within the project area. There are also no Knoxville Area Transit (KAT) bus stops or routes within the project area. The closest bus stop is nearly one mile east of the study intersection and is the N. Seven Oaks at Ed Financial stop on Route 16: Cedar Bluff Connector, which travels northbound to N. Peters Rd. City of Knoxville staff have indicated that sidewalks will not be required along the Kingston Pike road frontage. Any sidewalks proposed within the proposed site will require the construction of sidewalk and ADA-compliant curb ramps on any connecting corners of site driveways.

**Table 9
SUMMARY OF
CAPACITY AND LEVEL OF SERVICE**

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	2021 TRAFFIC			2026 BACKGROUND			2026 PROJECTED		
			V/C	DELAY	LOS	V/C	DELAY	LOS	V/C	DELAY	LOS
Capital Drive at Kingston Pike	SIGNAL	AM	0.61	8.2	A	0.62	8.4	A	3.20	81.9	F
		PM	3.17	124.2	F	3.32	131.9	F	3.36	119.6	F
Exclusive NBL Turn Lane and SBL Turn Lane, NB/SB Phasing Modifications and Split Optimization	<i>SIGNAL Mitigation</i>	<i>AM</i>							<i>0.65</i>	<i>12.6</i>	<i>B</i>
		<i>PM</i>							<i>0.99</i>	<i>35.2</i>	<i>D</i>
Exclusive NBL/T/R, and SBL Turn Lanes; NB/SB Phasing Modification and Split Optimization	<i>SIGNAL Mitigation</i>	<i>AM</i>							<i>0.65</i>	<i>12.5</i>	<i>B</i>
		<i>PM</i>							<i>0.99</i>	<i>35.1</i>	<i>D</i>
Exclusive NBL/T/R, SBL, and WBR Turn Lanes; NB/SB/EB Phasing Modification and Split Optimization	<i>SIGNAL Mitigation</i>	<i>AM</i>							<i>0.65</i>	<i>14.1</i>	<i>B</i>
		<i>PM</i>							<i>0.99</i>	<i>38.1</i>	<i>D</i>

Note: Average vehicle delay estimated in seconds. V/C ratios reported from worst-case movement.

RECOMMENDATIONS

The analyses conducted identifies the following recommendations. Final recommendations noted below include the recommendations of the supplemental analyses conducted in the included addendum letter reports.

- Construct approximately 400 feet of a three-lane roadway north of Kingston Pike (S.R. 1) to provide access to the existing GemStore jewelry store, proposed coffee/donut shop, and two proposed retail developments.
- Provide 100-foot storage for a left-turn lane on the new connector stub road at the southbound approach to Kingston Pike as shown in **Figure 9**.
 - Ensure there are no driveway openings to the GemStore and proposed retail developments within this storage length.
- Maintain the existing configuration of the northbound approach on Capital Drive to provide a shared left-through lane and a separate right-turn lane as shown in **Figure 9**.
 - Maintain the split-phased operation for the northbound and southbound approaches.
 - Maintain existing Do Not Block Driveway sign (R10-7 mod) and STOP bar striping at the existing access to the Broadway Carpets business on Capital Drive.
 - Ensure adequate distance between the turning path of the proposed northbound left-through lane and the STOP bar locations of the eastbound travel lanes.
- Provide a 50-foot storage westbound right-turn lane on Kingston Pike via appropriate striping as shown in **Figure 9**.
- Any sidewalks constructed within the proposed site along the connector stub road will require the construction of ADA-compliant curb ramps on any connecting corners of site driveways. Post STOP signs (R1-1) for exiting traffic from the GemStore, proposed coffee/donut shop, and proposed retail strip development driveways located along the new connector road north of Kingston Pike.
- Modify signal operations of existing span-wire system to include appropriate signal parameters to facilitate the proposed connector stub road and recommended turn lanes, which include:
 - Provide protected-permissive phasing for eastbound left-turn with additional signal heads and phasing and timing updates.
 - Provide protected-permissive phasing for northbound left-turn with additional signal heads and phasing and timing updates.
 - Provide the appropriate signal heads and phasing and timing updates for the northbound and southbound split-phased operations.
- Implement recommended timing and phasing plans for signals at the intersections of Kingston Pike and Sherway Road, Capital Drive, and Mabry Hood Road as provided in the **Appendix** with the Addendum #2 Supporting Documents.
- Minimize landscaping, using low growing vegetation, and signing at the proposed street access to insure that safe sight distance is maintained.

-
- Intersection and roadway design should conform to the recommended standards and practices of TDOT, AASHTO, ITE, the City of Knoxville Traffic Engineering Department, and Knox County EPW.

RECOMMENDED INTERSECTION GEOMETRY FOR PROPOSED DEVELOPMENT

Capital Drive Retail
Development
Knoxville, TN



NOTES:

- A. Tightening intersection layout requires asphalt removal. Likely to include utility and drainage impacts.
- B. ADA-compliant curb ramps required, including detectable warning surface and turning space behind ramp.
- C. Striping of turn lane assumes shoulder is full depth.
- D. Stub road construction will require modification of access and parking at GemStore jewelry store.



Figure 9

CONCLUSION

The study addressed the transportation impact analysis and access requirements of an existing GemStore jewelry store and a proposed coffee/donut shop and two retail store developments within a Capital Drive retail development via an approximately 400-foot long proposed Capital Drive stub road constructed to Knox County standards from centerline of Kingston Pike (S.R. 1). Traffic signal system parameters were maintained throughout the study except when phasing modification and split optimization are required. Peak hour factors were consistent between all PM peak hour analysis periods to provide a conservative queue length and operational analysis. Adjustments were made to peak hour factors at the proposed stub road during the AM peak hour with the proposed development to account for new trips. Existing traffic for the signalized intersection was found to be operating at LOS A and LOS F for the AM and PM peak hours. Background traffic was determined using a 1.0-percent compounded growth rate until the horizon year 2026. The analysis does not include development of the undeveloped 25-acre tract north of the proposed site as there are no known development plans. Without the proposed development, the study intersection will maintain its LOS A in the AM peak hour and LOS F during the PM peak hour. Traffic associated with the proposed development was generated for a 2,500 SF coffee/donut shop with drive-through window and two 10,000 SF retail stores. The site will generate 4,060 daily trips, and after consideration of pass-by traffic, approximately 2,840 primary trips will be generated. Trips were assigned to the study intersection projected conditions and analyzed for capacity and level of service. Analyses found that acceptable levels of service can be achieved for the study intersection with improvements of added turn lanes, phasing modifications, and split optimizations. Driveways should be located to the most extreme property limits to minimize the number of events where queues block access during the peak hours. Acceptable sight distances for the site driveways should be provided. With the recommendations of this report, the impact of this proposed site can be minimized and manageable.

ADDENDUM #1

Capital Drive at Kingston Pike Northbound Approach Configuration



1100 Marion St., Suite 300
Knoxville, Tennessee 37921
tel: 865.963.4300
fax: 865.524-5311

July 23, 2021

Mr. Rodney Phillips
All Eleven General Partnership
150 Major Reynolds Place
Knoxville, Tennessee 37919

RE: Capital Drive at Kingston Pike Northbound Approach Configuration

Dear Mr. Phillips:

CDM Smith is pleased provide this letter report regarding the recommendations of the June 2021 traffic impact study for the proposed Capital Drive Retail Development that would be at the intersection of Capital Drive and Kingston Pike. Specifically, the purpose of this letter report is to review alternatives for the northbound approach geometry due to the unfeasibility of moving a monument that is currently placed in the median of the northbound approach.

The traffic impact study report recommended that the northbound approach on Capital Drive be reconfigured to provide a 300-foot storage left-turn lane, a separate through lane, and a right-turn lane. As this would require the removal of a 50-foot landscaped median and relocation of a monument sign in the median at this approach, it was noted that the northbound approach can maintain its operation with its existing configuration by providing a shared left-through lane and a separate right-turn lane with split phased operation for the northbound and southbound approaches. It is important to note that an exclusive left-turn lane and shared through-right configuration is not recommended for the northbound approach as the through-right lane will be offset from the opposing receiving lane.

The remaining buildout analysis and final recommendations of the traffic impact study report continued forward assuming the northbound approach could operate with three exclusive lanes; however, it is our understanding that this is an unfeasible configuration for the northbound approach because of the cost to remove and relocate the monument sign. The analysis results in this letter retain the remaining intersection improvements as stated in the traffic impact study report (an exclusive westbound right turn lane and eastbound left-turn phasing modification).

Analysis of the buildout conditions were conducted using Synchro, version 10, with HCM 6th edition methodologies and found that with a north- and southbound split phased operation, the intersection of Capital Drive and Kingston Pike will operate at an overall level-of-service (LOS) C and D during the AM and PM peak hours, respectively. It should be noted that the signal cycle lengths were optimized during this analysis. The AM peak hour cycle length optimized to 80 seconds, and the PM peak hour





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cycle length optimized to 150 seconds. Worst-case movement volume-to-capacity (v/c) ratios are 0.75 during the AM peak hour and 0.99 during the PM peak hour. During the PM peak hour, the northbound through-left and the southbound through-right lanes are near capacity. Queues for the northbound approach will lessen with the split phased operation compared to the existing operations; although, during the PM peak hour, the northbound left-through lane queues may potentially extend past the full lane development of the right turn lane.

With northbound/southbound split phase operation and the additional improvements at the Capital Drive and Kingston Pike intersection (an exclusive westbound right turn lane and eastbound left-turn phasing modification), conditions for the AM and PM peak hours negligibly worsen as overall intersection delays for both peak periods will increase by approximately 2 seconds. Again, these results are with cycle length optimization, and the cycle lengths optimized to 80 seconds in the AM peak hour and 110 seconds in the PM peak hour. During the PM peak hour, the northbound left-through lane is expected to operate near capacity with a v/c ratio of 0.99, yet the v/c ratio of the southbound through-right lane is expected to decrease to 0.54. Northbound queues during the PM peak hour will reduce slightly but the left-through lane queues are expected to extend past the full lane development of the right turn lane.

The capacity and LOS analyses results comparison is presented in Table 1, and the 95th percentile queues for the northbound approach are shown in Table 2.

Table 1: Summary of 2026 Projected Capacity and Level-of-Service

INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	V/C	DELAY	LOS
Capital Drive at Kingston Pike	SIGNAL	AM	3.20	81.9	F
		PM	3.36	119.6	F
NB/SB Split-Phased Operation & Cycle Length Optimization	<i>SIGNAL Mitigation</i>	<i>AM</i>	<i>0.75</i>	<i>20.8</i>	<i>C</i>
		<i>PM</i>	<i>0.99</i>	<i>41.2</i>	<i>D</i>
NB/SB Split-Phased Operation, Cycle Length Optimization, Exclusive WBR Turn Lane & EB Phasing Modification	<i>SIGNAL Mitigation</i>	<i>AM</i>	<i>0.75</i>	<i>22.5</i>	<i>C</i>
		<i>PM</i>	<i>0.99</i>	<i>43.9</i>	<i>D</i>

Note: Average vehicle delay estimated in seconds. V/C ratios reported from worst-case movement.



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July 23, 2021

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Table 2: 2026 Projected 95th Percentile Queues

Approach & Direction		Peak Hour	Available Storage (ft)	95th Percentile Queue (ft)		
				2026 No Build	2026 Build with Partial Mitigation ¹	2026 Build with Full Mitigation ¹
Capital Drive	NBL-T	AM	---	200	135	135
		PM	---	406	365	278 ²
Capital Drive	NBR	AM	145	45	0	0
		PM	145	71	74	36

1. Partial Mitigation includes exclusive NB/SB split-phased operation and cycle length optimization.

Full Mitigation includes the partial mitigation improvements, WBR turn lane, and EBL protected-permissive phasing.

2. 95th percentile volume exceeds capacity.

In comparison to the analyses results of the recommended approach geometry from the traffic impact study (separate left, through, and right lanes) there are minimal differences in v/c ratios, delay, and northbound queues as with the three exclusive lane configuration. Table 3 shows the comparison of analyses results.

Table 3: Results Comparison to June 2021 Traffic Impact Study Recommended Geometry

Peak Hour	Criteria	Shared Left-Through & Right	Exclusive Left, Through, & Right
AM	V/C Ratio	0.75	0.65
	Delay (sec)	22.5	14.1
	LOS	C	B
	NBL Queue	135	164
PM	V/C Ratio	0.99	0.99
	Delay (sec)	43.9	38.1
	LOS	D	D
	NBL Queue	278	280

It should be noted that the analyses results of this letter report optimized the cycle length of the study intersection only; however, it is understood that the Capital Drive signal operates in a system with adjacent signals along Kingston Pike. It is possible, as mentioned in the traffic impact study report, that a split-phased operation will worsen queueing conditions for the northbound approach and have slight changes to overall intersection delays and v/c ratios. However, the northbound queues will depend on the actual cycle length employed in the field and is a function of how the City of Knoxville wants to allocate the signal timing to each phase.

Through the analyses documented in this letter report, with the buildout of the proposed Capital Drive Retail Development, the northbound approach of Capital Drive at Kingston Pike can operate as a shared left-through lane and exclusive right turn lane, which can be provided through the existing



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July 23, 2021

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layout. Additional analysis may be needed to ensure v/c ratios, delays, and queues with the split-phased operation of the signal within the signal system is within manageable measures. The recommendations of the June 2021 traffic impact study regarding the other intersection approaches are still valid and must be provided as well.

Sincerely,

A handwritten signature in black ink that reads "Allyson F. Boyd".

Allyson F. Boyd, PE
Transportation Engineer
CDM Smith Inc.



cc: Mr. Hollis Loveday, PE, CDM Smith Inc.

ADDENDUM #2

Capital Drive at Kingston Pike Corridor Progression



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September 13, 2021

Mr. Rodney Phillips
All Eleven General Partnership
150 Major Reynolds Place
Knoxville, Tennessee 37919

RE: Capital Drive at Kingston Pike Corridor Progression

Dear Mr. Phillips:

CDM Smith is pleased to provide this letter report regarding the recommendations of the June 2021 traffic impact study for the proposed Capital Drive Retail Development that would be at the intersection of Capital Drive and Kingston Pike. Specifically, the purpose of this letter report is to expand on the assumptions that the intersection of Capital Drive and Kingston Pike can sufficiently operate as a split-phased signal without significant negative impacts to traffic progressions on Kingston Pike.

In our letter report dated July 23, 2021, the analysis concluded that during the buildout conditions of the Capital Drive Retail Development and with a north- and southbound split-phased operation, the intersection of Capital Drive and Kingston Pike will operate at an overall level-of-service (LOS) C and D during the AM and PM peak hours, respectively. This analysis, however, solely analyzed the study intersection, and did not consider the impacts of adjacent signalized intersections on Kingston Pike. It is understood that the Capital Drive signal operates in a coordinated system with the adjacent signals on Kingston Pike. This letter report will present the analysis results of the two intersections on either side of Capital Drive, Mabry Hood Road/ I-140 Ramps and Sherway Road, and the coordination and progression of traffic among the signals with the proposed split-phased operation.

Peak hour traffic volumes were collected at Kingston Pike at Sherway Road and Mabry Hood Road in early September 2021, and the observed volumes were adjusted by the recommended 20-percent growth factor to synchronize with the adjusted values previously analyzed at Capital Drive. Signal timing data provided by the City of Knoxville shows that the Mabry Hood Road and Sherway Road signals both operate using split-phased timings, and all signals use different cycle lengths during the day. During the AM peak hour, the cycle length at Sherway Road is 100 seconds, while the cycle lengths at Capital Drive and Mabry Hood Road are 130 seconds. During the PM peak hour, the cycle length for all three signals is 140 seconds.

Analysis of the existing conditions were conducted using Synchro, Version 10 with HCM 6th edition methodologies, to establish baseline conditions of the study intersections within the signal system.





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The analysis determined that all intersections currently perform at LOS A or C during the AM peak hour and LOS C, D or F during the PM peak hour. As previously reported, the northbound approach at Capital Drive is over-capacity during the PM peak hour; likewise, the north- and southbound approaches at Mabry Hood/ I-140 ramps are near-capacity during the AM peak hour and over-capacity during the PM peak hour.

Observations of existing progression through the study area intersections shows that traffic does not always successfully travel through all three intersections in both directions during peak hours. During both peak hours, both directions of travel are impacted by the high volume of traffic exiting from I-140. Traveling eastbound, it is very common for the leading platoon of traffic to be stopped at Sherway Road from Mabry Hood Road, and those behind the leading platoon are likely to be stopped at Capital Drive. Westbound travel commonly progresses through Sherway Road and Capital Drive before being stopped at Mabry Hood Road. These observations are supported by the time-space diagrams illustrated in Synchro (see Figures 1 and 2) and visualizations in SimTraffic simulations.

With northbound/southbound split phase operation and the additional improvements at the Capital Drive and Kingston Pike intersection (an exclusive westbound right turn lane and eastbound left-turn phasing modification), conditions for the AM peak hour operate at LOS B or C and operate at LOS C or a D for the PM peak hour. These analysis results maintain the existing cycle lengths as currently observed and optimize the cycle offsets within the signal system. Proposed conditions for Capital Drive at Kingston Pike with the existing cycle lengths show better LOSs than shown in previous reports with shorter cycle lengths, likely due to the longer green times of Kingston Pike and the critical northbound phase. The capacity and LOS analyses results comparison is presented in Table 1.

Table 1: Summary of 2021 Existing and 2026 Projected Capacity and Level-of-Service

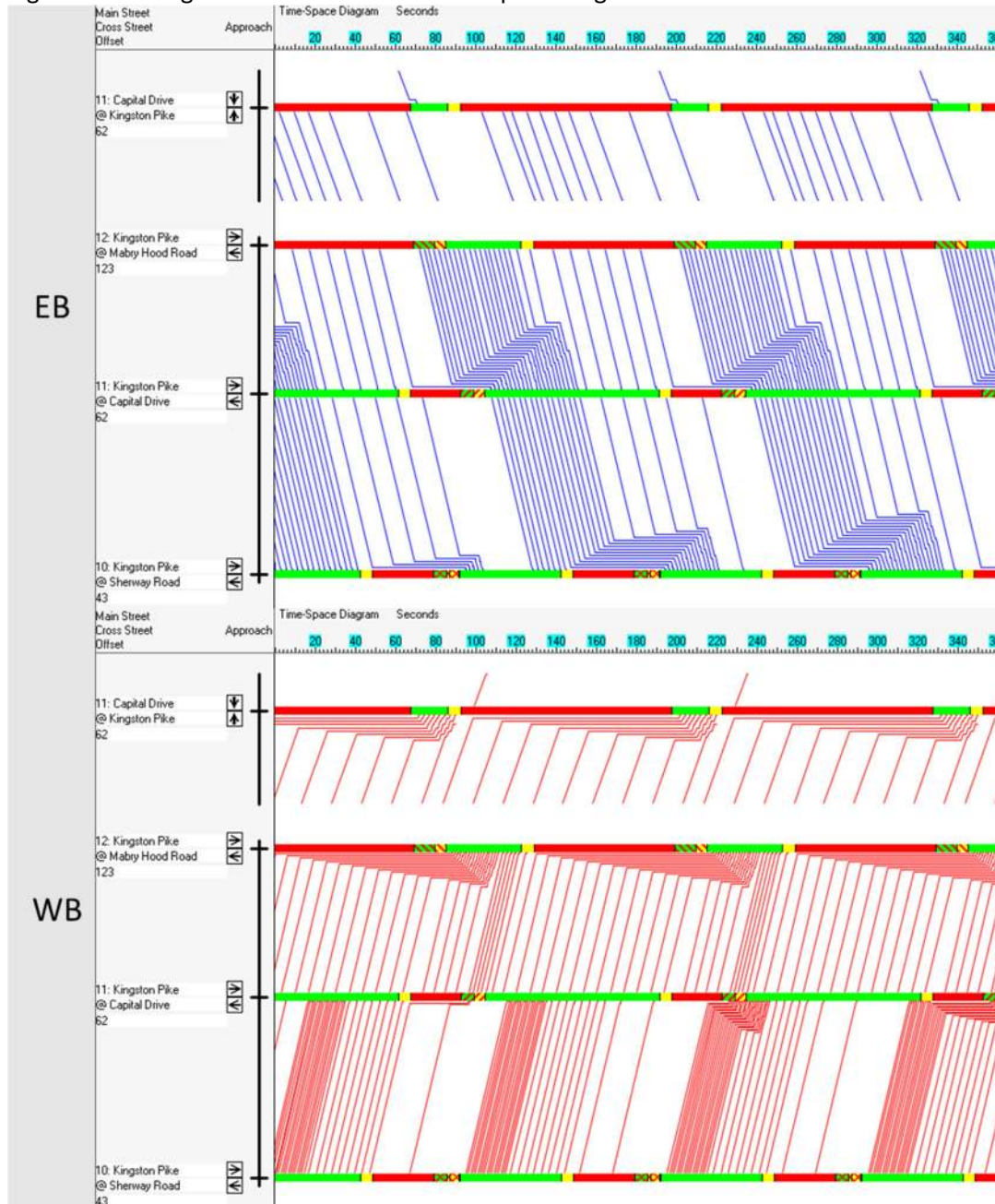
INTERSECTION	TRAFFIC CONTROL	PEAK PERIOD	2021 TRAFFIC			2026 PROJECTED		
			V/C	DELAY	LOS	V/C	DELAY	LOS
Sherway Road at Kingston Pike	SIGNAL	AM	0.60	10.0	A	0.62	10.8	B
		PM	0.77	20.4	C	0.73	27.6	C
Capital Drive at Kingston Pike	SIGNAL	AM	0.61	8.2	A	0.73	15.2	B
		PM	3.17	124.2	F	0.90	22.7	C
Mabry Hood Road at Kingston Pike	SIGNAL	AM	0.92	27.9	C	0.92	24.9	C
		PM	1.13	35.5	D	1.29	41.2	D

Note: Average vehicle delay estimated in seconds. V/C ratios reported from worst-case movement.

Capital Drive 2026 Projected configuration is with NBL-T/R split-phased operation, WBR turn lane, and EB phasing modification.

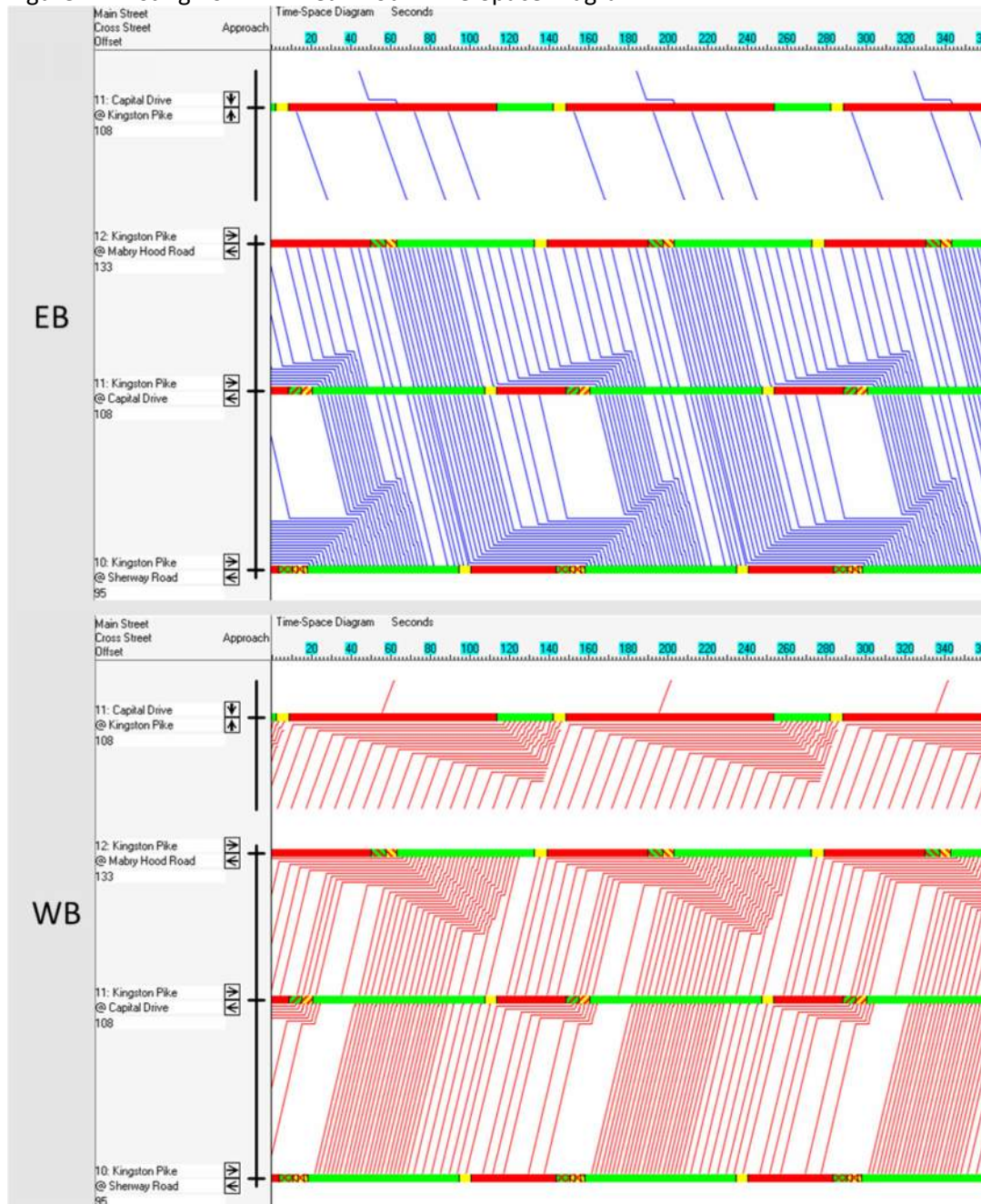
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Figure 1: Existing 2021 AM Peak Hour Time-Space Diagram



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Figure 2: Existing 2021 PM Peak Hour Time-Space Diagram



The split-phase operation of the signal at Capital Drive and additional traffic has both positive and negative impacts to the traffic progression along Kingston Pike as portrayed in SimTraffic visualizations and Synchro time-space diagrams, as shown in Figures 3 and 4. In the AM peak hour, with the offset optimization, eastbound progression improves, as traffic is more likely to proceed through Capital Drive during all eastbound green time at Mabry Hood Road. Some stops or queuing are expected at the approach to Sherway Road, which is not different than currently observed. Westbound AM peak hour traffic is more likely to encounter a stop or queue at Capital Drive, but experience stops and queueing at Mabry Hood as observed today. In the PM peak hour, eastbound traffic is more likely to be encounter a stop or queue at Capital Drive; yet is more likely to proceed through Sherway Road than currently observed. Similarly, traffic is more likely to encounter a queue or stop at Capital Drive from Sherway Road in the westbound direction; yet, progression is similar between Capital Drive and Mabry Hood Road as today.

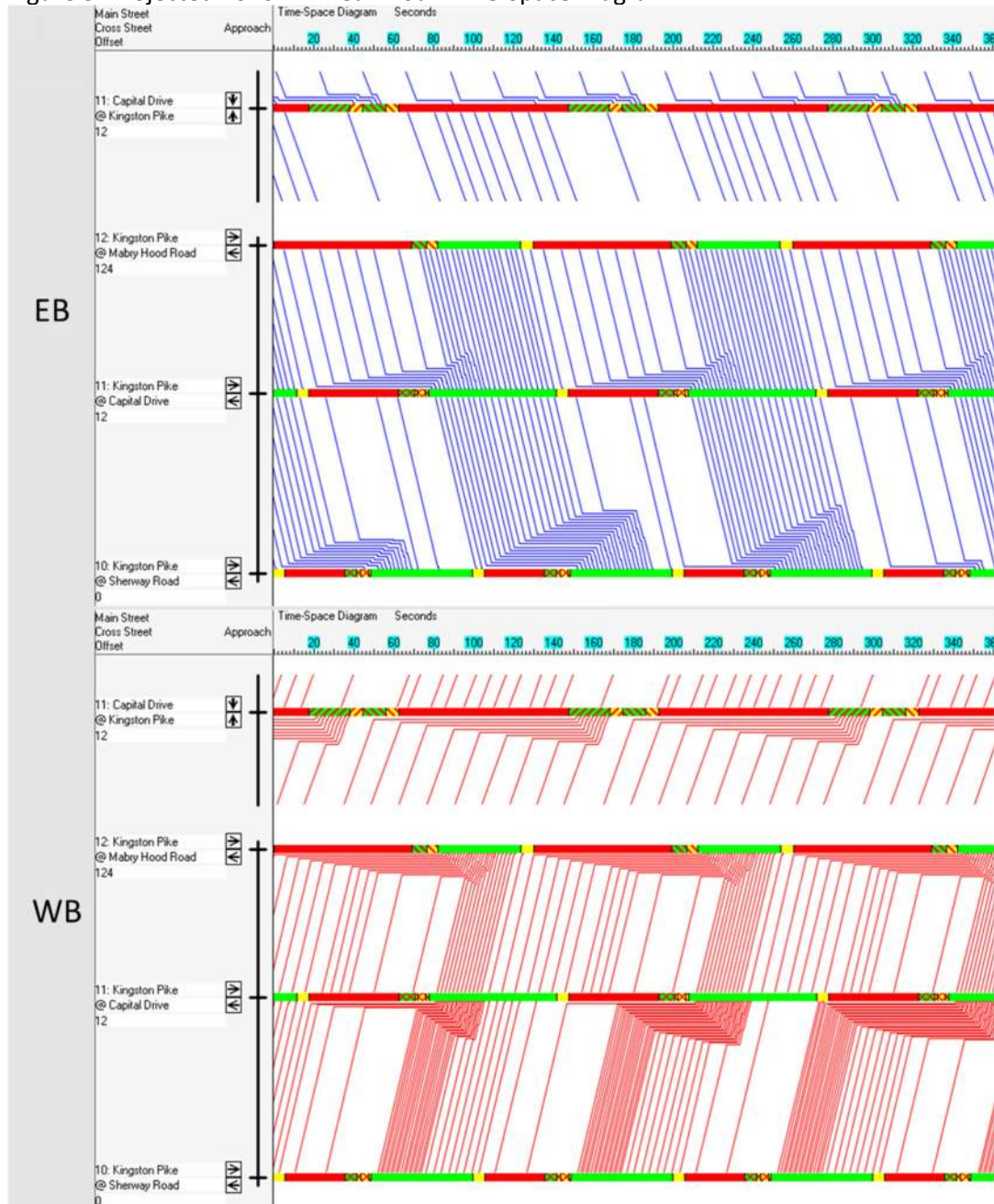
Additional queue analyses can also determine the impact of the proposed operations and progression of traffic along Kingston Pike. Using the HCM 6th methodologies of Synchro, the 95th percentile of the east- and westbound traffic along Kingston Pike is shown in Table 2. A comparison to existing queues is also shown. In the eastbound direction, PM peak hour queues at Mabry Hood Road are expected to increase by 150' with the optimized offset timings. The Synchro software's optimization minimizes delays as shown in Table 1 but at the expense of longer queues on Kingston Pike. In the westbound direction, AM peak hour queues at Mabry Hood and Capital Drive are expected to increase by 150' or more, and PM peak hour queues at Capital Drive are expected to increase by nearly 200'. These values reported illustrate the queues of optimized offset timings set by Synchro. It is possible to reduce these queues depending on how the City of Knoxville chooses to allocate the signal timings and offsets to each signal. As previously mentioned, the optimized timings favor an eastbound progression which is likely not preferred, especially during the PM peak hour.

Table 2: Kingston Pike 95th Percentile Queues Comparison with Split-Phase Operation at Capital Drive

Approach & Direction		Scenario	Peak Hour	95th Percentile Queue (ft)		
				Mabry Hood Rd.	Capital Dr.	Sherway Rd.
Kingston Pike	EB	Existing 2021	AM	505	295	260
			PM	375	455	395
Kingston Pike	EB	Projected 2026	AM	580	170	285
			PM	525	365	180
Kingston Pike	WB	Existing 2021	AM	270	105	215
			PM	495	380	505
Kingston Pike	WB	Projected 2026	AM	425	270	245
			PM	445	575	565

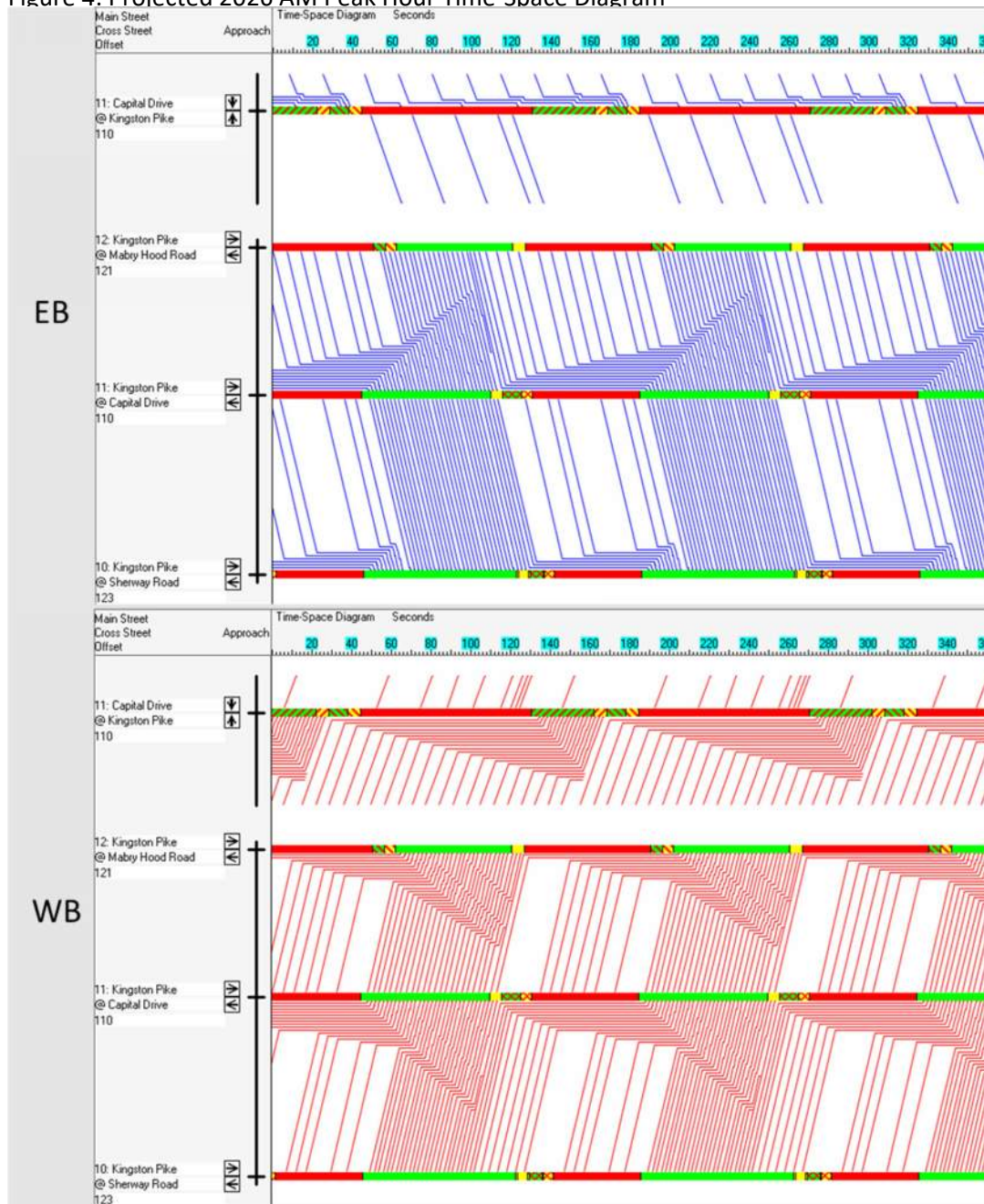
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Figure 3: Projected 2026 AM Peak Hour Time-Space Diagram



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Figure 4: Projected 2026 AM Peak Hour Time-Space Diagram



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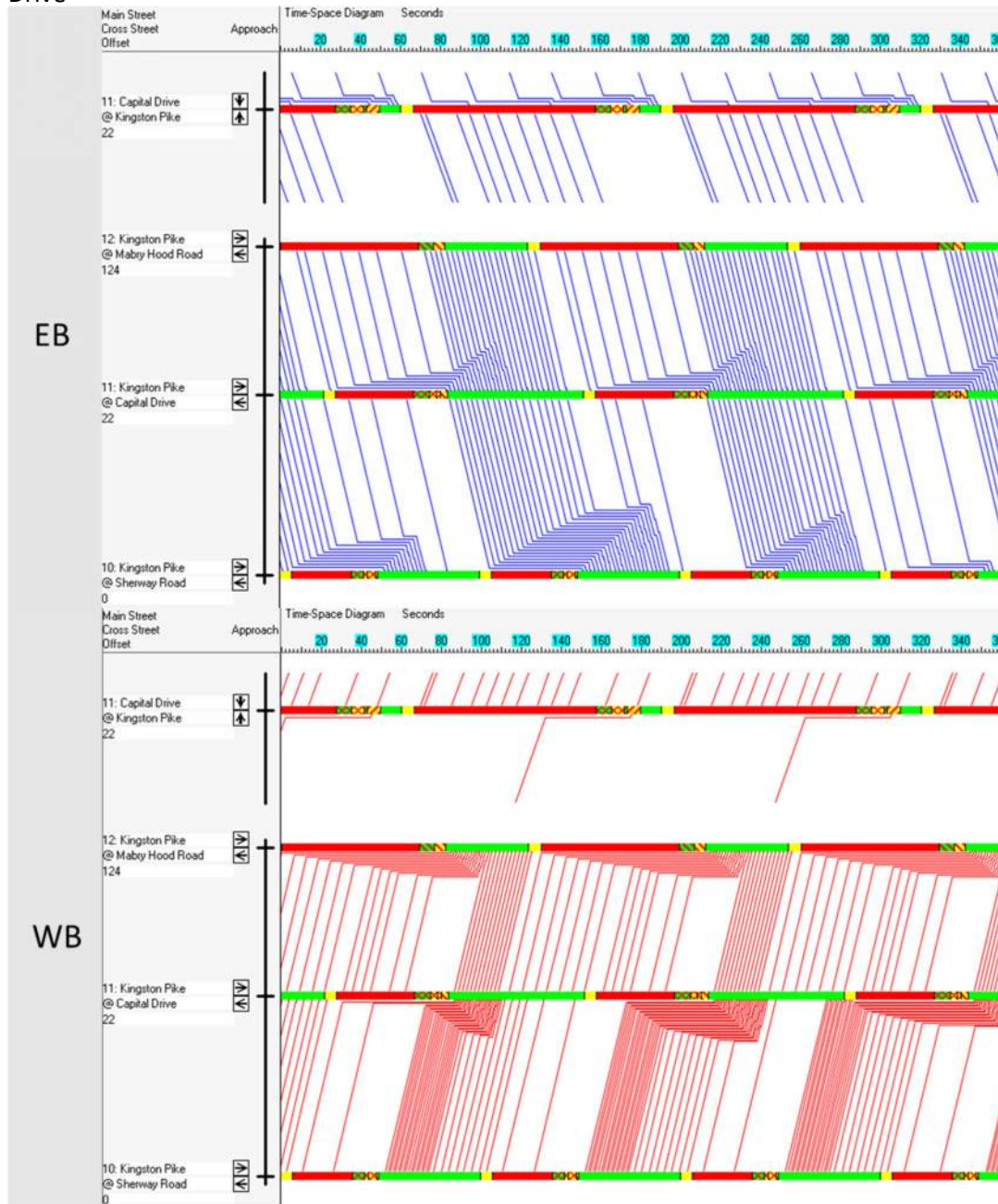
The initial recommendations of the Capital Drive Retail Development traffic impact study proposes that the northbound approach at Capital Drive be reconfigured to provide separate left, through, and right turn lanes, provided that the landscaped median can be removed and monument sign relocated. With the three-lane approach, the signal would operate under conventional phasing with additional left-turn phases for all approaches. For comparison purposes, additional analysis was conducted to compare the signal operations and Kingston Pike progression should Capital Drive be modified to provide a three-lane northbound approach. Using existing signal cycle lengths and optimized offsets, there are minimal differences between v/c ratios, delays, and northbound queues between the two- or three-lane configurations as shown in Table 3; however, westbound traffic along Kingston Pike between Capital Drive and Mabry Hood Road are negatively impacted by the different signal operations, specifically during the PM peak hour. Simulations in SimTraffic and Synchro time-space diagrams illustrated in Figures 5 and 6 show that westbound queues at Mabry Hood Road are expected to increase to near the entire distance to Capital Drive due to the added traffic on Kingston Pike and the wait time for the split-phase at Mabry Hood. With Capital Drive operating as a split-phased signal, this additional traffic is held at Capital Drive before being released to Mabry Hood Road and is likely to progress through the signal. As shown in Table 2, the worst-case queues expected at Capital Drive in the westbound approach are approximately 575 feet, which can be stored with no impacts to Sherway Road.

Table 3: Capital Drive Analysis Results Comparison

Peak Hour	Criteria	Split-Phased Signal	Conventional Signal
		Shared Left-Through & Right	Exclusive Left, Through, & Right
AM	V/C Ratio	0.65	0.65
	Delay (sec)	15.2	13.6
	LOS	B	B
	NBL Queue	195	165
PM	V/C Ratio	0.99	0.95
	Delay (sec)	22.4	15.1
	LOS	C	B
	NBL Queue	330	275

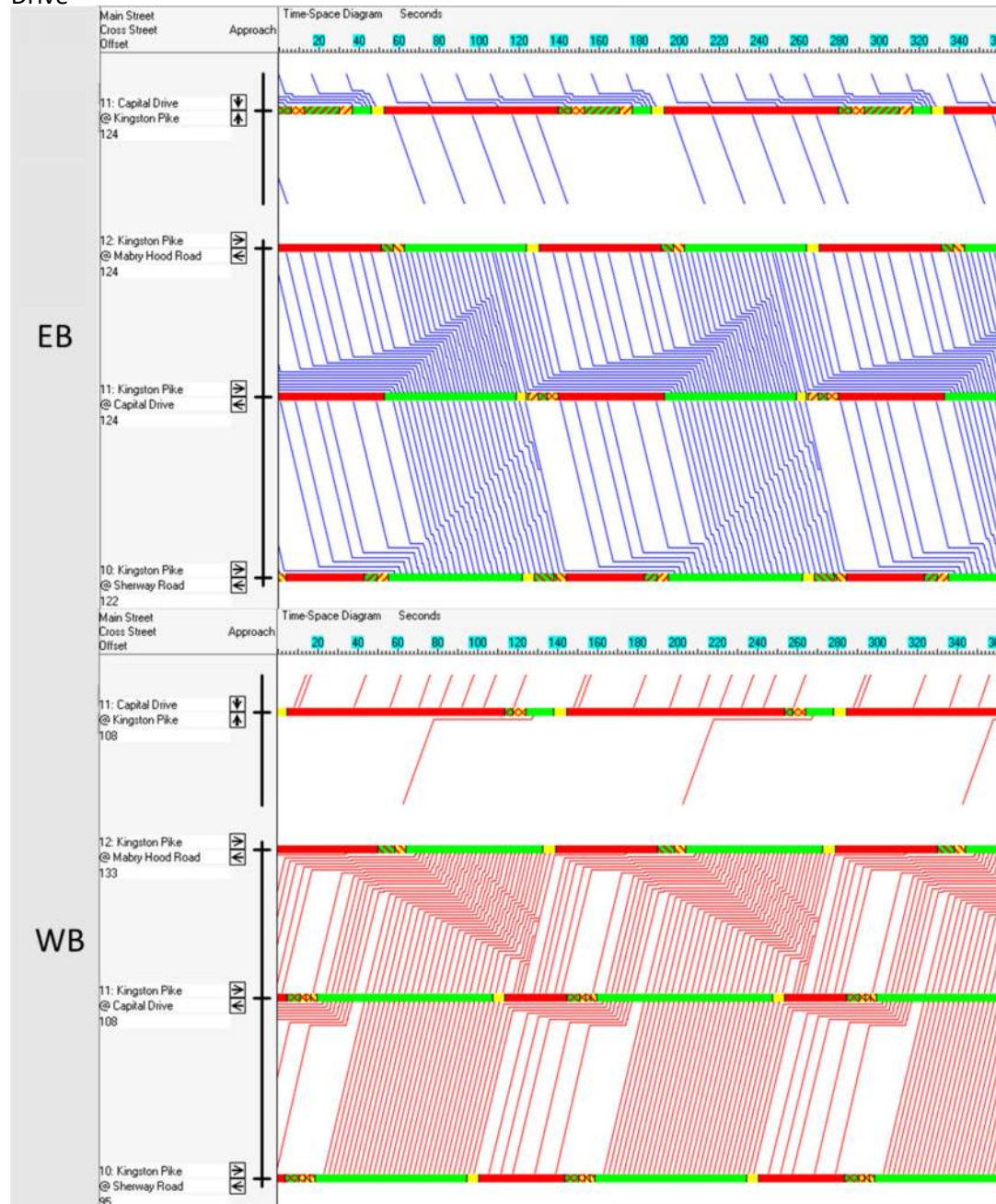
Mr. Rodney Phillips
September 13, 2021
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Figure 5: Projected 2026 AM Peak Hour Time-Space Diagram with Three-Lane Northbound Capital Drive



Mr. Rodney Phillips
September 13, 2021
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Figure 6: Projected 2026 PM Peak Hour Time-Space Diagram with Three-Lane Northbound Capital Drive





Mr. Rodney Phillips
September 13, 2021
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The analysis documented in this letter report illustrates the operational impact of a split-phased signal and proposed development at Capital Drive and Kingston Pike and the traffic progression between the two adjacent signals at Mabry Hood Road and Sherway Road. By considering the adjacent traffic and signal operations, the intersection at Capital Drive functions more favorably as a split-phased signal, and the additional traffic and timing changes will have a manageable impact on traffic flow. The split-phased operation at Capital Drive does not disrupt traffic progression along Kingston Pike, as much of the impacts are derived from over-capacity conditions at Mabry Hood Road. In fact, a split-phased operation at Capital Drive reduces queueing for westbound traffic in the PM peak hour at Mabry Hood Road by storing traffic at Capital Drive. Adjustments can be made at the preference of the City to determine the best timing and offset parameters to optimize progression in both directions of Kingston Pike.

Sincerely,

A handwritten signature in black ink that reads "Allyson F. Boyd". The signature is written in a cursive, flowing style.

Allyson F. Boyd, PE
Transportation Engineer
CDM Smith Inc.



cc: Mr. Hollis Loveday, PE, CDM Smith Inc.

APPENDIX

Traffic Counts

Sight Distance Observations

Trip Generation

ADT History

Synchro Analyses

Queue Reports

Addendum Supporting Documents

TRAFFIC COUNTS

Project ID: 21-190030-001
 Location: Capital Dr & SR 1/US 11/US 70/Kingston Pike
 City: Knoxville

Day: Tuesday
 Date: 05/04/2021

Groups Printed - Cars, PU, Vans - Heavy Trucks

	Capital Dr Northbound							Capital Dr Southbound							SR 1/US 11/US 70/Kingston Pike Eastbound							SR 1/US 11/US 70/Kingston Pike Westbound							
Start Time	Left	Thru	Rgt	Uturn	Peds	App. Total		Left	Thru	Rgt	Uturn	Peds	App. Total		Left	Thru	Rgt	Uturn	Peds	App. Total		Left	Thru	Rgt	Uturn	Peds	App. Total	Int. Total	
7:00 AM	4	0	7	0	0	11		0	0	0	0	0	0		0	99	17	0	0	116		6	77	0	0	0	83	210	
7:15 AM	16	0	16	0	0	32		0	0	0	0	0	0		0	149	18	0	0	167		11	82	0	0	0	93	292	
7:30 AM	19	0	16	0	0	35		0	0	0	0	0	0		1	146	27	0	0	174		18	116	0	0	0	134	343	
7:45 AM	36	0	31	0	0	67		0	0	0	0	0	0		0	198	34	0	0	232		14	122	0	0	0	136	435	
Total	75	0	70	0	0	145		0	0	0	0	0	0		1	592	96	0	0	689		49	397	0	0	0	446	1280	
8:00 AM	33	0	23	0	0	56		0	0	0	0	0	0		0	192	27	0	0	219		9	128	0	0	0	137	412	
8:15 AM	31	0	16	0	0	47		0	0	0	0	0	0		0	245	18	0	0	263		9	167	1	0	0	177	487	
8:30 AM	21	0	19	0	0	40		0	0	0	0	0	0		0	221	26	1	0	248		16	151	1	0	0	168	456	
8:45 AM	24	0	20	0	0	44		0	0	1	0	0	1		2	235	17	1	0	255		13	146	1	0	0	160	460	
Total	109	0	78	0	0	187		0	0	1	0	0	1		2	893	88	2	0	985		47	592	3	0	0	642	1815	
BREAK																													
4:00 PM	47	0	24	0	0	71		0	0	1	0	0	1		0	247	9	0	0	256		12	285	0	0	0	297	625	
4:15 PM	40	0	32	0	0	72		1	0	1	0	0	2		0	253	5	0	0	258		18	268	2	0	0	288	620	
4:30 PM	53	0	27	0	0	80		0	0	3	0	0	3		2	293	2	0	0	297		5	266	0	0	0	271	651	
4:45 PM	29	0	23	0	0	52		1	0	1	0	0	2		1	235	3	0	0	239		8	292	1	0	0	301	594	
Total	169	0	106	0	0	275		2	0	6	0	0	8		3	1028	19	0	0	1050		43	1111	3	0	0	1157	2490	
5:00 PM	84	0	31	0	0	115		0	0	2	0	0	2		1	260	4	0	0	265		13	314	0	0	0	327	709	
5:15 PM	41	0	18	0	0	59		0	0	1	0	0	1		3	284	3	0	0	290		8	300	0	0	0	308	658	
5:30 PM	40	0	12	0	0	52		0	0	4	0	0	4		2	236	3	0	0	241		10	243	2	0	0	255	552	
5:45 PM	9	0	9	0	0	18		1	0	1	0	0	2		1	203	1	1	0	206		5	220	1	0	0	226	452	
Total	174	0	70	0	0	244		1	0	8	0	0	9		7	983	11	1	0	1002		36	1077	3	0	0	1116	2371	
Grand Total	527	0	324	0	0	851		3	0	15	0	0	18		13	3496	214	3	0	3726		175	3177	9	0	0	3361	7956	
Apprch %	61.9	0.0	38.1	0.0	0.0			16.7	0.0	83.3	0.0	0.0			0.3	93.8	5.7	0.1	0.0			5.2	94.5	0.3	0.0	0.0			
Total %	6.6	0.0	4.1	0.0	0.0	10.7		0.0	0.0	0.2	0.0	0.0	0.2		0.2	43.9	2.7	0.0	0.0	46.8		2.2	39.9	0.1	0.0	0.0	42.2		
Cars, PU, Vans	527	0	324	0	0	851		3	0	15	0	0	18		13	3496	214	3	0	3726		175	3177	9	0	0	3361	7956	
% Cars, PU, Vans	100.0	0.0	100.0	0.0	0.0	100.0		100.0	0.0	100.0	0.0	0.0	100.0		100.0	100.0	100.0	100.0	0.0	100.0		100.0	100.0	100.0	0.0	0.0	100.0	100.0	

Project ID: 21-190030-001
 Location: Capital Dr & SR 1/US 11/US 70/Kingston Pike
 City: Knoxville

PEAK HOURS

Day: Tuesday
 Date: 05/04/2021

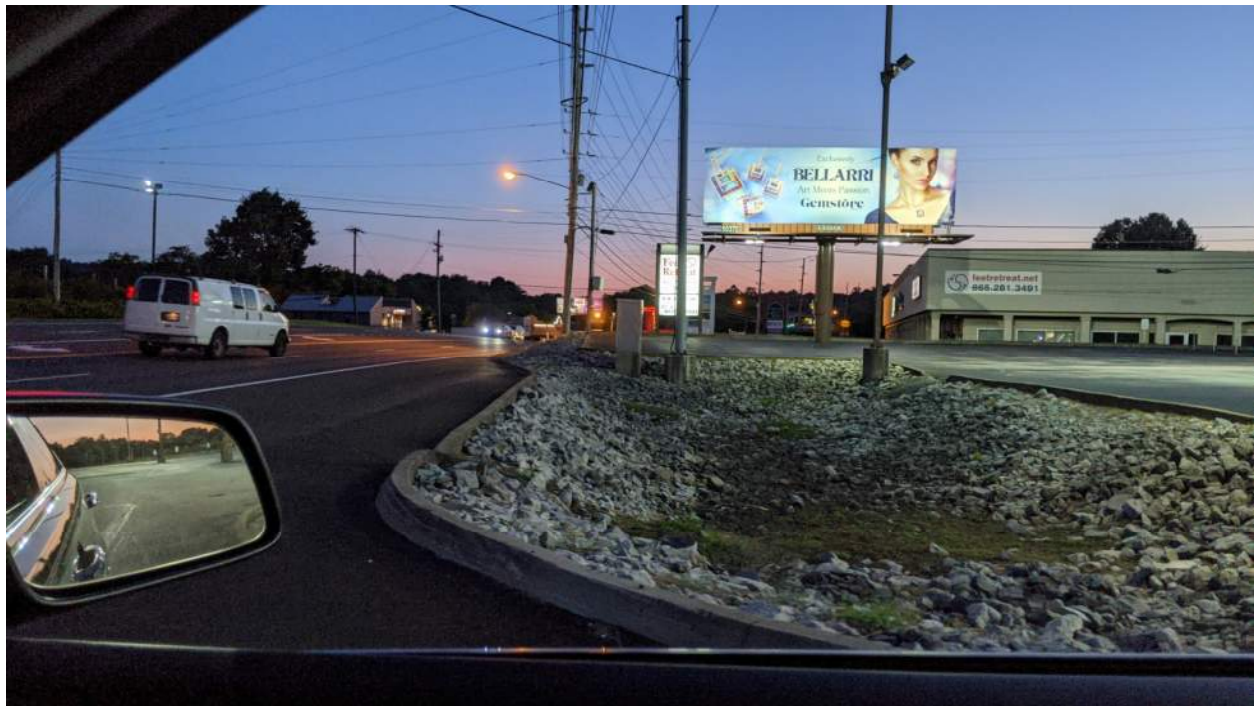
AM

	Capital Dr Northbound						Capital Dr Southbound						SR 1/US 11/US 70/Kingston Pike Eastbound						SR 1/US 11/US 70/Kingston Pike Westbound						
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total				
Peak Hour Analysis from 07:00 AM to 09:00 AM																									
Peak Hour for Entire Intersection Begins at 08:00 AM																									
8:00 AM	33	0	23	0	56	0	0	0	0	0	0	192	27	0	219	9	128	0	0	137	412				
8:15 AM	31	0	16	0	47	0	0	0	0	0	0	245	18	0	263	9	167	1	0	177	487				
8:30 AM	21	0	19	0	40	0	0	0	0	0	0	221	26	1	248	16	151	1	0	168	456				
8:45 AM	24	0	20	0	44	0	0	1	0	1	2	235	17	1	255	13	146	1	0	160	460				
Total Volume	109	0	78	0	187	0	0	1	0	1	2	893	88	2	985	47	592	3	0	642	1815				
% App. Total	58.3	0.0	41.7	0.0	100	0.0	0.0	100.0	0.0	100	0.2	90.7	8.9	0.2	100	7.3	92.2	0.5	0.0	100					
PHF	0.835						0.250						0.936						0.907						0.932
Cars, PU, Vans	109	0	78	0	187	0	0	1	0	1	2	893	88	2	985	47	592	3	0	642	1815				
% Cars, PU, Vans	100.0	0.0	100.0	0.0	100.0	0.0	0.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0				

PM

	Capital Dr Northbound						Capital Dr Southbound						SR 1/US 11/US 70/Kingston Pike Eastbound						SR 1/US 11/US 70/Kingston Pike Westbound						
Start Time	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Left	Thru	Rgt	Uturn	App. Total	Int. Total				
Peak Hour Analysis from 04:00 PM to 06:00 PM																									
Peak Hour for Entire Intersection Begins at 04:30 PM																									
4:30 PM	53	0	27	0	80	0	0	3	0	3	2	293	2	0	297	5	266	0	0	271	651				
4:45 PM	29	0	23	0	52	1	0	1	0	2	1	235	3	0	239	8	292	1	0	301	594				
5:00 PM	84	0	31	0	115	0	0	2	0	2	1	260	4	0	265	13	314	0	0	327	709				
5:15 PM	41	0	18	0	59	0	0	1	0	1	3	284	3	0	290	8	300	0	0	308	658				
Total Volume	207	0	99	0	306	1	0	7	0	8	7	1072	12	0	1091	34	1172	1	0	1207	2612				
% App. Total	67.6	0.0	32.4	0.0	100	12.5	0.0	87.5	0.0	100	0.6	98.3	1.1	0.0	100	2.8	97.1	0.1	0.0	100					
PHF	0.665					0.667					0.918					0.923					0.921				
Cars, PU, Vans	207	0	99	0	306	1	0	7	0	8	7	1072	12	0	1091	34	1172	1	0	1207	2612				
% Cars, PU, Vans	100.0	0.0	100.0	0.0	100.0	100.0	0.0	100.0	0.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	0.0	0.0	100.0	100.0				

SIGHT DISTANCE OBSERVATIONS



Capital Drive Southbound Approach, Looking Right



Capital Drive Southbound Approach, Looking Left

TRIP GENERATION

Shopping Center (820)

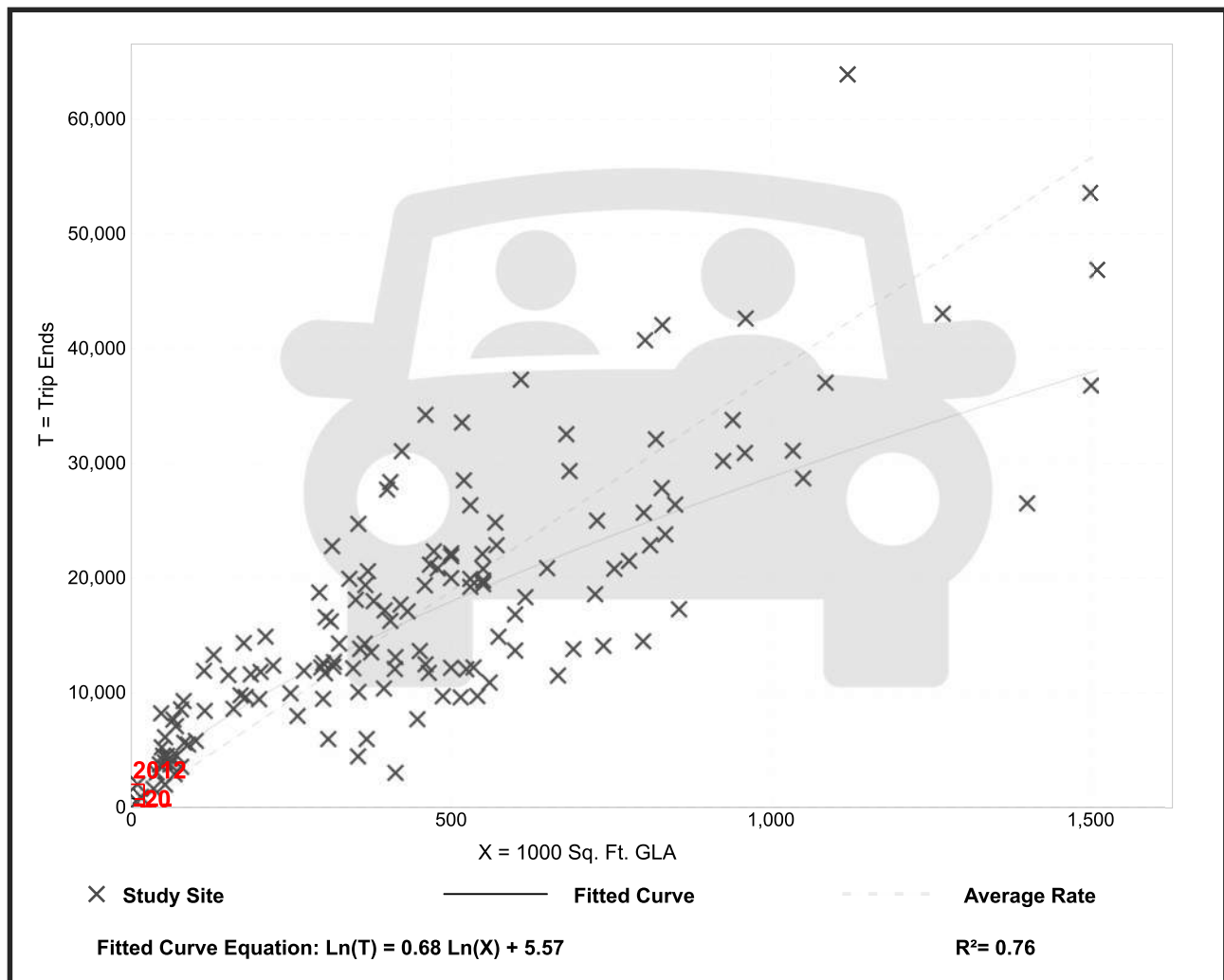
Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 147
Avg. 1000 Sq. Ft. GLA: 453
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
37.75	7.42 - 207.98	16.41

Data Plot and Equation



Trip Gen Manual, 10th Ed + Supplement • Institute of Transportation Engineers

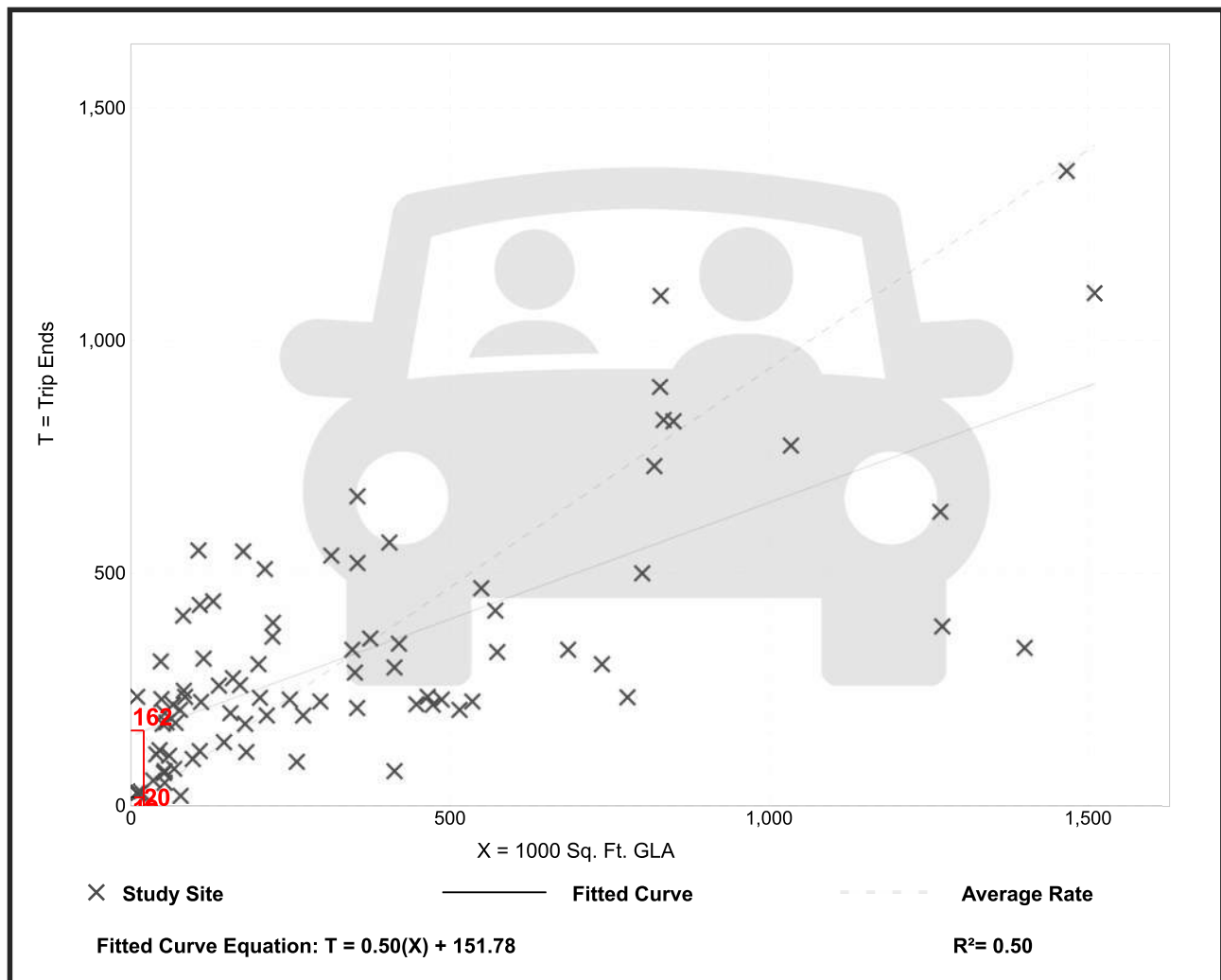
Shopping Center (820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA
On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: General Urban/Suburban
 Number of Studies: 84
 Avg. 1000 Sq. Ft. GLA: 351
 Directional Distribution: 62% entering, 38% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
0.94	0.18 - 23.74	0.87

Data Plot and Equation



Trip Gen Manual, 10th Ed + Supplement • Institute of Transportation Engineers

Shopping Center

(820)

Vehicle Trip Ends vs: 1000 Sq. Ft. GLA

On a: Weekday,
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.

Setting/Location: General Urban/Suburban

Number of Studies: 261

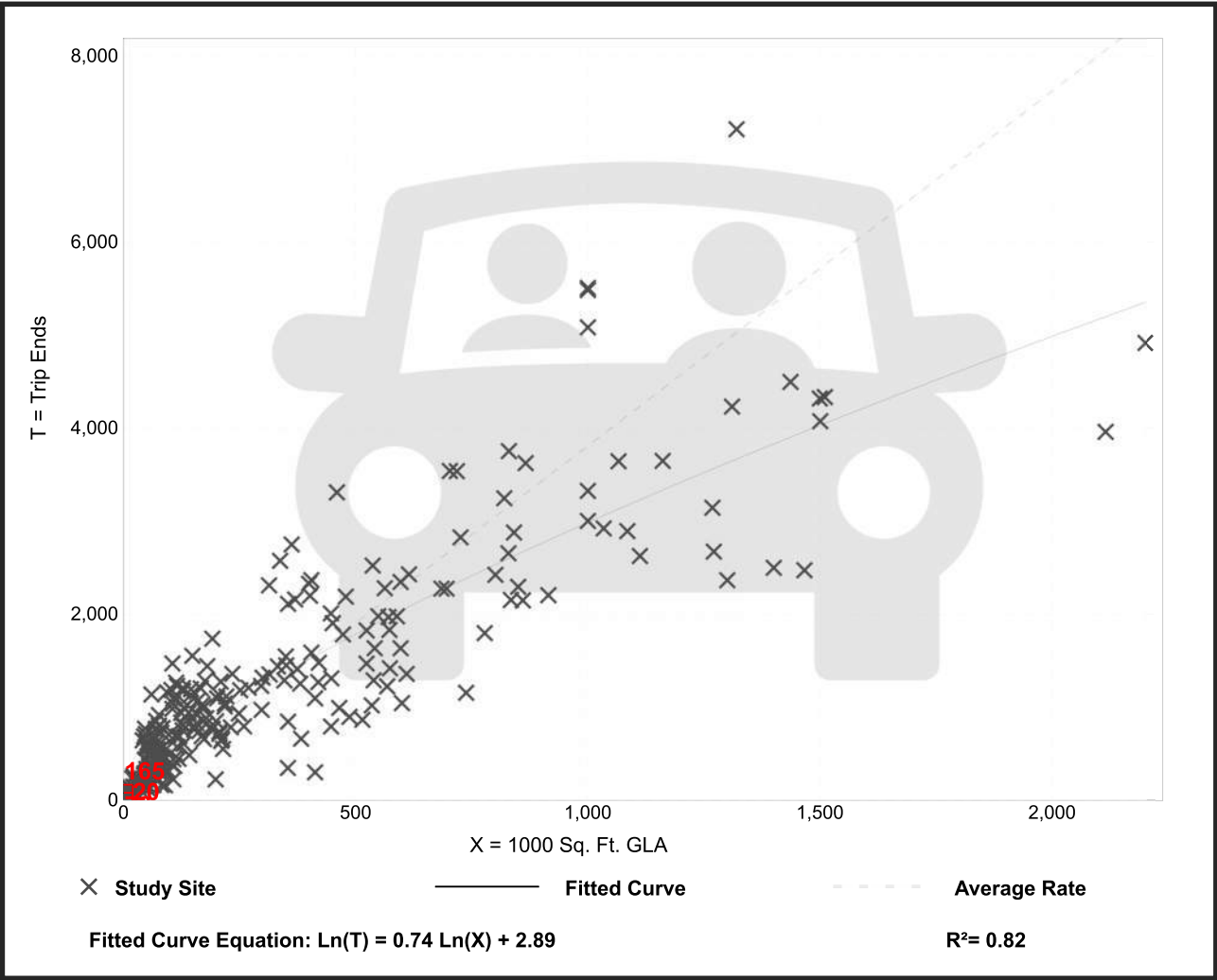
Avg. 1000 Sq. Ft. GLA: 327

Directional Distribution: 48% entering, 52% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GLA

Average Rate	Range of Rates	Standard Deviation
3.81	0.74 - 18.69	2.04

Data Plot and Equation



Coffee/Donut Shop with Drive-Through Window (937)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

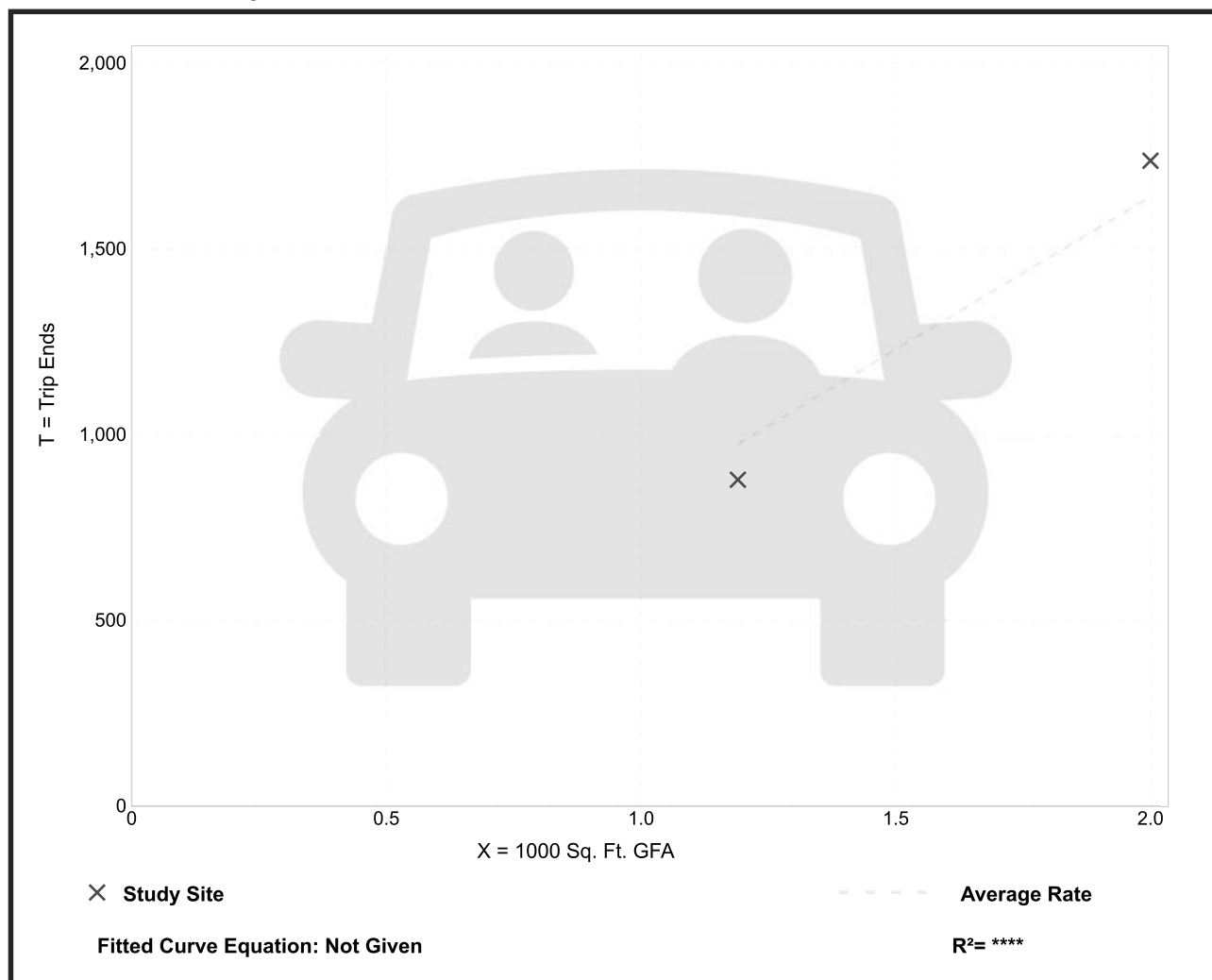
Setting/Location: General Urban/Suburban
Number of Studies: 2
Avg. 1000 Sq. Ft. GFA: 2
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
820.38	738.66 - 869.00	*

Data Plot and Equation

Caution – Small Sample Size



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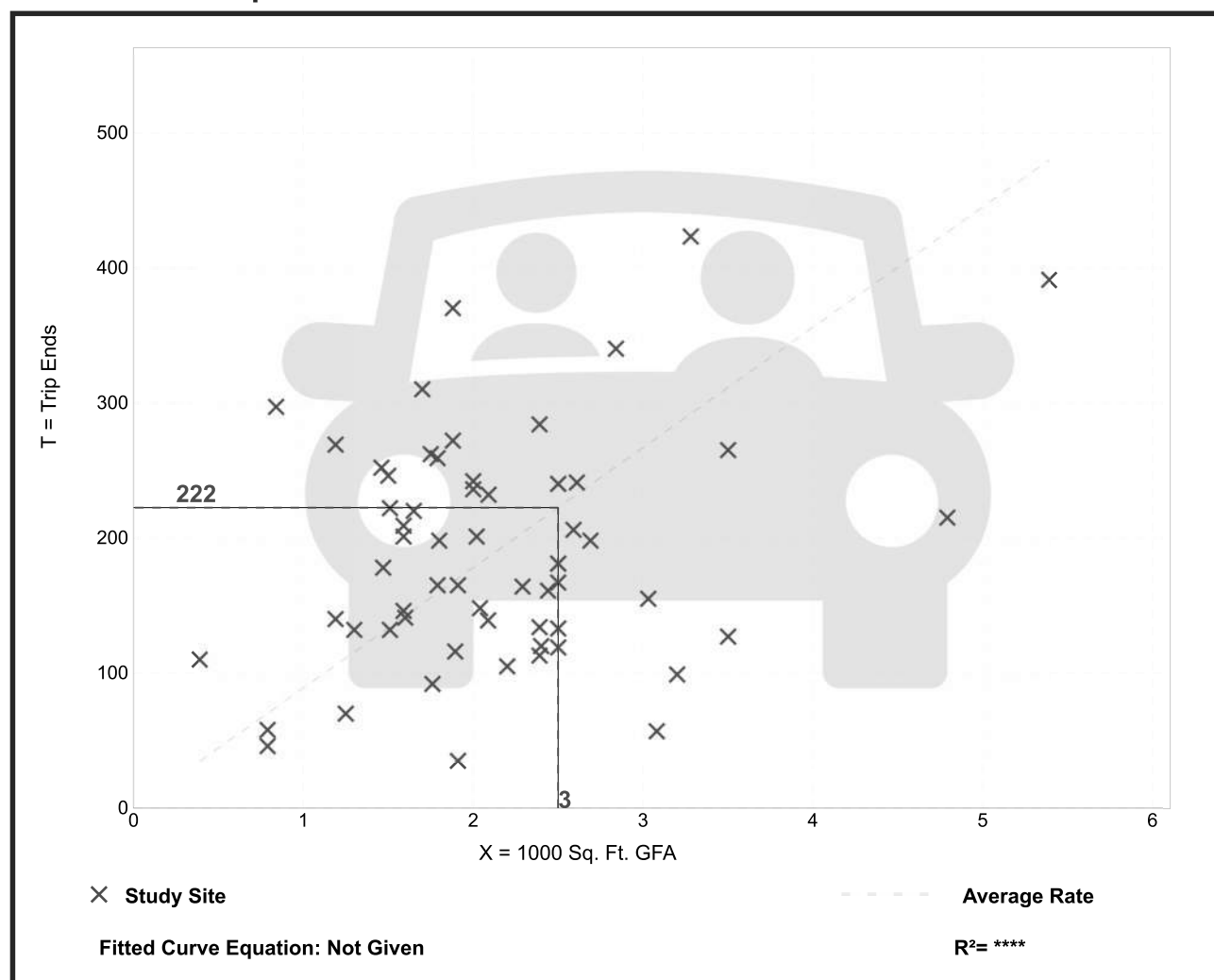
Coffee/Donut Shop with Drive-Through Window (937)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
 On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 7 and 9 a.m.
 Setting/Location: General Urban/Suburban
 Number of Studies: 61
 Avg. 1000 Sq. Ft. GFA: 2
 Directional Distribution: 51% entering, 49% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
88.99	18.32 - 353.57	48.19

Data Plot and Equation



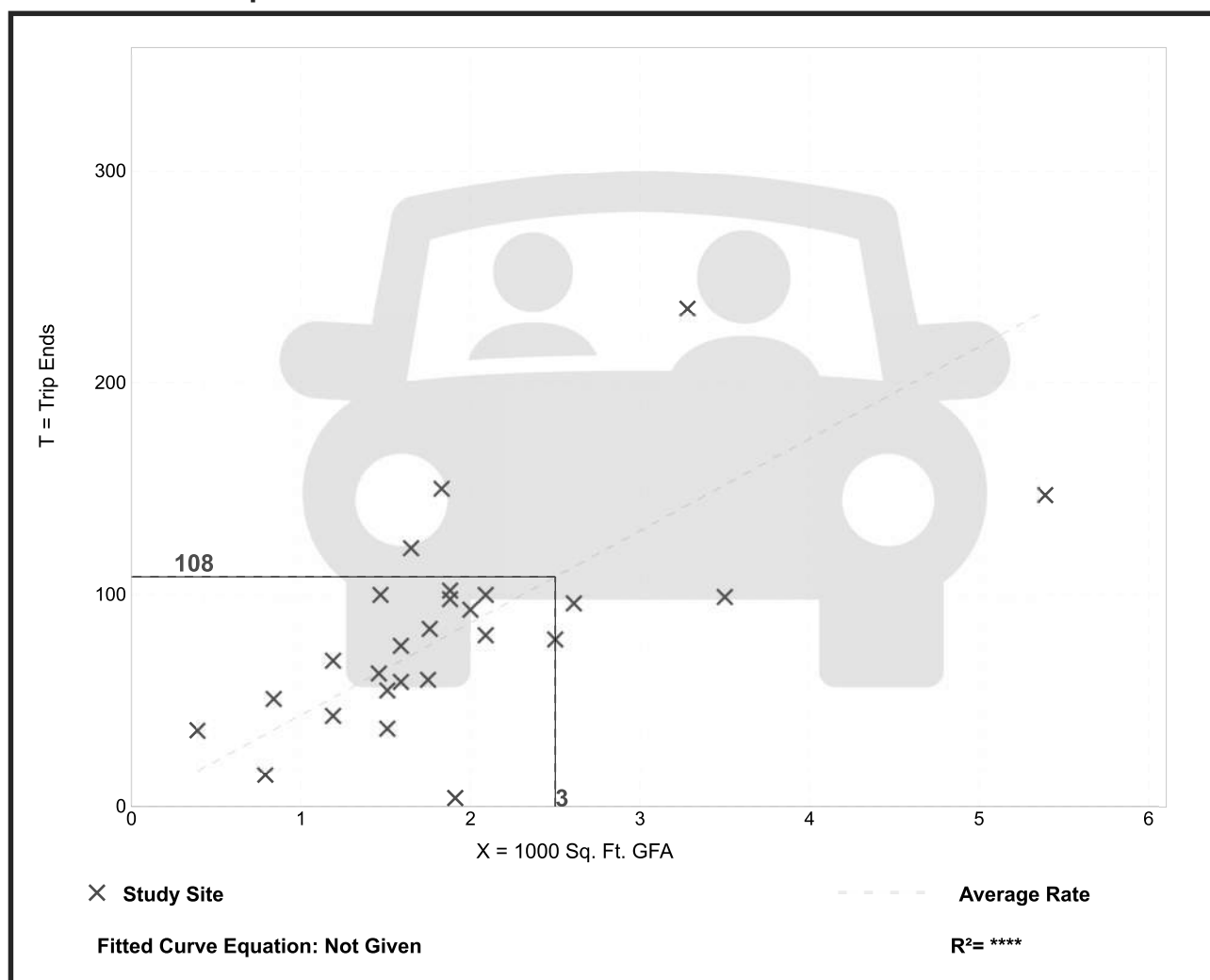
Coffee/Donut Shop with Drive-Through Window (937)

Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
 On a: Weekday,
 Peak Hour of Adjacent Street Traffic,
 One Hour Between 4 and 6 p.m.
 Setting/Location: General Urban/Suburban
 Number of Studies: 26
 Avg. 1000 Sq. Ft. GFA: 2
 Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
43.38	2.09 - 92.31	18.88

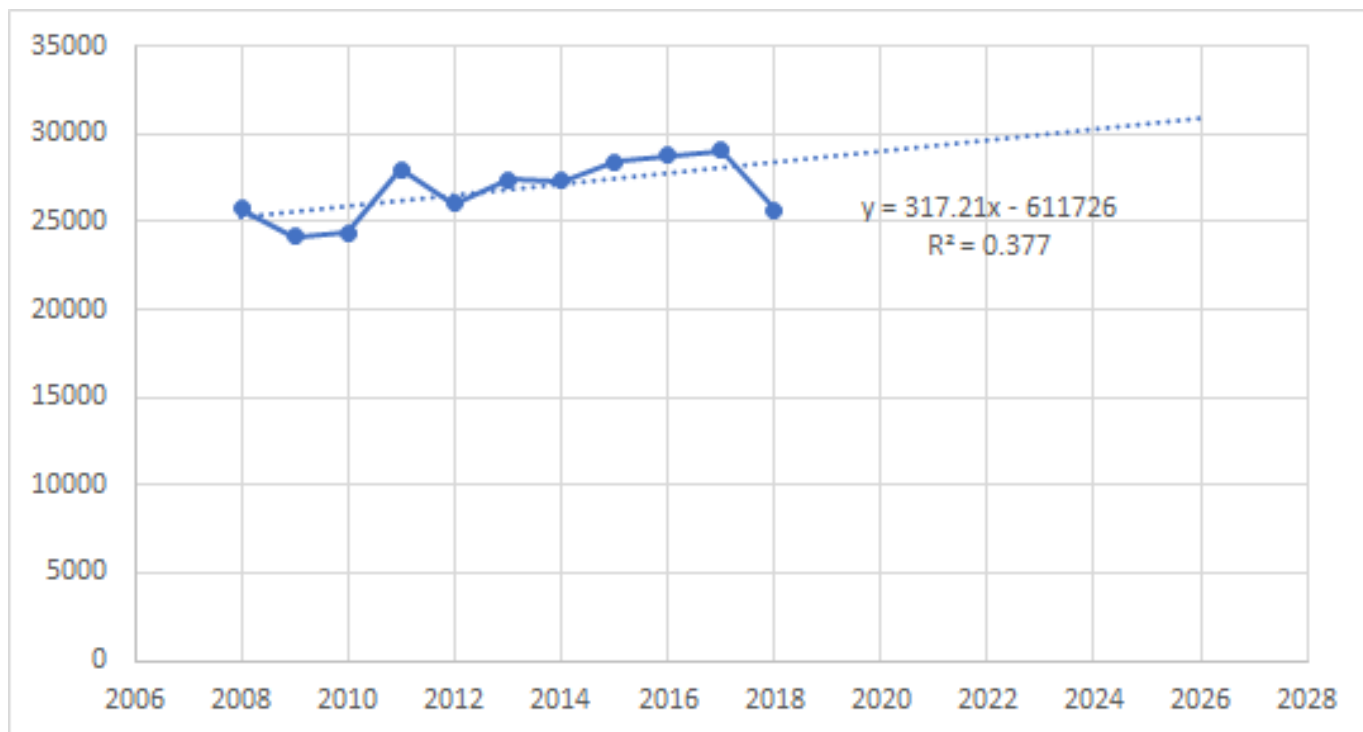
Data Plot and Equation



ADT HISTORY

OBJECTID	Station ID	Station No.	County	Location	Route Number
10467	93000128	128	Knox	S. OF ANDREW JACKSON LAKE	SR001
2008	25714				
2009	24173	-6.40%			
2010	24388	0.90%			
2011	27957	12.80%			
2012	26019	-7.40%			
2013	27441	5.20%			
2014	27306	-0.50%			
2015	28450	4.00%			
2016	28758	1.10%			
2017	29058	1.00%			
2018	25708	-13.00%			
2019	28721				
2020	29038				
2021	29355				
2022	29673				
2023	29990				
2024	30307				
2025	30624				
2026	30941				

1.10% Average Annual Growth



SYNCHRO ANALYSES

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2021 AM Existing
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1072	106	56	710	4	131	0	94	0	0	1
Future Volume (veh/h)	2	1072	106	56	710	4	131	0	94	0	0	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1945	1870
Adj Flow Rate, veh/h	2	1140	113	62	780	4	156	0	112	0	0	4
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.25	0.25	0.25
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	557	2375	235	464	2886	15	258	0	240	0	0	235
Arrive On Green	1.00	1.00	1.00	0.05	0.80	0.78	0.14	0.00	0.14	0.00	0.00	0.12
Sat Flow, veh/h	704	3334	330	1781	3625	19	1420	0	1683	0	0	1648
Grp Volume(v), veh/h	2	620	633	62	382	402	156	0	112	0	0	4
Grp Sat Flow(s),veh/h/ln	704	1814	1850	1781	1777	1867	1420	0	1683	0	0	1648
Q Serve(g_s), s	0.0	0.0	0.0	1.0	7.3	7.3	13.6	0.0	7.9	0.0	0.0	0.3
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.0	7.3	7.3	13.8	0.0	7.9	0.0	0.0	0.3
Prop In Lane	1.00		0.18	1.00		0.01	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	557	1292	1318	464	1415	1486	258	0	240	0	0	235
V/C Ratio(X)	0.00	0.48	0.48	0.13	0.27	0.27	0.61	0.00	0.47	0.00	0.00	0.02
Avail Cap(c_a), veh/h	557	1292	1318	589	1415	1486	285	0	272	0	0	266
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	3.4	3.4	3.4	53.9	0.0	51.2	0.0	0.0	49.0
Incr Delay (d2), s/veh	0.0	1.3	1.3	0.0	0.5	0.4	1.8	0.0	0.5	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.5	0.5	0.3	2.0	2.1	5.1	0.0	3.4	0.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	1.3	1.3	3.4	3.9	3.9	55.6	0.0	51.7	0.0	0.0	49.0
LnGrp LOS	A	A	A	A	A	A	E	A	D	A	A	D
Approach Vol, veh/h	1255			846			268			4		
Approach Delay, s/veh	1.3			3.9			54.0			49.0		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	2			4		5		6		8		
Phs Duration (G+Y+Rc), s	107.5			22.5		10.9		96.6		22.5		
Change Period (Y+Rc), s	6.0			6.5		5.5		6.0		6.5		
Max Green Setting (Gmax), s	99.0			18.5		14.5		79.0		18.5		
Max Q Clear Time (g_c+I1), s	9.3			15.8		3.0		2.0		2.3		
Green Ext Time (p_c), s	1.5			0.2		0.1		2.9		0.0		
Intersection Summary												
HCM 6th Ctrl Delay	8.2											
HCM 6th LOS	A											

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2021 PM Existing
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1286	14	41	1406	1	248	0	119	1	0	8
Future Volume (veh/h)	8	1286	14	41	1406	1	248	0	119	1	0	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1945	1870
Adj Flow Rate, veh/h	9	1398	15	45	1528	1	370	0	178	1	0	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	232	2378	26	296	2629	2	117	0	373	28	16	188
Arrive On Green	0.65	0.65	0.63	0.05	0.72	0.71	0.22	0.00	0.22	0.22	0.00	0.20
Sat Flow, veh/h	347	3677	39	1781	3644	2	295	0	1683	0	71	847
Grp Volume(v), veh/h	9	689	724	45	745	784	370	0	178	13	0	0
Grp Sat Flow(s),veh/h/ln	347	1814	1902	1781	1777	1870	295	0	1683	918	0	0
Q Serve(g_s), s	1.8	30.3	30.4	1.1	28.2	28.2	0.0	0.0	12.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	19.5	30.3	30.4	1.1	28.2	28.2	31.0	0.0	12.9	31.0	0.0	0.0
Prop In Lane	1.00		0.02	1.00		0.00	1.00		1.00	0.08		0.92
Lane Grp Cap(c), veh/h	232	1173	1230	296	1282	1349	117	0	373	231	0	0
V/C Ratio(X)	0.04	0.59	0.59	0.15	0.58	0.58	3.17	0.00	0.48	0.06	0.00	0.00
Avail Cap(c_a), veh/h	232	1173	1230	354	1282	1349	117	0	373	231	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.5	14.1	14.1	10.6	9.4	9.4	61.3	0.0	47.5	44.3	0.0	0.0
Incr Delay (d2), s/veh	0.3	2.2	2.1	0.1	1.9	1.8	998.5	0.0	0.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	12.0	12.6	0.4	10.0	10.5	36.6	0.0	5.5	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.9	16.3	16.2	10.6	11.3	11.2	1059.8	0.0	47.8	44.4	0.0	0.0
LnGrp LOS	B	B	B	B	B	B	F	A	D	D	A	A
Approach Vol, veh/h	1422			1574			548			13		
Approach Delay, s/veh	16.2			11.2			731.1			44.4		
Approach LOS	B			B			F			D		
Timer - Assigned Phs	2			4		5		6		8		
Phs Duration (G+Y+Rc), s	105.0			35.0		10.5		94.5		35.0		
Change Period (Y+Rc), s	6.0			6.5		5.5		6.0		6.5		
Max Green Setting (Gmax), s	99.0			28.5		9.5		84.0		28.5		
Max Q Clear Time (g_c+I1), s	30.2			33.0		3.1		32.4		33.0		
Green Ext Time (p_c), s	3.8			0.0		0.0		3.5		0.0		
Intersection Summary												
HCM 6th Ctrl Delay	124.2											
HCM 6th LOS	F											

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 AM No Build
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1126	111	59	746	4	138	0	99	0	0	1
Future Volume (veh/h)	2	1126	111	59	746	4	138	0	99	0	0	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1945	1870
Adj Flow Rate, veh/h	2	1198	118	65	820	4	164	0	118	0	0	4
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.25	0.25	0.25
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	535	2358	232	444	2868	14	265	0	248	0	0	243
Arrive On Green	1.00	1.00	1.00	0.05	0.79	0.78	0.15	0.00	0.15	0.00	0.00	0.13
Sat Flow, veh/h	678	3336	328	1781	3626	18	1421	0	1683	0	0	1648
Grp Volume(v), veh/h	2	650	666	65	402	422	164	0	118	0	0	4
Grp Sat Flow(s),veh/h/ln	678	1814	1850	1781	1777	1867	1421	0	1683	0	0	1648
Q Serve(g_s), s	0.0	0.0	0.0	1.1	7.9	7.9	14.3	0.0	8.4	0.0	0.0	0.3
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.1	7.9	7.9	14.5	0.0	8.4	0.0	0.0	0.3
Prop In Lane	1.00		0.18	1.00		0.01	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	535	1282	1308	444	1405	1477	265	0	248	0	0	243
V/C Ratio(X)	0.00	0.51	0.51	0.15	0.29	0.29	0.62	0.00	0.48	0.00	0.00	0.02
Avail Cap(c_a), veh/h	535	1282	1308	568	1405	1477	285	0	272	0	0	266
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	3.5	3.7	3.7	53.6	0.0	50.8	0.0	0.0	48.4
Incr Delay (d2), s/veh	0.0	1.4	1.4	0.1	0.5	0.5	2.4	0.0	0.5	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.5	0.5	0.3	2.3	2.4	5.3	0.0	3.6	0.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	1.4	1.4	3.6	4.2	4.2	55.9	0.0	51.3	0.0	0.0	48.4
LnGrp LOS	A	A	A	A	A	A	E	A	D	A	A	D
Approach Vol, veh/h	1318			889			282			4		
Approach Delay, s/veh	1.4			4.1			54.0			48.4		
Approach LOS	A			A			D			D		
Timer - Assigned Phs	2			4		5		6		8		
Phs Duration (G+Y+Rc), s	106.8			23.2		10.9		95.9		23.2		
Change Period (Y+Rc), s	6.0			6.5		5.5		6.0		6.5		
Max Green Setting (Gmax), s	99.0			18.5		14.5		79.0		18.5		
Max Q Clear Time (g_c+I1), s	9.9			16.5		3.1		2.0		2.3		
Green Ext Time (p_c), s	1.6			0.1		0.1		3.1		0.0		
Intersection Summary												
HCM 6th Ctrl Delay	8.4											
HCM 6th LOS	A											

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 PM No Build
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1350	15	43	1476	1	260	0	125	1	0	8
Future Volume (veh/h)	8	1350	15	43	1476	1	260	0	125	1	0	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1945	1870
Adj Flow Rate, veh/h	9	1467	16	47	1604	1	388	0	187	1	0	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	214	2375	26	279	2629	2	117	0	373	28	16	188
Arrive On Green	0.65	0.65	0.63	0.05	0.72	0.71	0.22	0.00	0.22	0.22	0.00	0.20
Sat Flow, veh/h	323	3676	40	1781	3645	2	295	0	1683	0	71	847
Grp Volume(v), veh/h	9	724	759	47	782	823	388	0	187	13	0	0
Grp Sat Flow(s),veh/h/ln	323	1814	1902	1781	1777	1870	295	0	1683	918	0	0
Q Serve(g_s), s	2.0	32.9	32.9	1.1	30.7	30.7	0.0	0.0	13.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	22.1	32.9	32.9	1.1	30.7	30.7	31.0	0.0	13.6	31.0	0.0	0.0
Prop In Lane	1.00		0.02	1.00		0.00	1.00		1.00	0.08		0.92
Lane Grp Cap(c), veh/h	214	1172	1229	279	1282	1349	117	0	373	231	0	0
V/C Ratio(X)	0.04	0.62	0.62	0.17	0.61	0.61	3.32	0.00	0.50	0.06	0.00	0.00
Avail Cap(c_a), veh/h	214	1172	1229	336	1282	1349	117	0	373	231	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	17.8	14.6	14.6	11.3	9.7	9.7	61.3	0.0	47.7	44.3	0.0	0.0
Incr Delay (d2), s/veh	0.4	2.4	2.3	0.1	2.2	2.1	1067.4	0.0	0.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	13.1	13.7	0.4	10.9	11.5	38.8	0.0	5.8	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.2	17.0	16.9	11.4	11.9	11.8	1128.8	0.0	48.1	44.4	0.0	0.0
LnGrp LOS	B	B	B	B	B	B	F	A	D	D	A	A
Approach Vol, veh/h		1492			1652			575			13	
Approach Delay, s/veh		17.0			11.8			777.3			44.4	
Approach LOS		B			B			F			D	
Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		105.0		35.0	10.5	94.5		35.0				
Change Period (Y+Rc), s		6.0		6.5	5.5	6.0		6.5				
Max Green Setting (Gmax), s		99.0		28.5	9.5	84.0		28.5				
Max Q Clear Time (g_c+I1), s		32.7		33.0	3.1	34.9		33.0				
Green Ext Time (p_c), s		4.2		0.0	0.0	3.8		0.0				
Intersection Summary												
HCM 6th Ctrl Delay				131.9								
HCM 6th LOS				F								

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 AM Build No Improvements
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Future Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1945	1870
Adj Flow Rate, veh/h	131	1156	118	65	791	98	164	8	118	86	7	92
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	498	2303	235	450	2472	306	198	7	272	41	8	8
Arrive On Green	1.00	1.00	1.00	0.05	0.78	0.76	0.16	0.16	0.16	0.16	0.16	0.14
Sat Flow, veh/h	638	3324	339	1781	3182	394	891	43	1683	0	51	51
Grp Volume(v), veh/h	131	630	644	65	442	447	172	0	118	185	0	0
Grp Sat Flow(s),veh/h/ln	638	1814	1848	1781	1777	1799	934	0	1683	102	0	0
Q Serve(g_s), s	0.0	0.0	0.0	1.2	9.6	9.7	0.0	0.0	8.2	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.2	9.6	9.7	21.0	0.0	8.2	21.0	0.0	0.0
Prop In Lane	1.00		0.18	1.00		0.22	0.95		1.00	0.46		0.50
Lane Grp Cap(c), veh/h	498	1257	1281	450	1380	1398	205	0	272	57	0	0
V/C Ratio(X)	0.26	0.50	0.50	0.14	0.32	0.32	0.84	0.00	0.43	3.24	0.00	0.00
Avail Cap(c_a), veh/h	498	1257	1281	574	1380	1398	205	0	272	57	0	0
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	4.0	4.3	4.4	55.8	0.0	49.1	59.7	0.0	0.0
Incr Delay (d2), s/veh	1.3	1.4	1.4	0.1	0.6	0.6	24.2	0.0	0.4	1052.5	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.5	0.5	0.4	2.9	3.0	7.1	0.0	3.5	18.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	1.3	1.4	1.4	4.0	4.9	5.0	80.0	0.0	49.5	1112.2	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	E	A	D	F	A	A
Approach Vol, veh/h		1405			954			290			185	
Approach Delay, s/veh		1.4			4.9			67.6		1112.2		
Approach LOS		A			A			E		F		
Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		105.0		25.0	10.9	94.1		25.0				
Change Period (Y+Rc), s		6.0		6.5	5.5	6.0		6.5				
Max Green Setting (Gmax), s		99.0		18.5	14.5	79.0		18.5				
Max Q Clear Time (g_c+I1), s		11.7		23.0	3.2	2.0		23.0				
Green Ext Time (p_c), s		1.9		0.0	0.1	4.1		0.0				
Intersection Summary												
HCM 6th Ctrl Delay				81.9								
HCM 6th LOS				F								

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 PM Build No Improvements
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Future Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1945	1870
Adj Flow Rate, veh/h	84	1448	16	47	1582	65	388	7	187	88	7	128
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	202	2375	26	284	2510	103	219	3	373	36	13	17
Arrive On Green	0.65	0.65	0.63	0.05	0.72	0.71	0.22	0.22	0.22	0.22	0.22	0.20
Sat Flow, veh/h	310	3675	41	1781	3479	142	758	14	1683	0	59	79
Grp Volume(v), veh/h	84	714	750	47	805	842	395	0	187	223	0	0
Grp Sat Flow(s),veh/h/ln	310	1814	1902	1781	1777	1845	772	0	1683	137	0	0
Q Serve(g_s), s	26.7	32.2	32.2	1.1	32.3	32.8	0.0	0.0	13.6	0.0	0.0	0.0
Cycle Q Clear(g_c), s	49.0	32.2	32.2	1.1	32.3	32.8	31.0	0.0	13.6	31.0	0.0	0.0
Prop In Lane	1.00		0.02	1.00		0.08	0.98		1.00	0.39		0.57
Lane Grp Cap(c), veh/h	202	1172	1229	284	1282	1331	222	0	373	66	0	0
V/C Ratio(X)	0.42	0.61	0.61	0.17	0.63	0.63	1.78	0.00	0.50	3.36	0.00	0.00
Avail Cap(c_a), veh/h	202	1172	1229	341	1282	1331	222	0	373	66	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	25.3	14.5	14.5	11.1	9.9	10.0	58.1	0.0	47.7	57.0	0.0	0.0
Incr Delay (d2), s/veh	6.2	2.4	2.3	0.1	2.3	2.3	368.8	0.0	0.4	1101.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	12.8	13.4	0.4	11.5	12.2	30.7	0.0	5.8	22.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	31.4	16.8	16.7	11.2	12.3	12.3	426.8	0.0	48.1	1158.1	0.0	0.0
LnGrp LOS	C	B	B	B	B	B	F	A	D	F	A	A
Approach Vol, veh/h	1548		1694			582			223			
Approach Delay, s/veh	17.6		12.3			305.2			1158.1			
Approach LOS	B		B			F			F			
Timer - Assigned Phs	2		4		5	6	8					
Phs Duration (G+Y+Rc), s	105.0		35.0		10.5	94.5	35.0					
Change Period (Y+Rc), s	6.0		6.5		5.5	6.0	6.5					
Max Green Setting (Gmax), s	99.0		28.5		9.5	84.0	28.5					
Max Q Clear Time (g_c+I1), s	34.8		33.0		3.1	51.0	33.0					
Green Ext Time (p_c), s	4.4		0.0		0.0	5.4	0.0					
Intersection Summary												
HCM 6th Ctrl Delay	119.6											
HCM 6th LOS	F											

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 AM Build w Phasing Mod
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Future Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	131	1156	118	65	791	98	164	8	118	86	7	92
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	439	2049	209	416	2229	276	306	14	203	264	11	141
Arrive On Green	1.00	1.00	1.00	0.05	0.70	0.69	0.11	0.13	0.13	0.07	0.09	0.08
Sat Flow, veh/h	638	3324	339	1781	3182	394	1818	104	1530	1781	113	1489
Grp Volume(v), veh/h	131	630	644	65	442	447	164	0	126	86	0	99
Grp Sat Flow(s),veh/h/ln	638	1814	1848	1781	1777	1799	1818	0	1634	1781	0	1602
Q Serve(g_s), s	1.0	0.0	0.0	1.6	12.9	13.0	10.0	0.0	9.4	5.5	0.0	7.8
Cycle Q Clear(g_c), s	3.1	0.0	0.0	1.6	12.9	13.0	10.0	0.0	9.4	5.5	0.0	7.8
Prop In Lane	1.00		0.18	1.00		0.22	1.00		0.94	1.00		0.93
Lane Grp Cap(c), veh/h	439	1118	1139	416	1245	1261	306	0	217	264	0	152
V/C Ratio(X)	0.30	0.56	0.57	0.16	0.35	0.35	0.54	0.00	0.58	0.33	0.00	0.65
Avail Cap(c_a), veh/h	439	1118	1139	472	1245	1261	339	0	251	269	0	160
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	6.9	7.8	7.9	43.6	0.0	52.9	47.3	0.0	57.9
Incr Delay (d2), s/veh	1.7	2.1	2.0	0.1	0.8	0.8	1.5	0.0	0.9	0.7	0.0	6.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.6	0.6	0.5	4.5	4.7	4.7	0.0	3.9	2.5	0.0	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	1.8	2.1	2.0	6.9	8.6	8.6	45.1	0.0	53.9	48.0	0.0	64.3
LnGrp LOS	A	A	A	A	A	A	D	A	D	D	A	E
Approach Vol, veh/h		1405			954			290			185	
Approach Delay, s/veh		2.0			8.5			48.9			56.7	
Approach LOS		A			A			D			E	
Timer - Assigned Phs		2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s		95.1	13.6	21.3	10.9	84.1	18.6	16.3				
Change Period (Y+Rc), s		6.0	6.5	6.5	5.5	6.0	6.5	6.5				
Max Green Setting (Gmax), s		86.0	7.5	17.5	9.5	71.0	14.5	10.5				
Max Q Clear Time (g_c+I1), s		15.0	7.5	11.4	3.6	5.1	12.0	9.8				
Green Ext Time (p_c), s		1.9	0.0	0.1	0.0	4.1	0.1	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			12.6									
HCM 6th LOS			B									

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 PM Build w Phasing Mod
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Future Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	84	1448	16	47	1582	65	388	7	187	88	7	128
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	152	2052	23	231	2204	90	408	13	337	270	7	130
Arrive On Green	0.56	0.56	0.54	0.05	0.63	0.62	0.19	0.21	0.21	0.07	0.09	0.07
Sat Flow, veh/h	310	3675	41	1781	3479	142	1818	59	1568	1781	83	1515
Grp Volume(v), veh/h	84	714	750	47	805	842	388	0	194	88	0	135
Grp Sat Flow(s),veh/h/ln	310	1814	1902	1781	1777	1845	1818	0	1627	1781	0	1598
Q Serve(g_s), s	35.1	40.2	40.2	1.5	42.5	43.1	26.8	0.0	14.9	6.2	0.0	11.8
Cycle Q Clear(g_c), s	67.7	40.2	40.2	1.5	42.5	43.1	26.8	0.0	14.9	6.2	0.0	11.8
Prop In Lane	1.00		0.02	1.00		0.08	1.00		0.96	1.00		0.95
Lane Grp Cap(c), veh/h	152	1013	1062	231	1126	1169	408	0	350	270	0	137
V/C Ratio(X)	0.55	0.71	0.71	0.20	0.72	0.72	0.95	0.00	0.55	0.33	0.00	0.99
Avail Cap(c_a), veh/h	152	1013	1062	288	1126	1169	408	0	350	270	0	137
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.7	22.5	22.6	17.9	17.2	17.3	44.9	0.0	49.0	53.0	0.0	65.1
Incr Delay (d2), s/veh	13.6	4.1	4.0	0.2	3.9	3.8	32.3	0.0	1.2	0.7	0.0	72.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	17.2	18.0	0.6	17.0	17.9	15.7	0.0	6.2	2.8	0.0	7.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.3	26.7	26.5	18.1	21.1	21.2	77.3	0.0	50.1	53.7	0.0	137.3
LnGrp LOS	E	C	C	B	C	C	E	A	D	D	A	F
Approach Vol, veh/h	1548		1694				582		223			
Approach Delay, s/veh	28.2		21.1				68.2		104.3			
Approach LOS	C		C				E		F			
Timer - Assigned Phs	2		3		4		5		6		7	
Phs Duration (G+Y+Rc), s	92.7		13.2		34.1		10.5		82.2		31.3	
Change Period (Y+Rc), s	6.0		6.5		6.5		5.5		6.0		6.5	
Max Green Setting (Gmax), s	86.7		6.7		27.6		9.5		71.7		24.8	
Max Q Clear Time (g_c+I1), s	45.1		8.2		16.9		3.5		69.7		28.8	
Green Ext Time (p_c), s	4.4		0.0		0.3		0.0		1.2		0.0	
Intersection Summary												
HCM 6th Ctrl Delay	35.2											
HCM 6th LOS	D											

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 AM Build w NB LTR
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Future Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	131	1156	118	65	791	98	164	8	118	86	7	92
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	439	2049	209	416	2229	276	306	263	232	299	11	141
Arrive On Green	1.00	1.00	1.00	0.05	0.70	0.69	0.11	0.14	0.14	0.07	0.09	0.08
Sat Flow, veh/h	638	3324	339	1781	3182	394	1818	1909	1683	1781	113	1489
Grp Volume(v), veh/h	131	630	644	65	442	447	164	8	118	86	0	99
Grp Sat Flow(s),veh/h/ln	638	1814	1848	1781	1777	1799	1818	1909	1683	1781	0	1602
Q Serve(g_s), s	1.0	0.0	0.0	1.6	12.9	13.0	10.0	0.5	8.5	5.5	0.0	7.8
Cycle Q Clear(g_c), s	3.1	0.0	0.0	1.6	12.9	13.0	10.0	0.5	8.5	5.5	0.0	7.8
Prop In Lane	1.00		0.18	1.00		0.22	1.00		1.00	1.00		0.93
Lane Grp Cap(c), veh/h	439	1118	1139	416	1245	1261	306	263	232	299	0	152
V/C Ratio(X)	0.30	0.56	0.57	0.16	0.35	0.35	0.54	0.03	0.51	0.29	0.00	0.65
Avail Cap(c_a), veh/h	439	1118	1139	472	1245	1261	339	308	272	299	0	160
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	6.9	7.8	7.9	43.6	48.5	51.9	47.7	0.0	57.9
Incr Delay (d2), s/veh	1.7	2.1	2.0	0.1	0.8	0.8	1.5	0.0	0.6	0.5	0.0	6.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.6	0.6	0.5	4.5	4.7	4.7	0.2	3.6	2.5	0.0	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	1.8	2.1	2.0	6.9	8.6	8.6	45.1	48.5	52.6	48.3	0.0	64.3
LnGrp LOS	A	A	A	A	A	A	D	D	D	D	A	E
Approach Vol, veh/h		1405			954			290			185	
Approach Delay, s/veh		2.0			8.5			48.2			56.8	
Approach LOS		A			A			D			E	
Timer - Assigned Phs		2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s		95.1	13.0	21.9	10.9	84.1	18.6	16.3				
Change Period (Y+Rc), s		6.0	6.5	6.5	5.5	6.0	6.5	6.5				
Max Green Setting (Gmax), s		86.0	6.5	18.5	9.5	71.0	14.5	10.5				
Max Q Clear Time (g_c+I1), s		15.0	7.5	10.5	3.6	5.1	12.0	9.8				
Green Ext Time (p_c), s		1.9	0.0	0.2	0.0	4.1	0.1	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			12.5									
HCM 6th LOS			B									

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 PM Build w NB LTR
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 							
Traffic Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Future Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	84	1448	16	47	1582	65	388	7	187	88	7	128
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	152	2052	23	231	2204	90	408	413	364	268	7	130
Arrive On Green	0.56	0.56	0.54	0.05	0.63	0.62	0.19	0.22	0.22	0.06	0.09	0.07
Sat Flow, veh/h	310	3675	41	1781	3479	142	1818	1909	1683	1781	83	1515
Grp Volume(v), veh/h	84	714	750	47	805	842	388	7	187	88	0	135
Grp Sat Flow(s),veh/h/ln	310	1814	1902	1781	1777	1845	1818	1909	1683	1781	0	1598
Q Serve(g_s), s	35.1	40.2	40.2	1.5	42.5	43.1	26.8	0.4	13.7	6.2	0.0	11.8
Cycle Q Clear(g_c), s	67.7	40.2	40.2	1.5	42.5	43.1	26.8	0.4	13.7	6.2	0.0	11.8
Prop In Lane	1.00		0.02	1.00		0.08	1.00		1.00	1.00		0.95
Lane Grp Cap(c), veh/h	152	1013	1062	231	1126	1169	408	413	364	268	0	137
V/C Ratio(X)	0.55	0.71	0.71	0.20	0.72	0.72	0.95	0.02	0.51	0.33	0.00	0.99
Avail Cap(c_a), veh/h	152	1013	1062	288	1126	1169	408	413	364	268	0	137
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	43.7	22.5	22.6	17.9	17.2	17.3	44.9	43.1	48.4	53.2	0.0	65.1
Incr Delay (d2), s/veh	13.6	4.1	4.0	0.2	3.9	3.8	32.3	0.0	0.5	0.7	0.0	72.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	17.2	18.0	0.6	17.0	17.9	15.7	0.2	5.9	2.8	0.0	7.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.3	26.7	26.5	18.1	21.1	21.2	77.3	43.1	48.9	53.9	0.0	137.3
LnGrp LOS	E	C	C	B	C	C	E	D	D	D	A	F
Approach Vol, veh/h	1548		1694				582		223			
Approach Delay, s/veh	28.2		21.1				67.7		104.4			
Approach LOS	C		C				E		F			
Timer - Assigned Phs	2		3		4		5		6		7	
Phs Duration (G+Y+Rc), s	92.7		13.0		34.3		10.5		82.2		31.3	
Change Period (Y+Rc), s	6.0		6.5		6.5		5.5		6.0		6.5	
Max Green Setting (Gmax), s	86.7		6.5		27.8		9.5		71.7		24.8	
Max Q Clear Time (g_c+I1), s	45.1		8.2		15.7		3.5		69.7		28.8	
Green Ext Time (p_c), s	4.4		0.0		0.4		0.0		1.2		0.0	
Intersection Summary												
HCM 6th Ctrl Delay	35.1											
HCM 6th LOS	D											

HCM Signalized Intersection Capacity Analysis

11: Capital Drive & Kingston Pike

2026 AM Build w NB LLTR
Fast-Food Restaurant Development

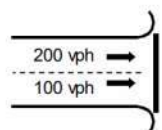
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↰↱		↰	↰↱		↰	↰↱	↰	↰	↱	
Traffic Volume (vph)	123	1087	111	59	720	89	138	7	99	79	6	85
Future Volume (vph)	123	1087	111	59	720	89	138	7	99	79	6	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	14	12	12	12
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		*0.67	0.95	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1778	3507		1770	3481		1192	1701	1697	1770	1603	
Flt Permitted	0.32	1.00		0.14	1.00		0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	599	3507		262	3481		1192	1701	1697	1770	1603	
Peak-hour factor, PHF	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.92	0.92	0.92
Adj. Flow (vph)	131	1156	118	65	791	98	164	8	118	86	7	92
RTOR Reduction (vph)	0	5	0	0	7	0	0	0	104	0	84	0
Lane Group Flow (vph)	131	1269	0	65	882	0	85	87	14	86	15	0
Turn Type	Perm	NA		pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases		6		5	2		4	4		8	8	
Permitted Phases	6			2					4			
Actuated Green, G (s)	78.0	78.0		88.8	88.8		12.8	12.8	12.8	9.4	9.4	
Effective Green, g (s)	80.0	80.0		90.3	90.8		15.3	15.3	15.3	11.9	11.9	
Actuated g/C Ratio	0.62	0.62		0.69	0.70		0.12	0.12	0.12	0.09	0.09	
Clearance Time (s)	6.0	6.0		5.5	6.0		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	368	2158		260	2431		140	200	199	162	146	
v/s Ratio Prot		c0.36		0.01	c0.25		c0.07	0.05		c0.05	0.01	
v/s Ratio Perm	0.22			0.16					0.01			
v/c Ratio	0.36	0.59		0.25	0.36		0.61	0.43	0.07	0.53	0.11	
Uniform Delay, d1	12.3	15.1		10.3	7.9		54.5	53.3	51.0	56.4	54.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.7	1.2		0.2	0.4		5.0	0.6	0.1	1.7	0.1	
Delay (s)	15.0	16.3		10.5	8.3		59.5	53.9	51.1	58.1	54.3	
Level of Service	B	B		B	A		E	D	D	E	D	
Approach Delay (s)		16.1			8.5			54.4			56.0	
Approach LOS		B			A			D			E	

Intersection Summary

HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	59.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

The lane utilization factor can be calculated as follows:



$$fLU = \frac{\text{Total App. Vol.}}{(\text{No. of Lanes}) \times (\text{High Lane Vol.})} = \frac{(100 + 200)}{(2 \times 200)} = 0.75$$

Assuming 75-25 distribution between NB left lanes:

$$(75+25)/(2*75) = 0.67$$

HCM Signalized Intersection Capacity Analysis

11: Capital Drive & Kingston Pike

2026 PM Build w NB LLTR
Fast-Food Restaurant Development

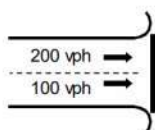
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement												
Lane Configurations	↰	↰↱		↰	↰↱		↰	↰↱	↰	↰	↱	
Traffic Volume (vph)	77	1332	15	43	1455	60	260	5	125	59	5	86
Future Volume (vph)	77	1332	15	43	1455	60	260	5	125	59	5	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	14	12	12	12
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		*0.67	0.95	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1778	3551		1770	3518		1192	1697	1697	1770	1598	
Flt Permitted	0.10	1.00		0.09	1.00		0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	179	3551		165	3518		1192	1697	1697	1770	1598	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Adj. Flow (vph)	84	1448	16	47	1582	65	388	7	187	88	7	128
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	128	0	45	0
Lane Group Flow (vph)	84	1464	0	47	1645	0	198	197	59	88	90	0
Turn Type	Perm	NA		pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases		6		5	2		4	4		8	8	
Permitted Phases	6			2					4			
Actuated Green, G (s)	80.0	80.0		90.6	90.6		22.9	22.9	22.9	7.5	7.5	
Effective Green, g (s)	82.0	82.0		92.1	92.6		25.4	25.4	25.4	10.0	10.0	
Actuated g/C Ratio	0.59	0.59		0.66	0.66		0.18	0.18	0.18	0.07	0.07	
Clearance Time (s)	6.0	6.0		5.5	6.0		6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	104	2079		184	2326		216	307	307	126	114	
v/s Ratio Prot		0.41		0.01	c0.47		c0.17	0.12		0.05	c0.06	
v/s Ratio Perm	c0.47			0.16					0.03			
v/c Ratio	0.81	0.70		0.26	0.71		0.92	0.64	0.19	0.70	0.79	
Uniform Delay, d1	22.8	20.4		16.2	15.1		56.3	53.1	48.6	63.5	64.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	47.1	2.0		0.3	1.8		38.1	3.4	0.1	12.8	28.7	
Delay (s)	69.9	22.5		16.5	16.9		94.4	56.5	48.7	76.3	92.7	
Level of Service	E	C		B	B		F	E	D	E	F	
Approach Delay (s)		25.0			16.9			66.9			86.2	
Approach LOS		C			B			E			F	

Intersection Summary

HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

The lane utilization factor can be calculated as follows:



$$fLU = \frac{\text{Total App. Vol.}}{(\text{No. of Lanes}) \times (\text{High Lane Vol.})} = \frac{(100 + 200)}{(2 \times 200)} = 0.75$$

Assuming 75-25 distribution between NB left lanes:

$$(75+25)/(2*75) = 0.67$$

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 AM Build w NB LTR WBR
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Future Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	131	1156	118	65	791	98	164	8	118	86	7	92
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	448	2049	209	416	2489	1086	306	263	232	299	11	141
Arrive On Green	1.00	1.00	1.00	0.05	0.70	0.69	0.11	0.14	0.14	0.07	0.09	0.08
Sat Flow, veh/h	638	3324	339	1781	3554	1585	1818	1909	1683	1781	113	1489
Grp Volume(v), veh/h	131	630	644	65	791	98	164	8	118	86	0	99
Grp Sat Flow(s),veh/h/ln	638	1814	1848	1781	1777	1585	1818	1909	1683	1781	0	1602
Q Serve(g_s), s	0.1	0.0	0.0	1.6	11.1	2.7	10.0	0.5	8.5	5.5	0.0	7.8
Cycle Q Clear(g_c), s	0.3	0.0	0.0	1.6	11.1	2.7	10.0	0.5	8.5	5.5	0.0	7.8
Prop In Lane	1.00		0.18	1.00		1.00	1.00		1.00	1.00		0.93
Lane Grp Cap(c), veh/h	448	1118	1139	416	2489	1086	306	263	232	299	0	152
V/C Ratio(X)	0.29	0.56	0.57	0.16	0.32	0.09	0.54	0.03	0.51	0.29	0.00	0.65
Avail Cap(c_a), veh/h	448	1118	1139	472	2489	1086	339	308	272	299	0	160
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	6.9	7.5	6.9	43.6	48.5	51.9	47.7	0.0	57.9
Incr Delay (d2), s/veh	1.7	2.1	2.0	0.1	0.3	0.2	1.5	0.0	0.6	0.5	0.0	6.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.6	0.6	0.5	3.8	0.9	4.7	0.2	3.6	2.5	0.0	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	1.7	2.1	2.0	6.9	7.8	7.0	45.1	48.5	52.6	48.3	0.0	64.3
LnGrp LOS	A	A	A	A	A	A	D	D	D	D	A	E
Approach Vol, veh/h		1405			954			290			185	
Approach Delay, s/veh		2.0			7.7			48.2			56.8	
Approach LOS		A			A			D			E	
Timer - Assigned Phs		2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s		95.1	13.0	21.9	10.9	84.1	18.6	16.3				
Change Period (Y+Rc), s		6.0	6.5	6.5	5.5	6.0	6.5	6.5				
Max Green Setting (Gmax), s		86.0	6.5	18.5	9.5	71.0	14.5	10.5				
Max Q Clear Time (g_c+I1), s		13.1	7.5	10.5	3.6	2.3	12.0	9.8				
Green Ext Time (p_c), s		2.3	0.0	0.2	0.0	4.1	0.1	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			12.2									
HCM 6th LOS			B									

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 PM Build w NB LTR WBR
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Future Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	84	1448	16	47	1582	65	388	7	187	88	7	128
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	150	2007	22	224	2208	962	430	436	385	268	7	130
Arrive On Green	0.55	0.55	0.53	0.05	0.62	0.61	0.21	0.23	0.23	0.06	0.09	0.07
Sat Flow, veh/h	310	3675	41	1781	3554	1585	1818	1909	1683	1781	83	1515
Grp Volume(v), veh/h	84	714	750	47	1582	65	388	7	187	88	0	135
Grp Sat Flow(s),veh/h/ln	310	1814	1902	1781	1777	1585	1818	1909	1683	1781	0	1598
Q Serve(g_s), s	35.5	41.3	41.4	1.5	42.5	2.4	26.3	0.4	13.5	6.2	0.0	11.8
Cycle Q Clear(g_c), s	67.5	41.3	41.4	1.5	42.5	2.4	26.3	0.4	13.5	6.2	0.0	11.8
Prop In Lane	1.00		0.02	1.00		1.00	1.00		1.00	1.00		0.95
Lane Grp Cap(c), veh/h	150	991	1039	224	2208	962	430	436	385	268	0	137
V/C Ratio(X)	0.56	0.72	0.72	0.21	0.72	0.07	0.90	0.02	0.49	0.33	0.00	0.99
Avail Cap(c_a), veh/h	150	991	1039	281	2208	962	430	436	385	268	0	137
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	44.7	23.8	23.8	19.0	18.1	11.3	43.4	41.8	46.9	53.2	0.0	65.1
Incr Delay (d2), s/veh	14.3	4.5	4.3	0.2	2.0	0.1	22.0	0.0	0.4	0.7	0.0	72.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	17.9	18.7	0.6	16.5	0.9	14.5	0.2	5.7	2.8	0.0	7.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	59.0	28.3	28.2	19.2	20.1	11.4	65.4	41.8	47.2	53.9	0.0	137.3
LnGrp LOS	E	C	C	B	C	B	E	D	D	D	A	F
Approach Vol, veh/h	1548		1694				582		223			
Approach Delay, s/veh	29.9		19.7				59.3		104.4			
Approach LOS	C		B				E		F			
Timer - Assigned Phs	2		3		4		5		6		7	
Phs Duration (G+Y+Rc), s	91.0		13.0		36.0		10.5		80.5		33.0	
Change Period (Y+Rc), s	6.0		6.5		6.5		5.5		6.0		6.5	
Max Green Setting (Gmax), s	85.0		6.5		29.5		9.5		70.0		26.5	
Max Q Clear Time (g_c+I1), s	44.5		8.2		15.5		3.5		69.5		28.3	
Green Ext Time (p_c), s	5.6		0.0		0.4		0.0		0.3		0.0	
Intersection Summary												
HCM 6th Ctrl Delay	34.0											
HCM 6th LOS	C											

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 AM Build w Full Improvements
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Future Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	131	1156	118	65	791	98	164	8	118	86	7	92
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	486	2047	209	415	2175	946	306	255	224	308	11	141
Arrive On Green	0.12	1.00	1.00	0.05	0.61	0.60	0.11	0.13	0.13	0.07	0.09	0.08
Sat Flow, veh/h	1818	3324	339	1781	3554	1585	1818	1909	1683	1781	113	1489
Grp Volume(v), veh/h	131	630	644	65	791	98	164	8	118	86	0	99
Grp Sat Flow(s),veh/h/ln	1818	1814	1848	1781	1777	1585	1818	1909	1683	1781	0	1602
Q Serve(g_s), s	3.3	0.0	0.0	1.7	14.4	3.5	10.0	0.5	8.5	5.5	0.0	7.8
Cycle Q Clear(g_c), s	3.3	0.0	0.0	1.7	14.4	3.5	10.0	0.5	8.5	5.5	0.0	7.8
Prop In Lane	1.00		0.18	1.00		1.00	1.00		1.00	1.00		0.93
Lane Grp Cap(c), veh/h	486	1117	1139	415	2175	946	306	255	224	308	0	152
V/C Ratio(X)	0.27	0.56	0.57	0.16	0.36	0.10	0.54	0.03	0.53	0.28	0.00	0.65
Avail Cap(c_a), veh/h	550	1117	1139	470	2175	946	353	323	285	312	0	173
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.9	0.0	0.0	7.7	12.6	11.3	43.6	49.0	52.5	47.2	0.0	57.9
Incr Delay (d2), s/veh	0.3	2.1	2.0	0.1	0.5	0.2	1.5	0.0	0.7	0.5	0.0	4.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.6	0.6	0.6	5.5	1.3	4.7	0.2	3.6	2.5	0.0	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.2	2.1	2.0	7.8	13.1	11.5	45.0	49.0	53.2	47.6	0.0	62.5
LnGrp LOS	A	A	A	A	B	B	D	D	D	D	A	E
Approach Vol, veh/h		1405			954			290			185	
Approach Delay, s/veh		2.6			12.5			48.5			55.6	
Approach LOS		A			B			D			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.4	83.6	13.6	21.3	10.9	84.1	18.7	16.3				
Change Period (Y+Rc), s	5.5	6.0	6.5	6.5	5.5	6.0	6.5	6.5				
Max Green Setting (Gmax), s	10.5	68.0	7.5	19.5	9.5	69.0	15.5	11.5				
Max Q Clear Time (g_c+I1), s	5.3	16.4	7.5	10.5	3.7	2.0	12.0	9.8				
Green Ext Time (p_c), s	0.2	2.3	0.0	0.2	0.0	3.0	0.2	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			14.1									
HCM 6th LOS			B									

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 PM Build w Full Improvements
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Future Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	84	1448	16	47	1582	65	388	7	187	88	7	128
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	199	1965	22	217	1881	816	451	458	404	268	7	130
Arrive On Green	0.06	0.53	0.52	0.05	0.53	0.52	0.22	0.24	0.24	0.06	0.09	0.07
Sat Flow, veh/h	1818	3675	41	1781	3554	1585	1818	1909	1683	1781	83	1515
Grp Volume(v), veh/h	84	714	750	47	1582	65	388	7	187	88	0	135
Grp Sat Flow(s),veh/h/ln	1818	1814	1902	1781	1777	1585	1818	1909	1683	1781	0	1598
Q Serve(g_s), s	2.8	42.3	42.4	1.6	52.9	2.9	25.9	0.4	13.3	6.2	0.0	11.8
Cycle Q Clear(g_c), s	2.8	42.3	42.4	1.6	52.9	2.9	25.9	0.4	13.3	6.2	0.0	11.8
Prop In Lane	1.00		0.02	1.00		1.00	1.00		1.00	1.00		0.95
Lane Grp Cap(c), veh/h	199	970	1017	217	1881	816	451	458	404	268	0	137
V/C Ratio(X)	0.42	0.74	0.74	0.22	0.84	0.08	0.86	0.02	0.46	0.33	0.00	0.99
Avail Cap(c_a), veh/h	248	970	1017	274	1881	816	465	473	417	268	0	137
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	26.3	25.0	25.0	20.3	27.9	17.2	42.0	40.6	45.5	53.2	0.0	65.1
Incr Delay (d2), s/veh	1.4	5.0	4.8	0.2	4.7	0.2	14.8	0.0	0.3	0.7	0.0	72.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	18.5	19.3	0.6	22.3	1.1	13.5	0.2	5.6	2.8	0.0	7.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	27.8	30.0	29.8	20.5	32.7	17.4	56.8	40.6	45.8	53.9	0.0	137.3
LnGrp LOS	C	C	C	C	C	B	E	D	D	D	A	F
Approach Vol, veh/h		1548			1694			582			223	
Approach Delay, s/veh		29.8			31.8			53.1			104.4	
Approach LOS		C			C			D			F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.3	78.1	13.0	37.6	10.5	78.8	34.6	16.0				
Change Period (Y+Rc), s	5.5	6.0	6.5	6.5	5.5	6.0	6.5	6.5				
Max Green Setting (Gmax), s	9.5	67.3	6.5	32.2	9.5	67.3	29.2	9.5				
Max Q Clear Time (g_c+I1), s	4.8	54.9	8.2	15.3	3.6	44.4	27.9	13.8				
Green Ext Time (p_c), s	0.1	4.4	0.0	0.4	0.0	3.5	0.2	0.0				
Intersection Summary												
HCM 6th Ctrl Delay			38.1									
HCM 6th LOS			D									

HCM Signalized Intersection Capacity Analysis
11: Capital Drive & Kingston Pike

2026 AM Build w Full Improvements + Split Phase
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	123	1087	111	59	720	89	138	7	99	79	6	85
Future Volume (vph)	123	1087	111	59	720	89	138	7	99	79	6	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	14	12	12	12
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)	3.5	4.0		4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	*0.67	0.95	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (prot)	1778	3507		1770	3539	1583	1192	1701	1697	1770	1603	
Flt Permitted	0.29	1.00		0.15	1.00	1.00	0.95	0.96	1.00	0.95	1.00	
Satd. Flow (perm)	534	3507		281	3539	1583	1192	1701	1697	1770	1603	
Peak-hour factor, PHF	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.92	0.92	0.92
Adj. Flow (vph)	131	1156	118	65	791	98	164	8	118	86	7	92
RTOR Reduction (vph)	0	5	0	0	0	42	0	0	104	0	83	0
Lane Group Flow (vph)	131	1269	0	65	791	56	85	87	14	86	16	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases	6			2		2			4			
Actuated Green, G (s)	85.3	77.1		79.5	74.2	74.2	13.0	13.0	13.0	10.1	10.1	
Effective Green, g (s)	89.3	79.1		82.5	76.2	74.2	15.5	15.5	15.5	12.6	12.6	
Actuated g/C Ratio	0.69	0.61		0.63	0.59	0.57	0.12	0.12	0.12	0.10	0.10	
Clearance Time (s)	5.5	6.0		5.5	6.0	6.0	6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	464	2133		256	2074	903	142	202	202	171	155	
v/s Ratio Prot	c0.02	c0.36		0.01	0.22		c0.07	0.05		c0.05	0.01	
v/s Ratio Perm	0.17			0.15		0.04			0.01			
v/c Ratio	0.28	0.59		0.25	0.38	0.06	0.60	0.43	0.07	0.50	0.10	
Uniform Delay, d1	8.0	15.6		11.5	14.3	12.4	54.3	53.2	50.8	55.7	53.5	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	1.2		0.2	0.5	0.1	4.5	0.5	0.1	0.8	0.1	
Delay (s)	8.3	16.8		11.7	14.9	12.5	58.8	53.7	50.9	56.6	53.6	
Level of Service	A	B		B	B	B	E	D	D	E	D	
Approach Delay (s)		16.1			14.4			54.0			55.0	
Approach LOS		B			B			D			E	
Intersection Summary												
HCM 2000 Control Delay			21.9				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			130.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			59.6%				ICU Level of Service			B		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis
11: Capital Drive & Kingston Pike

2026 PM Build w Full Improvements + Split Phase
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	1332	15	43	1455	60	260	5	125	59	5	86
Future Volume (vph)	77	1332	15	43	1455	60	260	5	125	59	5	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	14	12	12	12
Grade (%)		-1%			0%			-1%			0%	
Total Lost time (s)	4.0	4.0		4.0	4.0	6.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	*0.67	0.95	1.00	1.00	1.00	
Frt	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (prot)	1778	3551		1770	3539	1583	1192	1697	1697	1770	1598	
Flt Permitted	0.05	1.00		0.08	1.00	1.00	0.95	0.95	1.00	0.95	1.00	
Satd. Flow (perm)	99	3551		155	3539	1583	1192	1697	1697	1770	1598	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Adj. Flow (vph)	84	1448	16	47	1582	65	388	7	187	88	7	128
RTOR Reduction (vph)	0	0	0	0	0	30	0	0	98	0	98	0
Lane Group Flow (vph)	84	1464	0	47	1582	35	198	197	89	88	37	0
Turn Type	pm+pt	NA		pm+pt	NA	Perm	Split	NA	Perm	Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases	6			2		2			4			
Actuated Green, G (s)	82.2	76.0		79.7	74.5	74.5	25.6	25.6	25.6	8.7	8.7	
Effective Green, g (s)	86.2	78.0		82.7	76.5	74.5	28.1	28.1	28.1	11.2	11.2	
Actuated g/C Ratio	0.62	0.56		0.59	0.55	0.53	0.20	0.20	0.20	0.08	0.08	
Clearance Time (s)	6.0	6.0		5.5	6.0	6.0	6.5	6.5	6.5	6.5	6.5	
Vehicle Extension (s)	3.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	159	1978		168	1933	842	239	340	340	141	127	
v/s Ratio Prot	c0.03	0.41		0.01	c0.45		c0.17	0.12		c0.05	0.02	
v/s Ratio Perm	0.29			0.15		0.02			0.05			
v/c Ratio	0.53	0.74		0.28	0.82	0.04	0.83	0.58	0.26	0.62	0.29	
Uniform Delay, d1	24.4	23.4		19.0	26.1	15.7	53.6	50.6	47.2	62.4	60.6	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	3.1	2.5		0.3	4.0	0.1	19.6	1.5	0.1	6.1	0.5	
Delay (s)	27.5	25.9		19.3	30.1	15.8	73.2	52.1	47.3	68.4	61.1	
Level of Service	C	C		B	C	B	E	D	D	E	E	
Approach Delay (s)		26.0			29.2			57.8			64.0	
Approach LOS		C			C			E			E	

Intersection Summary

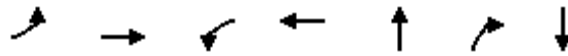
HCM 2000 Control Delay	34.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

QUEUE REPORTS

Queues
11: Capital Drive & Kingston Pike

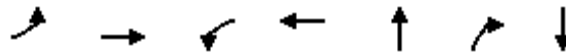
2021 AM Existing
Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	2	1253	62	784	156	112	4
v/c Ratio	0.00	0.49	0.18	0.28	0.76	0.33	0.01
Control Delay	6.5	9.3	4.5	4.0	75.8	11.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	9.3	4.5	4.0	75.8	11.0	0.0
Queue Length 50th (ft)	0	242	10	84	126	0	0
Queue Length 95th (ft)	3	295	20	105	188	44	0
Internal Link Dist (ft)		1015		1260	617		180
Turn Bay Length (ft)	200		200			145	
Base Capacity (vph)	479	2532	432	2801	228	368	517
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.49	0.14	0.28	0.68	0.30	0.01
Intersection Summary							

Queues
11: Capital Drive & Kingston Pike

2021 PM Existing
Fast-Food Restaurant Development



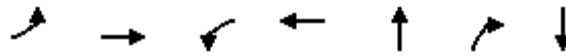
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	9	1413	45	1529	370	178	13
v/c Ratio	0.05	0.61	0.18	0.60	1.19	0.39	0.11
Control Delay	10.6	15.7	7.3	10.8	160.6	21.3	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	15.7	7.3	10.8	160.6	21.3	1.9
Queue Length 50th (ft)	3	381	11	324	~406	52	0
Queue Length 95th (ft)	11	454	22	381	#378	65	0
Internal Link Dist (ft)		1015		1260	617		180
Turn Bay Length (ft)	200		200			145	
Base Capacity (vph)	167	2325	281	2553	310	459	117
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.61	0.16	0.60	1.19	0.39	0.11

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
11: Capital Drive & Kingston Pike

2026 AM No Build
Fast-Food Restaurant Development



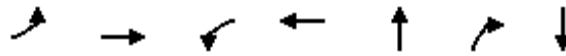
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	2	1316	65	824	164	118	4
v/c Ratio	0.00	0.52	0.21	0.30	0.78	0.33	0.01
Control Delay	6.5	9.8	4.8	4.2	77.9	10.8	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	9.8	4.8	4.2	77.9	10.8	0.0
Queue Length 50th (ft)	0	262	11	90	133	0	0
Queue Length 95th (ft)	3	318	21	111	#200	45	0
Internal Link Dist (ft)		1015		1260	617		180
Turn Bay Length (ft)	200		200			145	
Base Capacity (vph)	458	2525	412	2792	228	373	500
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.52	0.16	0.30	0.72	0.32	0.01

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
11: Capital Drive & Kingston Pike

2026 PM No Build
Fast-Food Restaurant Development



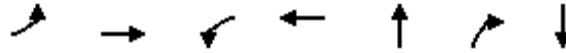
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	9	1483	47	1605	388	187	13
v/c Ratio	0.06	0.64	0.21	0.63	1.25	0.41	0.11
Control Delay	11.0	16.4	7.7	11.3	181.3	22.6	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.0	16.4	7.7	11.3	181.3	22.6	1.9
Queue Length 50th (ft)	3	414	11	354	~440	59	0
Queue Length 95th (ft)	11	493	23	415	#406	71	0
Internal Link Dist (ft)		1015		1260	617		180
Turn Bay Length (ft)	200		200			145	
Base Capacity (vph)	148	2324	265	2553	310	459	117
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.06	0.64	0.18	0.63	1.25	0.41	0.11

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
11: Capital Drive & Kingston Pike

2026 AM Build No Improvements
Fast-Food Restaurant Development



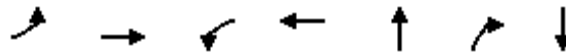
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	131	1274	65	889	172	118	185
v/c Ratio	0.31	0.51	0.20	0.33	1.08	0.32	1.09
Control Delay	10.3	10.0	4.8	4.5	145.5	10.5	136.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.3	10.0	4.8	4.5	145.5	10.5	136.1
Queue Length 50th (ft)	40	248	11	95	~161	0	~150
Queue Length 95th (ft)	77	303	21	118	#280	45	#306
Internal Link Dist (ft)		1015		1260	617		180
Turn Bay Length (ft)	200		200			145	
Base Capacity (vph)	422	2478	417	2710	159	373	170
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.51	0.16	0.33	1.08	0.32	1.09

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
11: Capital Drive & Kingston Pike

2026 PM Build No Improvements
Fast-Food Restaurant Development



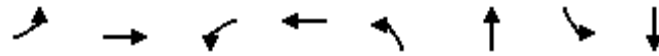
Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	84	1464	47	1647	395	187	223
v/c Ratio	0.61	0.63	0.20	0.65	1.95	0.41	2.82
Control Delay	37.8	16.2	7.6	11.6	472.5	23.0	870.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	37.8	16.2	7.6	11.6	472.5	23.0	870.8
Queue Length 50th (ft)	43	405	11	372	~554	61	~279
Queue Length 95th (ft)	#145	483	23	436	#518	73	#298
Internal Link Dist (ft)		1015		1260	617		180
Turn Bay Length (ft)	200		200			145	
Base Capacity (vph)	138	2324	269	2539	203	458	79
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.61	0.63	0.17	0.65	1.95	0.41	2.82

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
11: Capital Drive & Kingston Pike

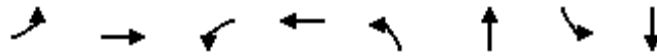
2026 AM Build w Phasing Mod
Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	131	1274	65	889	164	126	86	99
v/c Ratio	0.34	0.57	0.23	0.36	0.58	0.42	0.38	0.49
Control Delay	15.9	15.6	8.2	7.9	50.5	14.6	45.3	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	15.6	8.2	7.9	50.5	14.6	45.3	21.1
Queue Length 50th (ft)	50	311	15	133	119	6	59	6
Queue Length 95th (ft)	108	426	33	188	166	52	102	61
Internal Link Dist (ft)		1015		1260		617		180
Turn Bay Length (ft)	200		200		145			
Base Capacity (vph)	380	2235	317	2476	294	347	229	243
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.57	0.21	0.36	0.56	0.36	0.38	0.41
Intersection Summary								

Queues
11: Capital Drive & Kingston Pike

2026 PM Build w Phasing Mod
Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	84	1464	47	1647	388	194	88	135
v/c Ratio	0.90	0.72	0.25	0.73	0.97	0.41	0.42	0.77
Control Delay	101.9	25.4	13.0	19.7	82.3	11.8	43.6	66.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	101.9	25.4	13.0	19.7	82.3	11.8	43.6	66.2
Queue Length 50th (ft)	68	516	15	511	312	16	58	75
Queue Length 95th (ft)	#188	622	31	599	294	27	75	95
Internal Link Dist (ft)		1015		1260		617		180
Turn Bay Length (ft)	200		200		145			
Base Capacity (vph)	93	2025	222	2248	400	479	211	183
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.72	0.21	0.73	0.97	0.41	0.42	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
11: Capital Drive & Kingston Pike

2026 AM Build w NB LTR
Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	131	1274	65	889	164	8	118	86	99
v/c Ratio	0.34	0.57	0.23	0.36	0.57	0.03	0.36	0.38	0.49
Control Delay	15.9	15.6	8.2	7.9	50.5	47.9	10.1	45.4	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	15.9	15.6	8.2	7.9	50.5	47.9	10.1	45.4	21.1
Queue Length 50th (ft)	50	311	15	133	119	6	0	59	6
Queue Length 95th (ft)	108	426	33	188	166	20	38	102	61
Internal Link Dist (ft)		1015		1260		617			180
Turn Bay Length (ft)	200		200		145		145		
Base Capacity (vph)	380	2235	317	2476	294	302	379	226	243
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.57	0.21	0.36	0.56	0.03	0.31	0.38	0.41
Intersection Summary									

Queues
11: Capital Drive & Kingston Pike

2026 PM Build w NB LTR
Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	1464	47	1647	388	7	187	88	135
v/c Ratio	0.90	0.72	0.25	0.73	0.97	0.02	0.38	0.39	0.77
Control Delay	101.9	25.4	13.0	19.7	82.3	43.4	10.1	42.6	66.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	101.9	25.4	13.0	19.7	82.3	43.4	10.1	42.6	66.2
Queue Length 50th (ft)	68	516	15	511	312	5	9	58	75
Queue Length 95th (ft)	#188	622	31	599	294	14	21	75	95
Internal Link Dist (ft)		1015		1260		617			180
Turn Bay Length (ft)	200		200		145		145		
Base Capacity (vph)	93	2025	222	2248	400	405	503	227	183
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.72	0.21	0.73	0.97	0.02	0.37	0.39	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
11: Capital Drive & Kingston Pike

2026 AM Build w NB LLTR
Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	131	1274	65	889	85	87	118	86	99
v/c Ratio	0.35	0.58	0.24	0.36	0.61	0.43	0.38	0.53	0.43
Control Delay	17.5	17.1	9.2	8.7	71.8	59.1	10.7	68.5	18.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.5	17.1	9.2	8.7	71.8	59.1	10.7	68.5	18.5
Queue Length 50th (ft)	54	338	17	150	102	72	0	70	5
Queue Length 95th (ft)	112	444	35	198	171	117	39	125	61
Internal Link Dist (ft)		1015		1260		617			180
Turn Bay Length (ft)	200		200		145		145		
Base Capacity (vph)	373	2193	310	2436	174	248	355	178	244
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.35	0.58	0.21	0.36	0.49	0.35	0.33	0.48	0.41
Intersection Summary									

Queues
11: Capital Drive & Kingston Pike

2026 PM Build w NB LLTR
Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	1464	47	1647	198	197	187	88	135
v/c Ratio	0.79	0.69	0.24	0.71	0.92	0.64	0.43	0.70	0.85
Control Delay	72.5	22.6	11.3	17.2	99.3	63.4	14.6	91.7	82.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	72.5	22.6	11.3	17.2	99.3	63.4	14.6	91.7	82.5
Queue Length 50th (ft)	59	486	14	473	265	175	24	80	80
Queue Length 95th (ft)	#176	584	29	555	286	189	35	102	100
Internal Link Dist (ft)		1015		1260		617			180
Turn Bay Length (ft)	200		200		145		145		
Base Capacity (vph)	107	2110	236	2330	221	315	442	126	158
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.69	0.20	0.71	0.90	0.63	0.42	0.70	0.85

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
11: Capital Drive & Kingston Pike

2026 PM Build w NB LTR WBR
Fast-Food Restaurant Development

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	1464	47	1582	65	388	7	187	88	135
v/c Ratio	0.83	0.74	0.26	0.71	0.06	0.92	0.02	0.36	0.39	0.76
Control Delay	84.4	27.0	14.0	20.1	0.1	70.3	42.2	9.5	41.6	63.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	84.4	27.0	14.0	20.1	0.1	70.3	42.2	9.5	41.6	63.1
Queue Length 50th (ft)	63	532	16	491	0	307	5	9	57	73
Queue Length 95th (ft)	#181	641	32	577	0	289	14	19	73	92
Internal Link Dist (ft)		1015		1260			617			180
Turn Bay Length (ft)	200		200		50	145		145		
Base Capacity (vph)	101	1981	214	2217	1018	421	427	522	227	186
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.74	0.22	0.71	0.06	0.92	0.02	0.36	0.39	0.73

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
11: Capital Drive & Kingston Pike

2026 AM Build w NB LTR WBR
Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	131	1274	65	791	98	164	8	118	86	99
v/c Ratio	0.31	0.57	0.23	0.31	0.09	0.57	0.03	0.36	0.38	0.49
Control Delay	14.9	15.6	8.2	7.7	0.6	50.5	47.9	10.1	45.4	21.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.9	15.6	8.2	7.7	0.6	50.5	47.9	10.1	45.4	21.1
Queue Length 50th (ft)	49	311	15	117	0	119	6	0	59	6
Queue Length 95th (ft)	103	426	33	166	8	166	20	38	102	61
Internal Link Dist (ft)		1015		1260			617			180
Turn Bay Length (ft)	200		200		50	145		145		
Base Capacity (vph)	419	2235	317	2512	1141	294	302	379	226	243
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.31	0.57	0.21	0.31	0.09	0.56	0.03	0.31	0.38	0.41

Intersection Summary

Queues
11: Capital Drive & Kingston Pike

2026 AM Build w Full Improvements

Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	131	1274	65	791	98	164	8	118	86	99
v/c Ratio	0.27	0.57	0.23	0.37	0.10	0.56	0.03	0.36	0.36	0.49
Control Delay	7.9	16.1	8.7	14.9	0.2	49.1	47.9	10.2	44.1	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	7.9	16.1	8.7	14.9	0.2	49.1	47.9	10.2	44.1	21.0
Queue Length 50th (ft)	31	318	15	173	0	117	6	0	59	6
Queue Length 95th (ft)	60	437	34	248	0	164	20	38	100	61
Internal Link Dist (ft)		1015		1260			617			180
Turn Bay Length (ft)	200		200		50	145		100		
Base Capacity (vph)	499	2217	323	2110	997	306	316	391	240	254
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.57	0.20	0.37	0.10	0.54	0.03	0.30	0.36	0.39

Intersection Summary

Queues
11: Capital Drive & Kingston Pike

2026 PM Build w Full Improvements

Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	1464	47	1582	65	388	7	187	88	135
v/c Ratio	0.47	0.74	0.26	0.85	0.07	0.86	0.02	0.36	0.42	0.59
Control Delay	26.7	27.8	14.7	34.7	0.2	60.8	40.8	8.9	42.6	22.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.7	27.8	14.7	34.7	0.2	60.8	40.8	8.9	42.6	22.5
Queue Length 50th (ft)	28	524	16	624	0	310	5	7	58	6
Queue Length 95th (ft)	81	671	34	794	0	280	13	18	71	23
Internal Link Dist (ft)		1015		1260			617			180
Turn Bay Length (ft)	200		200		50	145		145		
Base Capacity (vph)	198	1966	217	1858	892	454	463	553	209	254
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.74	0.22	0.85	0.07	0.85	0.02	0.34	0.42	0.53

Intersection Summary

Queues
11: Capital Drive & Kingston Pike

2026 AM Build w Full Improvements + Split Phase
Fast-Food Restaurant Development

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	131	1274	65	791	98	85	87	118	86	99
v/c Ratio	0.28	0.59	0.24	0.38	0.10	0.60	0.43	0.38	0.50	0.42
Control Delay	9.2	18.0	10.0	16.0	1.3	70.8	58.6	10.6	65.4	17.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.2	18.0	10.0	16.0	1.3	70.8	58.6	10.6	65.4	17.6
Queue Length 50th (ft)	34	338	17	184	0	102	72	0	70	5
Queue Length 95th (ft)	66	469	37	254	15	170	116	39	123	60
Internal Link Dist (ft)		1015		1260			617			180
Turn Bay Length (ft)	200		200		50	145		145		
Base Capacity (vph)	470	2167	286	2073	958	183	261	367	204	266
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.59	0.23	0.38	0.10	0.46	0.33	0.32	0.42	0.37
Intersection Summary										

Queues
11: Capital Drive & Kingston Pike

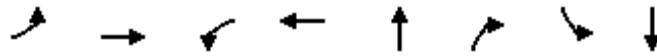
2026 PM Build w Full Improvements + Split Phase
Fast-Food Restaurant Development

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	1464	47	1582	65	198	197	187	88	135
v/c Ratio	0.53	0.73	0.26	0.82	0.07	0.83	0.58	0.43	0.62	0.60
Control Delay	32.1	27.0	14.4	31.4	0.1	80.2	57.0	19.8	81.6	28.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.1	27.0	14.4	31.4	0.1	80.2	57.0	19.8	81.6	28.8
Queue Length 50th (ft)	30	550	16	637	0	255	168	48	78	24
Queue Length 95th (ft)	83	663	34	748	0	271	178	59	101	42
Internal Link Dist (ft)		1015		1260			617			180
Turn Bay Length (ft)	200		200		50	145		145		
Base Capacity (vph)	159	2005	223	1932	900	272	387	482	146	230
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.53	0.73	0.21	0.82	0.07	0.73	0.51	0.39	0.60	0.59
Intersection Summary										

ADDENDUM #1 SUPPORTING DOCUMENTS

Queues
11: Capital Drive & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	131	1274	65	889	172	118	86	99
v/c Ratio	0.45	0.74	0.24	0.42	0.67	0.28	0.37	0.34
Control Delay	24.2	23.1	10.5	9.9	46.3	2.0	36.1	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.2	23.1	10.5	9.9	46.3	2.0	36.1	11.9
Queue Length 50th (ft)	47	290	14	121	82	0	40	3
Queue Length 95th (ft)	112	#452	31	170	135	0	80	44
Internal Link Dist (ft)		1015		1260	617			180
Turn Bay Length (ft)	200		200			145		
Base Capacity (vph)	291	1713	330	2117	267	428	265	318
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.45	0.74	0.20	0.42	0.64	0.28	0.32	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

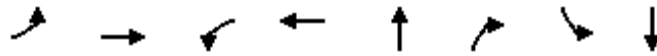
11: Capital Drive & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Future Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	131	1156	118	65	791	98	164	8	118	86	7	92
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	378	1539	157	299	1875	232	253	12	245	206	13	172
Arrive On Green	0.46	0.46	0.44	0.08	0.59	0.56	0.15	0.15	0.15	0.12	0.12	0.08
Sat Flow, veh/h	638	3324	339	1781	3182	394	1738	85	1683	1781	113	1489
Grp Volume(v), veh/h	131	630	644	65	442	447	172	0	118	86	0	99
Grp Sat Flow(s),veh/h/ln	638	1814	1848	1781	1777	1799	1822	0	1683	1781	0	1602
Q Serve(g_s), s	11.3	22.9	23.0	1.3	10.9	11.0	7.1	0.0	5.2	3.6	0.0	4.7
Cycle Q Clear(g_c), s	12.2	22.9	23.0	1.3	10.9	11.0	7.1	0.0	5.2	3.6	0.0	4.7
Prop In Lane	1.00		0.18	1.00		0.22	0.95		1.00	1.00		0.93
Lane Grp Cap(c), veh/h	378	840	856	299	1047	1060	265	0	245	206	0	185
V/C Ratio(X)	0.35	0.75	0.75	0.22	0.42	0.42	0.65	0.00	0.48	0.42	0.00	0.54
Avail Cap(c_a), veh/h	378	840	856	408	1047	1060	273	0	252	267	0	240
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.1	17.7	17.9	12.7	9.0	9.1	32.2	0.0	31.4	32.9	0.0	34.5
Incr Delay (d2), s/veh	2.5	6.1	6.1	0.1	1.2	1.2	3.9	0.0	0.5	0.5	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	9.5	9.8	0.4	3.6	3.7	3.3	0.0	2.1	1.5	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.6	23.8	23.9	12.9	10.2	10.4	36.1	0.0	32.0	33.4	0.0	35.4
LnGrp LOS	B	C	C	B	B	B	D	A	C	C	A	D
Approach Vol, veh/h	1405			954			290			185		
Approach Delay, s/veh	23.3			10.5			34.4			34.5		
Approach LOS	C			B			C			C		
Timer - Assigned Phs	2			4		5		6		8		
Phs Duration (G+Y+Rc), s	51.1			15.6		10.1		41.0		13.2		
Change Period (Y+Rc), s	6.0			6.5		5.5		6.0		6.5		
Max Green Setting (Gmax), s	42.0			9.5		9.5		27.0		9.5		
Max Q Clear Time (g_c+I1), s	13.0			9.1		3.3		25.0		6.7		
Green Ext Time (p_c), s	1.8			0.0		0.0		1.0		0.1		
Intersection Summary												
HCM 6th Ctrl Delay	20.8											
HCM 6th LOS	C											

Queues
11: Capital Drive & Kingston Pike

2026 PM Build with Split Phasing
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	1464	47	1647	395	187	88	135
v/c Ratio	1.04	0.74	0.28	0.76	1.01	0.41	0.62	0.76
Control Delay	145.8	29.2	15.6	23.5	104.6	23.7	84.9	67.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	145.8	29.2	15.6	23.5	104.6	23.7	84.9	67.4
Queue Length 50th (ft)	~90	577	17	587	~394	63	84	80
Queue Length 95th (ft)	#209	688	35	680	362	73	107	99
Internal Link Dist (ft)		1015		1260	617			180
Turn Bay Length (ft)	200		200			145		
Base Capacity (vph)	81	1968	204	2178	392	458	153	185
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.04	0.74	0.23	0.76	1.01	0.41	0.58	0.73

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 PM Build with Split Phasing
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Future Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	84	1448	16	47	1582	65	388	7	187	88	7	128
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	137	1993	22	214	2134	87	393	7	370	154	7	131
Arrive On Green	0.54	0.54	0.53	0.04	0.61	0.60	0.22	0.22	0.22	0.09	0.09	0.07
Sat Flow, veh/h	310	3675	41	1781	3479	142	1788	32	1683	1781	83	1515
Grp Volume(v), veh/h	84	714	750	47	805	842	395	0	187	88	0	135
Grp Sat Flow(s),veh/h/ln	310	1814	1902	1781	1777	1845	1820	0	1683	1781	0	1598
Q Serve(g_s), s	39.7	44.6	44.7	1.6	48.1	48.7	32.4	0.0	14.6	7.1	0.0	12.7
Cycle Q Clear(g_c), s	77.7	44.6	44.7	1.6	48.1	48.7	32.4	0.0	14.6	7.1	0.0	12.7
Prop In Lane	1.00		0.02	1.00		0.08	0.98		1.00	1.00		0.95
Lane Grp Cap(c), veh/h	137	984	1031	214	1090	1131	400	0	370	154	0	138
V/C Ratio(X)	0.61	0.73	0.73	0.22	0.74	0.74	0.99	0.00	0.51	0.57	0.00	0.97
Avail Cap(c_a), veh/h	137	984	1031	266	1090	1131	400	0	370	154	0	138
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	52.1	25.9	26.0	20.9	20.5	20.7	58.3	0.0	51.3	65.8	0.0	69.5
Incr Delay (d2), s/veh	18.6	4.7	4.5	0.2	4.5	4.4	41.2	0.0	0.4	3.2	0.0	68.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	19.6	20.5	0.6	19.8	20.9	19.5	0.0	6.3	3.4	0.0	7.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.7	30.6	30.4	21.1	25.0	25.1	99.5	0.0	51.8	69.0	0.0	137.9
LnGrp LOS	E	C	C	C	C	C	F	A	D	E	A	F
Approach Vol, veh/h	1548		1694				582			223		
Approach Delay, s/veh	32.7		25.0				84.2			110.7		
Approach LOS	C		C				F			F		
Timer - Assigned Phs	2		4		5	6	8					
Phs Duration (G+Y+Rc), s	96.0		37.0		10.7	85.3	17.0					
Change Period (Y+Rc), s	6.0		6.5		5.5	6.0	6.5					
Max Green Setting (Gmax), s	90.0		30.5		9.5	75.0	10.5					
Max Q Clear Time (g_c+I1), s	50.7		34.4		3.6	79.7	14.7					
Green Ext Time (p_c), s	4.4		0.0		0.0	0.0	0.0					
Intersection Summary												
HCM 6th Ctrl Delay			41.2									
HCM 6th LOS			D									

Queues
11: Capital Drive & Kingston Pike

2026 AM Build w Split Phasing MIT
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	131	1274	65	791	98	172	118	86	99
v/c Ratio	0.30	0.74	0.24	0.48	0.12	0.67	0.28	0.37	0.34
Control Delay	9.8	23.1	10.9	18.8	0.3	46.3	2.0	36.1	11.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	9.8	23.1	10.9	18.8	0.3	46.3	2.0	36.1	11.9
Queue Length 50th (ft)	28	290	14	157	0	82	0	40	3
Queue Length 95th (ft)	54	#452	31	226	0	135	0	80	44
Internal Link Dist (ft)		1015		1260		617			180
Turn Bay Length (ft)	200		200		50		145		
Base Capacity (vph)	468	1713	337	1647	815	267	428	265	318
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.74	0.19	0.48	0.12	0.64	0.28	0.32	0.31

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 AM Build w Split Phasing MIT
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Future Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	131	1156	118	65	791	98	164	8	118	86	7	92
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	451	1539	157	299	1597	673	253	12	245	206	13	172
Arrive On Green	0.10	0.46	0.44	0.08	0.45	0.42	0.15	0.15	0.15	0.12	0.12	0.08
Sat Flow, veh/h	1818	3324	339	1781	3554	1585	1738	85	1683	1781	113	1489
Grp Volume(v), veh/h	131	630	644	65	791	98	172	0	118	86	0	99
Grp Sat Flow(s),veh/h/ln	1818	1814	1848	1781	1777	1585	1822	0	1683	1781	0	1602
Q Serve(g_s), s	2.8	22.9	23.0	1.5	12.6	3.0	7.1	0.0	5.2	3.6	0.0	4.7
Cycle Q Clear(g_c), s	2.8	22.9	23.0	1.5	12.6	3.0	7.1	0.0	5.2	3.6	0.0	4.7
Prop In Lane	1.00		0.18	1.00		1.00	0.95		1.00	1.00		0.93
Lane Grp Cap(c), veh/h	451	840	856	299	1597	673	265	0	245	206	0	185
V/C Ratio(X)	0.29	0.75	0.75	0.22	0.50	0.15	0.65	0.00	0.48	0.42	0.00	0.54
Avail Cap(c_a), veh/h	538	840	856	408	1597	673	273	0	252	267	0	240
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	10.2	17.7	17.9	13.1	15.6	14.1	32.2	0.0	31.4	32.9	0.0	34.5
Incr Delay (d2), s/veh	0.4	6.1	6.1	0.1	1.1	0.5	3.9	0.0	0.5	0.5	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	9.5	9.8	0.5	4.7	1.0	3.3	0.0	2.1	1.5	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.5	23.8	23.9	13.3	16.7	14.6	36.1	0.0	32.0	33.4	0.0	35.4
LnGrp LOS	B	C	C	B	B	B	D	A	C	C	A	D
Approach Vol, veh/h		1405			954			290			185	
Approach Delay, s/veh		22.6			16.2			34.4			34.5	
Approach LOS		C			B			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.2	40.0		15.6	10.1	41.0		13.2				
Change Period (Y+Rc), s	5.5	6.0		6.5	5.5	6.0		6.5				
Max Green Setting (Gmax), s	9.5	27.0		9.5	9.5	27.0		9.5				
Max Q Clear Time (g_c+I1), s	4.8	14.6		9.1	3.5	25.0		6.7				
Green Ext Time (p_c), s	0.1	2.0		0.0	0.0	0.8		0.1				
Intersection Summary												
HCM 6th Ctrl Delay				22.5								
HCM 6th LOS				C								

Queues
11: Capital Drive & Kingston Pike

2026 PM Build with Split Phasing MIT
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	1464	47	1582	65	395	187	88	135
v/c Ratio	0.37	0.85	0.24	0.95	0.08	1.02	0.38	0.50	0.49
Control Delay	16.6	31.8	14.2	41.9	0.2	93.0	12.1	56.6	15.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.6	31.8	14.2	41.9	0.2	93.0	12.1	56.6	15.8
Queue Length 50th (ft)	25	486	14	~588	0	~287	22	59	5
Queue Length 95th (ft)	54	#656	31	#778	0	#278	36	81	23
Internal Link Dist (ft)		1015		1260		617			180
Turn Bay Length (ft)	200		200		50		145		
Base Capacity (vph)	252	1725	243	1673	803	389	486	193	288
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.85	0.19	0.95	0.08	1.02	0.38	0.46	0.47

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

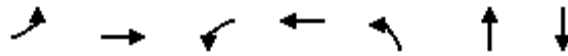
2026 PM Build with Split Phasing MIT
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Future Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	84	1448	16	47	1582	65	388	7	187	88	7	128
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	200	1735	19	209	1646	706	390	7	367	194	9	165
Arrive On Green	0.07	0.47	0.45	0.06	0.46	0.45	0.22	0.22	0.22	0.11	0.11	0.09
Sat Flow, veh/h	1818	3675	41	1781	3554	1585	1788	32	1683	1781	83	1515
Grp Volume(v), veh/h	84	714	750	47	1582	65	395	0	187	88	0	135
Grp Sat Flow(s), veh/h/ln	1818	1814	1902	1781	1777	1585	1820	0	1683	1781	0	1598
Q Serve(g_s), s	2.5	37.7	37.8	1.4	47.4	2.6	23.8	0.0	10.8	5.1	0.0	9.1
Cycle Q Clear(g_c), s	2.5	37.7	37.8	1.4	47.4	2.6	23.8	0.0	10.8	5.1	0.0	9.1
Prop In Lane	1.00		0.02	1.00		1.00	0.98		1.00	1.00		0.95
Lane Grp Cap(c), veh/h	200	856	898	209	1646	706	397	0	367	194	0	174
V/C Ratio(X)	0.42	0.83	0.84	0.23	0.96	0.09	0.99	0.00	0.51	0.45	0.00	0.77
Avail Cap(c_a), veh/h	266	856	898	288	1646	706	397	0	367	194	0	174
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	24.2	25.3	25.3	20.4	28.6	17.7	42.9	0.0	37.8	45.9	0.0	48.9
Incr Delay (d2), s/veh	1.4	9.4	9.0	0.2	14.7	0.3	43.7	0.0	0.5	0.6	0.0	17.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	17.0	17.8	0.6	21.7	1.0	15.4	0.0	4.5	2.3	0.0	4.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	25.6	34.7	34.4	20.6	43.2	17.9	86.6	0.0	38.3	46.5	0.0	66.5
LnGrp LOS	C	C	C	C	D	B	F	A	D	D	A	E
Approach Vol, veh/h	1548				1694				582		223	
Approach Delay, s/veh	34.0				41.6				71.1		58.6	
Approach LOS	C				D				E		E	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.0	55.0		28.0	10.1	55.9		16.0				
Change Period (Y+Rc), s	5.5	6.0		6.5	5.5	6.0		6.5				
Max Green Setting (Gmax), s	9.5	45.0		21.5	9.5	45.0		9.5				
Max Q Clear Time (g_c+I1), s	4.5	49.4		25.8	3.4	39.8		11.1				
Green Ext Time (p_c), s	0.1	0.0		0.0	0.0	2.0		0.0				
Intersection Summary												
HCM 6th Ctrl Delay	43.9											
HCM 6th LOS	D											

ADDENDUM #2 SUPPORTING DOCUMENTS

Queues
10: Sherway Road & Kingston Pike

2021 AM Existing
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	68	982	16	842	21	22	57
v/c Ratio	0.14	0.38	0.04	0.35	0.13	0.13	0.32
Control Delay	5.5	9.0	5.7	10.2	42.8	25.4	23.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.5	9.0	5.7	10.2	42.8	25.4	23.6
Queue Length 50th (ft)	11	114	3	138	13	4	10
Queue Length 95th (ft)	29	258	10	215	32	24	33
Internal Link Dist (ft)		1260		498		159	1054
Turn Bay Length (ft)	200		200				
Base Capacity (vph)	552	2560	516	2438	321	305	265
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.38	0.03	0.35	0.07	0.07	0.22
Intersection Summary							

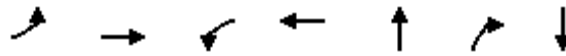
HCM 6th Signalized Intersection Summary 10: Sherway Road & Kingston Pike

2021 AM Existing
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	728	33	12	626	19	14	5	10	8	2	25
Future Volume (veh/h)	53	728	33	12	626	19	14	5	10	8	2	25
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1864	1864	1864	1949	1949	1949	2224	2224	2224	1847	1847	1847
Adj Flow Rate, veh/h	68	939	43	16	817	25	21	7	15	13	3	41
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.81	0.81	0.81	0.73	0.73	0.73
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	540	2345	107	471	2422	74	127	38	81	22	5	69
Arrive On Green	0.06	0.68	0.66	0.04	0.66	0.64	0.06	0.06	0.03	0.06	0.06	0.04
Sat Flow, veh/h	1776	3449	158	1856	3667	112	2118	630	1351	369	85	1164
Grp Volume(v), veh/h	68	482	500	16	412	430	21	0	22	57	0	0
Grp Sat Flow(s),veh/h/ln	1776	1771	1836	1856	1851	1928	2118	0	1981	1619	0	0
Q Serve(g_s), s	1.1	12.0	12.0	0.3	9.7	9.8	0.9	0.0	1.1	3.5	0.0	0.0
Cycle Q Clear(g_c), s	1.1	12.0	12.0	0.3	9.7	9.8	0.9	0.0	1.1	3.5	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.06	1.00		0.68	0.23		0.72
Lane Grp Cap(c), veh/h	540	1204	1248	471	1222	1273	127	0	119	95	0	0
V/C Ratio(X)	0.13	0.40	0.40	0.03	0.34	0.34	0.17	0.00	0.19	0.60	0.00	0.00
Avail Cap(c_a), veh/h	645	1204	1248	616	1222	1273	381	0	357	227	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.87	0.87	0.87	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.9	7.0	7.1	5.3	7.4	7.5	44.6	0.0	45.5	46.4	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.9	0.8	0.0	0.7	0.7	0.6	0.0	0.7	5.9	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	3.8	4.0	0.1	3.4	3.5	0.5	0.0	0.6	1.5	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	5.0	7.9	7.9	5.3	8.2	8.2	45.2	0.0	46.3	52.3	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D	A	D	D	A	A
Approach Vol, veh/h	1050				858				43		57	
Approach Delay, s/veh	7.7				8.1				45.8		52.3	
Approach LOS	A				A				D		D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.1	70.0		10.0	8.2	72.0		9.9				
Change Period (Y+Rc), s	5.0	6.0		6.5	6.0	6.0		5.5				
Max Green Setting (Gmax), s	11.0	38.0		15.5	10.0	38.0		12.5				
Max Q Clear Time (g_c+I1), s	3.1	11.8		3.1	2.3	14.0		5.5				
Green Ext Time (p_c), s	0.1	3.4		0.1	0.0	4.1		0.1				
Intersection Summary												
HCM 6th Ctrl Delay	10.0											
HCM 6th LOS	A											

Queues
11: Capital Drive & Kingston Pike

2021 AM Existing
Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	2	1253	62	784	156	112	4
v/c Ratio	0.00	0.49	0.18	0.28	0.76	0.33	0.01
Control Delay	6.5	9.3	4.5	4.0	75.8	11.0	0.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	6.5	9.3	4.5	4.0	75.8	11.0	0.0
Queue Length 50th (ft)	0	242	10	84	126	0	0
Queue Length 95th (ft)	3	295	20	105	188	44	0
Internal Link Dist (ft)		1015		1260	617		180
Turn Bay Length (ft)	200		200			145	
Base Capacity (vph)	479	2532	432	2801	228	368	517
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.00	0.49	0.14	0.28	0.68	0.30	0.01
Intersection Summary							

HCM 6th Signalized Intersection Summary

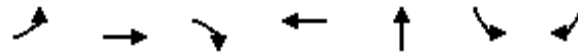
11: Capital Drive & Kingston Pike

2021 AM Existing
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	2	1072	106	56	710	4	131	0	94	0	0	1
Future Volume (veh/h)	2	1072	106	56	710	4	131	0	94	0	0	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1945	1870
Adj Flow Rate, veh/h	2	1140	113	62	780	4	156	0	112	0	0	4
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.25	0.25	0.25
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	557	2375	235	464	2886	15	258	0	240	0	0	235
Arrive On Green	1.00	1.00	1.00	0.05	0.80	0.78	0.14	0.00	0.14	0.00	0.00	0.12
Sat Flow, veh/h	704	3334	330	1781	3625	19	1420	0	1683	0	0	1648
Grp Volume(v), veh/h	2	620	633	62	382	402	156	0	112	0	0	4
Grp Sat Flow(s),veh/h/ln	704	1814	1850	1781	1777	1867	1420	0	1683	0	0	1648
Q Serve(g_s), s	0.0	0.0	0.0	1.0	7.3	7.3	13.6	0.0	7.9	0.0	0.0	0.3
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.0	7.3	7.3	13.8	0.0	7.9	0.0	0.0	0.3
Prop In Lane	1.00		0.18	1.00		0.01	1.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	557	1292	1318	464	1415	1486	258	0	240	0	0	235
V/C Ratio(X)	0.00	0.48	0.48	0.13	0.27	0.27	0.61	0.00	0.47	0.00	0.00	0.02
Avail Cap(c_a), veh/h	557	1292	1318	589	1415	1486	285	0	272	0	0	266
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	3.4	3.4	3.4	53.9	0.0	51.2	0.0	0.0	49.0
Incr Delay (d2), s/veh	0.0	1.3	1.3	0.0	0.5	0.4	1.8	0.0	0.5	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.5	0.5	0.3	2.0	2.1	5.1	0.0	3.4	0.0	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	1.3	1.3	3.4	3.9	3.9	55.6	0.0	51.7	0.0	0.0	49.0
LnGrp LOS	A	A	A	A	A	A	E	A	D	A	A	D
Approach Vol, veh/h		1255			846			268				4
Approach Delay, s/veh		1.3			3.9			54.0				49.0
Approach LOS		A			A			D				D
Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		107.5		22.5	10.9	96.6		22.5				
Change Period (Y+Rc), s		6.0		6.5	5.5	6.0		6.5				
Max Green Setting (Gmax), s		99.0		18.5	14.5	79.0		18.5				
Max Q Clear Time (g_c+I1), s		9.3		15.8	3.0	2.0		2.3				
Green Ext Time (p_c), s		1.5		0.2	0.1	2.9		0.0				
Intersection Summary												
HCM 6th Ctrl Delay				8.2								
HCM 6th LOS				A								

Queues
12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2021 AM Existing
Capital Drive Retail Development



Lane Group	EBL	EBT	EBR	WBT	NBT	SBL	SBR
Lane Group Flow (vph)	78	1153	603	1038	1126	44	91
v/c Ratio	0.32	0.69	0.37	0.55	0.89	0.34	0.39
Control Delay	24.6	30.9	0.7	28.4	45.0	63.9	8.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	24.6	30.9	0.7	28.4	45.0	63.9	8.4
Queue Length 50th (ft)	37	406	0	219	430	36	0
Queue Length 95th (ft)	71	506	0	268	519	68	14
Internal Link Dist (ft)		411		1015	451		
Turn Bay Length (ft)	300						
Base Capacity (vph)	273	1676	1615	1886	1345	151	250
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.69	0.37	0.55	0.84	0.29	0.36
Intersection Summary							

HCM 6th Signalized Intersection Summary

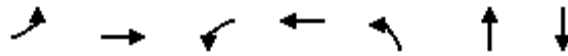
12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2021 AM Existing
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	874	457	0	772	41	413	176	265	30	0	62
Future Volume (veh/h)	59	874	457	0	772	41	413	176	265	30	0	62
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	2027	2027	2027	0	1817	1817	1870	1870	1870	1949	0	1949
Adj Flow Rate, veh/h	78	1153	0	0	986	52	545	232	349	44	0	91
Peak Hour Factor	0.91	0.91	0.91	0.94	0.94	0.94	0.91	0.91	0.91	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	0	2	2	2	2	2	2	0	2
Cap, veh/h	383	2199		0	2341	123	595	271	418	0	0	0
Arrive On Green	0.05	0.57	0.00	0.00	0.65	0.62	0.37	0.37	0.35	0.02	0.00	0.02
Sat Flow, veh/h	1931	3852	1718	0	4989	254	1602	730	1126		0	
Grp Volume(v), veh/h	78	1153	0	0	675	363	609	0	517		0.0	
Grp Sat Flow(s),veh/h/ln	1931	1926	1718	0	1654	1772	1790	0	1668			
Q Serve(g_s), s	2.5	23.8	0.0	0.0	12.9	13.1	42.1	0.0	36.9			
Cycle Q Clear(g_c), s	2.5	23.8	0.0	0.0	12.9	13.1	42.1	0.0	36.9			
Prop In Lane	1.00		1.00	0.00		0.14	0.89		0.67			
Lane Grp Cap(c), veh/h	383	2199		0	1604	859	665	0	620			
V/C Ratio(X)	0.20	0.52		0.00	0.42	0.42	0.92	0.00	0.83			
Avail Cap(c_a), veh/h	456	2199		0	1604	859	709	0	661			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.33	1.33	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	0.97	0.97	1.00	0.00	1.00			
Uniform Delay (d), s/veh	14.9	17.1	0.0	0.0	14.2	14.3	38.9	0.0	38.0			
Incr Delay (d2), s/veh	0.1	0.9	0.0	0.0	0.8	1.5	15.4	0.0	7.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.0	10.1	0.0	0.0	4.2	4.8	21.2	0.0	16.4			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.0	18.0	0.0	0.0	15.0	15.8	54.3	0.0	46.0			
LnGrp LOS	B	B		A	B	B	D	A	D			
Approach Vol, veh/h	1231		A	1038			1126					
Approach Delay, s/veh	17.8			15.3			50.5					
Approach LOS	B			B			D					
Timer - Assigned Phs	2			4	5	6						
Phs Duration (G+Y+Rc), s	78.2			51.8	11.1	67.1						
Change Period (Y+Rc), s	6.5			6.0	5.5	6.5						
Max Green Setting (Gmax), s	53.5			49.0	10.5	37.5						
Max Q Clear Time (g_c+I1), s	25.8			44.1	4.5	15.1						
Green Ext Time (p_c), s	3.3			1.7	0.0	2.5						
Intersection Summary												
HCM 6th Ctrl Delay	27.9											
HCM 6th LOS	C											

Queues
10: Sherway Road & Kingston Pike

2021 PM Existing
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	79	1560	21	1325	122	36	128
v/c Ratio	0.30	0.67	0.10	0.60	0.60	0.17	0.64
Control Delay	13.9	20.4	8.5	18.6	71.1	29.8	48.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.9	20.4	8.5	18.6	71.1	29.8	48.3
Queue Length 50th (ft)	27	333	5	375	106	11	63
Queue Length 95th (ft)	m51	395	16	504	118	25	111
Internal Link Dist (ft)		1260		2903		159	1054
Turn Bay Length (ft)	200		200				
Base Capacity (vph)	289	2313	254	2202	229	231	250
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.27	0.67	0.08	0.60	0.53	0.16	0.51

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

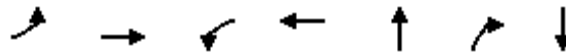
10: Sherway Road & Kingston Pike

2021 PM Existing
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	60	1168	15	17	1020	40	64	7	12	25	5	57
Future Volume (veh/h)	60	1168	15	17	1020	40	64	7	12	25	5	57
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1864	1864	1864	1949	1949	1949	2224	2224	2224	1847	1847	1847
Adj Flow Rate, veh/h	79	1540	20	21	1275	50	122	13	23	37	7	84
Peak Hour Factor	0.91	0.91	0.91	0.96	0.96	0.96	0.63	0.63	0.63	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	321	2363	31	253	2348	92	189	64	114	48	9	109
Arrive On Green	0.05	0.66	0.65	0.03	0.65	0.63	0.09	0.09	0.07	0.10	0.10	0.09
Sat Flow, veh/h	1776	3581	46	1856	3632	142	2118	720	1274	471	89	1070
Grp Volume(v), veh/h	79	761	799	21	649	676	122	0	36	128	0	0
Grp Sat Flow(s),veh/h/ln	1776	1771	1856	1856	1851	1923	2118	0	1995	1631	0	0
Q Serve(g_s), s	2.0	35.9	36.0	0.5	26.7	26.9	7.8	0.0	2.4	10.7	0.0	0.0
Cycle Q Clear(g_c), s	2.0	35.9	36.0	0.5	26.7	26.9	7.8	0.0	2.4	10.7	0.0	0.0
Prop In Lane	1.00		0.03	1.00		0.07	1.00		0.64	0.29		0.66
Lane Grp Cap(c), veh/h	321	1169	1225	253	1197	1243	189	0	178	166	0	0
V/C Ratio(X)	0.25	0.65	0.65	0.08	0.54	0.54	0.64	0.00	0.20	0.77	0.00	0.00
Avail Cap(c_a), veh/h	376	1169	1225	335	1197	1243	272	0	256	198	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.79	0.79	0.79	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.3	14.2	14.2	11.8	13.5	13.5	61.6	0.0	59.9	61.8	0.0	0.0
Incr Delay (d2), s/veh	0.3	2.2	2.1	0.1	1.8	1.7	3.6	0.0	0.6	14.3	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	13.6	14.3	0.2	10.8	11.2	4.4	0.0	1.2	5.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.7	16.4	16.4	11.9	15.2	15.2	65.2	0.0	60.4	76.1	0.0	0.0
LnGrp LOS	B	B	B	B	B	B	E	A	E	E	A	A
Approach Vol, veh/h	1639			1346			158			128		
Approach Delay, s/veh	16.1			15.2			64.1			76.1		
Approach LOS	B			B			E			E		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.7	94.5		16.5	8.8	96.4		18.2				
Change Period (Y+Rc), s	5.0	6.0		6.5	5.5	6.0		5.5				
Max Green Setting (Gmax), s	10.0	76.0		15.5	9.5	76.0		15.5				
Max Q Clear Time (g_c+I1), s	4.0	28.9		9.8	2.5	38.0		12.7				
Green Ext Time (p_c), s	0.1	6.8		0.2	0.0	8.8		0.1				
Intersection Summary												
HCM 6th Ctrl Delay				20.4								
HCM 6th LOS				C								

Queues
11: Capital Drive & Kingston Pike

2021 PM Existing
Fast-Food Restaurant Development



Lane Group	EBL	EBT	WBL	WBT	NBT	NBR	SBT
Lane Group Flow (vph)	9	1413	45	1529	370	178	13
v/c Ratio	0.05	0.61	0.18	0.60	1.19	0.39	0.11
Control Delay	10.6	15.7	7.3	10.8	160.6	21.3	1.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	15.7	7.3	10.8	160.6	21.3	1.9
Queue Length 50th (ft)	3	381	11	324	~406	52	0
Queue Length 95th (ft)	11	454	22	381	#378	65	0
Internal Link Dist (ft)		1015		1260	617		180
Turn Bay Length (ft)	200		200			145	
Base Capacity (vph)	167	2325	281	2553	310	459	117
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.05	0.61	0.16	0.60	1.19	0.39	0.11

Intersection Summary

- ~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
- # 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

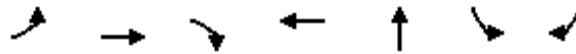
11: Capital Drive & Kingston Pike

2021 PM Existing
Fast-Food Restaurant Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	8	1286	14	41	1406	1	248	0	119	1	0	8
Future Volume (veh/h)	8	1286	14	41	1406	1	248	0	119	1	0	8
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1945	1870
Adj Flow Rate, veh/h	9	1398	15	45	1528	1	370	0	178	1	0	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	232	2378	26	296	2629	2	117	0	373	28	16	188
Arrive On Green	0.65	0.65	0.63	0.05	0.72	0.71	0.22	0.00	0.22	0.22	0.00	0.20
Sat Flow, veh/h	347	3677	39	1781	3644	2	295	0	1683	0	71	847
Grp Volume(v), veh/h	9	689	724	45	745	784	370	0	178	13	0	0
Grp Sat Flow(s),veh/h/ln	347	1814	1902	1781	1777	1870	295	0	1683	918	0	0
Q Serve(g_s), s	1.8	30.3	30.4	1.1	28.2	28.2	0.0	0.0	12.9	0.0	0.0	0.0
Cycle Q Clear(g_c), s	19.5	30.3	30.4	1.1	28.2	28.2	31.0	0.0	12.9	31.0	0.0	0.0
Prop In Lane	1.00		0.02	1.00		0.00	1.00		1.00	0.08		0.92
Lane Grp Cap(c), veh/h	232	1173	1230	296	1282	1349	117	0	373	231	0	0
V/C Ratio(X)	0.04	0.59	0.59	0.15	0.58	0.58	3.17	0.00	0.48	0.06	0.00	0.00
Avail Cap(c_a), veh/h	232	1173	1230	354	1282	1349	117	0	373	231	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	16.5	14.1	14.1	10.6	9.4	9.4	61.3	0.0	47.5	44.3	0.0	0.0
Incr Delay (d2), s/veh	0.3	2.2	2.1	0.1	1.9	1.8	998.5	0.0	0.4	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	12.0	12.6	0.4	10.0	10.5	36.6	0.0	5.5	0.4	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	16.9	16.3	16.2	10.6	11.3	11.2	1059.8	0.0	47.8	44.4	0.0	0.0
LnGrp LOS	B	B	B	B	B	B	F	A	D	D	A	A
Approach Vol, veh/h	1422			1574			548			13		
Approach Delay, s/veh	16.2			11.2			731.1			44.4		
Approach LOS	B			B			F			D		
Timer - Assigned Phs	2			4		5		6		8		
Phs Duration (G+Y+Rc), s	105.0			35.0		10.5		94.5		35.0		
Change Period (Y+Rc), s	6.0			6.5		5.5		6.0		6.5		
Max Green Setting (Gmax), s	99.0			28.5		9.5		84.0		28.5		
Max Q Clear Time (g_c+I1), s	30.2			33.0		3.1		32.4		33.0		
Green Ext Time (p_c), s	3.8			0.0		0.0		3.5		0.0		
Intersection Summary												
HCM 6th Ctrl Delay	124.2											
HCM 6th LOS	F											

Queues
12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2021 PM Existing
Capital Drive Retail Development



Lane Group	EBL	EBT	EBR	WBT	NBT	SBL	SBR
Lane Group Flow (vph)	50	1228	865	1926	801	150	284
v/c Ratio	0.32	0.56	0.54	0.72	1.07	0.91	1.04
Control Delay	16.6	17.6	1.3	28.3	101.9	111.7	96.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	16.6	17.6	1.3	28.3	101.9	111.7	96.1
Queue Length 50th (ft)	18	333	0	574	~403	138	~157
Queue Length 95th (ft)	34	373	0	m493	#474	#191	#207
Internal Link Dist (ft)		411		1015	451		
Turn Bay Length (ft)	300						
Base Capacity (vph)	206	2191	1615	2683	747	165	273
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.56	0.54	0.72	1.07	0.91	1.04

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

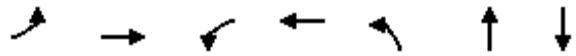
12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2021 PM Existing
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	890	627	0	1236	48	278	98	185	91	0	173
Future Volume (veh/h)	36	890	627	0	1236	48	278	98	185	91	0	173
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	2027	2027	2027	0	1817	1817	1870	1870	1870	1949	0	1949
Adj Flow Rate, veh/h	50	1228	0	0	1854	72	397	140	264	150	0	284
Peak Hour Factor	0.87	0.87	0.87	0.80	0.80	0.80	0.84	0.84	0.84	0.73	0.73	0.73
Percent Heavy Veh, %	2	2	2	0	2	2	2	2	2	2	0	2
Cap, veh/h	252	2806		0	3198	124	350	132	255	0	0	0
Arrive On Green	0.05	0.73	0.00	0.00	0.65	0.63	0.21	0.21	0.20	0.01	0.00	0.01
Sat Flow, veh/h	1931	3852	1718	0	5064	190	1635	617	1192		0	
Grp Volume(v), veh/h	50	1228	0	0	1251	675	434	0	367		0.0	
Grp Sat Flow(s),veh/h/ln	1931	1926	1718	0	1654	1783	1789	0	1656			
Q Serve(g_s), s	1.1	17.8	0.0	0.0	29.6	29.8	30.0	0.0	30.0			
Cycle Q Clear(g_c), s	1.1	17.8	0.0	0.0	29.6	29.8	30.0	0.0	30.0			
Prop In Lane	1.00		1.00	0.00		0.11	0.91		0.72			
Lane Grp Cap(c), veh/h	252	2806		0	2158	1164	383	0	355			
V/C Ratio(X)	0.20	0.44		0.00	0.58	0.58	1.13	0.00	1.03			
Avail Cap(c_a), veh/h	326	2806		0	2158	1164	383	0	355			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	0.77	0.77	1.00	0.00	1.00			
Uniform Delay (d), s/veh	10.7	7.6	0.0	0.0	13.6	13.7	55.0	0.0	55.9			
Incr Delay (d2), s/veh	0.1	0.5	0.0	0.0	0.9	1.6	87.3	0.0	56.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.4	6.5	0.0	0.0	10.3	11.4	22.8	0.0	18.2			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.8	8.1	0.0	0.0	14.5	15.3	142.3	0.0	112.6			
LnGrp LOS	B	A		A	B	B	F	A	F			
Approach Vol, veh/h	1278		A		1926		801					
Approach Delay, s/veh	8.2				14.8		128.7					
Approach LOS	A				B		F					
Timer - Assigned Phs	2		4		5		6					
Phs Duration (G+Y+Rc), s	106.0		34.0		10.6		95.4					
Change Period (Y+Rc), s	6.5		6.5		5.5		6.5					
Max Green Setting (Gmax), s	82.5		27.5		10.5		66.5					
Max Q Clear Time (g_c+I1), s	19.8		32.0		3.1		31.8					
Green Ext Time (p_c), s	3.6		0.0		0.0		5.9					
Intersection Summary												
HCM 6th Ctrl Delay			35.5									
HCM 6th LOS			D									

Queues
10: Sherway Road & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	74	1079	16	941	26	23	66
v/c Ratio	0.17	0.42	0.04	0.39	0.16	0.14	0.35
Control Delay	5.7	9.3	5.7	10.6	43.9	25.2	23.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.7	9.3	5.7	10.6	43.9	25.2	23.1
Queue Length 50th (ft)	13	132	3	163	16	4	11
Queue Length 95th (ft)	30	287	10	243	37	25	35
Internal Link Dist (ft)		1260		498		159	1054
Turn Bay Length (ft)	200		200				
Base Capacity (vph)	463	2564	410	2435	178	177	239
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.42	0.04	0.39	0.15	0.13	0.28
Intersection Summary							

HCM 6th Signalized Intersection Summary

10: Sherway Road & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	69	962	42	15	842	24	21	6	13	11	2	35
Future Volume (veh/h)	69	962	42	15	842	24	21	6	13	11	2	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1864	1864	1864	1949	1949	1949	2224	2224	2224	1847	1847	1847
Adj Flow Rate, veh/h	74	1034	45	16	915	26	26	7	16	15	3	48
Peak Hour Factor	0.93	0.93	0.93	0.92	0.92	0.92	0.81	0.81	0.81	0.73	0.73	0.73
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	493	2319	101	425	2389	68	132	37	85	24	5	77
Arrive On Green	0.06	0.67	0.65	0.04	0.65	0.63	0.06	0.06	0.04	0.07	0.07	0.05
Sat Flow, veh/h	1776	3458	150	1856	3677	104	2118	602	1375	367	73	1176
Grp Volume(v), veh/h	74	530	549	16	461	480	26	0	23	66	0	0
Grp Sat Flow(s),veh/h/ln	1776	1771	1837	1856	1851	1930	2118	0	1976	1617	0	0
Q Serve(g_s), s	1.3	14.1	14.1	0.3	11.6	11.6	1.2	0.0	1.1	4.0	0.0	0.0
Cycle Q Clear(g_c), s	1.3	14.1	14.1	0.3	11.6	11.6	1.2	0.0	1.1	4.0	0.0	0.0
Prop In Lane	1.00		0.08	1.00		0.05	1.00		0.70	0.23		0.73
Lane Grp Cap(c), veh/h	493	1188	1232	425	1203	1254	132	0	123	106	0	0
V/C Ratio(X)	0.15	0.45	0.45	0.04	0.38	0.38	0.20	0.00	0.19	0.62	0.00	0.00
Avail Cap(c_a), veh/h	542	1188	1232	497	1203	1254	212	0	198	194	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.78	0.78	0.78	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	5.4	7.7	7.8	5.9	8.2	8.2	44.5	0.0	45.3	46.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.9	0.9	0.0	0.9	0.9	0.7	0.0	0.7	5.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	4.5	4.7	0.1	4.1	4.3	0.6	0.0	0.6	1.8	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	5.5	8.7	8.7	5.9	9.1	9.1	45.2	0.0	46.1	51.8	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	D	A	D	D	A	A
Approach Vol, veh/h	1153				957				49			
Approach Delay, s/veh	8.5				9.0				45.6			
Approach LOS	A				A				D			
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.2	69.0		10.2	8.2	71.0		10.6				
Change Period (Y+Rc), s	5.0	6.0		6.5	6.0	6.0		5.5				
Max Green Setting (Gmax), s	8.0	51.0		7.5	6.0	52.0		10.5				
Max Q Clear Time (g_c+I1), s	3.3	13.6		3.2	2.3	16.1		6.0				
Green Ext Time (p_c), s	0.1	4.0		0.0	0.0	4.8		0.1				
Intersection Summary												
HCM 6th Ctrl Delay	10.8											
HCM 6th LOS	B											

Queues
11: Capital Drive & Kingston Pike

2026 AM Build w Split Phasing

Capital Drive Retail Development

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	131	1274	65	791	98	172	118	86	99
v/c Ratio	0.29	0.61	0.25	0.40	0.11	0.67	0.34	0.51	0.42
Control Delay	5.1	7.9	11.3	18.0	1.5	65.1	9.3	66.2	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.1	7.9	11.3	18.0	1.5	65.1	9.3	66.2	17.8
Queue Length 50th (ft)	20	128	18	196	0	138	0	70	5
Queue Length 95th (ft)	m25	166	39	267	15	195	38	124	60
Internal Link Dist (ft)		1015		1260		617			180
Turn Bay Length (ft)	200		200		50		145		
Base Capacity (vph)	457	2081	298	1982	921	315	403	193	256
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.29	0.61	0.22	0.40	0.11	0.55	0.29	0.45	0.39
Intersection Summary									
m Volume for 95th percentile queue is metered by upstream signal.									

HCM 6th Signalized Intersection Summary

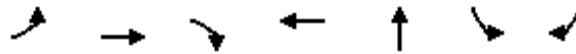
11: Capital Drive & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Future Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	131	1156	118	65	791	98	164	8	118	86	7	92
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	473	1994	203	408	2118	920	223	11	216	169	11	142
Arrive On Green	0.12	1.00	1.00	0.05	0.60	0.58	0.13	0.13	0.13	0.10	0.10	0.08
Sat Flow, veh/h	1818	3324	339	1781	3554	1585	1738	85	1683	1781	113	1489
Grp Volume(v), veh/h	131	630	644	65	791	98	172	0	118	86	0	99
Grp Sat Flow(s),veh/h/ln	1818	1814	1848	1781	1777	1585	1822	0	1683	1781	0	1602
Q Serve(g_s), s	3.5	0.0	0.0	1.7	15.0	3.6	11.8	0.0	8.5	6.0	0.0	7.8
Cycle Q Clear(g_c), s	3.5	0.0	0.0	1.7	15.0	3.6	11.8	0.0	8.5	6.0	0.0	7.8
Prop In Lane	1.00		0.18	1.00		1.00	0.95		1.00	1.00		0.93
Lane Grp Cap(c), veh/h	473	1088	1109	408	2118	920	234	0	216	169	0	152
V/C Ratio(X)	0.28	0.58	0.58	0.16	0.37	0.11	0.73	0.00	0.55	0.51	0.00	0.65
Avail Cap(c_a), veh/h	523	1088	1109	463	2118	920	322	0	298	192	0	173
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.55	0.55	0.55	0.93	0.93	0.93	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.7	0.0	0.0	8.5	13.6	12.2	54.5	0.0	53.1	55.9	0.0	57.9
Incr Delay (d2), s/veh	0.2	1.2	1.2	0.1	0.5	0.2	2.9	0.0	0.8	0.9	0.0	4.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.4	0.4	0.6	5.8	1.3	5.6	0.0	3.7	2.7	0.0	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.9	1.2	1.2	8.5	14.1	12.4	57.5	0.0	53.9	56.8	0.0	62.5
LnGrp LOS	A	A	A	A	B	B	E	A	D	E	A	E
Approach Vol, veh/h		1405			954			290			185	
Approach Delay, s/veh		1.9			13.6			56.0			59.8	
Approach LOS		A			B			E			E	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	11.4	81.5		20.7	10.9	82.0		16.4				
Change Period (Y+Rc), s	5.5	6.0		6.5	5.5	6.0		6.5				
Max Green Setting (Gmax), s	9.5	64.0		20.5	9.5	64.0		11.5				
Max Q Clear Time (g_c+I1), s	5.5	17.0		13.8	3.7	2.0		9.8				
Green Ext Time (p_c), s	0.1	2.3		0.4	0.0	3.0		0.1				
Intersection Summary												
HCM 6th Ctrl Delay				15.2								
HCM 6th LOS				B								

Queues
12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development



Lane Group	EBL	EBT	EBR	WBT	NBT	SBL	SBR
Lane Group Flow (vph)	82	1278	632	1156	1198	54	95
v/c Ratio	0.41	0.78	0.39	0.65	0.90	0.48	0.44
Control Delay	27.4	34.6	0.7	28.1	45.1	73.9	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	34.6	0.7	28.1	45.1	73.9	10.5
Queue Length 50th (ft)	40	484	0	208	461	45	0
Queue Length 95th (ft)	73	578	0	194	562	83	17
Internal Link Dist (ft)		411		1015	451		
Turn Bay Length (ft)	300						
Base Capacity (vph)	205	1639	1615	1787	1387	112	218
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.40	0.78	0.39	0.65	0.86	0.48	0.44
Intersection Summary							

HCM 6th Signalized Intersection Summary
12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development

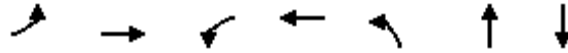
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	1163	575	0	1034	53	521	222	347	44	0	78
Future Volume (veh/h)	75	1163	575	0	1034	53	521	222	347	44	0	78
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	2027	2027	2027	0	1817	1817	1870	1870	1870	1949	0	1949
Adj Flow Rate, veh/h	82	1278	0	0	1100	56	573	244	381	54	0	95
Peak Hour Factor	0.91	0.91	0.91	0.94	0.94	0.94	0.91	0.91	0.91	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	0	2	2	2	2	2	2	0	2
Cap, veh/h	386	2120		0	2245	114	621	282	452	0	0	0
Arrive On Green	0.06	0.55	0.00	0.00	0.93	0.89	0.39	0.39	0.37	0.02	0.00	0.02
Sat Flow, veh/h	1931	3852	1718	0	4998	246	1583	718	1153		0	
Grp Volume(v), veh/h	82	1278	0	0	752	404	648	0	550		0.0	
Grp Sat Flow(s),veh/h/ln	1931	1926	1718	0	1654	1773	1791	0	1663			
Q Serve(g_s), s	2.7	29.0	0.0	0.0	3.9	4.2	44.8	0.0	39.2			
Cycle Q Clear(g_c), s	2.7	29.0	0.0	0.0	3.9	4.2	44.8	0.0	39.2			
Prop In Lane	1.00		1.00	0.00		0.14	0.88		0.69			
Lane Grp Cap(c), veh/h	386	2120		0	1536	823	702	0	652			
V/C Ratio(X)	0.21	0.60		0.00	0.49	0.49	0.92	0.00	0.84			
Avail Cap(c_a), veh/h	410	2120		0	1536	823	737	0	684			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00			
Upstream Filter(l)	1.00	1.00	0.00	0.00	0.92	0.92	1.00	0.00	1.00			
Uniform Delay (d), s/veh	15.3	19.7	0.0	0.0	2.6	2.8	37.7	0.0	36.7			
Incr Delay (d2), s/veh	0.1	1.3	0.0	0.0	1.0	1.9	16.3	0.0	8.5			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.2	12.5	0.0	0.0	1.0	1.4	22.6	0.0	17.4			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	15.4	20.9	0.0	0.0	3.7	4.8	54.0	0.0	45.2			
LnGrp LOS	B	C		A	A	A	D	A	D			
Approach Vol, veh/h	1360		A	1156			1198					
Approach Delay, s/veh	20.6			4.0			50.0					
Approach LOS	C			A			D					
Timer - Assigned Phs	2			4		5	6					
Phs Duration (G+Y+Rc), s	75.5			54.5		11.2	64.4					
Change Period (Y+Rc), s	6.5			6.0		5.5	6.5					
Max Green Setting (Gmax), s	54.5			51.0		7.3	41.7					
Max Q Clear Time (g_c+l1), s	31.0			46.8		4.7	6.2					
Green Ext Time (p_c), s	3.7			1.6		0.0	2.9					
Intersection Summary												
HCM 6th Ctrl Delay			24.9									
HCM 6th LOS			C									

Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues
10: Sherway Road & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Group Flow (vph)	86	1680	22	1426	132	37	137
v/c Ratio	0.43	0.80	0.14	0.71	0.61	0.17	0.48
Control Delay	11.7	7.6	16.3	24.6	70.5	28.7	39.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	11.7	7.6	16.3	24.6	70.5	28.7	39.6
Queue Length 50th (ft)	6	99	7	477	115	11	68
Queue Length 95th (ft)	m13	177	17	562	125	25	120
Internal Link Dist (ft)		1260		2903		159	1054
Turn Bay Length (ft)	200		200				
Base Capacity (vph)	212	2108	157	2008	243	244	285
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.80	0.14	0.71	0.54	0.15	0.48

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

10: Sherway Road & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	1510	19	21	1319	50	83	8	15	32	6	73
Future Volume (veh/h)	78	1510	19	21	1319	50	83	8	15	32	6	73
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1864	1864	1864	1949	1949	1949	2224	2224	2224	1847	1847	1847
Adj Flow Rate, veh/h	86	1659	21	22	1374	52	132	13	24	40	7	90
Peak Hour Factor	0.91	0.91	0.91	0.96	0.96	0.96	0.63	0.63	0.63	0.81	0.81	0.81
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	342	2047	26	293	2053	78	200	66	122	58	10	130
Arrive On Green	0.10	0.57	0.56	0.10	0.56	0.55	0.09	0.09	0.08	0.12	0.12	0.11
Sat Flow, veh/h	1776	3582	45	1856	3638	137	2118	700	1292	476	83	1071
Grp Volume(v), veh/h	86	819	861	22	698	728	132	0	37	137	0	0
Grp Sat Flow(s),veh/h/ln	1776	1771	1856	1856	1851	1924	2118	0	1991	1630	0	0
Q Serve(g_s), s	0.0	51.6	51.9	0.0	36.9	37.2	8.4	0.0	2.4	11.3	0.0	0.0
Cycle Q Clear(g_c), s	0.0	51.6	51.9	0.0	36.9	37.2	8.4	0.0	2.4	11.3	0.0	0.0
Prop In Lane	1.00		0.02	1.00		0.07	1.00		0.65	0.29		0.66
Lane Grp Cap(c), veh/h	342	1012	1061	293	1045	1086	200	0	188	198	0	0
V/C Ratio(X)	0.25	0.81	0.81	0.08	0.67	0.67	0.66	0.00	0.20	0.69	0.00	0.00
Avail Cap(c_a), veh/h	342	1012	1061	293	1045	1086	287	0	270	198	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.58	0.58	0.58	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	33.4	23.9	24.0	38.2	21.3	21.4	61.2	0.0	59.3	59.5	0.0	0.0
Incr Delay (d2), s/veh	0.2	4.2	4.0	0.1	3.4	3.3	3.7	0.0	0.5	18.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	21.1	22.2	0.6	16.0	16.7	4.8	0.0	1.3	5.7	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	33.6	28.1	28.0	38.3	24.7	24.7	65.0	0.0	59.8	77.6	0.0	0.0
LnGrp LOS	C	C	C	D	C	C	E	A	E	E	A	A
Approach Vol, veh/h	1766				1448				169			
Approach Delay, s/veh	28.3				24.9				63.8			
Approach LOS	C				C				E			
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	18.8	83.0		17.2	17.8	84.0		21.0				
Change Period (Y+Rc), s	5.5	* 6		6.5	5.5	6.0		5.5				
Max Green Setting (Gmax), s	8.0	* 77		16.5	6.5	78.0		15.5				
Max Q Clear Time (g_c+I1), s	2.0	39.2		10.4	2.0	53.9		13.3				
Green Ext Time (p_c), s	0.1	7.5		0.3	0.0	9.0		0.1				

Intersection Summary

HCM 6th Ctrl Delay	30.6
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Queues
11: Capital Drive & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	1464	47	1582	65	395	187	88	135
v/c Ratio	0.47	0.81	0.27	0.90	0.08	0.91	0.37	0.61	0.55
Control Delay	31.8	19.7	18.0	25.8	0.7	77.2	19.1	80.5	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.8	19.7	18.0	25.8	0.7	77.2	19.1	80.5	20.0
Queue Length 50th (ft)	24	297	10	286	0	346	50	78	6
Queue Length 95th (ft)	m49	m363	m15	#574	m2	331	62	100	23
Internal Link Dist (ft)		1015		1260		617			180
Turn Bay Length (ft)	200		200		50		145		
Base Capacity (vph)	199	1816	193	1751	823	443	509	151	254
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.42	0.81	0.24	0.90	0.08	0.89	0.37	0.58	0.53

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

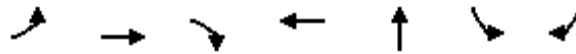
11: Capital Drive & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Future Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	84	1448	16	47	1582	65	388	7	187	88	7	128
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	296	1759	19	335	1701	736	433	8	408	153	7	130
Arrive On Green	0.17	0.96	0.93	0.16	0.96	0.93	0.24	0.24	0.24	0.09	0.09	0.07
Sat Flow, veh/h	1818	3675	41	1781	3554	1585	1788	32	1683	1781	83	1515
Grp Volume(v), veh/h	84	714	750	47	1582	65	395	0	187	88	0	135
Grp Sat Flow(s),veh/h/ln	1818	1814	1902	1781	1777	1585	1820	0	1683	1781	0	1598
Q Serve(g_s), s	0.0	11.1	11.3	0.0	24.4	0.4	29.4	0.0	13.3	6.7	0.0	11.8
Cycle Q Clear(g_c), s	0.0	11.1	11.3	0.0	24.4	0.4	29.4	0.0	13.3	6.7	0.0	11.8
Prop In Lane	1.00		0.02	1.00		1.00	0.98		1.00	1.00		0.95
Lane Grp Cap(c), veh/h	296	868	910	335	1701	736	441	0	408	153	0	137
V/C Ratio(X)	0.28	0.82	0.82	0.14	0.93	0.09	0.90	0.00	0.46	0.58	0.00	0.99
Avail Cap(c_a), veh/h	296	868	910	335	1701	736	442	0	409	153	0	137
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.65	0.65	0.65	0.65	0.65	0.65	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.7	1.8	1.8	20.1	2.1	2.7	51.3	0.0	45.2	61.6	0.0	65.1
Incr Delay (d2), s/veh	0.3	5.8	5.6	0.0	7.4	0.2	19.8	0.0	0.3	3.5	0.0	72.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	2.4	2.5	0.8	2.9	0.2	15.8	0.0	5.6	3.2	0.0	7.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	32.1	7.6	7.4	20.2	9.5	2.8	71.1	0.0	45.5	65.0	0.0	137.3
LnGrp LOS	C	A	A	C	A	A	E	A	D	E	A	F
Approach Vol, veh/h	1548				1694				582		223	
Approach Delay, s/veh	8.9				9.5				62.9		108.8	
Approach LOS	A				A				E		F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.1	71.0		37.9	15.1	71.0		16.0				
Change Period (Y+Rc), s	5.5	6.0		6.5	5.5	6.0		6.5				
Max Green Setting (Gmax), s	9.5	65.0		31.5	9.5	65.0		9.5				
Max Q Clear Time (g_c+I1), s	2.0	26.4		31.4	2.0	13.3		13.8				
Green Ext Time (p_c), s	0.1	5.6		0.0	0.0	3.6		0.0				
Intersection Summary												
HCM 6th Ctrl Delay	22.4											
HCM 6th LOS	C											

Queues
12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development



Lane Group	EBL	EBT	EBR	WBT	NBT	SBL	SBR
Lane Group Flow (vph)	52	1333	908	2092	853	162	299
v/c Ratio	0.34	0.71	0.56	0.92	0.98	0.66	0.92
Control Delay	23.0	28.0	1.4	23.1	75.4	70.6	68.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	23.0	28.0	1.4	23.1	75.4	70.6	68.1
Queue Length 50th (ft)	23	473	0	502	385	141	167
Queue Length 95th (ft)	44	527	0	444	#462	175	195
Internal Link Dist (ft)		411		1015	451		
Turn Bay Length (ft)	300						
Base Capacity (vph)	151	1885	1615	2274	866	252	330
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.71	0.56	0.92	0.98	0.64	0.91

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary

12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	45	1160	790	0	1610	63	351	124	241	118	0	218
Future Volume (veh/h)	45	1160	790	0	1610	63	351	124	241	118	0	218
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	2027	2027	2027	0	1817	1817	1870	1870	1870	1949	0	1949
Adj Flow Rate, veh/h	52	1333	0	0	2012	79	418	148	287	162	0	299
Peak Hour Factor	0.87	0.87	0.87	0.80	0.80	0.80	0.84	0.84	0.84	0.73	0.73	0.73
Percent Heavy Veh, %	2	2	2	0	2	2	2	2	2	2	0	2
Cap, veh/h	274	2669		0	3019	118	404	153	304	0	0	0
Arrive On Green	0.05	0.69	0.00	0.00	1.00	1.00	0.25	0.25	0.23	0.01	0.00	0.01
Sat Flow, veh/h	1931	3852	1718	0	5062	192	1614	610	1217		0	
Grp Volume(v), veh/h	52	1333	0	0	1357	734	463	0	390		0.0	
Grp Sat Flow(s),veh/h/ln	1931	1926	1718	0	1654	1783	1790	0	1651			
Q Serve(g_s), s	1.3	22.8	0.0	0.0	0.0	0.0	35.0	0.0	32.5			
Cycle Q Clear(g_c), s	1.3	22.8	0.0	0.0	0.0	0.0	35.0	0.0	32.5			
Prop In Lane	1.00		1.00	0.00		0.11	0.90		0.74			
Lane Grp Cap(c), veh/h	274	2669		0	2039	1099	447	0	413			
V/C Ratio(X)	0.19	0.50		0.00	0.67	0.67	1.04	0.00	0.94			
Avail Cap(c_a), veh/h	286	2669		0	2039	1099	447	0	413			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00			
Upstream Filter(l)	1.00	1.00	0.00	0.00	0.31	0.31	1.00	0.00	1.00			
Uniform Delay (d), s/veh	7.8	10.1	0.0	0.0	0.0	0.0	52.5	0.0	52.5			
Incr Delay (d2), s/veh	0.1	0.7	0.0	0.0	0.5	1.0	52.1	0.0	30.5			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.5	8.8	0.0	0.0	0.2	0.3	22.1	0.0	17.0			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.9	10.8	0.0	0.0	0.5	1.0	104.6	0.0	83.0			
LnGrp LOS	A	B		A	A	A	F	A	F			
Approach Vol, veh/h	1385		A	2091			853					
Approach Delay, s/veh	10.7			0.7			94.7					
Approach LOS	B			A			F					
Timer - Assigned Phs	2			4	5	6						
Phs Duration (G+Y+Rc), s	101.0			39.0	10.7	90.3						
Change Period (Y+Rc), s	6.5			6.5	5.5	6.5						
Max Green Setting (Gmax), s	70.2			32.5	6.1	58.6						
Max Q Clear Time (g_c+l1), s	24.8			37.0	3.3	2.0						
Green Ext Time (p_c), s	4.1			0.0	0.0	7.0						

Intersection Summary

HCM 6th Ctrl Delay	22.4
HCM 6th LOS	C

Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Queues
11: Capital Drive & Kingston Pike

2026 AM Build - Three Lane Approach

Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	131	1274	65	791	98	164	8	118	86	99
v/c Ratio	0.27	0.57	0.23	0.37	0.10	0.57	0.03	0.37	0.36	0.49
Control Delay	4.4	7.1	8.7	14.8	0.2	49.8	47.9	10.3	44.4	21.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	4.4	7.1	8.7	14.8	0.2	49.8	47.9	10.3	44.4	21.0
Queue Length 50th (ft)	19	127	15	172	0	117	6	0	59	6
Queue Length 95th (ft)	m24	147	34	248	0	164	20	38	100	61
Internal Link Dist (ft)		1015		1260			617			180
Turn Bay Length (ft)	200		200		50	145		145		
Base Capacity (vph)	502	2228	324	2121	1001	304	316	391	240	254
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.57	0.20	0.37	0.10	0.54	0.03	0.30	0.36	0.39

Intersection Summary

m Volume for 95th percentile queue is metered by upstream signal.

HCM 6th Signalized Intersection Summary

11: Capital Drive & Kingston Pike

2026 AM Build - Three Lane Approach
Capital Drive Retail Development

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Future Volume (veh/h)	123	1087	111	59	720	89	138	7	99	79	6	85
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1870	1870
Adj Flow Rate, veh/h	131	1156	118	65	791	98	164	8	118	86	7	92
Peak Hour Factor	0.94	0.94	0.94	0.91	0.91	0.91	0.84	0.84	0.84	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	487	2048	209	415	2176	946	306	250	220	312	11	141
Arrive On Green	0.12	1.00	1.00	0.05	0.61	0.60	0.11	0.13	0.13	0.08	0.09	0.08
Sat Flow, veh/h	1818	3324	339	1781	3554	1585	1818	1909	1683	1781	113	1489
Grp Volume(v), veh/h	131	630	644	65	791	98	164	8	118	86	0	99
Grp Sat Flow(s),veh/h/ln	1818	1814	1848	1781	1777	1585	1818	1909	1683	1781	0	1602
Q Serve(g_s), s	3.3	0.0	0.0	1.7	14.4	3.5	10.0	0.5	8.5	5.5	0.0	7.8
Cycle Q Clear(g_c), s	3.3	0.0	0.0	1.7	14.4	3.5	10.0	0.5	8.5	5.5	0.0	7.8
Prop In Lane	1.00		0.18	1.00		1.00	1.00		1.00	1.00		0.93
Lane Grp Cap(c), veh/h	487	1118	1139	415	2176	946	306	250	220	312	0	152
V/C Ratio(X)	0.27	0.56	0.57	0.16	0.36	0.10	0.54	0.03	0.54	0.28	0.00	0.65
Avail Cap(c_a), veh/h	550	1118	1139	470	2176	946	353	323	285	312	0	173
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.55	0.55	0.55	0.93	0.93	0.93	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.9	0.0	0.0	7.7	12.6	11.3	43.6	49.3	52.8	46.9	0.0	57.9
Incr Delay (d2), s/veh	0.2	1.1	1.1	0.1	0.4	0.2	0.5	0.0	0.8	0.2	0.0	4.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	0.4	0.4	0.6	5.4	1.3	4.6	0.2	3.7	2.5	0.0	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	8.1	1.1	1.1	7.8	13.0	11.5	44.1	49.3	53.6	47.1	0.0	62.5
LnGrp LOS	A	A	A	A	B	B	D	D	D	D	A	E
Approach Vol, veh/h	1405			954			290			185		
Approach Delay, s/veh	1.8			12.5			48.1			55.3		
Approach LOS	A			B			D			E		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.4	83.6	14.0	21.0	10.9	84.1	18.6	16.3				
Change Period (Y+Rc), s	5.5	6.0	6.5	6.5	5.5	6.0	6.5	6.5				
Max Green Setting (Gmax), s	10.5	68.0	7.5	19.5	9.5	69.0	15.5	11.5				
Max Q Clear Time (g_c+I1), s	5.3	16.4	7.5	10.5	3.7	2.0	12.0	9.8				
Green Ext Time (p_c), s	0.2	2.3	0.0	0.2	0.0	3.0	0.1	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	13.6											
HCM 6th LOS	B											

Queues
11: Capital Drive & Kingston Pike

2026 PM Build - Three Lane Approach

Capital Drive Retail Development

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	84	1464	47	1582	65	388	7	187	88	135
v/c Ratio	0.62	0.78	0.24	0.83	0.07	0.84	0.02	0.38	0.41	0.62
Control Delay	36.2	18.9	11.0	14.9	0.1	56.7	39.4	18.5	41.2	30.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	36.2	18.9	11.0	14.9	0.1	56.7	39.4	18.5	41.2	30.5
Queue Length 50th (ft)	23	274	6	197	0	301	5	49	56	26
Queue Length 95th (ft)	m36	m499	m9	445	m0	276	13	59	70	43
Internal Link Dist (ft)		1015		1260			617			180
Turn Bay Length (ft)	200		200		50	300		145		
Base Capacity (vph)	135	1867	205	1911	913	469	481	524	215	238
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.62	0.78	0.23	0.83	0.07	0.83	0.01	0.36	0.41	0.57
Intersection Summary										
m Volume for 95th percentile queue is metered by upstream signal.										

HCM 6th Signalized Intersection Summary

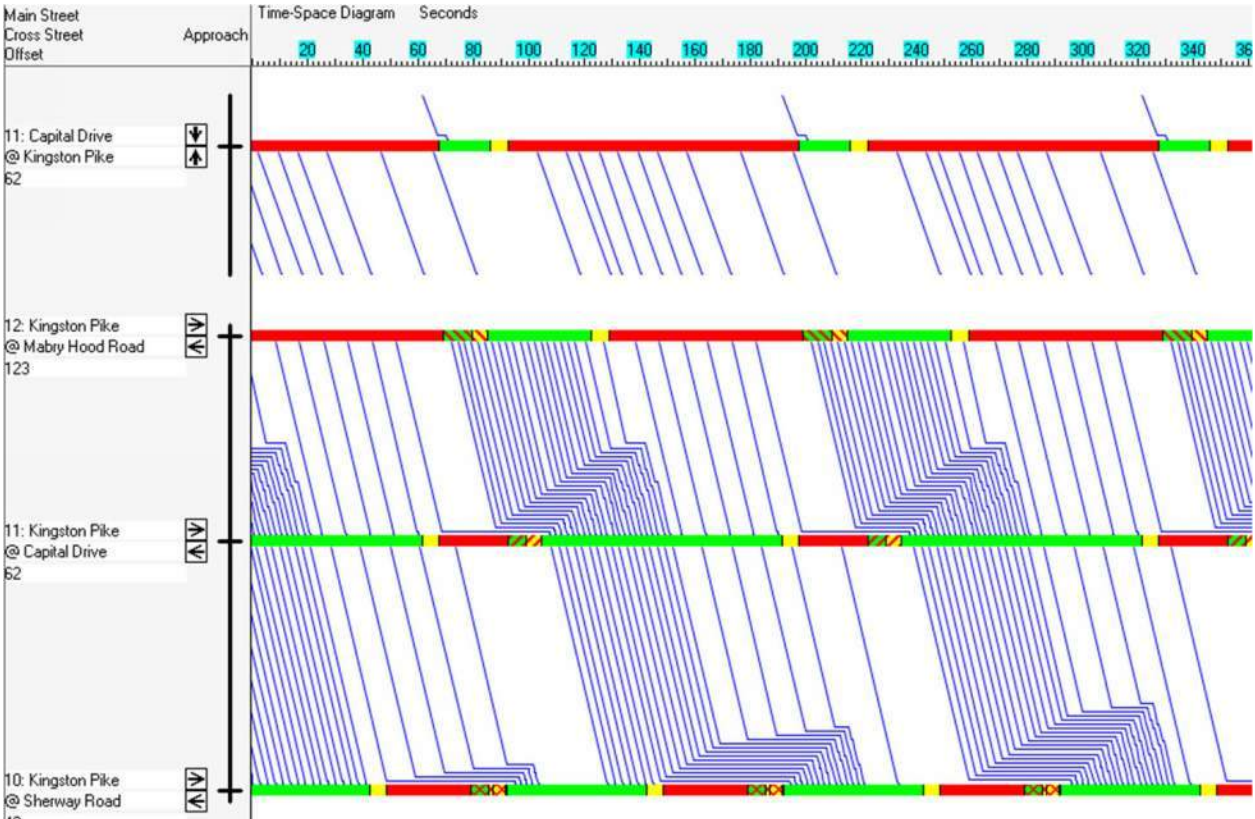
11: Capital Drive & Kingston Pike

2026 PM Build - Three Lane Approach
Capital Drive Retail Development

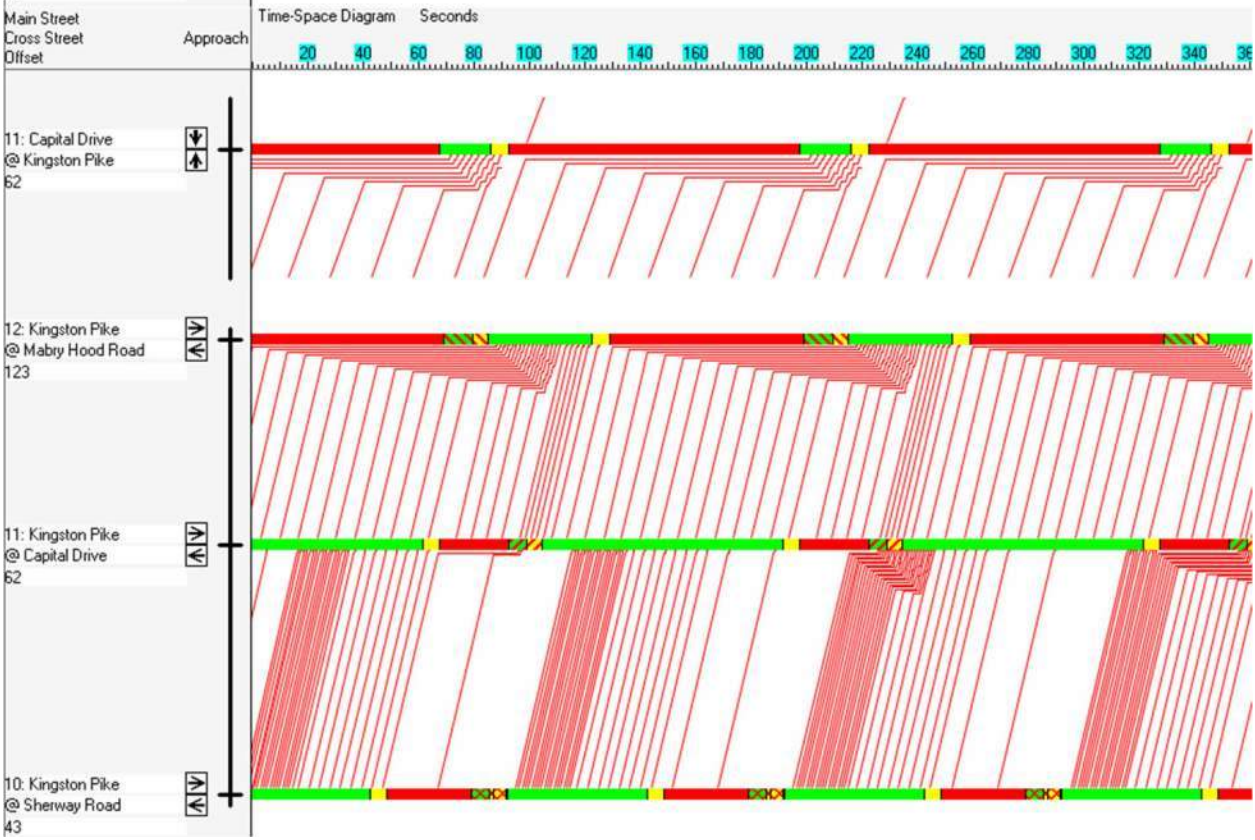
												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Future Volume (veh/h)	77	1332	15	43	1455	60	260	5	125	59	5	86
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No			No			No		
Adj Sat Flow, veh/h/ln	1909	1909	1909	1870	1870	1870	1909	1909	1986	1870	1945	1870
Adj Flow Rate, veh/h	84	1448	16	47	1582	65	388	7	187	88	7	128
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.67	0.67	0.67	0.67	0.67	0.67
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	315	1785	20	368	1853	804	457	461	406	268	7	135
Arrive On Green	0.12	0.97	0.94	0.19	1.00	1.00	0.22	0.24	0.24	0.06	0.09	0.07
Sat Flow, veh/h	1818	3675	41	1781	3554	1585	1818	1909	1683	1781	86	1575
Grp Volume(v), veh/h	84	714	750	47	1582	65	388	7	187	88	0	135
Grp Sat Flow(s),veh/h/ln	1818	1814	1902	1781	1777	1585	1818	1909	1683	1781	0	1662
Q Serve(g_s), s	0.0	7.4	7.6	0.0	0.0	0.0	25.8	0.4	10.0	6.2	0.0	11.3
Cycle Q Clear(g_c), s	0.0	7.4	7.6	0.0	0.0	0.0	25.8	0.4	10.0	6.2	0.0	11.3
Prop In Lane	1.00		0.02	1.00		1.00	1.00		1.00	1.00		0.95
Lane Grp Cap(c), veh/h	315	881	924	368	1853	804	457	461	406	268	0	142
V/C Ratio(X)	0.27	0.81	0.81	0.13	0.85	0.08	0.85	0.02	0.46	0.33	0.00	0.95
Avail Cap(c_a), veh/h	315	881	924	368	1853	804	486	491	433	268	0	142
HCM Platoon Ratio	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.44	0.44	0.44	0.48	0.48	0.48	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.9	1.1	1.2	17.4	0.0	0.0	41.9	40.4	25.7	53.2	0.0	64.9
Incr Delay (d2), s/veh	0.2	3.7	3.5	0.0	2.6	0.1	12.7	0.0	0.3	0.7	0.0	59.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	1.6	1.6	0.8	0.7	0.0	13.2	0.2	4.1	2.8	0.0	7.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	18.1	4.8	4.7	17.5	2.6	0.1	54.5	40.4	26.0	53.9	0.0	123.9
LnGrp LOS	B	A	A	B	A	A	D	D	C	D	A	F
Approach Vol, veh/h	1548		1694				582				223	
Approach Delay, s/veh	5.5		2.9				45.2				96.3	
Approach LOS	A		A				D				F	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	12.2	77.0	13.0	37.8	17.2	72.0	34.8	16.0				
Change Period (Y+Rc), s	5.5	6.0	6.5	6.5	5.5	6.0	6.5	6.5				
Max Green Setting (Gmax), s	4.5	71.0	6.5	33.5	9.5	66.0	30.5	9.5				
Max Q Clear Time (g_c+I1), s	2.0	2.0	8.2	12.0	2.0	9.6	27.8	13.3				
Green Ext Time (p_c), s	0.0	5.6	0.0	0.5	0.0	3.6	0.5	0.0				
Intersection Summary												
HCM 6th Ctrl Delay	15.1											
HCM 6th LOS	B											

Existing 2021 AM Peak Hour Time-Space Diagram

EB

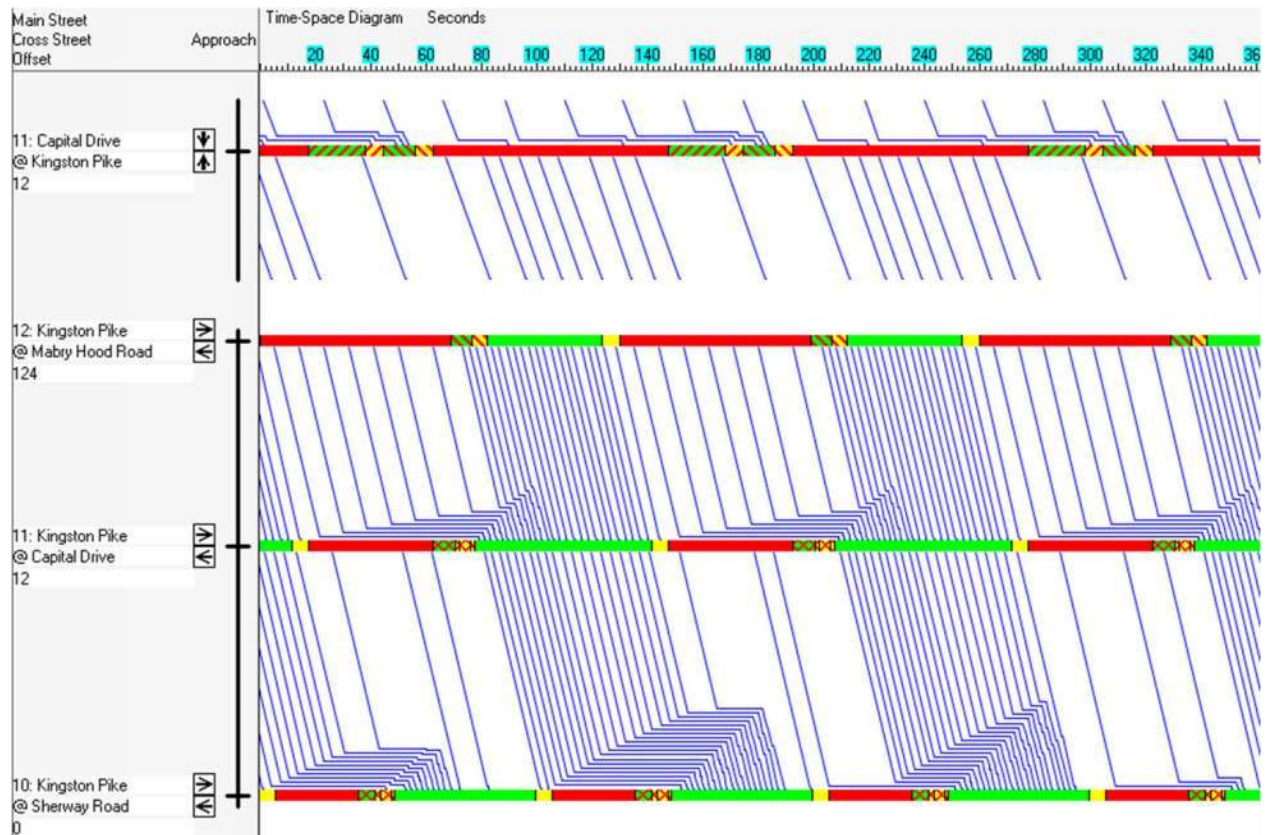


WB

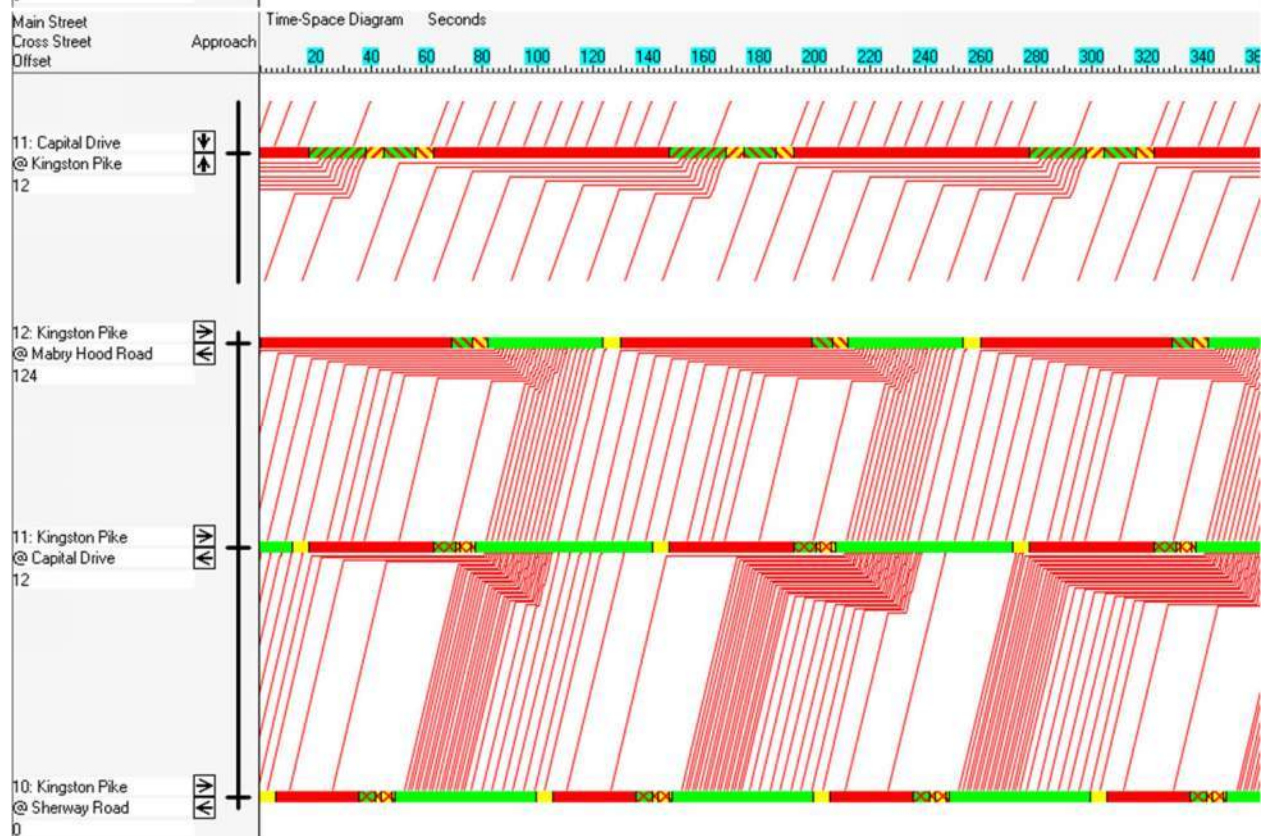


Projected 2026 AM Peak Hour Time-Space Diagram

EB

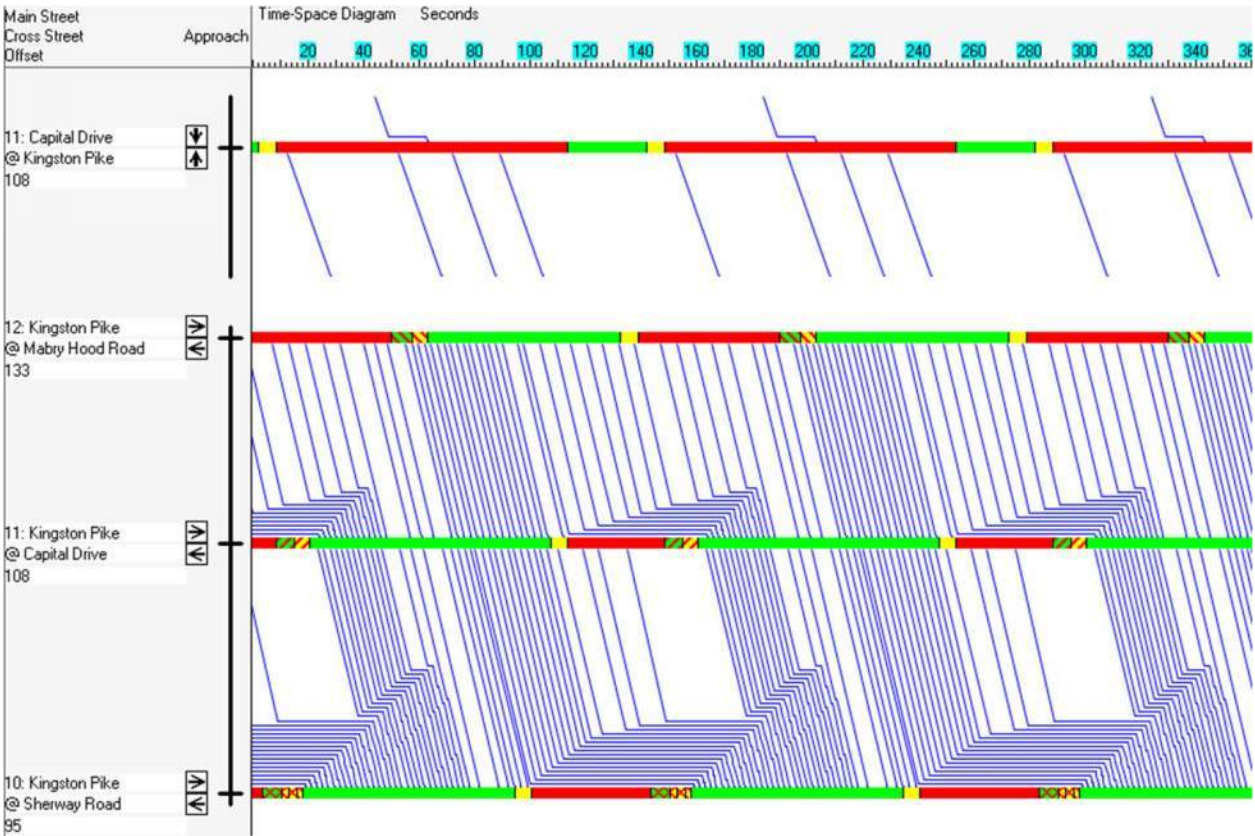


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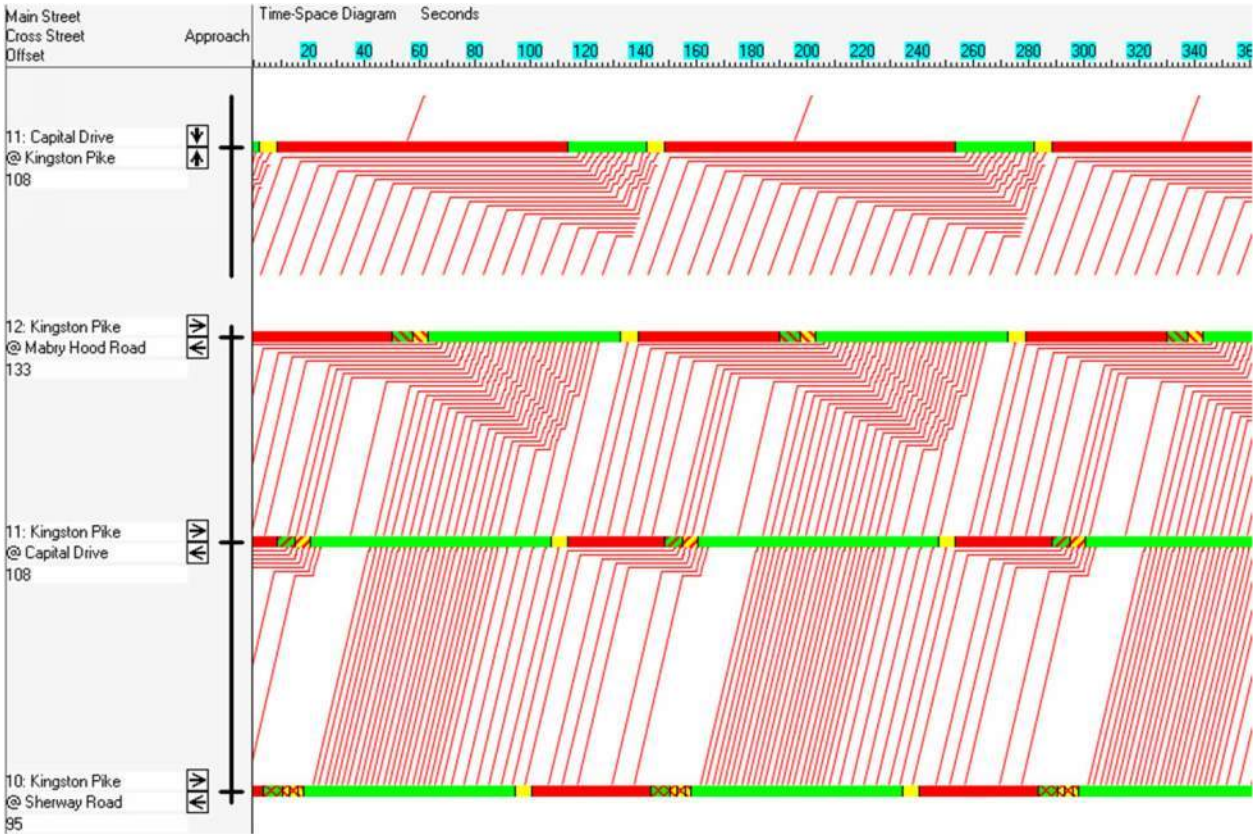


Existing 2021 PM Peak Hour Time-Space Diagram

EB

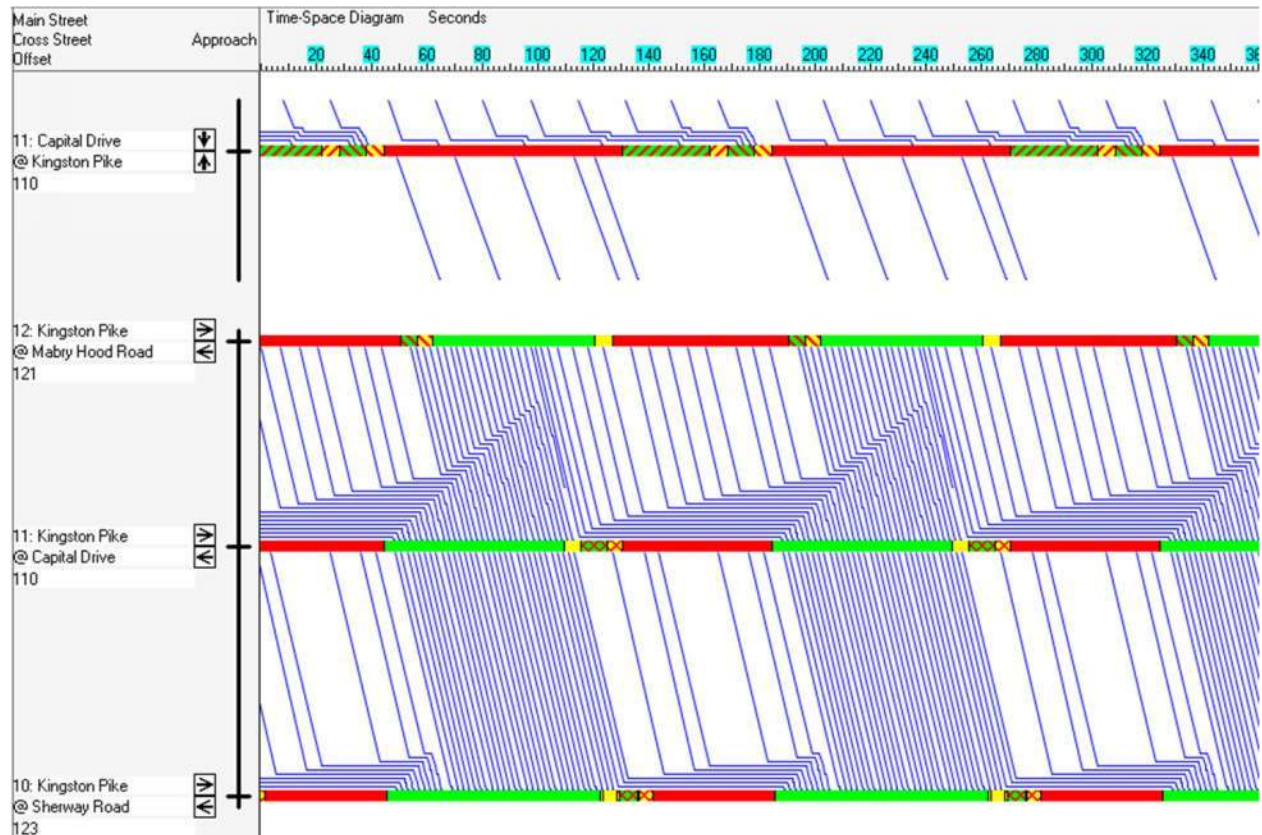


WB

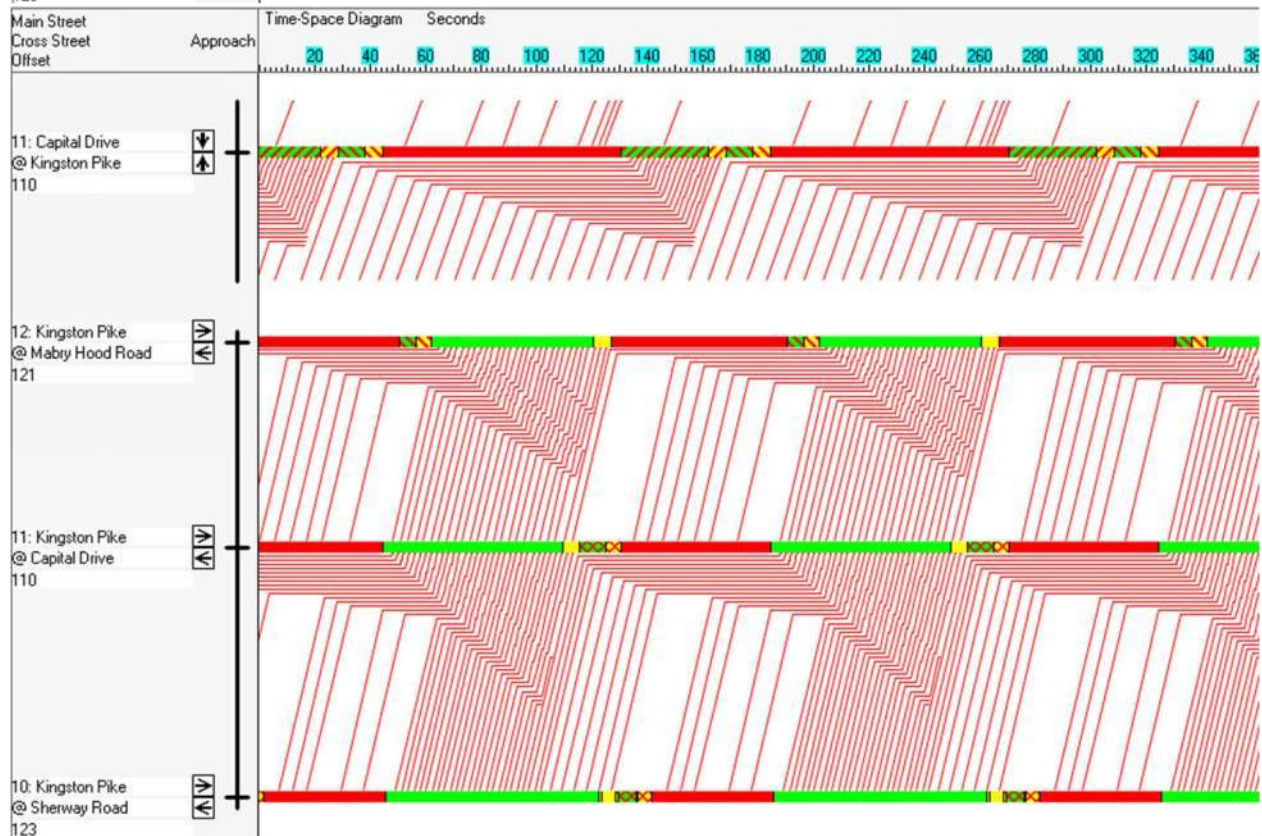


Projected 2026 PM Peak Hour Time-Space Diagram

EB



WB



Timings
10: Sherway Road & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development

							
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	69	962	15	842	21	6	2
Future Volume (vph)	69	962	15	842	21	6	2
Turn Type	pm+pt	NA	pm+pt	NA	Split	NA	NA
Protected Phases	1	6	5	2	4	4	8
Permitted Phases	6		2				
Detector Phase	1	6	5	2	4	4	8
Switch Phase							
Minimum Initial (s)	6.0	18.0	6.0	18.0	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	12.0	24.0	11.5	11.5	10.5
Total Split (s)	13.0	58.0	12.0	57.0	14.0	14.0	16.0
Total Split (%)	13.0%	58.0%	12.0%	57.0%	14.0%	14.0%	16.0%
Yellow Time (s)	4.0	4.5	4.5	4.5	4.0	4.0	4.0
All-Red Time (s)	1.0	1.5	1.5	1.5	2.5	2.5	1.5
Lost Time Adjust (s)	-1.0	-2.0	-1.5	-2.0	-2.5	-2.5	-1.5
Total Lost Time (s)	4.0	4.0	4.5	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag			
Lead-Lag Optimize?							
Recall Mode	None	C-Max	None	C-Max	None	None	None
Act Effct Green (s)	75.9	73.2	73.1	68.4	9.2	9.2	8.7
Actuated g/C Ratio	0.76	0.73	0.73	0.68	0.09	0.09	0.09
v/c Ratio	0.17	0.42	0.04	0.39	0.16	0.14	0.35
Control Delay	5.7	9.3	5.7	10.6	43.9	25.2	23.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.7	9.3	5.7	10.6	43.9	25.2	23.1
LOS	A	A	A	B	D	C	C
Approach Delay		9.1		10.6		35.1	23.1
Approach LOS		A		B		D	C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 10.7

Intersection LOS: B

Intersection Capacity Utilization 52.9%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 10: Sherway Road & Kingston Pike

 Ø1	 Ø2 (R)	 Ø4	 Ø8
13 s	57 s	14 s	16 s
 Ø5	 Ø6 (R)		
12 s	58 s		

Timings

11: Capital Drive & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	123	1087	59	720	89	7	99	79	6
Future Volume (vph)	123	1087	59	720	89	7	99	79	6
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Split	NA
Protected Phases	1	6	5	2		4		8	8
Permitted Phases	6		2		2		4		
Detector Phase	1	6	5	2	2	4	4	8	8
Switch Phase									
Minimum Initial (s)	6.0	15.0	6.0	15.0	15.0	6.0	6.0	6.0	6.0
Minimum Split (s)	15.0	24.0	15.0	24.0	24.0	12.5	12.5	12.5	12.5
Total Split (s)	15.0	70.0	15.0	70.0	70.0	27.0	27.0	18.0	18.0
Total Split (%)	11.5%	53.8%	11.5%	53.8%	53.8%	20.8%	20.8%	13.8%	13.8%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5
Lost Time Adjust (s)	-2.0	-2.0	-1.5	-2.0	0.0	-2.5	-2.5	-2.5	-2.5
Total Lost Time (s)	3.5	4.0	4.0	4.0	6.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes						
Recall Mode	None	Max	None	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	86.2	77.0	81.0	72.8	70.8	18.8	18.8	12.4	12.4
Actuated g/C Ratio	0.66	0.59	0.62	0.56	0.54	0.14	0.14	0.10	0.10
v/c Ratio	0.29	0.61	0.25	0.40	0.11	0.67	0.34	0.51	0.42
Control Delay	5.3	8.2	11.3	18.0	1.5	65.1	9.3	66.2	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	8.2	11.3	18.0	1.5	65.1	9.3	66.2	17.8
LOS	A	A	B	B	A	E	A	E	B
Approach Delay		7.9		15.8		42.4			40.3
Approach LOS		A		B		D			D

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 12 (9%), Referenced to phase 2:WBTL, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 16.2

Intersection LOS: B

Intersection Capacity Utilization 63.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 11: Capital Drive & Kingston Pike

			
Ø1	Ø2 (R)	Ø4	Ø8
15 s	70 s	27 s	18 s
			
Ø5	Ø6		
15 s	70 s		

Timings
12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development

							
Lane Group	EBL	EBT	EBR	WBT	NBT	SBL	SBR
Lane Configurations		 		  	  		
Traffic Volume (vph)	75	1163	575	1034	222	44	78
Future Volume (vph)	75	1163	575	1034	222	44	78
Turn Type	pm+pt	NA	Free	NA	NA	Prot	Prot
Protected Phases	5	2		6	4	8	8
Permitted Phases	2		Free				
Detector Phase	5	2		6	4	8	8
Switch Phase							
Minimum Initial (s)	6.0	8.5		8.5	6.0	6.0	6.0
Minimum Split (s)	11.5	20.5		20.5	12.5	12.0	12.0
Total Split (s)	12.8	61.0		48.2	57.0	12.0	12.0
Total Split (%)	9.8%	46.9%		37.1%	43.8%	9.2%	9.2%
Yellow Time (s)	4.0	5.0		5.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	-1.5	-2.5		-2.5	-2.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0		4.0	3.5	4.0	4.0
Lead/Lag	Lead			Lag			
Lead-Lag Optimize?							
Recall Mode	None	C-Max		C-Max	None	None	None
Act Effct Green (s)	59.0	59.0	130.0	46.6	51.3	8.2	8.2
Actuated g/C Ratio	0.45	0.45	1.00	0.36	0.39	0.06	0.06
v/c Ratio	0.41	0.78	0.39	0.65	0.90	0.48	0.44
Control Delay	27.4	34.6	0.7	28.0	45.1	73.9	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	34.6	0.7	28.0	45.1	73.9	10.5
LOS	C	C	A	C	D	E	B
Approach Delay		23.6		28.0	45.1		
Approach LOS		C		C	D		

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 124 (95%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 30.8

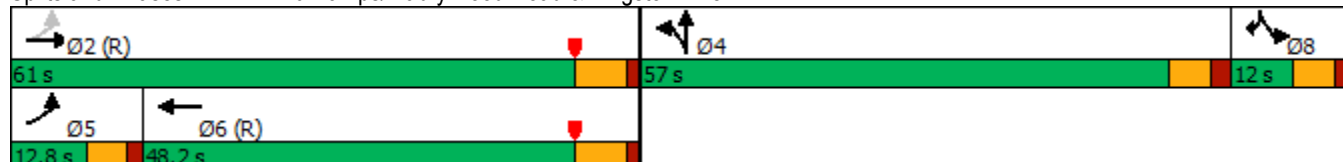
Intersection LOS: C

Intersection Capacity Utilization 75.4%

ICU Level of Service D

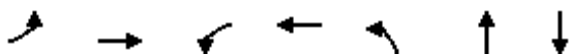
Analysis Period (min) 15

Splits and Phases: 12: I-140 Ramps/Mabry Hood Road & Kingston Pike



Timings 10: Sherway Road & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	78	1510	21	1319	83	8	6
Future Volume (vph)	78	1510	21	1319	83	8	6
Turn Type	pm+pt	NA	pm+pt	NA	Split	NA	NA
Protected Phases	1	6	5	2	4	4	8
Permitted Phases	6		2				
Detector Phase	1	6	5	2	4	4	8
Switch Phase							
Minimum Initial (s)	6.0	18.0	6.0	18.0	5.0	5.0	8.0
Minimum Split (s)	11.0	24.0	12.0	24.0	11.5	11.5	18.0
Total Split (s)	13.0	84.0	12.0	83.0	23.0	23.0	21.0
Total Split (%)	9.3%	60.0%	8.6%	59.3%	16.4%	16.4%	15.0%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.0	4.0	4.0
All-Red Time (s)	1.0	1.5	1.5	1.5	2.5	2.5	1.5
Lost Time Adjust (s)	-1.0	-2.0	-1.5	-2.0	-2.5	-2.5	-1.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			
Recall Mode	None	C-Max	None	C-Max	None	None	Max
Act Effect Green (s)	89.2	84.0	86.6	79.0	16.9	16.9	20.1
Actuated g/C Ratio	0.64	0.60	0.62	0.56	0.12	0.12	0.14
v/c Ratio	0.43	0.80	0.14	0.71	0.61	0.17	0.48
Control Delay	13.3	4.9	16.3	24.6	70.5	28.7	39.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.3	4.9	16.3	24.6	70.5	28.7	39.6
LOS	B	A	B	C	E	C	D
Approach Delay		5.3		24.5		61.4	39.6
Approach LOS		A		C		E	D

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 117 (84%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 17.2

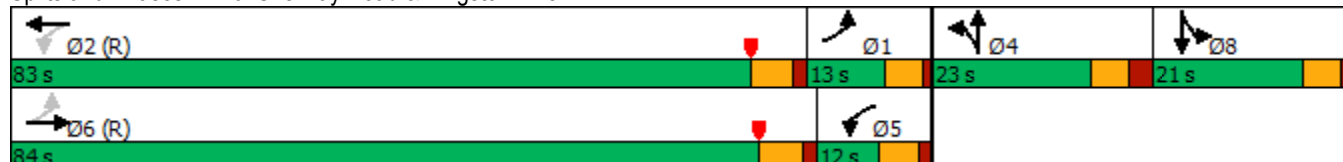
Intersection LOS: B

Intersection Capacity Utilization 70.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 10: Sherway Road & Kingston Pike



Timings 11: Capital Drive & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	77	1332	43	1455	60	5	125	59	5
Future Volume (vph)	77	1332	43	1455	60	5	125	59	5
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Split	NA
Protected Phases	1	6	5	2		4		8	8
Permitted Phases	6		2		2		4		
Detector Phase	1	6	5	2	2	4	4	8	8
Switch Phase									
Minimum Initial (s)	6.0	15.0	6.0	15.0	15.0	6.0	6.0	6.0	6.0
Minimum Split (s)	15.0	24.0	15.0	24.0	24.0	16.0	16.0	16.0	16.0
Total Split (s)	15.0	71.0	15.0	71.0	71.0	38.0	38.0	16.0	16.0
Total Split (%)	10.7%	50.7%	10.7%	50.7%	50.7%	27.1%	27.1%	11.4%	11.4%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5
Lost Time Adjust (s)	-2.0	-2.0	-1.5	-2.0	0.0	-2.5	-2.5	-2.5	-2.5
Total Lost Time (s)	3.5	4.0	4.0	4.0	6.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	71.8	71.3	69.4	69.4	67.4	33.3	33.3	11.4	11.4
Actuated g/C Ratio	0.51	0.51	0.50	0.50	0.48	0.24	0.24	0.08	0.08
v/c Ratio	0.45	0.81	0.25	0.90	0.08	0.93	0.35	0.61	0.55
Control Delay	34.5	21.4	21.3	24.1	0.1	81.7	10.7	80.5	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.5	21.4	21.3	24.1	0.1	81.7	10.7	80.5	20.0
LOS	C	C	C	C	A	F	B	F	C
Approach Delay		22.1		23.1		58.9			43.9
Approach LOS		C		C		E			D

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 113 (81%), Referenced to phase 2:WBTL, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 29.0

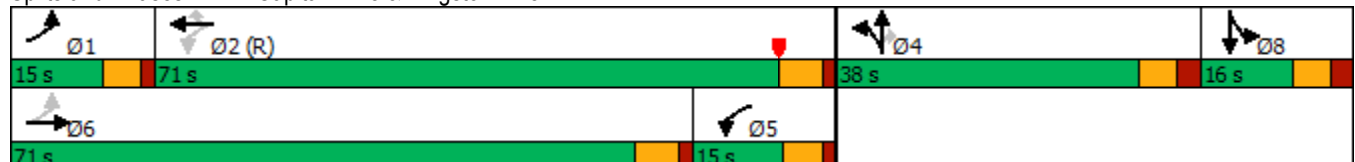
Intersection LOS: C

Intersection Capacity Utilization 76.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 11: Capital Drive & Kingston Pike



Timings
12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development

							
Lane Group	EBL	EBT	EBR	WBT	NBT	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	45	1160	790	1610	124	118	218
Future Volume (vph)	45	1160	790	1610	124	118	218
Turn Type	pm+pt	NA	Free	NA	NA	Prot	Prot
Protected Phases	5	2		6	4	8	8
Permitted Phases	2		Free				
Detector Phase	5	2		6	4	8	8
Switch Phase							
Minimum Initial (s)	6.0	8.5		8.5	6.0	6.0	6.0
Minimum Split (s)	11.5	20.5		20.5	12.5	12.5	12.5
Total Split (s)	11.5	89.0		77.5	32.0	19.0	19.0
Total Split (%)	8.2%	63.6%		55.4%	22.9%	13.6%	13.6%
Yellow Time (s)	4.0	5.0		5.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5		1.5	2.5	2.5	2.5
Lost Time Adjust (s)	-1.5	-2.5		-2.5	-2.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.5	4.5
Lead/Lag	Lead			Lag			
Lead-Lag Optimize?							
Recall Mode	None	C-Max		C-Max	None	None	None
Act Effct Green (s)	85.0	85.0	140.0	75.8	28.0	14.5	14.5
Actuated g/C Ratio	0.61	0.61	1.00	0.54	0.20	0.10	0.10
v/c Ratio	0.35	0.61	0.56	0.78	1.22	0.88	1.09
Control Delay	17.9	18.6	1.4	14.4	153.1	101.6	114.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.9	18.6	1.4	14.4	153.1	101.6	114.5
LOS	B	B	A	B	F	F	F
Approach Delay		11.8		14.4	153.1		
Approach LOS		B		B	F		

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 124 (89%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.22

Intersection Signal Delay: 41.8

Intersection LOS: D

Intersection Capacity Utilization 77.8%

ICU Level of Service D

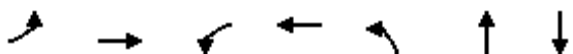
Analysis Period (min) 15

Splits and Phases: 12: I-140 Ramps/Mabry Hood Road & Kingston Pike



Timings 10: Sherway Road & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	69	962	15	842	21	6	2
Future Volume (vph)	69	962	15	842	21	6	2
Turn Type	pm+pt	NA	pm+pt	NA	Split	NA	NA
Protected Phases	1	6	5	2	4	4	8
Permitted Phases	6		2				
Detector Phase	1	6	5	2	4	4	8
Switch Phase							
Minimum Initial (s)	6.0	18.0	6.0	18.0	5.0	5.0	5.0
Minimum Split (s)	11.0	24.0	12.0	24.0	11.5	11.5	10.5
Total Split (s)	13.0	58.0	12.0	57.0	14.0	14.0	16.0
Total Split (%)	13.0%	58.0%	12.0%	57.0%	14.0%	14.0%	16.0%
Yellow Time (s)	4.0	4.5	4.5	4.5	4.0	4.0	4.0
All-Red Time (s)	1.0	1.5	1.5	1.5	2.5	2.5	1.5
Lost Time Adjust (s)	-1.0	-2.0	-1.5	-2.0	-2.5	-2.5	-1.5
Total Lost Time (s)	4.0	4.0	4.5	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag			
Lead-Lag Optimize?							
Recall Mode	None	C-Max	None	C-Max	None	None	None
Act Effct Green (s)	75.9	73.2	73.1	68.4	9.2	9.2	8.7
Actuated g/C Ratio	0.76	0.73	0.73	0.68	0.09	0.09	0.09
v/c Ratio	0.17	0.42	0.04	0.39	0.16	0.14	0.35
Control Delay	5.7	9.3	5.7	10.6	43.9	25.2	23.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.7	9.3	5.7	10.6	43.9	25.2	23.1
LOS	A	A	A	B	D	C	C
Approach Delay		9.1		10.6		35.1	23.1
Approach LOS		A		B		D	C

Intersection Summary

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 0 (0%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 10.7

Intersection LOS: B

Intersection Capacity Utilization 52.9%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 10: Sherway Road & Kingston Pike

Ø1 13 s	Ø2 (R) 57 s	Ø4 14 s	Ø8 16 s
Ø5 12 s	Ø6 (R) 58 s		

Timings

11: Capital Drive & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	123	1087	59	720	89	7	99	79	6
Future Volume (vph)	123	1087	59	720	89	7	99	79	6
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Split	NA
Protected Phases	1	6	5	2		4		8	8
Permitted Phases	6		2		2		4		
Detector Phase	1	6	5	2	2	4	4	8	8
Switch Phase									
Minimum Initial (s)	6.0	15.0	6.0	15.0	15.0	6.0	6.0	6.0	6.0
Minimum Split (s)	15.0	24.0	15.0	24.0	24.0	12.5	12.5	12.5	12.5
Total Split (s)	15.0	70.0	15.0	70.0	70.0	27.0	27.0	18.0	18.0
Total Split (%)	11.5%	53.8%	11.5%	53.8%	53.8%	20.8%	20.8%	13.8%	13.8%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5
Lost Time Adjust (s)	-2.0	-2.0	-1.5	-2.0	0.0	-2.5	-2.5	-2.5	-2.5
Total Lost Time (s)	3.5	4.0	4.0	4.0	6.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes						
Recall Mode	None	Max	None	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	86.2	77.0	81.0	72.8	70.8	18.8	18.8	12.4	12.4
Actuated g/C Ratio	0.66	0.59	0.62	0.56	0.54	0.14	0.14	0.10	0.10
v/c Ratio	0.29	0.61	0.25	0.40	0.11	0.67	0.34	0.51	0.42
Control Delay	5.3	8.2	11.3	18.0	1.5	65.1	9.3	66.2	17.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	5.3	8.2	11.3	18.0	1.5	65.1	9.3	66.2	17.8
LOS	A	A	B	B	A	E	A	E	B
Approach Delay		7.9		15.8		42.4			40.3
Approach LOS		A		B		D			D

Intersection Summary

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 12 (9%), Referenced to phase 2:WBTL, Start of Yellow

Natural Cycle: 75

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 16.2

Intersection LOS: B

Intersection Capacity Utilization 63.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 11: Capital Drive & Kingston Pike

 Ø1	 Ø2 (R)	 Ø4	 Ø8
15 s	70 s	27 s	18 s
 Ø5	 Ø6		
15 s	70 s		

Timings
12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2026 AM Build w Split Phasing
Capital Drive Retail Development

							
Lane Group	EBL	EBT	EBR	WBT	NBT	SBL	SBR
Lane Configurations		 		  	  		
Traffic Volume (vph)	75	1163	575	1034	222	44	78
Future Volume (vph)	75	1163	575	1034	222	44	78
Turn Type	pm+pt	NA	Free	NA	NA	Prot	Prot
Protected Phases	5	2		6	4	8	8
Permitted Phases	2		Free				
Detector Phase	5	2		6	4	8	8
Switch Phase							
Minimum Initial (s)	6.0	8.5		8.5	6.0	6.0	6.0
Minimum Split (s)	11.5	20.5		20.5	12.5	12.0	12.0
Total Split (s)	12.8	61.0		48.2	57.0	12.0	12.0
Total Split (%)	9.8%	46.9%		37.1%	43.8%	9.2%	9.2%
Yellow Time (s)	4.0	5.0		5.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5		1.5	2.0	2.0	2.0
Lost Time Adjust (s)	-1.5	-2.5		-2.5	-2.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0		4.0	3.5	4.0	4.0
Lead/Lag	Lead			Lag			
Lead-Lag Optimize?							
Recall Mode	None	C-Max		C-Max	None	None	None
Act Effct Green (s)	59.0	59.0	130.0	46.6	51.3	8.2	8.2
Actuated g/C Ratio	0.45	0.45	1.00	0.36	0.39	0.06	0.06
v/c Ratio	0.41	0.78	0.39	0.65	0.90	0.48	0.44
Control Delay	27.4	34.6	0.7	28.0	45.1	73.9	10.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	27.4	34.6	0.7	28.0	45.1	73.9	10.5
LOS	C	C	A	C	D	E	B
Approach Delay		23.6		28.0	45.1		
Approach LOS		C		C	D		

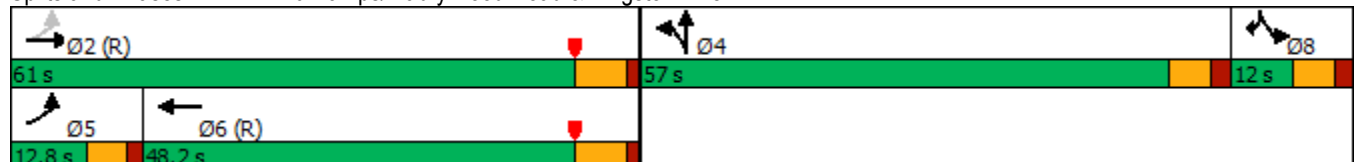
Intersection Summary

Cycle Length: 130
 Actuated Cycle Length: 130
 Offset: 124 (95%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 30.8
 Intersection Capacity Utilization 75.4%
 Analysis Period (min) 15

Intersection LOS: C

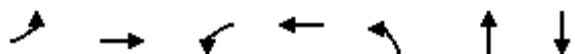
ICU Level of Service D

Splits and Phases: 12: I-140 Ramps/Mabry Hood Road & Kingston Pike



Timings 10: Sherway Road & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT
Lane Configurations							
Traffic Volume (vph)	78	1510	21	1319	83	8	6
Future Volume (vph)	78	1510	21	1319	83	8	6
Turn Type	pm+pt	NA	pm+pt	NA	Split	NA	NA
Protected Phases	1	6	5	2	4	4	8
Permitted Phases	6		2				
Detector Phase	1	6	5	2	4	4	8
Switch Phase							
Minimum Initial (s)	6.0	18.0	6.0	18.0	5.0	5.0	8.0
Minimum Split (s)	11.0	24.0	12.0	24.0	11.5	11.5	18.0
Total Split (s)	13.0	84.0	12.0	83.0	23.0	23.0	21.0
Total Split (%)	9.3%	60.0%	8.6%	59.3%	16.4%	16.4%	15.0%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.0	4.0	4.0
All-Red Time (s)	1.0	1.5	1.5	1.5	2.5	2.5	1.5
Lost Time Adjust (s)	-1.0	-2.0	-1.5	-2.0	-2.5	-2.5	-1.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lead	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			
Recall Mode	None	C-Max	None	C-Max	None	None	Max
Act Effect Green (s)	89.2	84.0	86.6	79.0	16.9	16.9	20.1
Actuated g/C Ratio	0.64	0.60	0.62	0.56	0.12	0.12	0.14
v/c Ratio	0.43	0.80	0.14	0.71	0.61	0.17	0.48
Control Delay	13.3	4.9	16.3	24.6	70.5	28.7	39.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	13.3	4.9	16.3	24.6	70.5	28.7	39.6
LOS	B	A	B	C	E	C	D
Approach Delay		5.3		24.5		61.4	39.6
Approach LOS		A		C		E	D

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 117 (84%), Referenced to phase 2:WBTL and 6:EBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 17.2

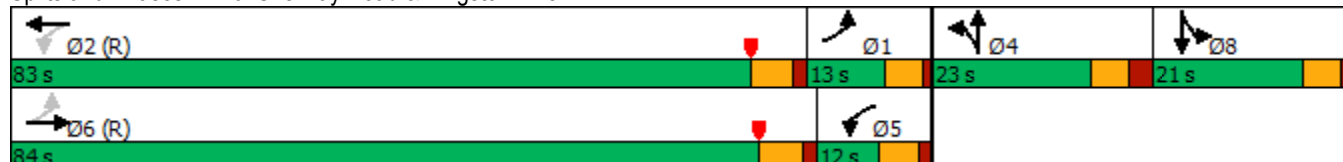
Intersection LOS: B

Intersection Capacity Utilization 70.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 10: Sherway Road & Kingston Pike



Timings 11: Capital Drive & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development

									
Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	NBR	SBL	SBT
Lane Configurations									
Traffic Volume (vph)	77	1332	43	1455	60	5	125	59	5
Future Volume (vph)	77	1332	43	1455	60	5	125	59	5
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	Split	NA
Protected Phases	1	6	5	2		4		8	8
Permitted Phases	6		2		2		4		
Detector Phase	1	6	5	2	2	4	4	8	8
Switch Phase									
Minimum Initial (s)	6.0	15.0	6.0	15.0	15.0	6.0	6.0	6.0	6.0
Minimum Split (s)	15.0	24.0	15.0	24.0	24.0	16.0	16.0	16.0	16.0
Total Split (s)	15.0	71.0	15.0	71.0	71.0	38.0	38.0	16.0	16.0
Total Split (%)	10.7%	50.7%	10.7%	50.7%	50.7%	27.1%	27.1%	11.4%	11.4%
Yellow Time (s)	4.0	4.5	4.0	4.5	4.5	4.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5	1.5	2.5	2.5	2.5	2.5
Lost Time Adjust (s)	-2.0	-2.0	-1.5	-2.0	0.0	-2.5	-2.5	-2.5	-2.5
Total Lost Time (s)	3.5	4.0	4.0	4.0	6.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lag	Lag	Lag				
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes				
Recall Mode	None	Max	None	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	71.8	71.3	69.4	69.4	67.4	33.3	33.3	11.4	11.4
Actuated g/C Ratio	0.51	0.51	0.50	0.50	0.48	0.24	0.24	0.08	0.08
v/c Ratio	0.45	0.81	0.25	0.90	0.08	0.93	0.35	0.61	0.55
Control Delay	34.5	21.4	21.3	24.1	0.1	81.7	10.7	80.5	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	34.5	21.4	21.3	24.1	0.1	81.7	10.7	80.5	20.0
LOS	C	C	C	C	A	F	B	F	C
Approach Delay		22.1		23.1		58.9			43.9
Approach LOS		C		C		E			D

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 113 (81%), Referenced to phase 2:WBTL, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 29.0

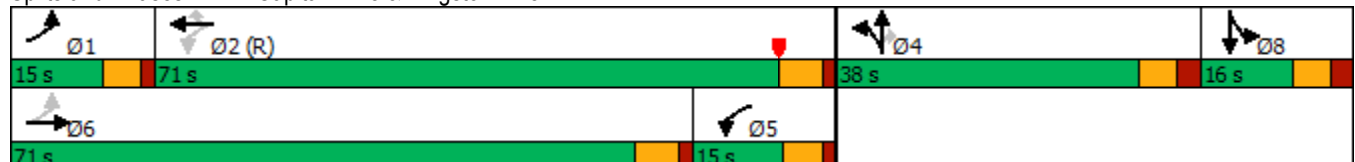
Intersection LOS: C

Intersection Capacity Utilization 76.6%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 11: Capital Drive & Kingston Pike



Timings
12: I-140 Ramps/Mabry Hood Road & Kingston Pike

2026 PM Build w Split Phasing
Capital Drive Retail Development

							
Lane Group	EBL	EBT	EBR	WBT	NBT	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	45	1160	790	1610	124	118	218
Future Volume (vph)	45	1160	790	1610	124	118	218
Turn Type	pm+pt	NA	Free	NA	NA	Prot	Prot
Protected Phases	5	2		6	4	8	8
Permitted Phases	2		Free				
Detector Phase	5	2		6	4	8	8
Switch Phase							
Minimum Initial (s)	6.0	8.5		8.5	6.0	6.0	6.0
Minimum Split (s)	11.5	20.5		20.5	12.5	12.5	12.5
Total Split (s)	11.5	89.0		77.5	32.0	19.0	19.0
Total Split (%)	8.2%	63.6%		55.4%	22.9%	13.6%	13.6%
Yellow Time (s)	4.0	5.0		5.0	4.0	4.0	4.0
All-Red Time (s)	1.5	1.5		1.5	2.5	2.5	2.5
Lost Time Adjust (s)	-1.5	-2.5		-2.5	-2.5	-2.0	-2.0
Total Lost Time (s)	4.0	4.0		4.0	4.0	4.5	4.5
Lead/Lag	Lead			Lag			
Lead-Lag Optimize?							
Recall Mode	None	C-Max		C-Max	None	None	None
Act Effct Green (s)	85.0	85.0	140.0	75.8	28.0	14.5	14.5
Actuated g/C Ratio	0.61	0.61	1.00	0.54	0.20	0.10	0.10
v/c Ratio	0.35	0.61	0.56	0.78	1.22	0.88	1.09
Control Delay	17.9	18.6	1.4	14.4	153.1	101.6	114.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.9	18.6	1.4	14.4	153.1	101.6	114.5
LOS	B	B	A	B	F	F	F
Approach Delay		11.8		14.4	153.1		
Approach LOS		B		B	F		

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

Offset: 124 (89%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.22

Intersection Signal Delay: 41.8

Intersection LOS: D

Intersection Capacity Utilization 77.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 12: I-140 Ramps/Mabry Hood Road & Kingston Pike





**CDM
Smith**

