



APPENDIX

Appendix A: Framework Document

Appendix B: AM and PM TMCs and Tube Counts

Appendix C: Travel Time & Queues

Appendix D: AM Existing Conditions Calibration Results

Appendix E: PM Existing Conditions Calibration Results

Appendix F: Crash Data

Appendix G: Crash Maps

Appendix H: Transit Data

Appendix I: Signal Timing Existing Conditions

Appendix J: PLTS Rating

Appendix K: Signal Timing 2026 No-Build Conditions

Appendix L: Signal Timing 2036 No-Build Conditions

Appendix M: VISSIM Results for 2026 & 2036 No-Build Conditions

Appendix N: TDM Growth Rate Calculations No-Build and Build Conditions

Appendix O: Synchro Screening Results (2036 Build Alternative 1)

Appendix P: Synchro Screening Results (2036 Build Alternative 1A)

Appendix Q: Synchro Screening Results (2036 Build Alternative 2)

Appendix R: Synchro Screening Results (2036 Build Alternative 3)

Appendix S: Signal Justification Report (SJR)

Appendix T: Signal Timing 2026 Build Alternative 1

Appendix U: Signal Timing 2026 Build Alternative 3A

Appendix V: Signal Timing 2026 Build Alternative 3C

Appendix W: Signal Timing 2036 Build Alternative 1

Appendix X: Signal Timing 2036 Build Alternative 3A

Appendix Y: Signal Timing 2036 Build Alternative 3C

Appendix Z: VISSIM Results for 2026 & 2036 Build Conditions Alternatives 1,3A,3C



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix A: Framework Document

Duke Street and West Taylor Run Parkway Intersection Traffic Analysis

Framework Document

April 7, 2022 (Revised May 4, 2022)

Prepared for:

The City of Alexandria



Prepared by:





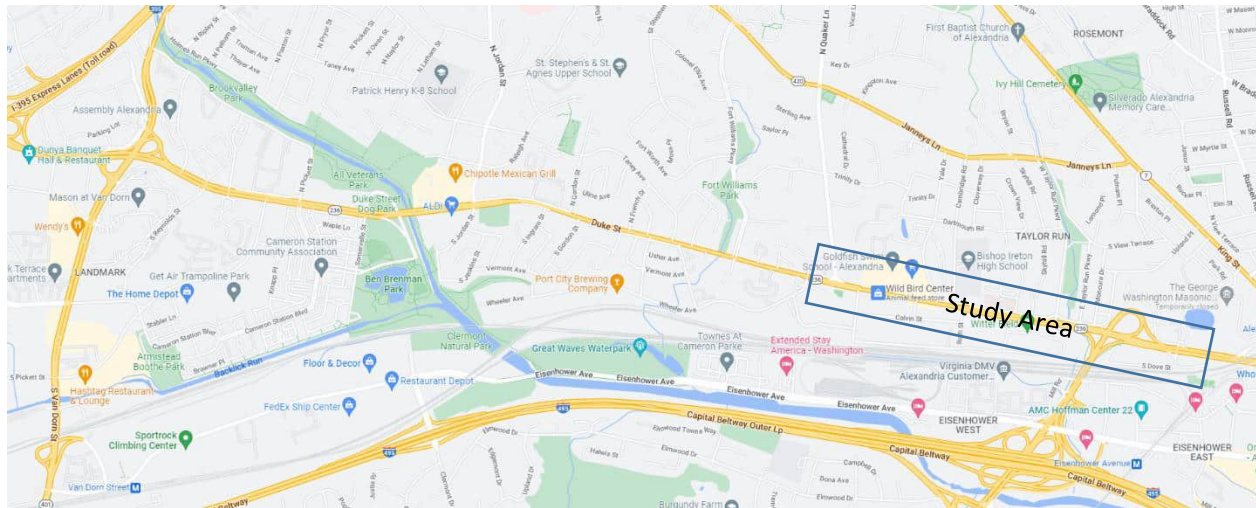
Table of Contents

1. Project Description and Location	1
2. Stakeholder Roles	2
3. Study Area	3
4. Data Collection	3
5. Operational Analysis	5
5.1. Analysis Years and Periods	5
5.2. Tool Selection	6
5.3. Calibration Assumptions and Targets	7
5.4. Left-turn Phasing and Signal Warrant Analyses	8
5.5. Measures of Effectiveness	8
6. Alternatives	8
7. Traffic Forecasting	9
8. Safety Analysis	9
9. Planned Deliverables	10

1. Project Description and Location

Virginia State Route 236 (Duke Street), which traverses City of Alexandria (the City), is a critical roadway corridor for Northern Virginia. Many of the City's major arterials that provide access points to I-395 and I-495 are routinely congested during peak hours. Congestion worsens with the occurrence of incidents on I-395 or I-495 when many commuters cut through City streets. During the PM peak period, queues on the rightmost eastbound lane at the intersection of Duke Street and West Taylor Run Parkway spill over into upstream intersections, and on many occasions onto North Quaker Lane. Such traffic loads encourage cut-through traffic in neighborhood streets, resulting in heavy backups on southbound West Taylor Run Parkway. Multiple north-south streets (e.g., Fort Williams Parkway, North Quaker Lane, West Taylor Run Parkway) are used as routes for cut-through traffic, which all converge at the Duke Street and West Taylor Run Parkway intersection and eastbound Duke Street on-ramp to Telegraph Road. The surrounding area is shown in **Figure 1**.

Figure 1: Surrounding Area Map



In June 2016, City Council directed staff to conduct a comprehensive traffic study that examined traffic volumes, speeds, and traffic origins and destinations as a response to residents' concerns about increased traffic and traffic diversion to neighborhoods in central Alexandria. Final recommendations from the Central Alexandria Traffic Study were shared with City Council members outlining the short- and long-term recommendations of study. Long-term recommendations included:

1. Initiate a Complete Street redesign of the intersection at Duke Street and West Taylor Run Parkway, with the primary goal of reducing cut-through traffic, improving safety, and providing more efficient mobility.
2. Accelerate Duke Street corridor (**Corridor B**) design with the goal of reducing cut-through traffic in Central Alexandria neighborhoods.
3. Prioritize Duke Street for Traffic Adaptive Signal Control implementation.
4. Promote and encourage greater use of transportation alternatives in Alexandria and in neighboring jurisdictions.

The project involves two parts: 1) conducting traffic analysis of the study network and 2) developing design plans for the preferred option. The traffic analysis approach and assumptions outlined in this Framework Document will support the final design of the Duke Street and West Taylor Run Parkway intersection, and the impact on surrounding neighborhoods. Project will develop mitigation measures using existing traffic data to discourage cut-through traffic, and to protect the neighborhoods. Reconfiguring the intersection of Duke Street and West Taylor Run Parkway/Telegraph Road on-ramp, will improve safety and operations, especially for pedestrians and bicyclists and will relieve the congestion. Additional access on Duke Street eastbound near Telegraph Road on-ramp will relieve the congestion at Duke Street and West Taylor Run Parkway.

Project does not involve analysis of the traffic operations resulting from the sequence of construction for the geometric improvements at of Duke Street and W. Taylor Run Parkway, and new intersection construction at Duke Street eastbound and Telegraph Rd on-ramp. The exact sequence, schedule and closure time periods have not yet been determined; however, construction is expected to last for approximately 12-18 months. Project is expected to improve the commute once construction is completed.

Recently completed or ongoing studies or projects in the vicinity of the study area will be referenced as needed during this project including:

1. Central Alexandria Transportation Study (2018)
2. Eisenhower East Small Area Plan (EESAP) 2019 Update
3. Traffic impact studies, and adjacent projects
4. Duke Street BRT Planning/Preliminary Design/Survey (started in April 2022)

Assumptions on background projects that will be incorporated into future conditions analyses are discussed further in the following Sections.

The purpose of this Framework Document is to set forth clarifications and processes to be followed for the traffic analysis and traffic forecasting for the project. It contains assumptions for modeling including inputs, growth rates, measures of effectiveness (MOEs), and Vissim calibration targets and thresholds. All the clarifications for modeling documented in the Framework Document will be reviewed and approved by the City, and the Virginia Department of Transportation (VDOT) prior to initiating the operational analyses.

2. Stakeholder Roles

Stakeholder roles are generally detailed below. It is assumed that each organization will designate one point of contact for all coordination and participation in Study Work Group (SWG) meetings. Other individuals may be involved as necessary.

- *City of Alexandria*
 - Lead agency
 - Review and approve project documents
 - Attend SWG meetings
 - Provide Vissim and project related files from previous studies
 - Provide travel demand model and related files from the Duke Street BRT project
 - Provide historical traffic data
 - Provide existing signal timings and Synchro files
 - Provide surveys of the existing intersections and base GIS maps
 - Provide the most up-to-date approved major developments, development/redevelopment plans, and funded roadway improvements within the study area
 - Review traffic forecasting, traffic operations methodology, traffic analysis models, and operations analysis results
- *VDOT*
 - Provide historical traffic data
 - Review and approve project documents
 - Attend SWG meetings
 - Review traffic forecasting, traffic operations methodology, traffic analysis models, and operations analysis results
- *Consultant Team*
 - Coordinate with the SWG
 - Compile and process data received and conduct traffic analysis tasks outlined in the scope of work

- Prepare project documents including reports, memorandums, analyses
- Facilitate project meetings

3. Study Area

The study area is focused on the intersection of Duke Street and W. Taylor Run Parkway, and multiple intersections adjacent to it, and the intermediate ramp connections. It includes following nine (9) key intersections:

1. Duke Street and N. Quaker Lane (existing)
2. Duke Street and Cambridge Road (existing)
3. Duke Street and Witter Drive (existing)
4. Duke Street and West Taylor Run Pkwy (existing)*
5. Duke Street eastbound and Telegraph Rd on-ramp (existing)*
6. Duke Street westbound and Telegraph Rd off-ramp (existing) **
7. Duke Street westbound and Telegraph Rd on-ramp(existing)
8. Duke Street and Dove Street (existing)
9. Duke Street eastbound and Telegraph Rd on-ramp (proposed)**

* - Intersections #4 and #5 is one intersection. They are shown two intersections to match the intersections in the Request for Qualifications (RFQU) and emphasize the back-ups on Telegraph Road ramp onto eastbound Duke Street.

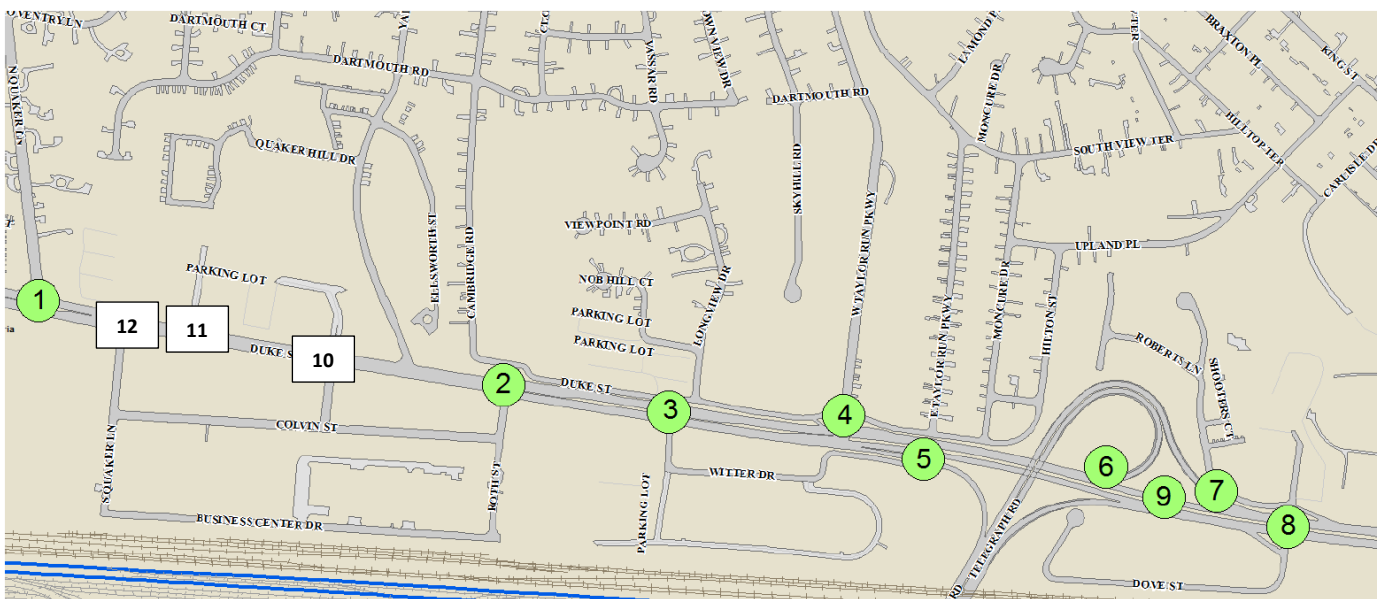
** - Intersections #6 and #9 are two different intersections. Depending on the alternative analysis results, these two intersections can be combined into a single intersection.

Figure 2 shows the study area from the RFQU. Three (3) other intersections will be included to the network. These intersections include the following:

10. Duke Street and Sweeley Street (existing)
11. Duke Street and Alexandria Commons (existing)
12. Duke Street and South Quaker Lane (existing)

Additional details on analysis tool selection for each intersection is discussed in **Section 5 Tool Selection**.

Figure 2: Study Area Map



4. Data Collection

Background Data

The City will also provide the traffic counts, queue and travel time data at the existing intersections, and calibrated Vissim models of the study network from the Eisenhower East Small Area Plan 2019 Multimodal Transportation Study (EESAP)¹, and traffic data from Central Alexandria Transportation Study (2018). Per VDOT's current traffic forecasting memorandum (IIM-TMPD – 7.0)², WSP will utilize the previously-calibrated models to develop the pre-pandemic existing conditions that aligns with the traffic data collected and synthesized. WSP will work with the City to obtain available data and information related to this corridor needed to support technical operational analysis activities, including:

- Historical traffic count data
- Current Synchro files and signal timing at all study area intersections
- Calibrated Vissim model files (AM and PM Peak periods) from EESAP
- Crash data (latest 3-year, pre-pandemic period)
- Previous traffic studies
- Planned or programmed roadway network improvements
- Land use plans
- Approved and planned development plans within the project area
- Pedestrian and bicycle counts
- Blue tooth data and Streetlight data
- Transit ridership/boarding/alighting information

The City will obtain and forward the above data, traffic studies, planned programmed roadway improvements, development/re-development plans, developer-funded projects, and supporting data and/or traffic analysis models. Once the applicable studies have been received from the City, WSP will review the information and extract the appropriate data that is pertinent to the corridor analysis.

Traffic Counts

The atypical traffic conditions resulting from the pandemic require that a pre-pandemic condition for both AM and PM peaks be established as the “existing conditions” upon which the Vissim model will be calibrated. WSP will rely on the counts completed for previous studies such as EESAP and Central Alexandria Study. Since these counts were completed before the pandemic, and were collected in 2018 while schools were in session, no additional counts or data collection along the network are included in this project. However, WSP will review traffic count data to be collected in May 2022, under the Duke Street BRT project, and verify traffic patterns and complete any gaps in the available traffic data.

Queue Lengths

Queue length data was collected while school was in session as part of the EESAP during AM and PM peak periods, which will be utilized for this study. No additional data collection will be performed. Local knowledge of the maximum queue impact will be documented and used for verifying Vissim model queuing impact as part of the calibration process. Queue data is available from EESAP for the intersections of Duke Street at Dove Street, and Duke Street at W. Taylor Run Parkway. Local knowledge of queuing impact to adjacent intersections west of the West Taylor Run Parkway intersection will be documented and used to support the visual confirmation of queuing impact observed in the model. Field observations will be made for Duke Street BRT project in May 2022, and collected data will be used to assist the calibration effort.

Travel Times

¹ Eisenhower East SAP 2019 Multimodal Transportation Study (October 2019): <https://media.alexandriava.gov/docs-archives/planning/info/eisenhowereast-carlyle/eisenhower-eastsapupdatetrafficstudyfinalreport103119.pdf>. (Accessed on 4/4/2022)

² VDOT Traffic forecast Memorandum (Effective date: 1/22/2021): https://www.virginia.gov/business/resources/IIM/TMPD-7.0_Traffic_Forecasting.pdf. (Accessed on 4/4/2022)

Travel time data was collected while school was in session as part of the EESAP during AM and PM peak periods, which will be utilized for this study. No additional data collection will be performed.

Find Data Gaps and Collect Additional Data:

Based on the existing data and information gathered, WSP will notify the City of any additional data that will provide a complete picture of multimodal transportation and infrastructure in the study area, and to develop Vissim models for the existing and future scenarios. If needed, WSP will utilize the AM and PM peak period data collected for the Duke Street BRT project.

Origin-destination data

The City will provide WSP with Origin-Destination data collected and processed in the Central Alexandria Transportation Study. WSP will compare this data with the most recently available StreetLight O-D data to verify any change in traffic patterns that may warrant consideration in traffic analysis and modeling process. Relay routing, with the combined routes option activated, will be developed for the Vissim models using balanced traffic volumes and StreetLight origin-destination data. O/D data from StreetLight Data will be used to understand traffic routings within the study area and adjacent roadways if counts are not available.

Crash Data

Coordination will occur with the City staff to obtain a minimum of three (3) years of historical crash data; however, preferably the five (5) most recent years of crash data will be obtained, if available. The crash data will be reviewed for location, identification of crash patterns, severity of crashes, and likely causes of crashes. If necessary, FR300-P Reports (i.e. police crash reports) will be requested at specific locations to determine a stronger understanding of specific critical crash locations.

Field Review

WSP will conduct a field review of the study area to observe peak period traffic operations, inventory access points, driveways and spacing, identify and locate turn/auxiliary lanes, inventory inter-parcel connections, lane configuration, lane widths, storage lengths, medians and connection spacing, signs, pavement markings, highway lighting, and access driveways.

WSP will perform field investigations of pedestrian and bicycle features such as existing sidewalks, missing sidewalks, crosswalks, countdown signals, curb ramps that do not meet ADA standards, on-street and off-street bicycle facilities, schools, median refuge spaces, pedestrian signals and/or flashing beacon locations, sidewalks and trails.

Transit Data

WSP will review existing transit service type, routes, destinations, location of stops, frequency during peak and non-peak hours, condition of bus shelters, access to transit stops, etc. The City will provide existing ridership data for both DASH and Metrobus services through the study intersections. The projected ridership for the future years for the transit service in the study area is not part of this scope of work, and will be obtained in coordination with the Duke Street BRT project.

5. Operational Analysis

5.1. Analysis Years and Periods

The time periods to be analyzed are the typical weekday AM and PM peak periods determined from traffic counts collected in 2018. The assumed opening year and design year are 2026 and 2036, respectively.

Operational analyses will be conducted for the twelve (12) study area intersections for weekday AM peak, and weekday PM peak for the following scenarios:

- 2018 Baseline Existing Conditions (Vissim calibration only) - Eight (8) intersections and additional three (3) intersections

- 2026 No-Build – Eleven (11) intersections
- 2036 No-Build – Eleven (11) intersections
- 2036 Build Alternatives (up to two) – Twelve (12) intersections
- 2036 Preferred Alternative – Twelve (12) intersections

WSP will utilize the EESAP AM and PM peak period data (standard five hours for AM and PM data, typically 7 AM to 9 AM and 4:30 PM to 7:30 PM) for all modes at intersections within the study area. It is anticipated that a two-hour Vissim simulation period (one seeding hour, one peak hour for reporting) will be used for weekday AM peak and PM peak period analyses. The weekday PM shoulder hours will not be reported but may be used to assist with design decisions if peak hour analyses do not have clear differences in operations between alternatives due to congestion. Analysis periods will be verified and finalized using traffic count and travel time data.

5.2. Tool Selection

Inputs and analysis methodologies will be consistent with VDOT's Traffic Operation and Safety Analysis Manual (TOSAM), Version 2.0³. The following analysis tools were selected and will be used for various elements of the analysis. Calibration parameters for Vissim are provided in Section 5.3 and measures of effectiveness are detailed in Section 5.5 of this document.

5.2.1. VISSIM

Calibrated Vissim models from EESAP 2019 Multimodal Transportation Study network will be used for preparing 2018 existing conditions Vissim files for this project. Vissim 11 will be used to evaluate the core study area. Since existing conditions Vissim files for EESAP were prepared using older Vissim version, files will be converted to Vissim 11 version. Traffic data collected in May 2022 will be utilized for validating and to fill the gaps in the traffic volumes data used for the EESAP model. City will provide the calibrated Vissim files for both peak periods. The intersections identified for Vissim analyses are listed in **Section 3.0** and shown on **Figure 2**. Vissim analyses at these intersections are critical to determine the project design elements (intersection configurations, control type, turn lane lengths, etc.) based on the calibrated model operations.

The following approach and assumptions will be used to analyze traffic operations using Vissim.

- The VDOT Sample Size Determination Tool will be used to determine the appropriate number of microsimulation runs for each analysis period.
- Traffic volume inputs will be developed in 15-minute intervals in conjunction with the balanced traffic counts along the corridor. Traffic volume count data will be balanced in 60-minute intervals of the weekday AM peak, and weekday PM peak hours.
- Vehicle routes will be consistent through the entire simulation period and will be based on the summed and balanced peak hour traffic volumes.
- Vehicle compositions (percent cars and heavy vehicles) will be consistent through the entire simulation period and unique for each entry link into the Vissim network. These compositions will be developed based on calculated truck percentages from the collected traffic counts.
- DASH and WMATA bus routes and stop dwelling will be modeled within the Vissim network.
- Pedestrians will be modeled at existing signalized crosswalks based on existing count data, as well as crosswalks that may be included at the new or modified intersection.
- Additional assumptions listed below:
 - Car following model - Arterial – Wiedemann 74 car following model or adjust for calibration
 - Vehicle parameters – VDOT TOSAM
 - Vehicle Fleet -The North American vehicle fleet
 - Performance measure intervals – Report in one hour interval
 - Simulation resolution – 10 time steps/second

³ VDOT Traffic Operations and Safety Analysis Manual (TOSAM) – Version 2.0:
<https://www.virginia.gov/business/resources/TOSAM.pdf>. (Accessed on 4/4/2022)

- Random seeds – Starting seed #100, seed increment of 10

5.2.2. SYNCHRO

Synchro 10 will be used to optimize signal timings at study area intersections for future analysis. The City of Alexandria will provide existing signal timing and Synchro files. Synchro will also be used to analyze intersection configurations during screening of alternatives analysis prior to selecting alternatives for Vissim analysis.

5.2.3. VJUST

The VDOT Junction Screening Tool (VJuST) will be used to evaluate the performance of alternate intersection configurations at the proposed intersection of Duke Street eastbound and Telegraph Rd on-ramp for the design year. The VJuST results will be used as part of necessary Signal Warrant Analysis and Signal Justification Reports (SJRs) for the project. Sidra will be used if a roundabout is identified as a potential alternate intersection configuration.

5.3. Calibration Assumptions and Targets

The weekday AM, and weekday PM Vissim models will be calibrated using guidance and direction provided in the TOSAM 2.0. Vissim calibration assumptions and targets are presented in **Table 1**.

Table 1: Vissim Calibration Assumptions and Targets

Simulated Measure	Calibration Threshold
Simulated Traffic Volume (vehicles per hour) At intersections, difference targets must be met for a minimum of 85% turning movements.	Within ± 20% for <100 vph Within ± 15% for ≥100 vph to <1,000 vph Within ± 10% for ≥1,000 vph to <5,000 vph Within ± 500 vph for ≥5,000 vph
Simulated Travel Time (seconds) 85% of travel time routes and segments must be met	Within ± 30% for average observed travel times on arterials
Simulated Queue Length (feet) Calibration threshold must be met at the critical locations consisting of all approaches of Duke Street at W. Taylor Run Parkway and ramps to/from Telegraph Road	Visually acceptable maximum queue lengths are represented at critical locations

Traffic volumes, travel times, and queue lengths will be used as calibration measures. Specific requirements of the Vissim model consist of the following:

Calibration:

- Model traffic volume calibration will focus intersections identified in **Section 3.0** that may be mostly impacted by the proposed project.
- Simulated Traffic Volumes: will be calibrated based on the VDOT TOSAM.
- Simulated Travel Times: Model travel times for Duke Street corridor route between N Quaker Lane (intersection #8) and Dove Street (intersection #1) will be calibrated based on the VDOT TOSAM.
- Queuing Impact: Modeled and observed queues will be compared qualitatively at all approaches of the West Taylor Run Parkway / Duke Street intersection and associated ramps to/from Telegraph Road, which is the critical (approaches) locations.
- WSP will provide operational Measures of Effectiveness (MOEs) for study intersections and ramps as indicated in the study area map (**Figure 1**).
- The Vissim model calibration procedures and results will be summarized in a technical memorandum. This technical memorandum will document modifications that were made to the Vissim models to meet

the calibration targets. If any target is not satisfied, the Vissim models can still be considered reasonably calibrated for the purposes of the project. WSP will submit written justification and provide a resolution agreeable to project stakeholders.

5.4. Left-turn Phasing and Signal Warrant Analyses

The left-turn phase analysis will be conducted at Duke Street eastbound and Telegraph Rd on-ramp (proposed) in accordance with VDOT's Guidance for Determination and Documentation of Left-Turn Phasing Mode, Version 1.0 (February 2015) for the design year. The results of the left-turn analysis will be summarized within VDOT's Left-Turn Phase Selection Engineering Assessment Workbook. The traffic signal warrant analysis will be conducted at the same intersection for the opening and design years. If the left-turn phasing is changed at Duke Street and W. Taylor Run Parkway, it will be documented in the study.

5.5. Measures of Effectiveness

Output data will include tabulated intersection and approach delays, maximum queues, model vs. field traffic volumes, and ramp link average speeds as well as corridor route travel times. For non-motorized traffic, MOEs will be reported qualitatively (not using Vissim) based on time to cross the intersection of Duke Street and West Taylor Run Parkway. Selected MOEs vary depending on the analysis tool:

- Vissim MOEs
 - Throughput (vph) at intersections by movement
 - Microsimulation delay (sec/veh) at intersections by movement
 - Maximum queue length (feet) at intersections by movement
 - Travel time (sec) along calibrated travel time routes
- Synchro MOEs*
 - Control delay (sec/veh) at intersections by movement
 - Level of service (LOS) at intersections by movement
 - 95th percentile queue length (feet) at intersections by movement

** Synchro will also be used to analyze intersection configurations during screening of alternatives analysis prior to selecting alternatives for Vissim analysis. HCM 6th Edition methodology will be used for reporting Synchro analysis unless the analysis includes intersections within NEMA phasing or clustered intersections. HCM 2000 methodology will be used for reporting all Synchro analyses that fall under these limitations.*

6. Alternatives

The purpose of the alternative analysis is to determine the optimal configuration of Duke Street and W. Taylor Run Parkway (existing), and Duke Street eastbound and Telegraph Rd on-ramp (proposed). All analysis scenarios will be evaluated during the weekday AM peak period, and PM peak period. No-Build and Preferred Alternative scenarios will be evaluated for opening and design years. Alternative analysis will be evaluated only for the design year. The following is a summary of the alternative analysis scenarios:

- 2036 Build Alternatives (up to two) – Twelve (12) intersections. A total of four (4) Vissim models (2 alternatives, AM and PM peak hours) will be developed:
 - Alternative 1 at Duke Street & West Taylor Run Pkwy and Alternative 1 at Duke Street eastbound and Telegraph Rd on-ramp (AM and PM)
 - Alternative 2 at Duke Street & West Taylor Run Pkwy and Alternative 2 at Duke Street eastbound and Telegraph Rd on-ramp (AM and PM)

- 2036 Preferred Alternative – Twelve (12) intersections. A total of two (2) Vissim models (1 preferred alternative, AM and PM peak hours) will be developed.

The scope does not include 3D modeling or video generation.

7. Traffic Forecasting

Using the growth rate developed for EESAP, WSP will conduct an analysis of the future No-Build, (Opening Year and Design Year) traffic operations using the approved traffic forecasts insert into the calibrated Vissim model from Existing conditions, as well as develop the No-Build Synchro model. WSP will not develop Future-year traffic forecasts using the latest Metropolitan Washington Council of Governments (MWCOC) travel demand forecasting model but rather rely on traffic forecast developed for Duke Street BRT project for the design year. Forecast will be used for developing No-Build conditions for Design Year.

City staff will provide the most up-to-date approved major developments and funded roadway improvements within the study area. Trip generation will exclude the BRAC-133 facility, since traffic generated by Mark Center is included in the traffic data. Trip generation, distribution and assignment for major approved developments will utilize information included in the development's Traffic Impact Analysis, to be provided by the City. No new trip generation, distribution, or assignment will be developed.

WSP will develop opening year (2026) and design year (2036) forecast traffic volumes. Traffic volume line diagrams depicting study network No-Build and Build forecasts will be provided, illustrating ADTs, AM, and PM peak hour volumes, and heavy vehicle percentages. The forecasted volumes will be submitted to the SWG for review prior to any analysis being performed. WSP will meet with the City (if needed) to discuss the findings. After approval, WSP will proceed with the Future Conditions No-build and Build operational analysis.

8. Safety Analysis

The Safety Analysis will be conducted using industry-accepted safety analysis methodologies to summarize crash patterns in the corridor from Duke Street at W. Taylor Run Parkway to Duke Street eastbound at Telegraph Rd on-ramp (proposed), determine the likely factors contributing to crashes, and propose mitigation measures. It is noted that the scope does not include future conditions safety analysis. WSP will:

- Review and analyze crash data from the VDOT online Crash Tool (<https://app.powerbigov.us/view?r=eyJrIjoiaWJhZjFhZDAtNTljMC00MDA1LWEyOTMtYWYwM2NiMmRiMmRkIiwidCI6IjYyMGFlNWE5LTRlYzEtNGZhMC04NjQxLTVkOWYzODZjNzMwOSJ9>) from 2017 to 2019. Crash data will be summarized by year, severity, type, time of day, roadway surface conditions, location, identification of crash patterns, and likely causes for crashes.
- Calculate the overall crash rate, as well as fatality, injury and property damage only (PDO) crash rates and compare to the latest available statewide average crash rates for similar corridors.
- Develop crash histograms and crash heat map graphics on aerials to provide a visualization of the concentrated areas based on the types of collisions, which will be utilized to determine high crash locations and tendencies, and will be utilized to determine critical focus areas during the field reviews. Conduct field reviews at the site to review traffic conditions, driver behavior, geometric layouts, and the presence and condition of signing, pavement markings, and delineation. Field reviews will be conducted during the peak periods when the highest number of crashes occur and during AM and PM peak periods. The analysis will include conflict analysis to investigate areas where conflicts tend to occur, both as crashes, but also as near-misses or situations where erratic maneuvers are observed.

- Provide an evaluation and recommendations for mitigation once the field reviews are completed. Short term maintenance type recommendations will be provided based on the field review. Typical recommendations may include signing/pavement marking improvements, sight distance improvements, improvements to traffic and pedestrian signals, and bike, pedestrian and transit facilities. These recommendations will be based on historical crash data, field reviews conducted, and the review of compliance with the Manual on Uniform Traffic Control Devices (MUTCD) and VDOT/City standards and policies. The review/analysis of the site will examine the geometric design, pedestrian/bicycle activity, the visibility of traffic control devices, and potential impacts of environmental factors. Recommendations will also include “maintenance-type” safety improvements which are expected to be low-cost and short-term measures.

9. Planned Deliverables

Below are the anticipated deliverables:

- Existing 2018 Baseline Conditions Technical Memo
- Existing 2018 Baseline Conditions Vissim Model
- Forecasted Technical Memo (2026 and 2036 No-Build Conditions)
- Analysis of Build Alternative including:
 - 2036 Build conditions alternatives analysis (2 alternatives, AM and PM peaks)
 - 2036 Build conditions preferred alternative analysis (AM and PM peaks)
- Draft and Final Traffic Analysis Report including:
 - Chapters from previous deliverables
 - Applicable left-turn phase analysis
 - Applicable Signal Warrant Analysis and Signal Justification Reports
 - Vissim and Synchro analysis files



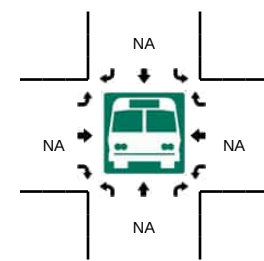
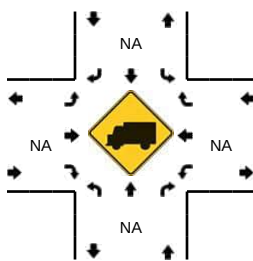
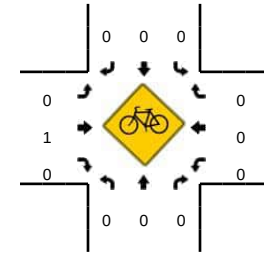
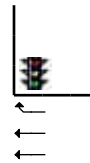
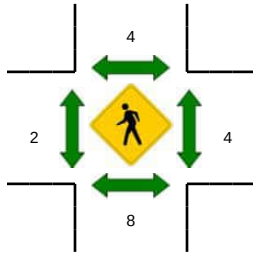
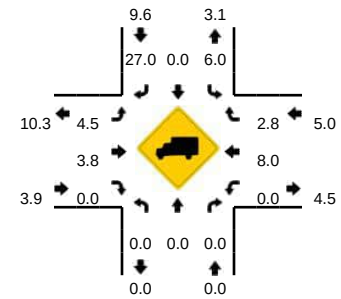
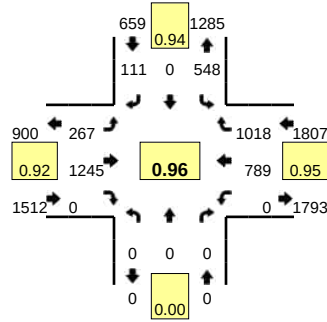
Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix B: AM and PM TMCs and Tube Counts

LOCATION: N Quaker Ln -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707701
DATE: Wed, Jun 06 2018

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



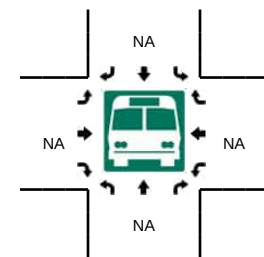
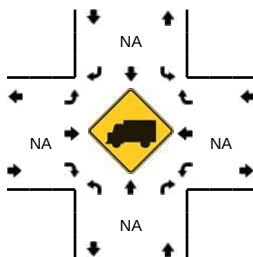
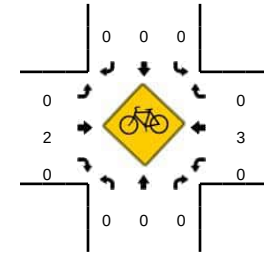
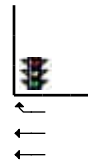
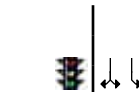
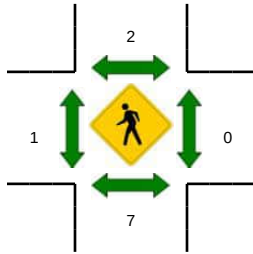
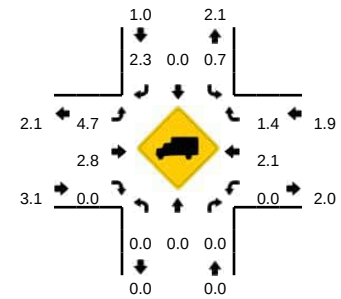
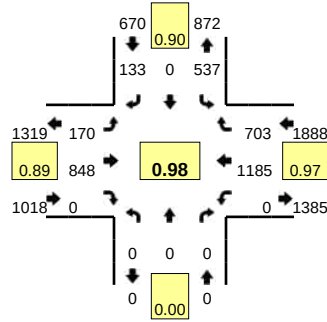
15-Min Count Period Beginning At	N Quaker Ln (Northbound)				N Quaker Ln (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	0	0	74	0	10	0	34	174	0	0	0	106	266	0	664	
6:45 AM	0	0	0	0	111	0	15	0	59	226	0	0	0	156	315	0	882	
7:00 AM	0	0	0	0	118	0	16	0	52	218	0	0	0	164	297	0	865	
7:15 AM	0	0	0	0	128	0	22	0	44	269	0	0	0	168	296	0	927	3338
7:30 AM	0	0	0	0	140	0	23	0	68	295	0	0	0	201	277	0	1004	3678
7:45 AM	0	0	0	0	145	0	24	0	85	328	0	0	0	189	267	0	1038	3834
8:00 AM	0	0	0	0	141	0	34	0	69	304	0	0	0	191	242	0	981	3950
8:15 AM	0	0	0	0	122	0	30	0	45	318	0	0	0	208	232	0	955	3978
8:30 AM	0	0	0	0	171	0	38	0	45	331	0	0	0	140	237	0	962	3936
8:45 AM	0	0	0	0	168	0	22	0	44	342	0	0	0	173	273	0	1022	3920
9:00 AM	0	0	0	0	132	0	22	0	40	276	0	1	0	167	241	0	879	3818
9:15 AM	0	0	0	0	151	0	23	0	30	279	0	1	0	160	232	0	876	3739
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	580	0	96	0	340	1312	0	0	0	756	1068	0	4152	
Heavy Trucks	0	0	0	0	40	0	12	0	24	52	0	0	0	36	16	0	180	
Pedestrians	4				8				0				0	8			20	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: N Quaker Ln -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707702
DATE: Wed, Jun 06 2018

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:00 PM -- 5:15 PM



15-Min Count Period Beginning At	N Quaker Ln (Northbound)				N Quaker Ln (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	111	0	17	0	37	222	0	1	0	225	153	0	766	
4:15 PM	0	0	0	0	123	0	30	0	41	229	0	0	0	214	176	0	813	
4:30 PM	0	0	0	0	99	0	16	0	40	192	0	0	0	244	168	0	759	
4:45 PM	0	0	0	0	154	0	44	0	32	267	0	1	0	240	177	0	915	3253
5:00 PM	0	0	0	0	140	0	33	0	47	239	0	0	0	288	168	0	915	3402
5:15 PM	0	0	0	0	125	0	16	0	45	211	0	1	0	307	178	0	883	3472
5:30 PM	0	0	0	0	142	0	45	0	40	187	0	0	0	286	172	0	872	3585
5:45 PM	0	0	0	0	130	0	39	0	37	211	0	0	0	304	185	0	906	3576
6:00 PM	0	0	0	0	139	0	55	0	30	214	0	1	0	244	168	1	852	3513
6:15 PM	0	0	0	0	144	0	29	0	18	210	0	1	0	273	174	0	849	3479
6:30 PM	0	0	0	0	167	0	37	0	27	200	0	0	0	223	173	0	827	3434
6:45 PM	0	0	0	0	122	0	37	0	29	188	0	1	0	230	177	0	784	3312
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	560	0	132	0	188	956	0	0	0	1152	672	0	3660	
Heavy Trucks	0	0	0	0	0	0	8	0	12	28	0	0	0	32	16	0	96	
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Stopped Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Comments:



Location: S Quaker Ln/Fire Station Dwy/Parking Lot Dwy & Duke St
Date: 6/6/2018
Site Code: 14707703

	Fire Station Dwy Southbound					Duke St Westbound					S Quaker Ln Northbound					Duke St Eastbound					Parking Lot Dwy Southeastbound				
Start Time	Right to Parking Lot	Right	Thru	Left	U-Turn	Right	Right to Parking Lot	Thru	Left	U-Turn	Right	Thru	Thru to Parking Lot	Left	U-Turn	Right	Thru	Left	Left to Parking Lot	U-Turn	Right to Duke St	Thru to S Quaker Ln	Left to Duke St	Left to Fire Station	U-Turn
06:30 AM	0	0	0	0	0	0	1	373	4	0	3	0	0	16	0	13	246	0	1	0	0	0	0	0	0
06:45 AM	0	0	0	0	0	0	1	471	3	0	6	0	0	17	0	23	321	0	1	0	0	0	0	0	0
07:00 AM	0	0	0	0	0	0	0	431	6	0	5	0	0	12	0	13	326	1	0	0	1	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	476	2	0	3	0	0	18	0	20	369	1	0	0	0	0	1	0	0
07:30 AM	0	0	0	0	0	0	0	448	7	0	4	0	0	16	0	24	404	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	460	7	0	2	0	0	11	0	28	466	0	0	0	0	0	1	0	0
08:00 AM	0	0	0	0	0	0	0	418	6	0	6	0	0	9	0	34	400	0	0	0	0	0	1	0	0
08:15 AM	0	0	0	0	0	0	0	409	4	0	2	0	0	17	0	32	421	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	1	0	0	0	405	6	1	4	0	0	11	0	32	454	0	0	1	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	428	6	0	5	0	0	16	0	32	466	0	0	0	0	0	0	0	0
09:00 AM	0	1	0	0	0	0	0	385	11	0	4	0	0	13	0	29	374	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	393	4	0	7	0	0	8	0	25	408	0	0	1	0	0	0	0	0
Total	0	1	0	1	0	0	2	5097	66	1	51	0	0	164	0	305	4655	2	2	2	1	0	3	0	0
Peak Hour Volumes	0	0	0	0	0	0	0	1735	24	0	14	0	0	53	0	118	1691	0	0	0	0	0	2	0	0

Peak Hour: 7:30 AM - 8:30 AM
Peak 15: 7:45 AM - 8:00 AM

Start Time	Fire Station Dwy					Duke St				S Quaker Ln					Duke St					Parking Lot Dwy				
	Right to Parking Lot	Right	Thru	Left		Right	Right to Parking Lot	Thru	Left		Right	Thru	Thru to Parking Lot	Left		Right	Thru	Left	Left to Parking Lot		Right to Duke St	Thru to S Quaker Ln	Left to Duke St	Left to Fire Station
06:30 AM	0	0	0	0		0	0	6	0		3	0	0	9		0	9	0	0		0	0	0	0
06:45 AM	0	0	0	0		0	0	12	0		4	0	0	6		1	25	0	0		0	0	0	0
07:00 AM	0	0	0	0		0	0	10	1		2	0	0	5		0	12	0	0		0	0	0	0
07:15 AM	0	0	0	0		0	0	9	0		2	0	0	3		1	12	0	0		0	0	0	0
07:30 AM	0	0	0	0		0	0	17	1		1	0	0	5		0	20	0	0		0	0	0	0
07:45 AM	0	0	0	0		0	0	16	0		0	0	0	0		4	19	0	0		0	0	0	0
08:00 AM	0	0	0	0		0	0	29	0		2	0	0	0		4	14	0	0		0	0	0	0
08:15 AM	0	0	0	0		0	0	31	0		0	0	0	1		1	14	0	0		0	0	0	0
08:30 AM	0	0	0	1		0	0	12	1		0	0	0	0		2	10	0	0		0	0	0	0
08:45 AM	0	0	0	0		0	0	14	2		1	0	0	1		0	18	0	0		0	0	0	0
09:00 AM	0	1	0	0		0	0	13	3		0	0	0	0		1	10	0	0		0	0	0	0
09:15 AM	0	0	0	0		0	0	21	1		0	0	0	1		3	16	0	0		0	0	0	0
Total	0	1	0	1		0	0	190	9		15	0	0	31		17	179	0	0		0	0	0	0
Peak Hour Heavy Vehicle Percentages	0%	0%	0%	0%		0%	0%	5%	4%		21%	0%	0%	11%		8%	4%	0%	0%		0%	0%	0%	0%

Start Time	Fire Station Dwy					Duke St				S Quaker Ln					Duke St					Parking Lot Dwy				
	Right to Parking Lot	Right	Thru	Left	Peds	Right	Right to Parking Lot	Thru	Left	Peds	Right	Thru	Thru to Parking Lot	Left	Peds	Right	Thru	Left	Left to Parking Lot	Peds	Right to Duke St	Thru to S Quaker Ln	Left to Duke St	Left to Fire Station
06:30 AM	0	0	0	0	3	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	3	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
07:00 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
08:00 AM	0	0	0	0	3	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0
08:15 AM	0	0	0	0	3	0	0	0	0	1	0	0	0	0	2	0	1	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	5	0	0	0	0	3	0	0	0	0	2	0	0	0	0	0	0	0	0	0
09:00 AM	0	0	0	0	2	0	0	0	0	2	0	0	0	0	3	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	26	0	0	0	0	12	0	0	0	0	13	0	4	0	0	0	0	0	0	0
Peak Hour Peds:	0	0	0	0	9	0	0	0	0	5	0	0	0	0	4	0	1	0	0	0	0	0	0	0



Location: S Quaker Ln/Fire Station Dwy/Parking Lot Dwy & Duke St

Date: 6/6/2018

Site Code: 14707704

Start Time	Fire Station Dwy Southbound					Duke St Westbound					S Quaker Ln Northbound					Duke St Eastbound					Parking Lot Dwy Southeastbound				
	Right to Parking Lot	Right	Thru	Left	U-Turn	Right	Right to Parking Lot	Thru	Left	U-Turn	Right	Thru	Thru to Parking Lot	Left	U-Turn	Right	Thru	Left	Left to Parking Lot	U-Turn	Right to Duke St	Thru to S Quaker Ln	Left to Duke St	Left to Fire Station	U-Turn
04:00 PM	0	0	0	0	0	0	0	2	383	5	0	4	0	0	12	0	84	250	0	2	0	0	0	0	0
04:15 PM	0	0	0	0	0	0	1	0	390	9	0	5	0	0	17	0	85	277	0	0	1	0	0	0	0
04:30 PM	0	0	0	0	0	0	0	1	351	8	0	8	0	0	26	0	111	186	0	1	0	1	0	0	0
04:45 PM	0	0	0	0	0	0	0	1	424	8	0	2	0	0	24	0	111	314	0	1	0	1	0	0	0
05:00 PM	0	0	0	0	0	0	0	0	392	5	1	6	0	0	32	0	106	260	0	0	0	0	0	0	0
05:15 PM	0	0	0	0	0	0	0	3	452	9	0	7	0	0	26	0	86	244	0	3	0	0	0	0	0
05:30 PM	0	0	0	0	0	0	0	2	458	7	0	3	0	0	26	0	91	239	0	2	0	0	0	0	0
05:45 PM	0	1	0	0	0	0	0	2	440	5	0	3	0	0	19	0	79	283	0	2	0	0	0	1	0
06:00 PM	0	0	0	0	0	0	0	2	408	7	0	3	0	0	12	0	49	292	0	2	2	0	0	0	0
06:15 PM	0	0	0	0	0	0	2	3	433	7	0	1	0	0	15	0	47	318	0	3	0	0	0	0	0
06:30 PM	0	1	0	0	0	0	0	1	366	10	0	4	0	0	13	0	51	298	0	1	1	0	0	0	0
06:45 PM	0	0	0	0	0	0	0	3	389	10	0	6	0	0	20	0	33	276	0	3	1	0	0	0	0
Total	0	2	0	0	0	0	3	20	4886	90	1	52	0	0	242	0	933	3237	0	20	5	2	0	1	0
Peak Hour Volumes	0	1	0	0	0	0	0	7	1742	26	1	19	0	0	103	0	362	1026	0	7	0	0	0	1	0

Peak Hour: 5:00 PM - 6:00 PM

Peak 15: 5:45 PM- 6:00 PM

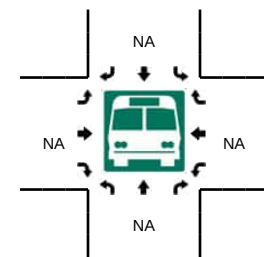
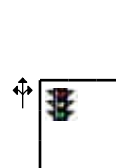
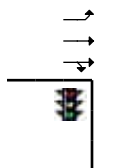
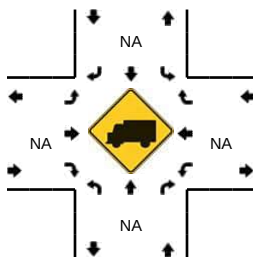
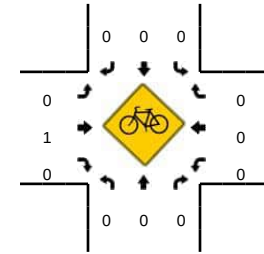
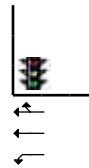
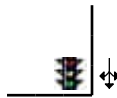
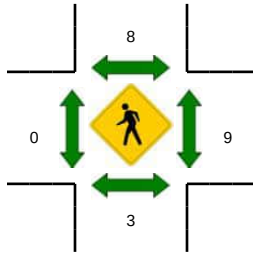
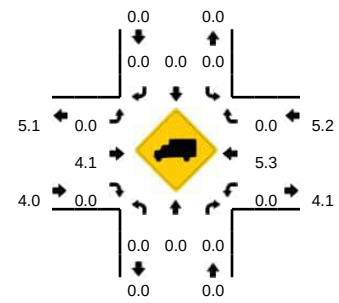
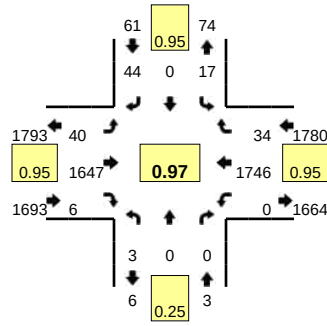
	Fire Station Dwy					Duke St					S Quaker Ln					Duke St					Parking Lot Dwy				
Start Time	Right to Parking Lot	Right	Thru	Left		Right	Right to Parking Lot	Thru	Left		Right	Thru	Thru to Parking Lot	Left		Right	Thru	Left	Left to Parking Lot		Right to Duke St	Thru to S Quaker Ln	Left to Duke St	Left to Fire Station	
04:00 PM	0	0	0	0		0	0	16	0		1	0	0	2		1	7	0	0		0	0	0	0	
04:15 PM	0	0	0	0		1	0	15	0		0	0	0	2		3	7	0	0		0	0	0	0	
04:30 PM	0	0	0	0		0	0	10	0		1	0	0	0		5	7	0	0		0	0	0	0	
04:45 PM	0	0	0	0		0	0	10	0		0	0	0	0		5	13	0	0		1	0	0	0	
05:00 PM	0	0	0	0		0	0	8	1		0	0	0	1		2	4	0	0		0	0	0	0	
05:15 PM	0	0	0	0		0	0	12	0		0	0	0	1		3	3	0	0		0	0	0	0	
05:30 PM	0	0	0	0		0	0	7	2		0	0	0	0		2	6	0	0		0	0	0	0	
05:45 PM	0	0	0	0		0	0	3	1		0	0	0	0		1	7	0	0		0	0	1	0	
06:00 PM	0	0	0	0		0	0	1	0		0	0	0	0		2	3	0	0		0	0	0	0	
06:15 PM	0	0	0	0		2	0	7	1		0	0	0	1		2	6	0	0		0	0	0	0	
06:30 PM	0	0	0	0		0	0	8	1		0	0	0	0		3	10	0	0		0	0	0	0	
06:45 PM	0	0	0	0		0	0	3	1		0	0	0	0		1	6	0	0		0	0	0	0	
Total	0	0	0	0		3	0	100	7		2	0	0	7		30	79	0	0		1	0	1	0	
Peak Hour Heavy Vehicle Percentages	0%	0%	0%	0%	0%	0%	0%	2%	15%	0%	0%	0%	0%	2%	0%	2%	2%	0%	0%	0%	0%	0%	100%	0%	0%

Start Time	Fire Station Dwy					Duke St					S Quaker Ln					Duke St					Parking Lot Dwy				
	Right to Parking Lot	Right	Thru	Left	Peds	Right	Right to Parking Lot	Thru	Left	Peds	Right	Thru	Thru to Parking Lot	Left	Peds	Right	Thru	Left	Left to Parking Lot	Peds	Right to Duke St	Thru to S Quaker Ln	Left to Duke St	Left to Fire Station	Peds
04:00 PM	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
04:30 PM	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1
04:45 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
05:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	2
05:15 PM	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3
05:30 PM	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	2	0	0	1	0	0	0	0	0	1
05:45 PM	0	0	0	0	0	3	0	0	0	0	2	0	0	0	0	2	0	2	0	0	0	0	0	0	3
06:00 PM	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	3	0	1	0	0	0	0	0	0	2
06:15 PM	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	7	0	0	0	0	1	0	0	0	1
06:30 PM	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	3	0	2	0	0	0	0	0	0	3
06:45 PM	0	0	0	0	0	7	0	0	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	0	7
Total	0	0	0	0	0	31	0	0	0	6	0	0	0	0	0	35	0	6	0	0	1	0	0	0	31
Total Peak Hour Peds:	0	0	0	0	9	0	0	0	2	0	7	0	0	0	11	0	3	0	0	0	0	0	0	0	9

LOCATION: Alexandria Commons (West) -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707705
DATE: Wed, Jun 06 2018

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



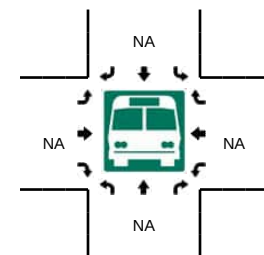
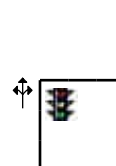
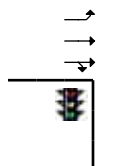
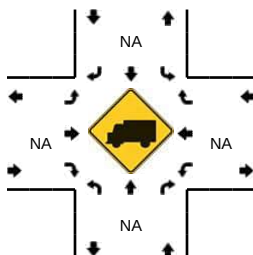
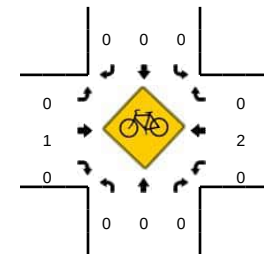
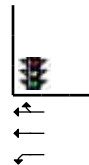
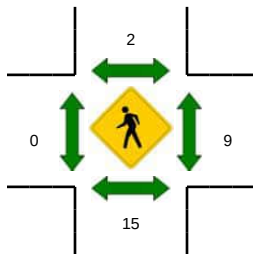
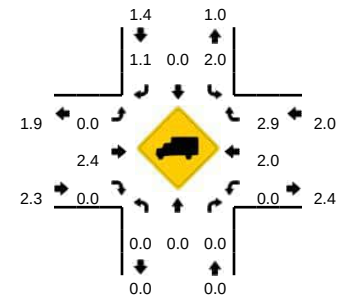
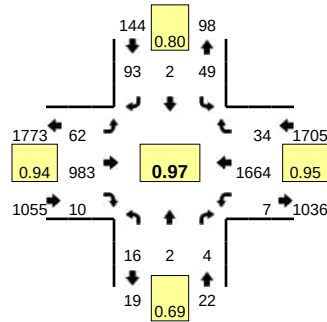
15-Min Count Period Beginning At	Alexandria Commons (West) (Northbound)				Alexandria Commons (West) (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	1	0	0	0	2	0	3	237	1	0	1	370	3	0	618	
6:45 AM	0	0	0	0	1	0	9	0	7	310	1	0	0	451	5	0	784	
7:00 AM	1	0	0	0	4	0	4	0	3	326	1	0	0	443	4	0	786	
7:15 AM	1	0	0	0	5	0	4	0	10	366	1	0	0	466	8	0	861	3049
7:30 AM	0	0	0	0	4	0	11	0	8	399	2	0	0	461	8	0	893	3324
7:45 AM	3	0	0	0	3	0	12	0	8	433	3	0	0	441	11	0	914	3454
8:00 AM	0	0	0	0	5	0	10	0	14	411	1	0	0	422	8	0	871	3539
8:15 AM	0	0	0	0	5	0	11	0	10	404	0	0	0	422	7	0	859	3537
8:30 AM	0	0	0	0	5	0	11	0	22	419	2	0	0	382	13	0	854	3498
8:45 AM	1	0	0	0	6	0	9	0	16	472	2	0	0	439	7	0	952	3536
9:00 AM	1	0	1	0	5	0	17	0	10	387	1	0	0	400	10	0	832	3497
9:15 AM	1	0	0	0	9	0	7	0	12	391	1	0	0	387	5	0	813	3451
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	12	0	0	0	12	0	48	0	32	1732	12	0	0	1764	44	0	3656	
Heavy Trucks	0	0	0	0	0	0	0	0	0	76	0	0	0	52	0	0	128	
Pedestrians	4	0	0	0	8	0	0	0	0	0	0	0	0	12	0	0	24	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: Alexandria Commons (West) -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707706
DATE: Wed, Jun 06 2018

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:45 PM -- 6:00 PM



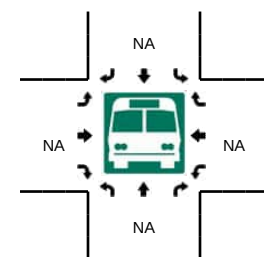
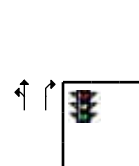
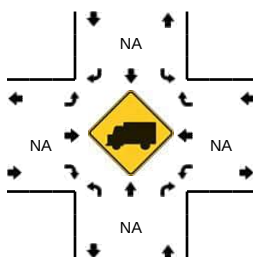
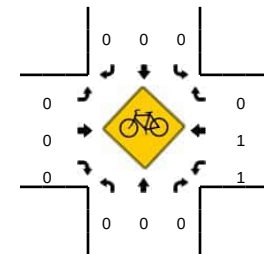
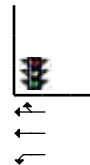
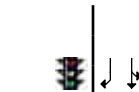
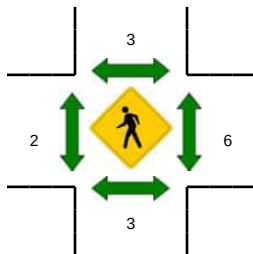
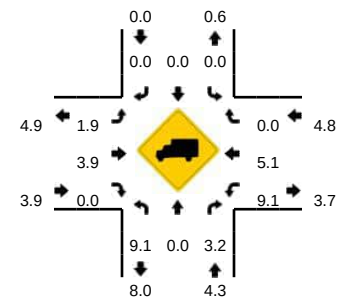
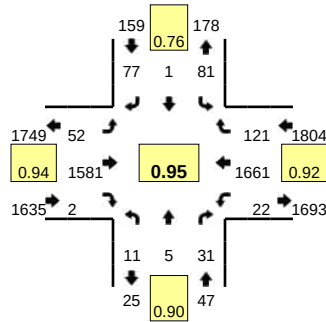
15-Min Count Period Beginning At	Alexandria Commons (West) (Northbound)				Alexandria Commons (West) (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	1	1	0	12	1	19	0	19	234	0	0	4	349	7	0	649	
4:15 PM	5	0	0	0	21	0	19	0	16	255	1	0	4	370	11	0	702	
4:30 PM	1	0	1	0	14	0	28	0	22	178	5	0	0	350	12	0	611	
4:45 PM	5	2	3	0	11	1	22	0	20	289	8	0	1	385	10	0	757	2719
5:00 PM	4	0	1	0	10	1	26	0	15	258	4	0	2	380	8	0	709	2779
5:15 PM	5	0	3	0	16	0	23	0	11	233	2	0	2	431	11	0	737	2814
5:30 PM	5	1	0	0	18	1	26	0	20	227	4	0	2	415	5	0	724	2927
5:45 PM	2	1	0	0	5	0	18	0	16	265	0	0	1	438	10	0	756	2926
6:00 PM	1	1	3	0	10	0	28	0	21	266	1	0	1	385	13	0	730	2947
6:15 PM	1	0	2	0	11	0	29	0	13	296	6	0	0	405	12	0	775	2985
6:30 PM	6	1	1	0	14	1	19	0	10	282	8	0	1	347	14	0	704	2965
6:45 PM	5	0	0	0	7	1	16	0	12	291	3	0	1	392	16	0	744	2953
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	8	4	0	0	20	0	72	0	64	1060	0	0	4	1752	40	0	3024	
Heavy Trucks	0	0	0	0	0	0	0	0	0	44	0	0	0	12	4	0	60	
Pedestrians		24				0				0				8			32	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: Sweeley St -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707707
DATE: Wed, Jun 06 2018

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



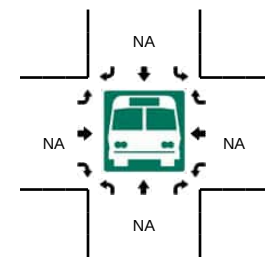
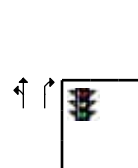
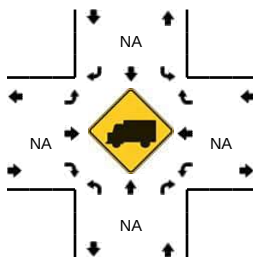
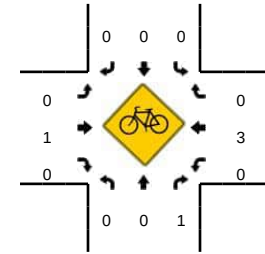
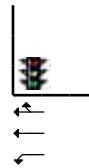
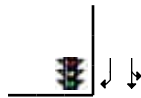
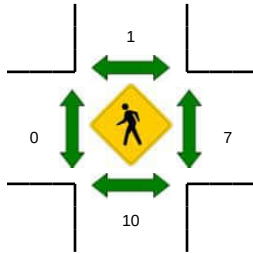
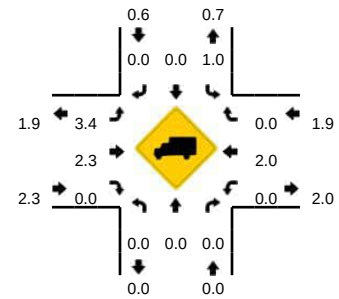
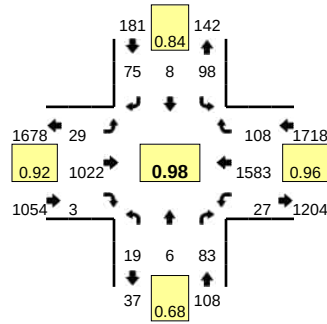
15-Min Count Period Beginning At	Sweeley St (Northbound)				Sweeley St (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	2	0	21	0	8	0	5	242	0	0	5	366	14	0	663	
6:45 AM	1	0	7	0	8	2	21	0	8	307	2	0	10	424	29	0	819	
7:00 AM	1	2	10	0	12	1	12	0	10	325	0	0	5	445	23	1	847	
7:15 AM	3	1	5	0	21	0	23	0	16	337	1	0	6	437	18	0	868	3197
7:30 AM	3	1	7	0	11	0	21	0	10	389	1	0	4	456	30	0	933	3467
7:45 AM	0	3	9	0	29	1	22	0	13	420	0	0	6	422	34	0	959	3607
8:00 AM	2	0	11	0	17	0	25	0	18	386	1	0	5	399	30	0	894	3654
8:15 AM	6	1	4	0	24	0	9	0	11	386	0	0	7	384	27	0	859	3645
8:30 AM	1	2	8	0	26	0	11	0	19	439	0	0	1	413	23	0	943	3655
8:45 AM	4	0	12	0	22	2	16	0	9	447	1	0	11	395	22	0	941	3637
9:00 AM	5	0	5	0	16	1	7	0	18	371	1	0	9	383	30	0	846	3589
9:15 AM	4	5	7	0	19	0	17	0	10	383	2	0	10	364	26	0	847	3577
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	12	36	0	116	4	88	0	52	1680	0	0	24	1688	136	0	3836	
Heavy Trucks	0	0	0	0	0	0	0	0	0	72	0	0	0	56	0	0	128	
Pedestrians	4				4				0				12				20	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: Sweeley St -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707708
DATE: Wed, Jun 06 2018

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:45 PM -- 6:00 PM



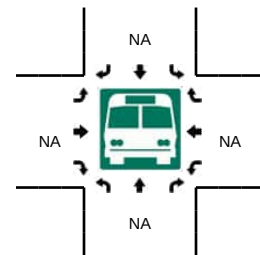
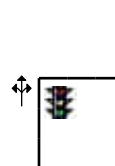
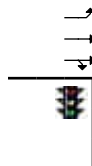
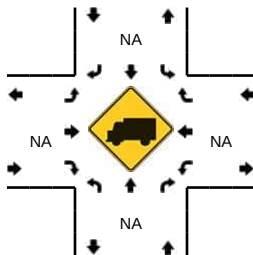
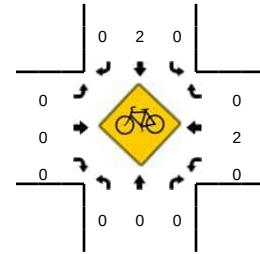
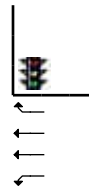
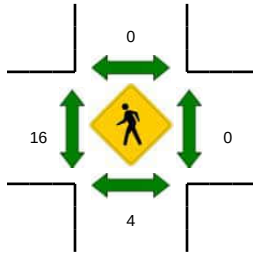
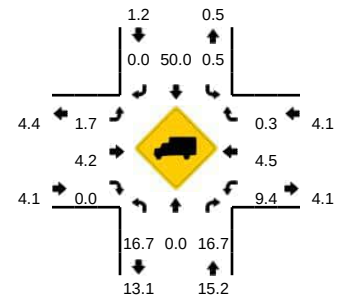
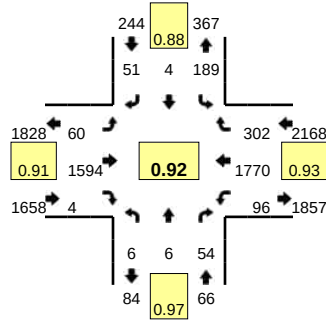
15-Min Count Period Beginning At	Sweeley St (Northbound)				Sweeley St (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	3	1	18	0	30	2	27	0	7	244	0	0	8	346	32	1	719	
4:15 PM	3	4	16	0	34	2	20	0	6	277	2	0	11	367	26	0	768	
4:30 PM	8	4	23	0	28	2	16	0	1	196	1	0	12	326	24	0	641	
4:45 PM	7	4	24	0	33	7	18	0	10	287	0	0	17	398	26	0	831	2959
5:00 PM	8	2	30	0	27	3	13	0	9	251	2	0	5	374	27	0	751	2991
5:15 PM	5	3	22	0	23	2	29	0	11	250	1	0	4	390	33	0	773	2996
5:30 PM	4	1	16	0	33	2	17	0	4	241	0	0	9	411	17	0	755	3110
5:45 PM	2	0	15	0	15	1	16	0	4	280	0	1	8	408	31	1	782	3061
6:00 PM	5	5	21	0	31	4	11	0	7	288	1	0	6	397	28	0	804	3114
6:15 PM	1	0	5	0	25	0	20	0	10	291	0	0	6	400	35	0	793	3134
6:30 PM	8	1	17	0	28	1	20	0	13	269	3	0	9	340	31	0	740	3119
6:45 PM	6	1	11	0	26	1	26	0	9	305	0	0	8	366	39	0	798	3135
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	8	0	60	0	60	4	64	0	16	1120	0	4	32	1632	124	4	3128	
Heavy Trucks	0	0	0	0	0	0	0	0	0	44	0	0	0	20	0	0	64	
Pedestrians		12				0				0				4			16	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: Roth St -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707709
DATE: Wed, Jun 06 2018

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



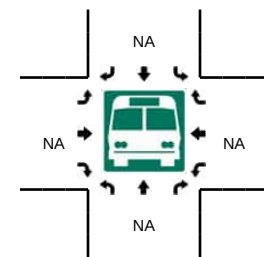
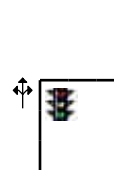
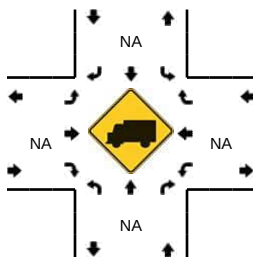
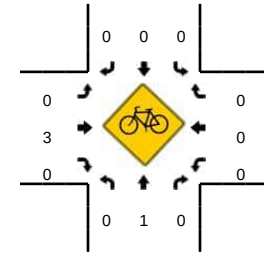
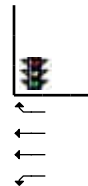
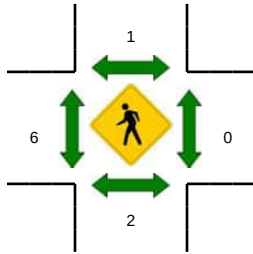
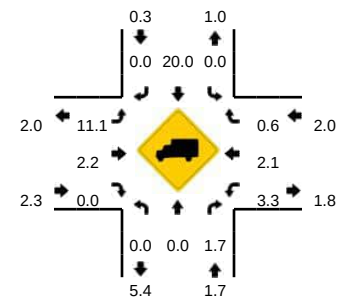
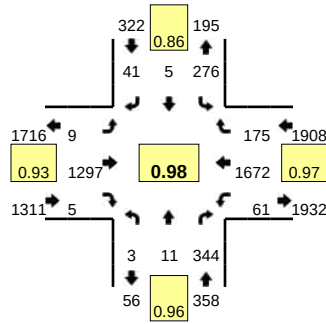
15-Min Count Period Beginning At	Roth St (Northbound)				Roth St (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	2	1	4	0	6	1	4	0	5	235	3	0	21	388	24	2	696	
6:45 AM	0	2	12	0	12	1	5	0	6	296	1	1	30	456	18	3	843	
7:00 AM	0	1	9	0	15	1	8	0	13	326	1	0	21	463	31	3	892	
7:15 AM	1	0	10	0	21	2	13	0	12	357	3	0	11	484	57	4	975	3406
7:30 AM	1	3	12	0	55	1	13	0	16	340	1	1	12	465	79	7	1006	3716
7:45 AM	0	3	14	0	47	0	21	0	21	433	2	0	22	469	90	3	1125	3998
8:00 AM	2	0	15	0	45	3	10	0	13	409	0	0	21	419	69	5	1011	4117
8:15 AM	3	0	13	0	42	0	7	0	9	412	1	0	21	417	64	5	994	4136
8:30 AM	0	3	17	0	32	2	12	0	11	435	0	0	23	418	46	6	1005	4135
8:45 AM	3	2	15	0	20	1	14	0	12	490	5	0	12	468	34	8	1084	4094
9:00 AM	2	1	14	0	21	0	16	0	20	391	0	0	17	366	36	3	887	3970
9:15 AM	0	2	10	0	26	0	11	0	10	392	0	0	9	400	45	7	912	3888
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	12	56	0	188	0	84	0	84	1732	8	0	88	1876	360	12	4500	
Heavy Trucks	0	0	16		0	0	0		0	88	0		0	44	4		152	
Pedestrians		4				0				28				0			32	
Bicycles	0	0	0		0	0	0		0	0	0		0	1	0		1	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: Roth St -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707710
DATE: Wed, Jun 06 2018

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:45 PM -- 6:00 PM



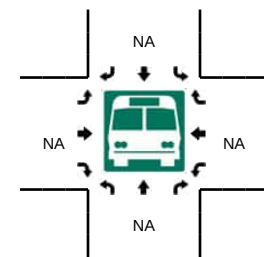
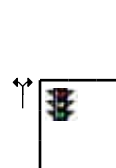
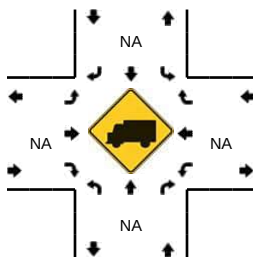
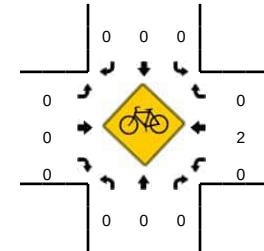
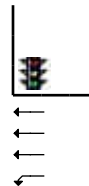
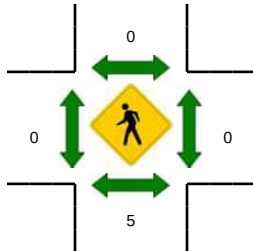
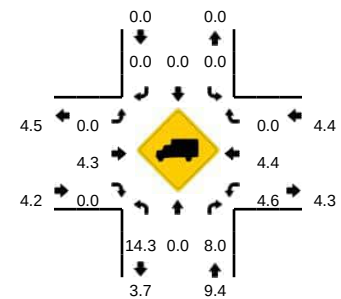
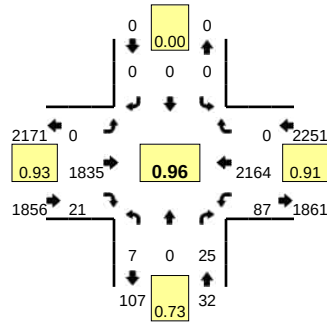
15-Min Count Period Beginning At	Roth St (Northbound)				Roth St (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	3	81	0	69	3	11	0	11	309	0	0	8	347	24	5	873	
4:15 PM	5	0	80	0	58	3	13	0	5	356	0	0	6	417	46	3	992	
4:30 PM	2	2	109	0	71	2	11	0	8	243	2	0	10	343	29	3	835	
4:45 PM	1	1	81	0	77	2	20	0	11	374	1	0	5	408	31	2	1014	3714
5:00 PM	1	2	89	0	78	2	13	0	0	332	0	0	14	396	48	4	979	3820
5:15 PM	1	3	83	0	58	2	12	0	2	329	4	0	12	423	55	1	985	3813
5:30 PM	0	3	90	0	83	0	11	0	2	287	1	0	14	408	37	4	940	3918
5:45 PM	1	3	82	0	57	1	5	0	5	349	0	0	6	445	35	6	995	3899
6:00 PM	1	0	56	0	74	0	13	0	9	317	2	0	10	408	32	1	923	3843
6:15 PM	2	0	46	0	67	1	9	0	6	360	1	0	12	432	30	5	971	3829
6:30 PM	3	0	52	0	87	1	10	0	8	320	0	0	10	367	22	6	886	3775
6:45 PM	2	1	30	0	48	0	10	0	4	361	3	0	19	419	25	0	922	3702
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
All Vehicles	4	12	328	0	228	4	20	0	20	1396	0	0	24	1780	140	24	3980	
Heavy Trucks	0	0	4		0	0	0		4	44	0		0	20	0		72	
Pedestrians	4				0				0				0				4	
Bicycles	0	0	0		0	0	0		0	2	0		0	0	0		2	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: Witter Dr -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707711
DATE: Wed, Jun 06 2018

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 7:45 AM -- 8:00 AM



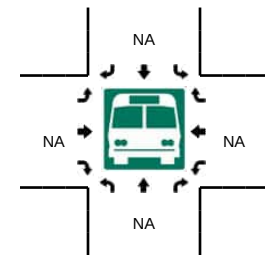
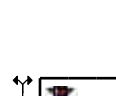
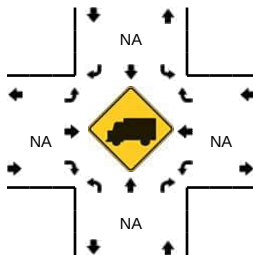
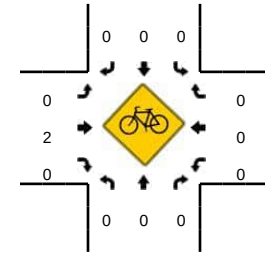
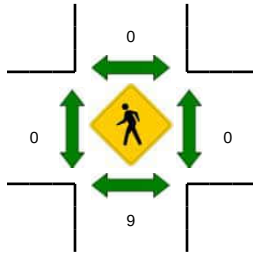
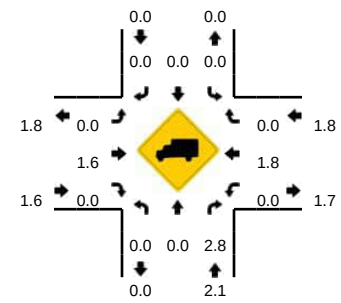
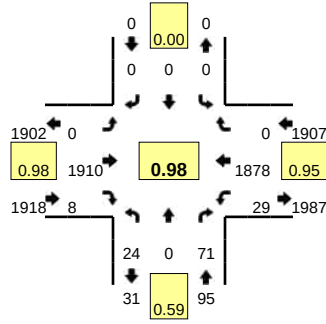
15-Min Count Period Beginning At	Witter Dr (Northbound)				Witter Dr (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	3	0	0	0	0	0	0	256	2	0	7	447	0	0	715	
6:45 AM	2	0	3	0	0	0	0	0	0	343	11	0	14	504	0	1	878	
7:00 AM	0	0	6	0	0	0	0	0	0	332	8	0	18	511	0	1	876	
7:15 AM	2	0	6	0	0	0	0	0	0	393	3	0	13	580	0	0	997	3466
7:30 AM	1	0	4	0	0	0	0	0	0	420	6	0	17	603	0	0	1051	3802
7:45 AM	2	0	6	0	0	0	0	0	0	492	6	0	20	547	0	1	1074	3998
8:00 AM	2	0	6	0	0	0	0	0	0	462	2	0	24	512	0	0	1008	4130
8:15 AM	2	0	9	0	0	0	0	0	0	461	7	0	25	502	0	0	1006	4139
8:30 AM	3	0	7	0	0	0	0	0	0	494	9	0	15	463	0	0	991	4079
8:45 AM	1	0	12	0	0	0	0	0	0	512	8	0	11	517	0	0	1061	4066
9:00 AM	6	0	11	0	0	0	0	0	0	402	8	0	12	398	0	0	837	3895
9:15 AM	5	0	7	0	0	0	0	0	0	440	4	0	10	480	0	0	946	3835
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	8	0	24	0	0	0	0	0	0	1968	24	0	80	2188	0	4	4296	
Heavy Trucks	4	0	4		0	0	0		0	100	0		0	88	0		196	
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	1	0		1	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: Witter Dr -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707712
DATE: Wed, Jun 06 2018

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:30 PM -- 5:45 PM



15-Min Count Period Beginning At	Witter Dr (Northbound)				Witter Dr (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	5	0	19	0	0	0	0	0	0	459	2	0	5	437	0	2	929	
4:15 PM	1	0	14	0	0	0	0	0	0	492	4	0	6	413	0	0	930	
4:30 PM	5	0	12	0	0	0	0	0	0	488	4	0	10	418	0	0	937	
4:45 PM	5	0	16	0	0	0	0	0	0	528	6	0	7	436	0	0	998	3794
5:00 PM	11	0	29	0	0	0	0	0	0	466	3	0	7	465	0	1	982	3847
5:15 PM	4	0	13	0	0	0	0	0	0	475	1	0	3	472	0	4	972	3889
5:30 PM	5	0	14	0	0	0	0	0	0	486	0	0	9	490	0	1	1005	3957
5:45 PM	4	0	15	0	0	0	0	0	0	483	4	0	4	451	0	0	961	3920
6:00 PM	7	0	5	0	0	0	0	0	0	440	5	0	2	466	0	3	928	3866
6:15 PM	6	0	7	0	0	0	0	0	0	463	4	0	8	444	0	0	932	3826
6:30 PM	4	0	14	0	0	0	0	0	0	464	4	0	6	406	0	1	899	3720
6:45 PM	4	0	9	0	0	0	0	0	0	420	2	0	7	406	0	1	849	3608
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	20	0	56	0	0	0	0	0	0	1944	0	0	36	1960	0	4	4020	
Heavy Trucks	0	0	0		0	0	0		0	24	0		0	36	0		60	
Pedestrians		12				0				0				0			12	
Bicycles	0	0	0		0	0	0		0	2	0		0	0	0		2	
Railroad																		
Stopped Buses																		

Comments:



Location: W Taylor Run Pkwy & Duke St

Date: 6/6/2018

Site Code: 14707713

	W Taylor Run Pkwy Southbound					WB Duke St Frontage Rd Southwestbound					Duke St Westbound						Northbound	Duke St Eastbound						EB Duke St Frontage Rd Southeastbound				
Start Time	Right to EB Duke FR	Right	Left	Left to WB Duke FR	U-Turn	Right to W Taylor Run Pkwy	Thru to EB Duke FR	Right to Duke St	Left to Duke St	U-Turn	Right to WB Duke FR	Right	Right to EB Duke FR	Thru	Left	U-Turn		Right	Thru	Left to WB Duke FR	Left	Left to EB Duke FR	U-Turn	Right to Duke St	Left to Duke St	Thru to WB Duke FR	Left to W Taylor Run Pkwy	U-Turn
06:30 AM	0	1	29	0	0	1	0	3	4	0	2	42	0	446	0	0	0	140	100	0	0	1	0	0	4	0	0	0
06:45 AM	1	3	39	1	0	0	1	2	4	0	5	31	1	495	0	0	0	193	113	1	2	1	0	1	7	0	4	0
07:00 AM	1	3	25	1	0	0	1	4	7	0	6	45	1	557	0	0	0	193	130	3	4	0	0	0	9	4	1	0
07:15 AM	0	2	60	0	0	0	0	1	8	0	5	49	0	542	0	0	0	227	157	3	1	0	0	1	4	2	1	0
07:30 AM	2	4	53	0	0	0	1	5	8	0	4	51	2	603	0	0	0	201	210	4	0	1	0	0	4	2	3	0
07:45 AM	3	6	61	0	0	0	1	3	10	0	10	48	1	609	0	0	0	283	226	2	6	3	0	0	8	2	5	0
08:00 AM	1	3	76	1	0	0	2	3	9	0	23	66	3	501	0	0	0	250	211	5	3	2	0	0	3	1	6	0
08:15 AM	0	3	69	0	0	0	2	7	11	0	12	46	2	551	0	0	0	227	211	2	1	1	0	2	6	3	5	0
08:30 AM	0	1	64	0	0	0	5	3	11	0	4	49	1	525	0	0	0	274	244	2	5	3	0	0	6	2	5	0
08:45 AM	0	1	60	1	0	0	0	4	13	0	5	46	2	526	0	0	0	268	238	1	4	3	0	0	9	0	2	0
09:00 AM	1	2	47	0	0	1	1	3	7	0	3	40	2	459	0	0	0	247	204	4	3	3	0	1	4	1	2	0
09:15 AM	3	1	47	0	0	2	2	4	7	0	4	35	1	467	0	0	0	214	191	3	3	5	0	0	6	0	0	0
Total	12	30	630	4	0	4	16	42	99	0	83	548	16	6281	0	0	0	2717	2235	30	32	23	0	5	70	17	34	0
Peak Hour Volumes	6	16	259	1	0	0	6	18	38	0	49	211	8	2264	0	0	0	961	858	13	10	7	0	2	21	8	19	0

Peak Hour: 7:30 AM - 8:30 AM

Peak 15: 7:45 AM - 8:00 AM

	W Taylor Run Pkwy Southbound					WB Duke St Frontage Rd Southwestbound					Duke St Westbound						Northbound	Duke St Eastbound						EB Duke St Frontage Rd Southeastbound				
Start Time	Right to EB Duke FR	Right	Left	Left to WB Duke FR		Right to W Taylor Run Pkwy	Thru to EB Duke FR	Right to Duke St	Left to Duke St		Right to WB Duke FR	Right	Right to EB Duke FR	Thru	Left			Right	Thru	Left to WB Duke FR	Left	Left to EB Duke FR		Right to Duke St	Left to Duke St	Thru to WB Duke FR	Left to W Taylor Run Pkwy	
06:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	5	11	0	0	0	0	0	1	0	0	0
06:45 AM	0	0	2	1	0	0	0	0	0	0	0	0	0	10	0	0	0	7	17	0	0	0	0	1	1	0	0	0
07:00 AM	1	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	8	8	0	0	0	0	0	2	0	0	0
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	1	12	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	22	0	0	0	5	13	0	0	0	0	0	0	0	0	0
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	13	11	1	0	1	0	0	0	0	0	0
08:00 AM	0	0	1	0	0	0	0	0	0	0	0	1	0	33	0	0	0	11	6	0	0	0	0	0	0	0	0	0
08:15 AM	0	1	0	0	0	0	0	0	0	0	1	0	0	31	0	0	0	10	7	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	2	0	0	0	0	0	2	0	0	1	0	19	0	0	0	5	8	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	1	0	17	0	0	0	11	7	0	1	0	0	0	0	0	0	0
09:00 AM	0	0	1	0	0	1	0	0	0	0	0	0	0	24	0	0	0	7	6	0	0	0	0	0	0	0	0	0
09:15 AM	0	1	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	6	10	0	0	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	0	0	0	0	1	2	0	103	0	0	0	39	37	1	0	1	0	0	0	0	0	0
Peak Hour Heavy Vehicle Percentages	0%	6%	0%	0%	0%	0%	0%	0%	0%	0%	2%	1%	0%	5%	0%	0%	0%	4%	4%	8%	0%	14%	0%	0%	0%	0%	0%	0%

	W Taylor Run Pkwy Southbound					WB Duke St Frontage Rd Southwestbound					Duke St Westbound						Northbound	Duke St Eastbound						EB Duke St Frontage Rd Southeastbound				
Start Time	Right to EB Duke FR	Right	Left	Left to WB Duke FR	Peds	Right to W Taylor Run Pkwy	Thru to EB Duke FR	Right to Duke St	Left to Duke St	Peds	Right to WB Duke FR	Right	Right to EB Duke FR	Thru	Left	Peds	Peds	Right	Thru	Left to WB Duke FR	Left	Left to EB Duke FR	Peds	Right to Duke St	Left to Duke St	Thru to WB Duke FR	Left to W Taylor Run Pkwy	Peds
06:30 AM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:00 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	1
07:15 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0
07:30 AM	0	0	0	0	4	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	3	0	0	0	0	0
07:45 AM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
08:00 AM	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
09:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
09:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	17	0	0	0	0	1	0	0	0	1	0	12	0	1	0	0	0	0	7	0	0	0	0	3
Peak Hour Peds	0	0	0	0	10	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	5	0	0	0	0	2



Location: W Taylor Run Pkwy & Duke St

Date: 6/6/2018

Site Code: 14707714

	W Taylor Run Pkwy Southbound					WB Duke St Frontage Rd Southwestbound					Duke St Westbound						Northbound	Duke St Eastbound						EB Duke St Frontage Rd Southeastbound				
Start Time	Right to EB Duke FR	Right	Left	Left to WB Duke FR	U-Turn	Right to W Taylor Run Pkwy	Thru to EB Duke FR	Right to Duke St	Left to Duke St	U-Turn	Right to WB Duke FR	Right	Right to EB Duke FR	Thru	Left	U-Turn		Right	Thru	Left to WB Duke FR	Left	Left to EB Duke FR	U-Turn	Right to Duke St	Left to Duke St	Thru to WB Duke FR	Left to W Taylor Run Pkwy	U-Turn
04:00 PM	2	3	48	0	0	1	8	1	22	0	8	35	1	475	0	0	0	316	186	3	0	0	0	0	17	3	1	0
04:15 PM	1	0	59	0	0	0	3	0	12	0	4	31	3	448	0	0	0	319	177	1	3	3	0	1	17	0	3	0
04:30 PM	2	0	58	0	0	0	0	1	19	0	7	42	3	436	0	0	0	310	128	2	4	2	0	2	15	1	0	0
04:45 PM	0	3	53	0	0	1	5	0	14	0	7	46	1	488	0	0	0	337	190	7	3	4	0	0	18	0	0	0
05:00 PM	0	1	55	0	0	0	5	3	24	0	4	50	1	441	0	0	0	290	190	2	3	2	0	1	20	2	2	0
05:15 PM	0	0	58	0	0	1	1	1	14	0	8	57	0	535	0	0	0	330	164	2	3	2	0	1	16	1	4	0
05:30 PM	1	0	52	0	0	1	3	3	19	0	6	50	2	509	0	0	0	303	182	2	2	3	0	2	14	2	2	0
05:45 PM	0	2	58	0	0	0	2	2	19	0	8	43	5	485	0	0	0	329	166	3	1	1	0	3	9	1	1	0
06:00 PM	0	0	53	0	0	1	0	2	23	0	8	46	0	506	0	0	0	298	156	3	4	2	1	1	8	2	1	0
06:15 PM	0	2	43	0	0	1	2	0	25	0	6	46	0	444	0	0	0	314	141	1	2	1	0	0	19	1	2	0
06:30 PM	0	0	67	0	0	1	1	0	15	0	7	38	0	439	0	0	0	320	164	2	3	4	0	0	9	1	1	0
06:45 PM	0	0	60	0	0	1	2	3	11	0	9	40	0	428	0	0	0	282	125	2	4	2	0	0	9	2	2	0
Total	6	11	664	0	0	8	32	16	217	0	82	524	16	5634	0	0	0	3748	1969	30	32	26	1	11	171	16	19	0
Peak Hour Volumes	1	3	223	0	0	2	11	9	76	0	26	200	8	1970	0	0	0	1252	702	9	9	8	0	7	59	6	9	0

Peak Hour: 4:45 PM - 5:45 PM

Peak 15: 5:15 PM - 5:30 PM

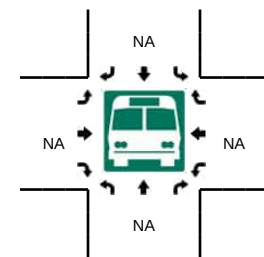
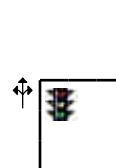
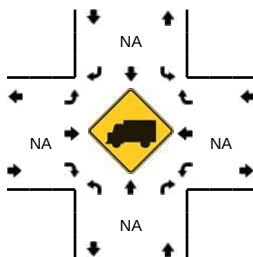
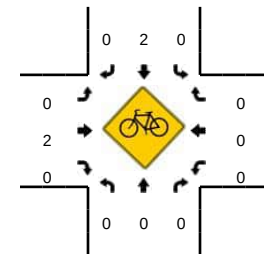
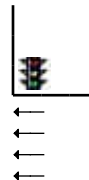
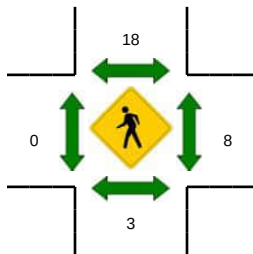
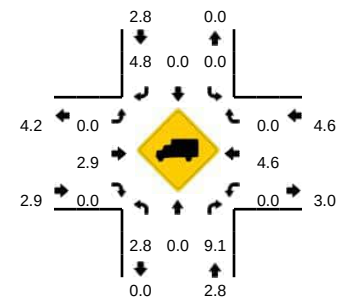
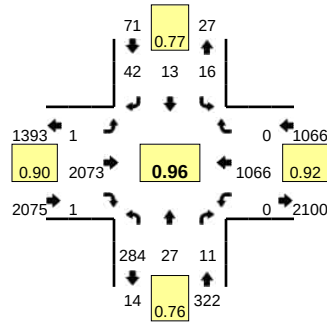
	W Taylor Run Pkwy Southbound					WB Duke St Frontage Rd Southwestbound					Duke St Westbound						Northbound	Duke St Eastbound						EB Duke St Frontage Rd Southeastbound				
Start Time	Right to EB Duke FR	Right	Left	Left to WB Duke FR		Right to W Taylor Run Pkwy	Thru to EB Duke FR	Right to Duke St	Left to Duke St		Right to WB Duke FR	Right	Right to EB Duke FR	Thru	Left			Right	Thru	Left to WB Duke FR	Left	Left to EB Duke FR		Right to Duke St	Left to Duke St	Thru to WB Duke FR	Left to W Taylor Run Pkwy	
04:00 PM	0	0	0	0		0	0	0	1		1	0	0	15	0			4	6	0	0	0		0	1	1	0	
04:15 PM	0	0	1	0		0	0	0	0		0	0	0	17	0			6	5	0	0	0		0	0	0	0	
04:30 PM	0	0	1	0		0	0	0	1		0	0	0	13	0			8	3	0	0	0		0	0	1	0	
04:45 PM	0	0	2	0		0	0	0	0		0	0	0	11	0			12	5	2	1	1		0	0	0	0	
05:00 PM	0	0	1	0		0	0	0	0		1	2	0	8	0			6	4	0	0	0		0	0	0	0	
05:15 PM	0	0	0	0		0	0	0	0		0	0	0	16	0			3	1	0	0	0		0	0	0	0	
05:30 PM	0	0	0	0		0	0	0	0		0	1	0	11	0			7	2	0	0	0		0	0	0	0	
05:45 PM	0	0	1	0		0	0	0	0		0	0	0	4	0			4	4	0	0	0		1	0	0	0	
06:00 PM	0	0	1	0		0	0	0	0		0	1	0	8	0			5	4	0	0	0		0	0	0	0	
06:15 PM	0	0	0	0		0	0	0	1		0	1	0	9	0			3	2	0	0	0		0	0	0	0	
06:30 PM	0	0	0	0		0	0	0	1		0	1	0	10	0			5	6	0	0	0		0	0	0	0	
06:45 PM	0	0	2	0		0	0	0	0		0	0	0	5	0			5	6	0	0	0		0	0	0	0	
Total	0	0	9	0		0	0	0	4		2	6	0	127	0			68	48	2	1	1		1	1	2	0	
Peak Hour Heavy Vehicle Percentages	0%	0%	4%	0%	0%	0%	0%	0%	5%	0%	8%	3%	0%	6%	0%	0%	0%	5%	7%	22%	11%	13%	0%	14%	2%	33%	0%	0%

	W Taylor Run Pkwy Southbound					WB Duke St Frontage Rd Southwestbound					Duke St Westbound						Northbound	Duke St Eastbound						EB Duke St Frontage Rd Southeastbound				
	Right to EB Duke FR	Right	Left	Left to WB Duke FR	Peds	Right to W Taylor Run Pkwy	Thru to EB Duke FR	Right to Duke St	Left to Duke St	Peds	Right to WB Duke FR	Right	Right to EB Duke FR	Thru	Left	Peds	Peds	Right	Thru	Left to WB Duke FR	Left	Left to EB Duke FR	Peds	Right to Duke St	Left to Duke St	Thru to WB Duke FR	Left to W Taylor Run Pkwy	Peds
04:00 PM	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0
04:30 PM	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	1	6	0	0	0	0	0	0	0	0	0	0	0
04:45 PM	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
05:00 PM	0	0	0	0	9	0	0	1	0	0	0	0	0	0	0	4	5	1	0	0	0	0	0	0	0	0	0	0
05:15 PM	0	0	0	1	2	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
05:30 PM	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
05:45 PM	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	2	2	0	1	0	0	0	0	0	0	0	0	0
06:00 PM	0	0	0	0	8	0	0	1	0	0	0	0	0	0	0	4	0	0	1	0	0	0	0	0	0	1	0	0
06:15 PM	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:30 PM	0	0	0	0	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
06:45 PM	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	1	4	2	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1	80	2	0	5	0	0	0	0	0	0	0	15	24	3	2	0	0	0	0	0	0	2	0	0
Peak Hour Peds	0	0	0	1	22	1	0	4	0	0	0	0	0	0	0	7	8	1	1	0	0	0	0	0	0	1	0	0

LOCATION: S Dove St -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707715
DATE: Wed, Jun 06 2018

Peak-Hour: 7:30 AM -- 8:30 AM
Peak 15-Min: 8:15 AM -- 8:30 AM



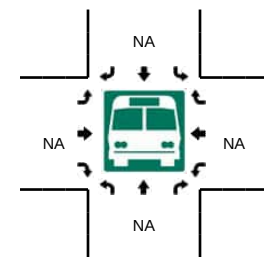
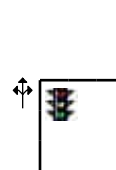
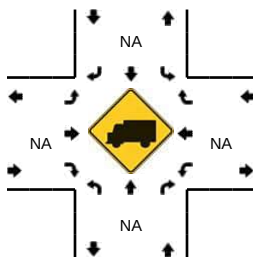
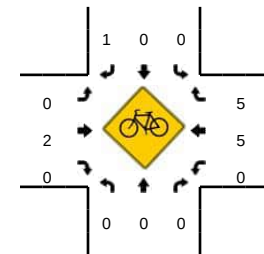
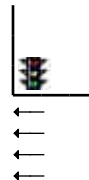
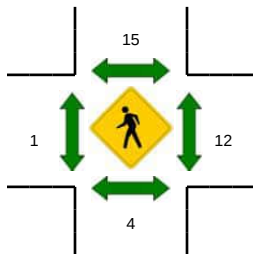
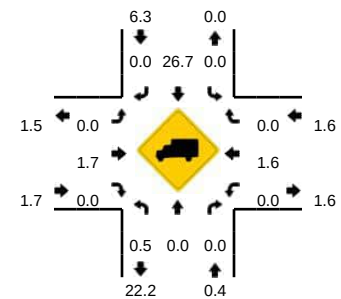
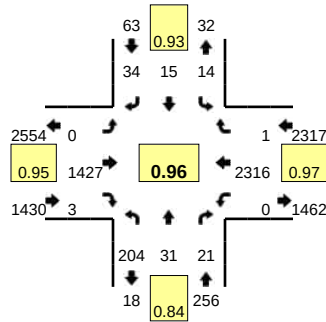
15-Min Count Period Beginning At	S Dove St (Northbound)				S Dove St (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	7	0	0	0	6	2	7	0	0	257	0	1	0	89	0	0	369	
6:45 AM	23	1	4	0	3	1	12	0	0	351	0	0	0	118	0	0	513	
7:00 AM	89	5	1	0	5	1	13	0	0	457	0	0	0	173	0	0	744	
7:15 AM	58	4	3	0	2	3	5	0	0	481	0	1	0	207	0	0	764	2390
7:30 AM	94	3	0	0	5	6	12	0	0	456	0	0	0	242	0	0	818	2839
7:45 AM	91	12	3	0	2	3	14	0	0	490	0	1	0	263	0	0	879	3205
8:00 AM	47	7	5	0	3	1	10	0	0	554	0	0	0	289	0	0	916	3377
8:15 AM	52	5	3	0	6	3	6	0	0	573	1	0	0	272	0	0	921	3534
8:30 AM	38	0	5	0	3	1	13	0	0	571	2	0	0	244	0	0	877	3593
8:45 AM	21	0	2	0	7	1	8	0	0	592	0	0	0	237	0	0	868	3582
9:00 AM	9	4	4	0	5	1	5	0	0	601	0	0	0	211	0	0	840	3506
9:15 AM	8	1	4	0	2	4	8	0	0	533	0	0	0	200	0	0	760	3345
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
All Vehicles	208	20	12	0	24	12	24	0	0	2292	4	0	0	1088	0	0	3684	
Heavy Trucks	12	0	0		0	0	0		0	48	0		0	108	0		168	
Pedestrians					20					0				12			32	
Bicycles	0	0	0		0	0	0		0	1	0		0	0	0		1	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: S Dove St -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 14707716
DATE: Wed, Jun 06 2018

Peak-Hour: 5:00 PM -- 6:00 PM
Peak 15-Min: 5:45 PM -- 6:00 PM

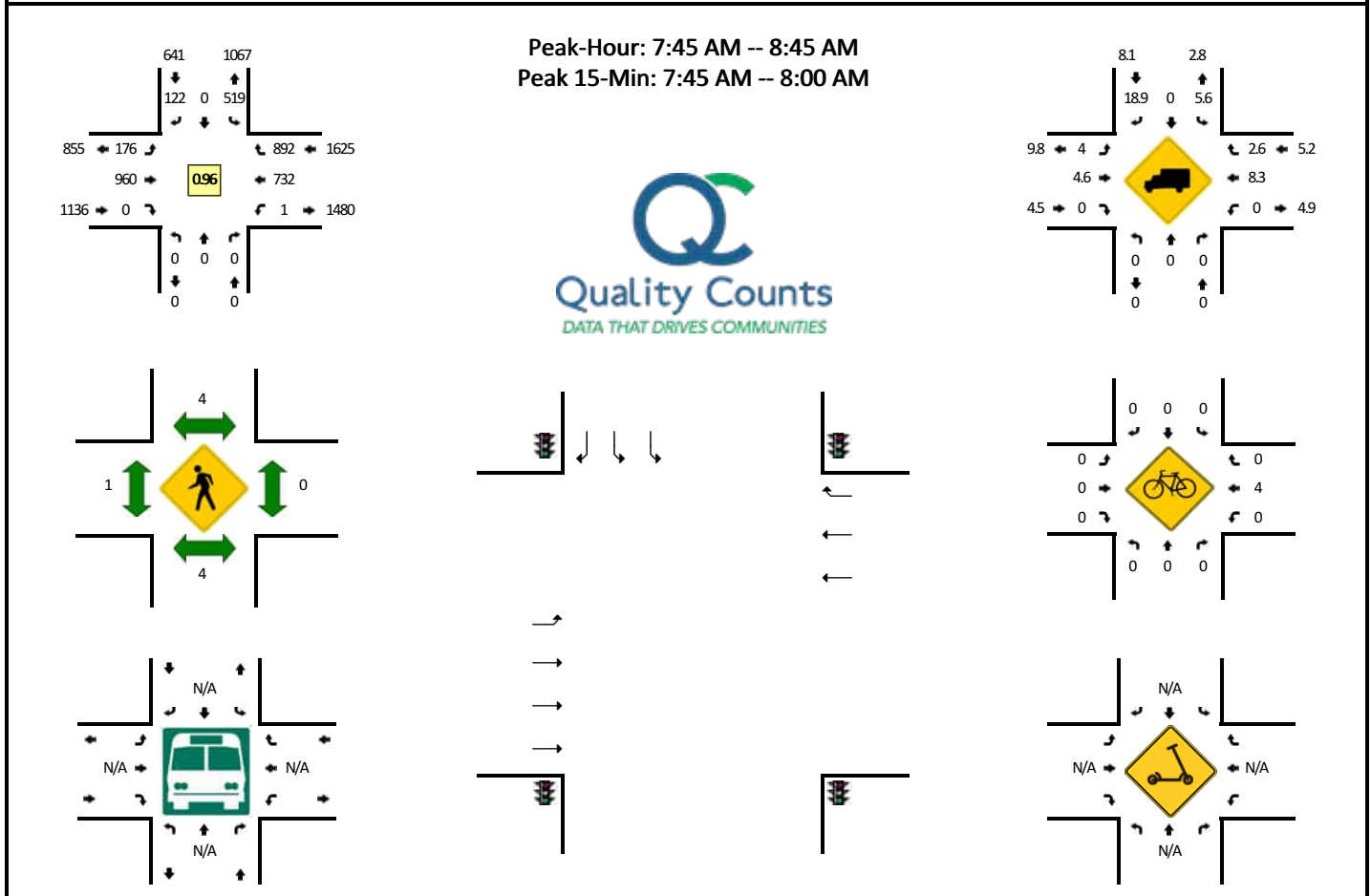


15-Min Count Period Beginning At	S Dove St (Northbound)				S Dove St (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	28	7	4	0	4	3	9	0	2	322	0	1	0	425	0	0	805	
4:15 PM	43	2	5	0	2	5	7	0	1	296	0	2	0	546	0	0	909	
4:30 PM	32	8	3	0	5	3	18	0	0	298	1	0	0	502	0	0	870	
4:45 PM	34	6	6	0	3	3	4	0	0	355	0	0	0	534	0	0	945	3529
5:00 PM	43	7	7	0	3	4	10	0	0	374	2	0	0	557	1	0	1008	3732
5:15 PM	62	8	6	0	3	3	8	0	0	351	1	0	0	581	0	0	1023	3846
5:30 PM	43	7	4	0	4	4	8	0	0	326	0	0	0	582	0	0	978	3954
5:45 PM	56	9	4	0	4	4	8	0	0	376	0	0	0	596	0	0	1057	4066
6:00 PM	27	7	4	0	3	7	6	0	0	359	0	0	0	547	0	0	960	4018
6:15 PM	54	9	5	0	5	4	3	0	0	319	1	0	0	491	0	0	891	3886
6:30 PM	30	6	4	0	4	1	7	0	0	309	0	0	0	480	0	0	841	3749
6:45 PM	20	6	2	0	4	3	7	0	0	315	0	0	0	445	0	0	802	3494
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	224	36	16	0	16	16	32	0	0	1504	0	0	0	2384	0	0	4228	
Heavy Trucks	0	0	0	0	0	8	0	0	0	32	0	0	0	32	0	0	72	
Pedestrians	0	0	0	0	12	0	0	0	0	0	0	0	0	8	0	0	20	
Bicycles	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	3	
Railroad																		
Stopped Buses																		

Comments:

LOCATION: N Quaker Ln -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 15824705
DATE: Wed, May 18 2022

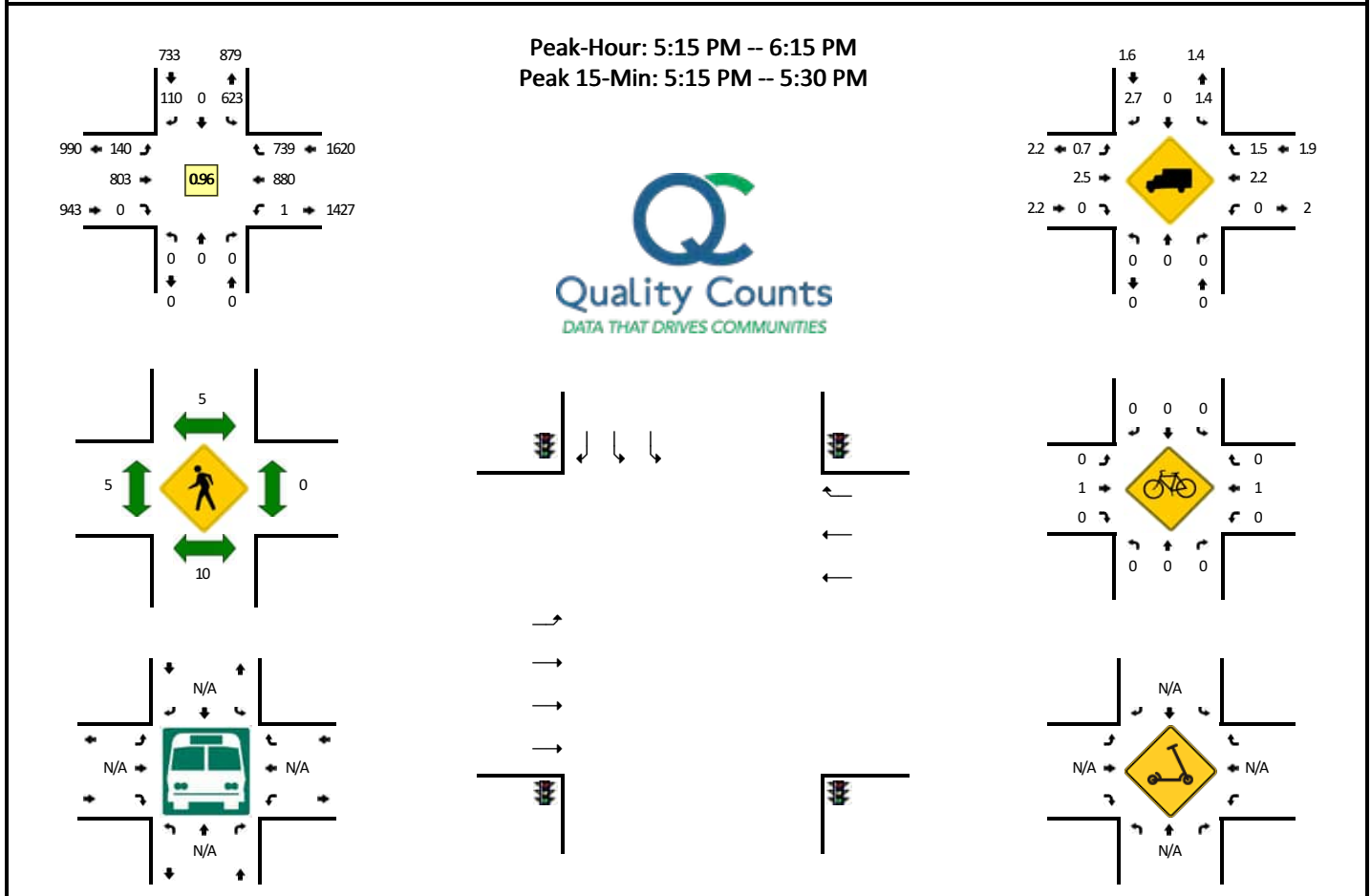


15-Min Count Period Beginning At	N Quaker Ln (Northbound)				N Quaker Ln (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	0	0	0	0	91	0	10	0	23	117	0	0	0	115	226	0	582	
6:45 AM	0	0	0	0	107	0	18	0	35	173	0	0	0	105	220	0	658	
7:00 AM	0	0	0	0	84	0	15	0	37	167	0	0	0	156	208	0	667	
7:15 AM	0	0	0	0	131	0	14	0	38	194	0	0	0	144	202	0	723	2630
7:30 AM	0	0	0	0	84	0	7	0	64	227	0	0	0	141	254	0	777	2825
7:45 AM	0	0	0	0	170	0	23	0	47	241	0	0	0	175	232	0	888	3055
8:00 AM	0	0	0	0	106	0	30	0	44	235	0	0	0	191	224	0	830	3218
8:15 AM	0	0	0	0	118	0	36	0	47	238	0	0	0	180	222	1	842	3337
8:30 AM	0	0	0	0	125	0	33	0	37	246	0	1	0	186	214	0	842	3402
8:45 AM	0	0	0	0	139	0	22	0	32	253	0	0	0	164	209	0	819	3333
9:00 AM	0	0	0	0	126	0	22	0	33	181	0	0	0	166	198	1	727	3230
9:15 AM	0	0	0	0	135	0	28	0	25	192	0	0	0	132	192	0	704	3092
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	680	0	92	0	188	964	0	0	0	700	928	0	3552	
Heavy Trucks	0	0	0	0	56	0	8	0	4	56	0	0	0	20	8	0	152	
Buses																		
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Scooters																		

Comments:

LOCATION: N Quaker Ln -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 15824706
DATE: Wed, May 18 2022

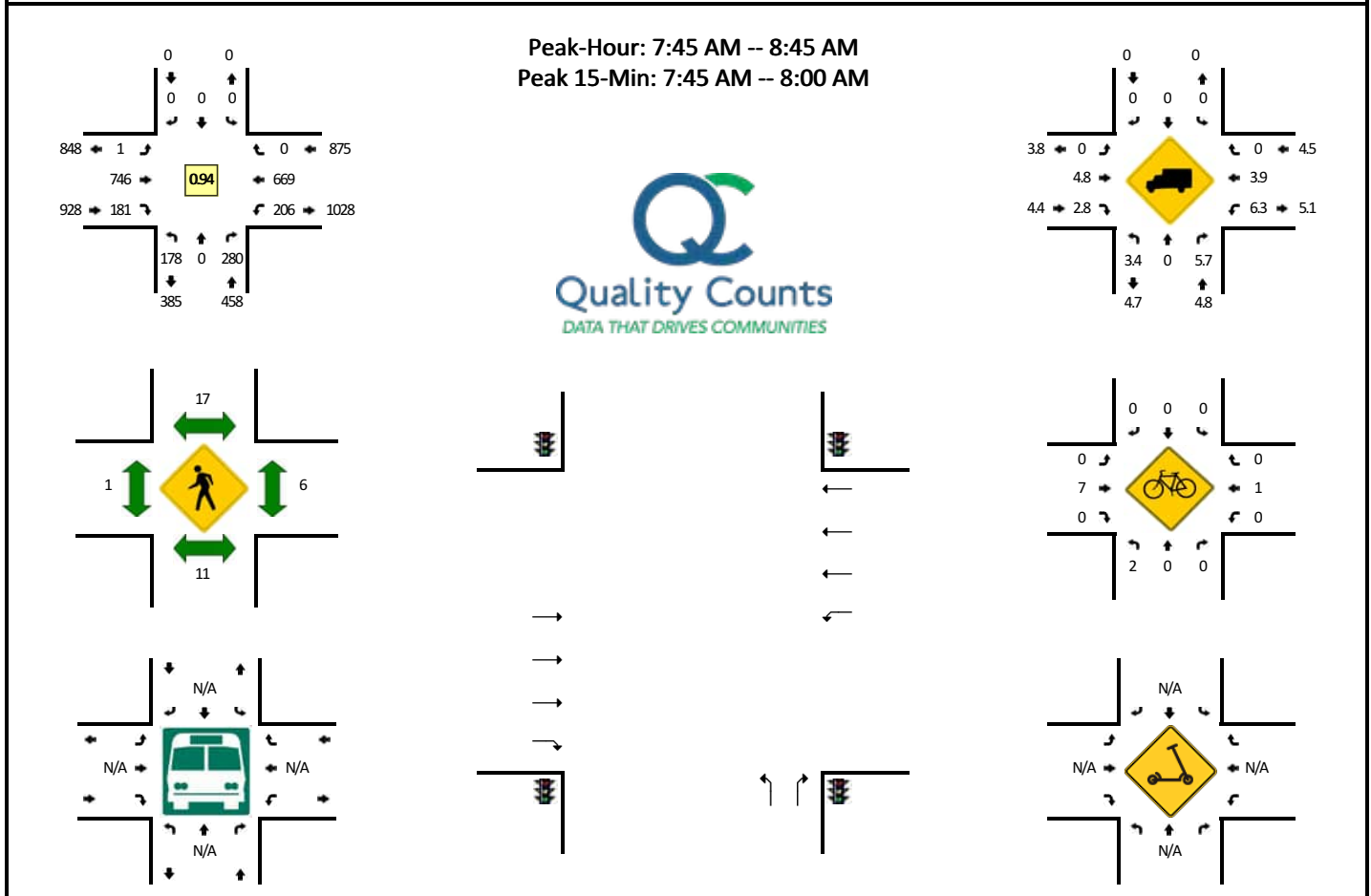


15-Min Count Period Beginning At	N Quaker Ln (Northbound)				N Quaker Ln (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	0	0	139	0	28	0	31	218	0	0	0	211	155	0	782	
4:15 PM	0	0	0	0	114	0	16	0	30	221	0	0	0	199	163	0	743	
4:30 PM	0	0	0	0	128	0	16	0	20	207	0	0	0	232	146	2	751	
4:45 PM	0	0	0	0	161	0	30	0	28	193	0	0	0	191	158	0	761	3037
5:00 PM	0	0	0	0	113	0	19	0	32	170	0	2	0	258	146	0	740	2995
5:15 PM	0	0	0	0	171	0	28	0	45	209	0	0	0	207	201	0	861	3113
5:30 PM	0	0	0	0	154	0	30	0	31	230	0	0	0	220	174	1	840	3202
5:45 PM	0	0	0	0	132	0	19	0	37	179	0	0	0	226	186	0	779	3220
6:00 PM	0	0	0	0	166	0	33	0	27	185	0	0	0	227	178	0	816	3296
6:15 PM	0	0	0	0	171	0	23	0	26	194	0	0	0	190	173	0	777	3212
6:30 PM	0	0	0	0	121	0	28	0	23	224	0	0	0	219	172	0	787	3159
6:45 PM	0	0	0	0	162	0	30	0	22	197	0	0	0	192	158	1	762	3142
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	0	0	684	0	112	0	180	836	0	0	0	828	804	0	3444	
Heavy Trucks	0	0	0	0	12	0	4	0	4	28	0	0	0	20	24	0	92	
Buses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Pedestrians	0	4	0	0	4	0	0	0	4	0	0	0	0	0	0	0	12	
Bicycles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Scooters	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Comments:

LOCATION: S Pickett St -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 15824701
DATE: Wed, May 18 2022

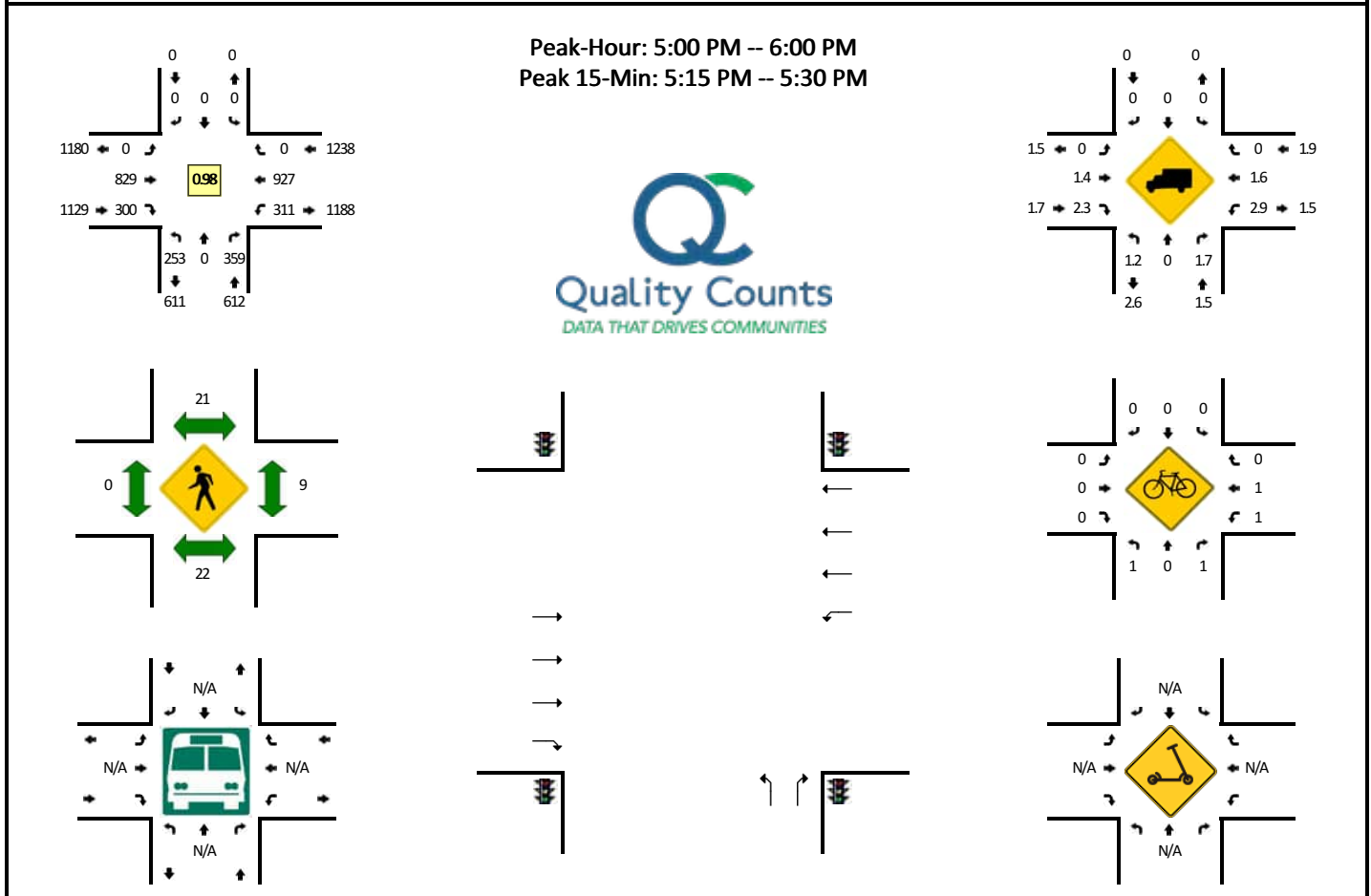


15-Min Count Period Beginning At	S Pickett St (Northbound)				S Pickett St (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
6:30 AM	19	0	42	0	0	0	0	0	0	103	16	0	23	104	0	0	307	
6:45 AM	18	0	46	0	0	0	0	0	0	136	27	0	28	124	0	0	379	
7:00 AM	22	0	61	0	0	0	0	0	0	105	44	0	34	125	0	0	391	
7:15 AM	45	0	58	0	0	0	0	0	0	128	35	0	41	133	0	0	440	1517
7:30 AM	45	0	72	0	0	0	0	0	0	213	30	0	47	168	0	0	575	1785
7:45 AM	52	0	78	0	0	0	0	0	0	206	50	1	42	174	0	1	604	2010
8:00 AM	46	0	69	0	0	0	0	0	0	184	32	0	61	169	0	1	562	2181
8:15 AM	39	0	62	0	0	0	0	0	0	164	48	0	39	151	0	0	503	2244
8:30 AM	41	0	71	0	0	0	0	0	0	192	51	0	62	175	0	0	592	2261
8:45 AM	59	0	66	0	0	0	0	0	0	181	73	0	65	147	0	0	591	2248
9:00 AM	40	0	74	0	0	0	0	0	0	168	55	0	44	146	0	0	527	2213
9:15 AM	52	0	66	0	0	0	0	0	0	149	54	0	71	112	0	0	504	2214
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	208	0	312	0	0	0	0	0	0	824	200	4	168	696	0	4	2416	
Heavy Trucks	8	0	24		0	0	0		0	32	16		16	36	0		132	
Buses																		
Pedestrians	0	0				8				0				8			16	
Bicycles		0	0		0	0	0		0	0	0		0	0	0		0	
Scooters																		

Comments:

LOCATION: S Pickett St -- Duke St
CITY/STATE: Alexandria, VA

QC JOB #: 15824702
DATE: Wed, May 18 2022



15-Min Count Period Beginning At	S Pickett St (Northbound)				S Pickett St (Southbound)				Duke St (Eastbound)				Duke St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	75	0	87	0	0	0	0	0	0	198	51	0	91	195	0	0	697	
4:15 PM	54	0	89	0	0	0	0	0	0	225	81	0	106	221	0	0	776	
4:30 PM	63	0	100	0	0	0	0	0	0	172	71	0	77	206	0	0	689	
4:45 PM	73	0	79	0	0	0	0	0	0	204	56	0	77	223	0	0	712	2874
5:00 PM	77	0	86	0	0	0	0	0	0	205	75	0	84	227	0	0	754	2931
5:15 PM	57	0	98	0	0	0	0	0	0	203	84	0	76	239	0	0	757	2912
5:30 PM	72	0	95	0	0	0	0	0	0	215	69	0	67	236	0	0	754	2977
5:45 PM	47	0	80	0	0	0	0	0	0	206	72	0	84	225	0	0	714	2979
6:00 PM	79	0	91	0	0	0	0	0	0	192	62	1	82	191	0	0	698	2923
6:15 PM	56	0	88	0	0	0	0	0	0	226	67	0	78	214	0	0	729	2895
6:30 PM	69	0	79	0	0	0	0	0	0	170	60	0	77	189	0	0	644	2785
6:45 PM	46	0	77	0	0	0	0	0	0	199	58	0	60	189	0	0	629	2700
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	228	0	392	0	0	0	0	0	0	812	336	0	304	956	0	0	3028	
Heavy Trucks	0	0	8		0	0	0		0	8	0		8	12	0		36	
Buses																		
Pedestrians		20				24				0				8			52	
Bicycles	0	0	4		0	0	0		0	0	0		0	0	0		4	
Scooters																		

Comments:

Report generated on 6/6/2022 7:55 PM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>) 1-877-580-2212



Location: W Taylor Run Pkwy -- Duke St
Date: 5/18/2022
Site Code: 15824707

	W Taylor Run Pkwy Southbound						Duke St FR Southwestbound						Duke St Westbound						Telegraph Rd SB Ramp Northwestbound						Duke St Eastbound						Duke St FR Southeastbound								
Start Time	Right to FR	Right	Left to Ramp	Left	Left to FR	U-Turn	Right	Thru	Right to Duke St	Left to Ramp	Left to Duke St	U-Turn	Right to FR (NE)	Right	To FR (NW)	Thru	Left to Ramp	U-Turn	Right to Duke St	Right to FR (NE)	To Taylor Run Pkwy	Left to FR (NW)	Left to Duke St	U-Turn	Separate Ramp Lane	Right to Ramp	Thru	To FR (NE)	Left	Left to FR (NW)	U-Turn	Right to Duke St	To Ramp	Left to Duke St	Thru	Left	U-Turn		
06:30 AM	0	0	17	5	0	0	0	0	2	0	0	0	0	1	35	5	350	0	0	0	0	0	0	0	0	135	0	57	0	1	1	0	0	1	0	3	1	0	
06:45 AM	1	1	20	4	0	0	0	0	1	1	3	0	0	4	34	9	363	0	0	0	0	0	0	0	0	189	0	98	1	2	2	1	0	5	2	2	1	0	
07:00 AM	1	1	21	1	0	0	0	0	0	1	5	0	0	4	53	9	396	0	0	0	0	0	0	0	0	144	0	106	1	3	1	0	1	1	1	6	0	2	
07:15 AM	0	2	28	5	0	0	0	1	1	1	5	3	0	3	45	11	478	0	0	0	0	0	0	0	0	215	4	117	0	5	2	0	1	0	1	1	0	0	
07:30 AM	0	0	42	6	0	0	0	0	0	4	5	2	0	4	65	42	529	0	0	0	0	0	0	0	0	210	1	108	2	1	0	0	0	0	3	1	2	0	
07:45 AM	2	0	58	6	0	0	0	0	2	8	0	0	0	11	85	29	494	0	0	0	0	0	0	0	0	227	4	139	2	1	0	0	0	3	6	2	1	4	0
08:00 AM	3	2	59	16	0	0	1	2	2	8	1	0	0	9	91	18	458	0	0	0	0	0	0	0	0	221	5	186	3	1	0	0	0	2	0	0	5	0	
08:15 AM	6	9	59	12	1	0	1	1	0	9	2	0	0	8	80	16	412	0	0	0	0	0	0	0	0	209	4	152	2	2	0	0	0	2	3	0	0	0	
08:30 AM	3	8	65	9	0	0	0	0	1	2	9	2	0	8	67	26	473	0	0	0	0	0	0	0	0	229	0	151	0	5	0	0	0	2	3	0	3	0	
08:45 AM	1	2	34	6	0	0	0	1	0	0	8	1	0	7	49	27	423	0	0	0	0	0	0	0	0	225	4	176	2	4	2	0	2	4	0	1	3	0	
09:00 AM	2	1	36	2	0	0	3	5	2	4	1	0	0	5	42	17	402	0	0	0	0	0	0	0	0	209	0	121	1	2	2	0	1	10	8	1	4	0	
09:15 AM	4	4	36	3	0	0	0	3	2	3	1	0	0	4	25	10	353	0	0	0	0	0	0	0	0	206	0	132	1	4	2	0	0	6	2	0	3	0	
Total	23	30	475	75	1	0	7	14	19	67	13	0	68	671	219	5131	0	0	0	0	0	0	0	0	0	2419	22	1543	15	31	12	1	8	39	30	10	28	0	

Peak Hour: 7:45 AM - 8:45 AM
Peak 15: 8:00 AM - 8:15 AM
PHF: 0.968207



Location: W Taylor Run Pkwy -- Duke St

Date: 5/18/2022

Site Code: 15824708

	W Taylor Run Pkwy Southbound						Duke St FR Southwestbound						Duke St Westbound						Telegraph Rd SB Ramp Northwestbound						Duke St Eastbound						Duke St FR Southeastbound							
Start Time	Right to FR	Right	Left to Ramp	Left	Left to FR	U-Turn	Right	Thru	Right to Duke St	Left to Ramp	Left to Duke St	U-Turn	Right to FR (NE)	Right	To FR (NW)	Thru	Left to Ramp	U-Turn	Right to Duke St	Right to FR (NE)	To Taylor Run Pkwy	Left to FR (NW)	Left to Duke St	U-Turn	Separate Ramp Lane	Right to Ramp	Thru	To FR (NE)	Left	Left to FR (NW)	U-Turn	Right to Duke St	To Ramp	Left to Duke St	Thru	Left	U-Turn	
04:00 PM	2	1	0	52	10	0	0	1	0	14	0	0	6	31	24	367	0	0	0	0	0	0	0	0	0	272	7	144	4	2	0	1	0	11	4	4	2	0
04:15 PM	2	2	1	46	8	0	0	3	2	8	3	0	3	21	17	358	0	0	0	0	0	0	0	0	0	301	7	135	4	5	3	2	1	7	4	2	0	
04:30 PM	1	3	1	71	4	0	0	2	5	9	1	0	9	40	16	368	0	0	0	0	0	0	0	0	0	307	9	149	0	3	5	1	0	11	4	0	1	
04:45 PM	0	2	0	62	3	0	0	1	1	0	2	2	0	4	45	26	410	0	0	0	0	0	0	0	0	301	5	163	5	2	2	0	0	11	1	2	3	
05:00 PM	1	2	1	53	5	0	3	1	0	8	2	0	9	38	23	439	0	0	0	0	0	0	0	0	0	279	8	141	2	4	0	0	0	13	2	1	1	
05:15 PM	1	2	0	55	4	0	0	1	0	10	2	0	7	50	20	389	0	0	0	0	0	0	0	0	0	331	9	173	1	5	2	0	0	6	2	2	1	
05:30 PM	0	1	0	66	8	0	0	0	2	11	0	0	8	53	19	414	0	0	0	0	0	0	0	0	0	283	5	161	1	2	1	0	0	7	0	3	4	
05:45 PM	0	5	0	56	1	0	0	2	0	10	1	0	4	46	24	506	0	0	0	0	0	0	0	0	0	280	7	154	1	6	2	1	0	4	3	0	3	
06:00 PM	1	2	0	61	6	0	0	3	1	13	1	0	3	33	16	419	0	0	0	0	0	0	0	0	0	289	3	152	2	10	1	1	0	15	1	0	3	
06:15 PM	1	3	1	46	8	0	0	0	1	19	3	0	3	21	17	372	0	0	0	0	0	0	0	0	0	304	8	145	0	5	0	1	1	2	0	0	3	
06:30 PM	2	2	2	41	5	0	0	1	0	0	1	0	4	38	15	354	0	0	0	0	0	0	0	0	0	299	1	118	1	4	0	0	0	3	3	1	1	
06:45 PM	1	3	0	41	6	0	0	1	2	2	1	0	4	25	12	409	0	0	0	0	0	0	0	0	0	289	6	124	4	10	1	1	0	5	0	1	0	
Total	12	28	6	650	68	0	4	16	13	106	17	0	64	441	229	4805	0	0	0	0	0	0	0	0	0	3525	75	1759	25	58	17	8	2	95	24	16	22	0

Peak Hour: 5:15 PM - 6:15 PM

Peak 15: 5:45 PM - 6:00 PM

PHF: 0.957437

Type of report: Tube Count - Volume Data

LOCATION: Duke St btwn Roth St & Witter Dr										QC JOB #: 15824747	
SPECIFIC LOCATION:										DIRECTION: EB, WB	
CITY/STATE: Alexandria, VA										DATE: May 18 2022 - May 18 2022	
Start Time	Mon	Tue	Wed 18 May 22	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile	
12:00 AM			122			122			122		
12:15 AM			114			114			114		
12:30 AM			99			99			99		
12:45 AM			78			78			78		
01:00 AM			55			55			55		
01:15 AM			53			53			53		
01:30 AM			56			56			56		
01:45 AM			42			42			42		
02:00 AM			52			52			52		
02:15 AM			48			48			48		
02:30 AM			44			44			44		
02:45 AM			43			43			43		
03:00 AM			44			44			44		
03:15 AM			38			38			38		
03:30 AM			32			32			32		
03:45 AM			53			53			53		
04:00 AM			48			48			48		
04:15 AM			52			52			52		
04:30 AM			103			103			103		
04:45 AM			149			149			149		
05:00 AM			157			157			157		
05:15 AM			205			205			205		
05:30 AM			295			295			295		
05:45 AM			339			339			339		
Day Total											
% Weekday Average											
% Week Average											
AM Peak 15-min Vol											
PM Peak 15-min Vol											
Comments:											

Report generated on 5/25/2022 10:00 AM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

LOCATION: Duke St btwn Roth St & Witter Dr							QC JOB #: 15824747			
SPECIFIC LOCATION:							DIRECTION: EB, WB			
CITY/STATE: Alexandria, VA							DATE: May 18 2022 - May 18 2022			
Start Time	Mon	Tue	Wed 18 May 22	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM			373			373			373	
06:15 AM			408			408			408	
06:30 AM			487			487			487	
06:45 AM			541			541			541	
07:00 AM			513			513			513	
07:15 AM			619			619			619	
07:30 AM			624			624			624	
07:45 AM			482			482			482	
08:00 AM			424			424			424	
08:15 AM			550			550			550	
08:30 AM			602			602			602	
08:45 AM			632			632			632	
09:00 AM			532			532			532	
09:15 AM			564			564			564	
09:30 AM			597			597			597	
09:45 AM			563			563			563	
10:00 AM			570			570			570	
10:15 AM			489			489			489	
10:30 AM			536			536			536	
10:45 AM			558			558			558	
11:00 AM			560			560			560	
11:15 AM			533			533			533	
11:30 AM			548			548			548	
11:45 AM			573			573			573	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										
Comments:										

LOCATION: Duke St btwn Roth St & Witter Dr									QC JOB #: 15824747	
SPECIFIC LOCATION:									DIRECTION: EB, WB	
CITY/STATE: Alexandria, VA									DATE: May 18 2022 - May 18 2022	
Start Time	Mon	Tue	Wed 18 May 22	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM			549			549			549	
12:15 PM			577			577			577	
12:30 PM			592			592			592	
12:45 PM			566			566			566	
01:00 PM			606			606			606	
01:15 PM			591			591			591	
01:30 PM			604			604			604	
01:45 PM			533			533			533	
02:00 PM			630			630			630	
02:15 PM			643			643			643	
02:30 PM			690			690			690	
02:45 PM			441			441			441	
03:00 PM			441			441			441	
03:15 PM			393			393			393	
03:30 PM			395			395			395	
03:45 PM			411			411			411	
04:00 PM			404			404			404	
04:15 PM			389			389			389	
04:30 PM			448			448			448	
04:45 PM			366			366			366	
05:00 PM			391			391			391	
05:15 PM			472			472			472	
05:30 PM			469			469			469	
05:45 PM			463			463			463	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										
Comments:										

LOCATION: Duke St btwn Roth St & Witter Dr							QC JOB #: 15824747			
SPECIFIC LOCATION:							DIRECTION: EB, WB			
CITY/STATE: Alexandria, VA							DATE: May 18 2022 - May 18 2022			
Start Time	Mon	Tue	Wed 18 May 22	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM			481			481			481	
06:15 PM			431			431			431	
06:30 PM			534			534			534	
06:45 PM			522			522			522	
07:00 PM			486			486			486	
07:15 PM			500			500			500	
07:30 PM			494			494			494	
07:45 PM			496			496			496	
08:00 PM			499			499			499	
08:15 PM			488			488			488	
08:30 PM			444			444			444	
08:45 PM			428			428			428	
09:00 PM			411			411			411	
09:15 PM			384			384			384	
09:30 PM			362			362			362	
09:45 PM			319			319			319	
10:00 PM			325			325			325	
10:15 PM			300			300			300	
10:30 PM			246			246			246	
10:45 PM			220			220			220	
11:00 PM			216			216			216	
11:15 PM			201			201			201	
11:30 PM			140			140			140	
11:45 PM			129			129			129	
Day Total			36319			36319			36319	
% Weekday Average			100%							
% Week Average			100%			100%				
AM Peak 15-min Vol			8:45 AM 632			8:45 AM 632			8:45 AM 632	
PM Peak 15-min Vol			2:30 PM 690			2:30 PM 690			2:30 PM 690	
Comments:										

Type of report: Tube Count - Volume Data

LOCATION: Duke St btwn Telegraph Rd & Callahan Dr										QC JOB #: 15824748	
SPECIFIC LOCATION:										DIRECTION: EB, WB	
CITY/STATE: Alexandria, VA										DATE: May 18 2022 - May 18 2022	
Start Time	Mon	Tue	Wed 18 May 22	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile	
12:00 AM			76			76			76		
12:15 AM			47			47			47		
12:30 AM			40			40			40		
12:45 AM			46			46			46		
01:00 AM			32			32			32		
01:15 AM			26			26			26		
01:30 AM			22			22			22		
01:45 AM			18			18			18		
02:00 AM			21			21			21		
02:15 AM			12			12			12		
02:30 AM			17			17			17		
02:45 AM			14			14			14		
03:00 AM			15			15			15		
03:15 AM			8			8			8		
03:30 AM			17			17			17		
03:45 AM			16			16			16		
04:00 AM			24			24			24		
04:15 AM			28			28			28		
04:30 AM			41			41			41		
04:45 AM			53			53			53		
05:00 AM			82			82			82		
05:15 AM			68			68			68		
05:30 AM			101			101			101		
05:45 AM			156			156			156		
Day Total											
% Weekday Average											
% Week Average											
AM Peak 15-min Vol											
PM Peak 15-min Vol											
Comments:											

Report generated on 5/25/2022 10:00 AM

SOURCE: Quality Counts, LLC (<http://www.qualitycounts.net>)

LOCATION: Duke St btwn Telegraph Rd & Callahan Dr									QC JOB #: 15824748	
SPECIFIC LOCATION:									DIRECTION: EB, WB	
CITY/STATE: Alexandria, VA									DATE: May 18 2022 - May 18 2022	
Start Time	Mon	Tue	Wed 18 May 22	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 AM			147			147			147	
06:15 AM			181			181			181	
06:30 AM			256			256			256	
06:45 AM			333			333			333	
07:00 AM			346			346			346	
07:15 AM			454			454			454	
07:30 AM			396			396			396	
07:45 AM			501			501			501	
08:00 AM			437			437			437	
08:15 AM			462			462			462	
08:30 AM			505			505			505	
08:45 AM			544			544			544	
09:00 AM			481			481			481	
09:15 AM			421			421			421	
09:30 AM			453			453			453	
09:45 AM			437			437			437	
10:00 AM			389			389			389	
10:15 AM			409			409			409	
10:30 AM			418			418			418	
10:45 AM			453			453			453	
11:00 AM			439			439			439	
11:15 AM			418			418			418	
11:30 AM			443			443			443	
11:45 AM			440			440			440	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										
Comments:										

LOCATION: Duke St btwn Telegraph Rd & Callahan Dr									QC JOB #: 15824748	
SPECIFIC LOCATION:									DIRECTION: EB, WB	
CITY/STATE: Alexandria, VA									DATE: May 18 2022 - May 18 2022	
Start Time	Mon	Tue	Wed 18 May 22	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
12:00 PM			438			438			438	
12:15 PM			440			440			440	
12:30 PM			473			473			473	
12:45 PM			502			502			502	
01:00 PM			456			456			456	
01:15 PM			441			441			441	
01:30 PM			479			479			479	
01:45 PM			501			501			501	
02:00 PM			500			500			500	
02:15 PM			538			538			538	
02:30 PM			532			532			532	
02:45 PM			530			530			530	
03:00 PM			541			541			541	
03:15 PM			568			568			568	
03:30 PM			598			598			598	
03:45 PM			587			587			587	
04:00 PM			604			604			604	
04:15 PM			540			540			540	
04:30 PM			657			657			657	
04:45 PM			626			626			626	
05:00 PM			620			620			620	
05:15 PM			640			640			640	
05:30 PM			699			699			699	
05:45 PM			613			613			613	
Day Total										
% Weekday Average										
% Week Average										
AM Peak 15-min Vol										
PM Peak 15-min Vol										
Comments:										

LOCATION: Duke St btwn Telegraph Rd & Callahan Dr							QC JOB #: 15824748			
SPECIFIC LOCATION:							DIRECTION: EB, WB			
CITY/STATE: Alexandria, VA							DATE: May 18 2022 - May 18 2022			
Start Time	Mon	Tue	Wed 18 May 22	Thu	Fri	Average Weekday 15-min Traffic	Sat	Sun	Average Week 15-min Traffic	Average Week Profile
06:00 PM			633			633			633	
06:15 PM			580			580			580	
06:30 PM			600			600			600	
06:45 PM			533			533			533	
07:00 PM			472			472			472	
07:15 PM			422			422			422	
07:30 PM			397			397			397	
07:45 PM			345			345			345	
08:00 PM			316			316			316	
08:15 PM			337			337			337	
08:30 PM			320			320			320	
08:45 PM			285			285			285	
09:00 PM			308			308			308	
09:15 PM			272			272			272	
09:30 PM			234			234			234	
09:45 PM			189			189			189	
10:00 PM			199			199			199	
10:15 PM			186			186			186	
10:30 PM			143			143			143	
10:45 PM			114			114			114	
11:00 PM			100			100			100	
11:15 PM			102			102			102	
11:30 PM			86			86			86	
11:45 PM			65			65			65	
Day Total			31104			31104			31104	
% Weekday Average			100%							
% Week Average			100%			100%				
AM Peak 15-min Vol			8:45 AM 544			8:45 AM 544			8:45 AM 544	
PM Peak 15-min Vol			5:30 PM 699			5:30 PM 699			5:30 PM 699	
Comments:										



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix C: Travel Time & Queues

Duke Street Transitway Travel Time Data
Date Collected: 5/18/2022
Collected By: Gorove Slade (JH & AN)

Travel Time Segment	AM Peak Period (6:30 - 9:30 AM)					PM Peak Period (4:00 - 7:00 PM)				
	Start Time	End Time	Duration (mm:ss)	Duration (s)	Collected By	Start Time	End Time	Duration (mm:ss)	Duration (s)	Collected By
EB Duke Street from east of Walker St to east of Dulany St/Diagonal Rd	6:32:10	6:40:08	07:58	478	JH	16:03:54	16:19:34	15:40	940	JH
	6:47:30	6:56:43	09:13	553	AN	16:23:47	16:47:27	23:40	1420	AN
	7:04:54	7:13:54	09:00	540	JH	16:38:36	16:59:43	21:07	1267	JH
	7:15:07	7:22:43	07:36	456	AN	17:14:21	17:33:57	19:36	1176	AN
	7:30:32	7:40:12	09:40	580	JH	17:23:33	17:39:45	16:12	972	JH
	7:43:43	7:54:41	10:58	658	AN	17:56:44	18:12:16	15:32	932	AN
	8:00:53	8:14:53	14:00	840	JH	18:03:11	18:17:57	14:46	886	JH
	8:12:23	8:24:15	11:52	712	AN	18:36:12	18:48:15	12:03	723	AN
	8:36:39	8:46:42	10:03	603	JH	18:38:11	18:49:43	11:32	692	JH
	8:43:18	8:54:15	10:57	657	AN					
	9:06:49	9:14:53	08:04	484	JH					
	9:11:11	9:20:17	09:06	546	AN					
WB Duke Street from west of Dulany St/Diagonal Rd to west of Walker St	6:32:41	6:43:04	10:23	623	AN	16:00:00	16:14:00	14:00	840	AN
	6:51:40	7:01:13	09:33	573	JH	16:23:22	16:33:10	09:48	588	JH
	6:58:45	7:09:27	10:42	642	AN	16:53:22	17:06:09	12:47	767	AN
	7:17:41	7:27:39	09:58	598	JH	17:03:24	17:15:51	12:27	747	JH
	7:24:55	7:36:47	11:52	712	AN	17:37:28	17:48:10	10:42	642	AN
	7:43:51	7:55:01	11:10	670	JH	17:43:34	17:55:37	12:03	723	JH
	7:57:23	8:07:58	10:35	635	AN	18:15:44	18:28:16	12:32	752	AN
	8:18:43	8:31:32	12:49	769	JH	18:21:09	18:30:44	09:35	575	JH
	8:27:33	8:38:42	11:09	669	AN	18:51:44	19:01:03	09:19	559	AN
	8:51:11	9:01:58	10:47	647	JH	18:52:54	19:03:03	10:09	609	JH
	8:55:53	9:07:25	11:32	692	AN					
	9:19:13	9:28:31	09:18	558	JH					

Note: Estimated based on available travel time data (video file not found)

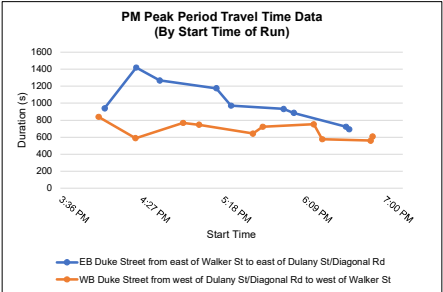
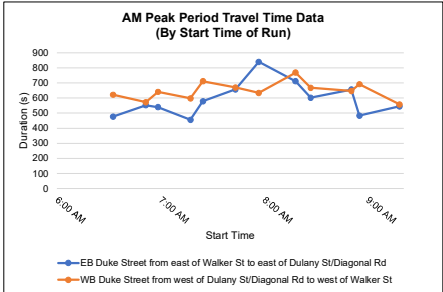
Summary (in seconds)			
	Collected By	AM	PM
EB Duke Street	JH	588	951
	AN	597	1063
Average (Overall Peak Period)		592	1001
Average (Peak Hour of Counts)*		698	1074
% Difference between Drivers		1.6%	11.7%
WB Duke Street	JH	636	648
	AN	662	712
Average (Overall Peak Period)		649	680
Average (Peak Hour of Counts)*		686	720
% Difference between Drivers		4.1%	9.8%
% Difference between Drivers (Overall)		7.5%	

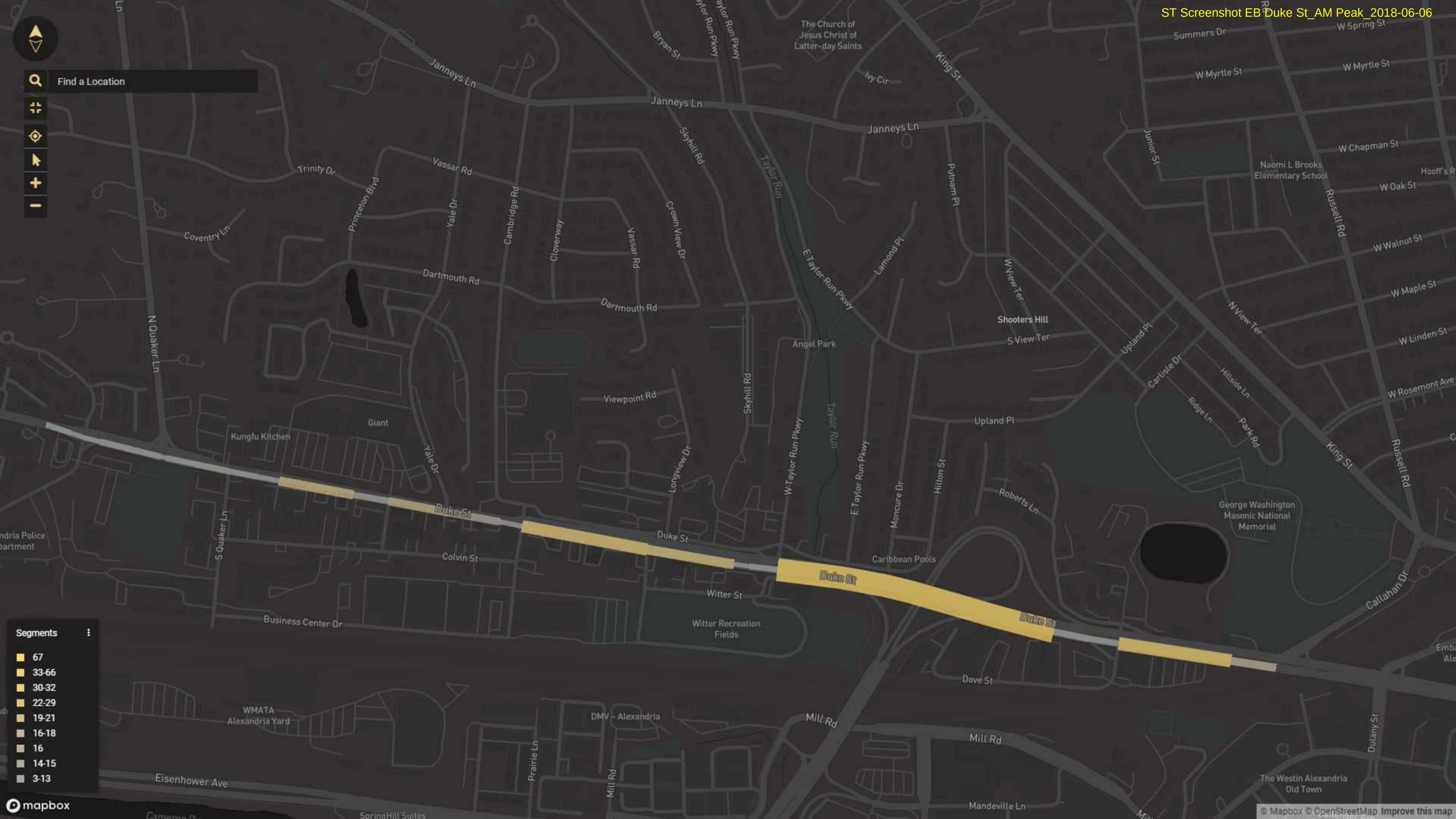
Note:

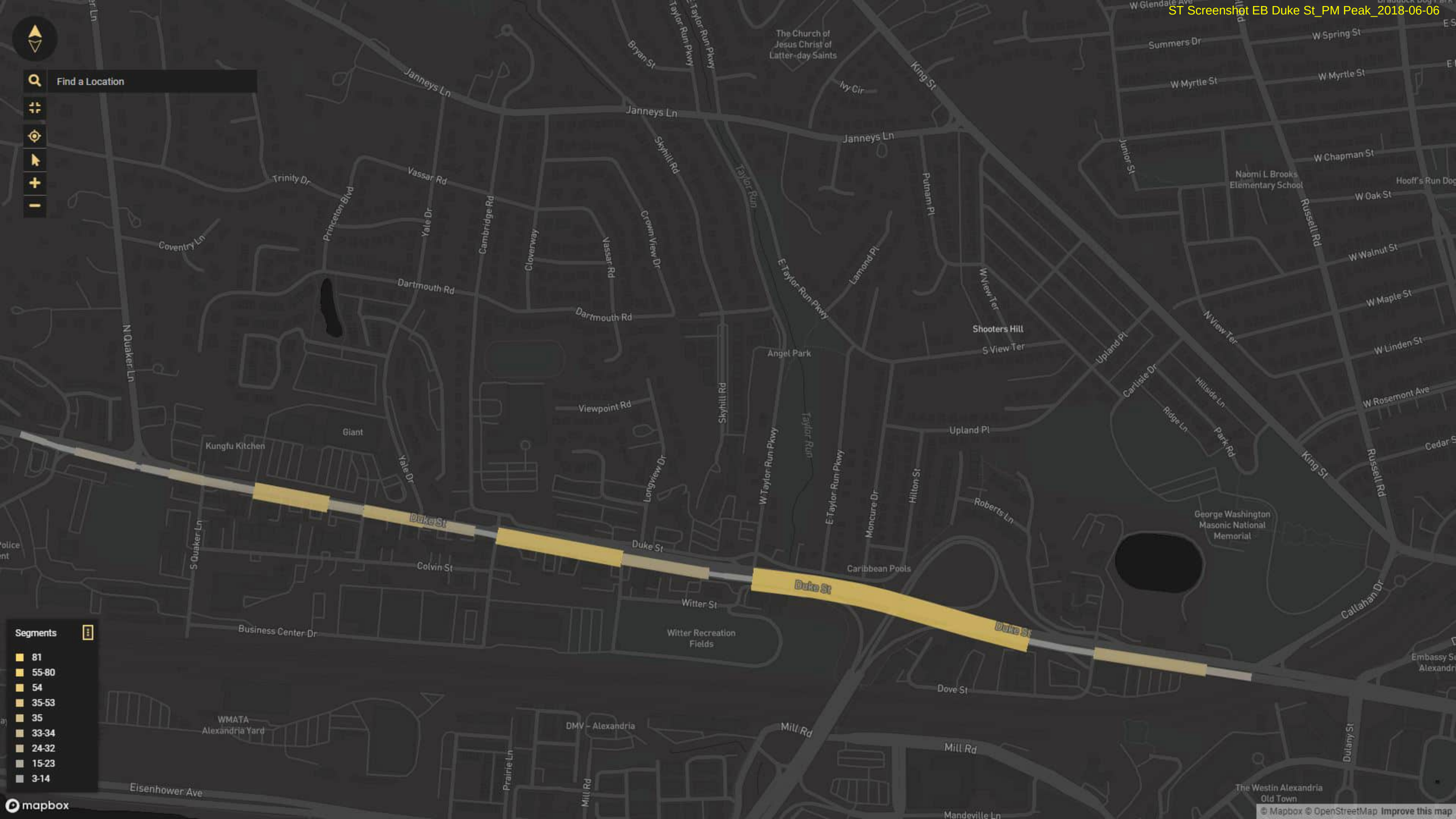
AM Peak Hour of Counts: 7:30 to 8:30 AM

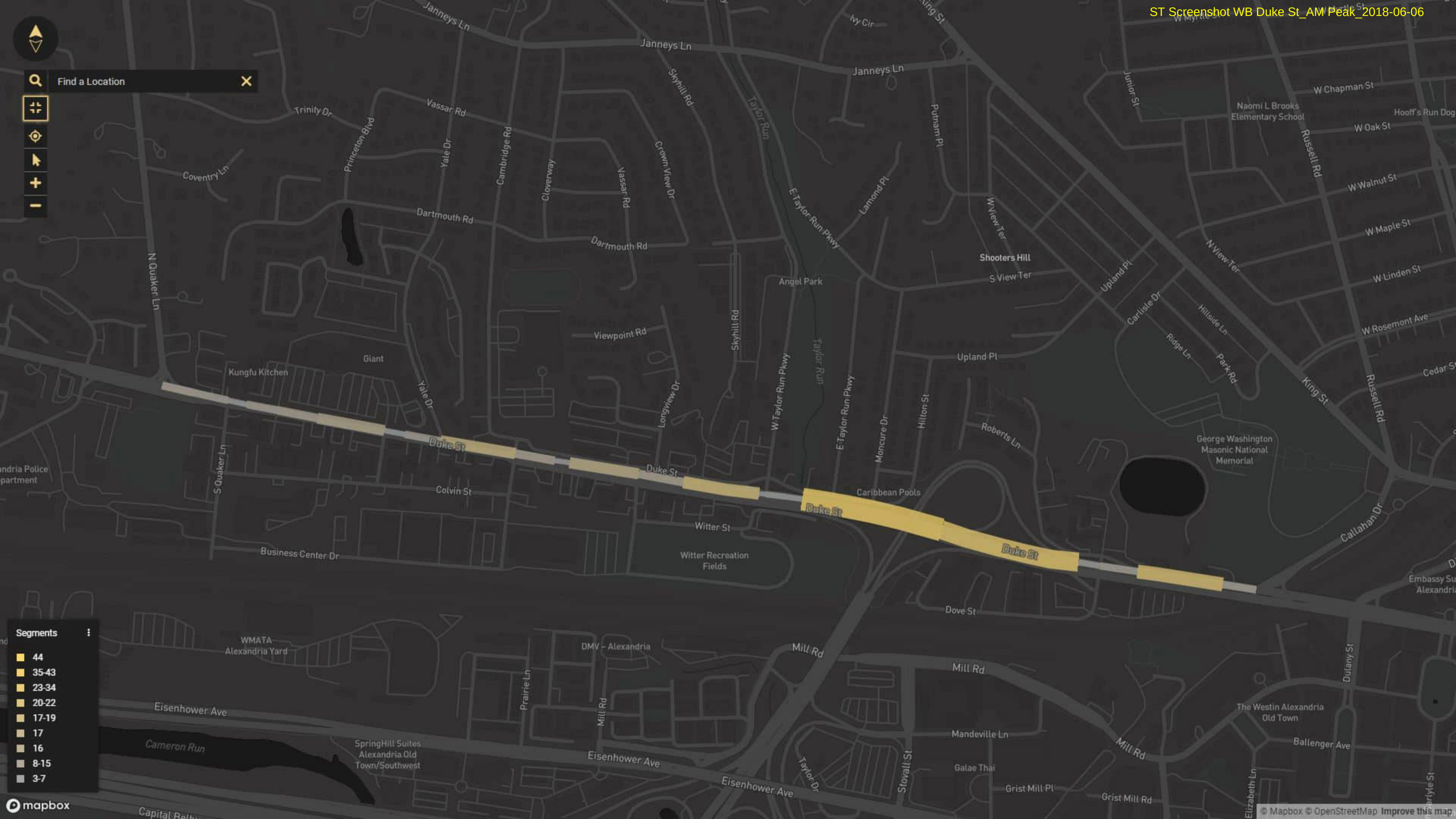
PM Peak Hour of Counts: 4:45 to 5:45 PM

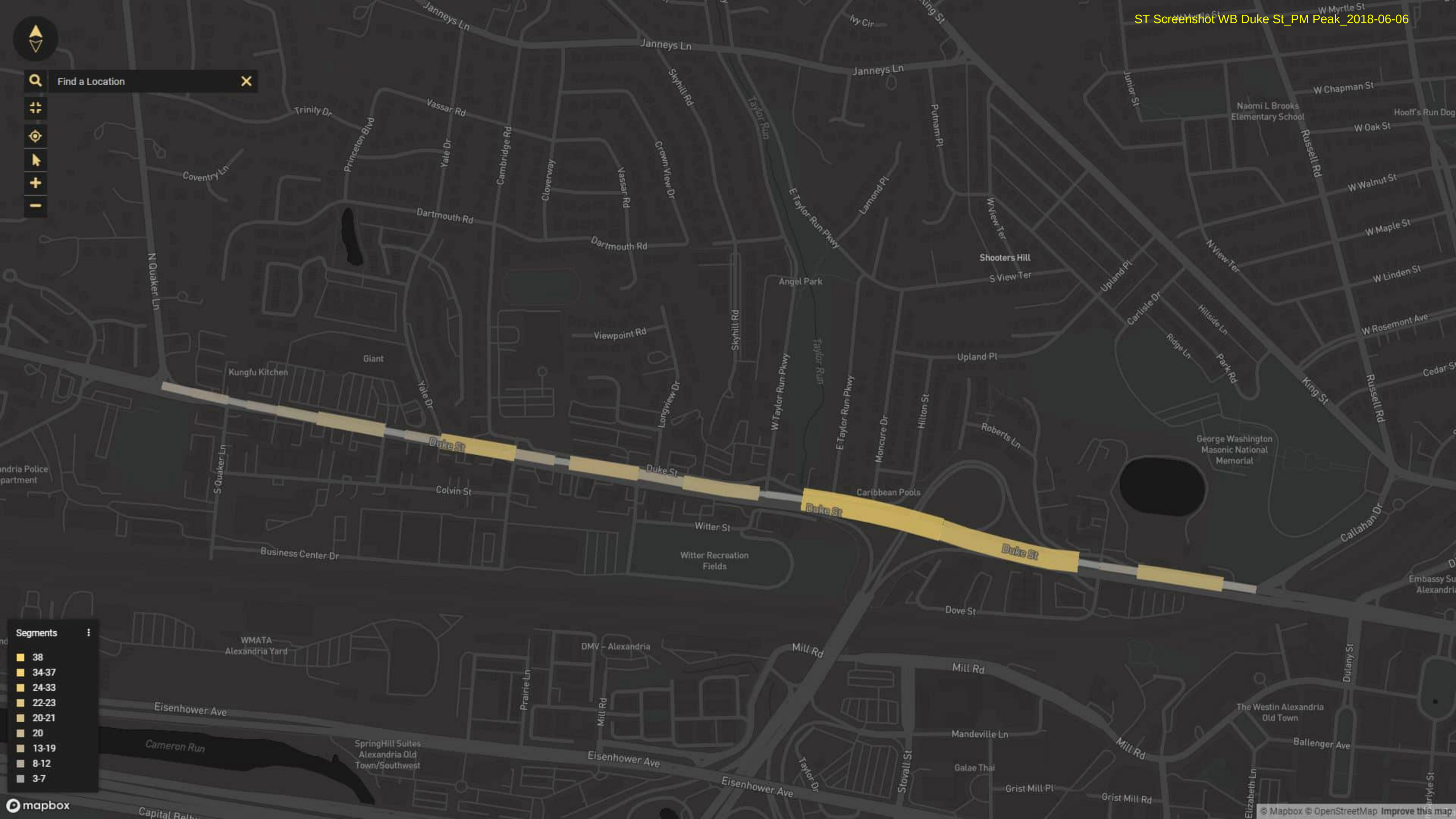
*Includes travel time runs started during peak hour











Please note when no notes are provided, it means that queues observed were for the approach and not a particular lane group.

N Quaker Ln & Duke St (Int 28)								
Time	EB	Notes	Time	WB	Notes	Time	SB	Notes
6:41	50	Maximum Queues are observed in Left Lane	6:41	150		6:41	175	
7:35	200		6:45	75		6:43	125	
7:36	200	Maximum Queues are observed in Left Lane	7:32	200		6:45	200	
8:30	100	Heavy School Bus% on SBR and EB approach	7:32	300	Maximum Queues are observed in Right Lane	7:32	175	
9:17	75		7:34	150		7:34	200	
		Light Traffic was observed after 8:20	7:35	125		8:28	175	
			7:35	300	Maximum Queues are observed in Right Lane	8:29	2500	
			8:28	150		8:30	225	
			8:30	150		9:16	350	
			8:32	275		9:17	400	
			9:15	100				
			9:15	360	Spill back continuous to upstream intersection by right movement			
			9:20	125				
			9:20	175	Maximum Queues are observed in Right Lane			

S Quaker Ln & Duke St (Int 29)								
Time	EB	Notes	Time	WB	Notes	Time	NB	Notes
6:37	50	Light Traffic was observed after 8:20	6:37	175		6:48	175	
6:39	150		6:39	275		6:00	50	
6:44	100		6:48	25		8:24	50	
6:46	100		7:36	50				
6:48	100		8:25	125				
7:30	50		9:15	20				
7:32	125							
8:25	225							
9:15	100							
9:17	150							

Alexandria Commons (West) & Duke St (Int 30)								
Time	EB	Notes	Time	WB	Notes	Time	SB	Notes
6:50	100		6:28	500		7:28	75	
7:28	200	Maximum Queues are observed in Left Lane	6:50	25				
7:39	50		7:39	75				
8:35	130		8:25	0	No queues observed in any movement			
8:36	125	8:35	150					
9:12	75	8:38	75					
9:15	100	Light Traffic was observed after 8:20	9:12	75				
			9:20	150				
			9:25	225				

Alexandria Commons (East)/Sweeley St & Duke St (Int 31)								
Time	EB	Notes	Time	WB	Notes	Time	NB/SB	Notes
6:51	1*25	Light Traffic was observed after 8:20	6:51	25	Maximum Queues are observed in Left Lane Maximum Queues are observed in Left Lane The queue is spilling back to this location from Intersection #28 (WBR movement)	6:51	50	SB
7:50	100		8:20	100		SB		
8:20	125		7:24	50		8:40	50	SB
8:40	75		7:40	50		8:40	50	NB
9:10	350		7:44	150		9:08	50	NB
			7:46	125				
			8:20	125				
			8:35	280				
			8:38	125				
			8:40	150				
			9:07	125				
			9:10	300				

Yale Dr & Duke St (Int 32)								
Time	EB	Notes	Time	WB	Notes	Time	SB	Notes
7:45	25	Queue Spill Back from Int 33	7:25	0	No queues observed in any movement	7:00	50	
7:46	150	Queue Spill Back from Int 33	8:18	0	No queues observed in any movement	7:22	125	
8:30	25	Queue Spill Back from Int 33	9:05	0	No queues observed in any movement	7:50	375	
8:40	25	Queue Spill Back from Int 33	9:06	25	Queue Spill Back from Int 31	8:40	150	
			9:06	268	Queue Spill Back from Int 31			
			9:25	380	Queue Spill Back from Int 31			

Roth St & Duke St (Int 33)								
Time	EB	Notes	Time	WB	Notes	Time	SB	Notes
6:56	150		6:56	175				
6:56	200		6:58	275				
7:18	270		7:00	635				
7:20	300		7:04	635				
7:23	150		7:16	560				
7:46	360	Spill back continuous to upstream intersection	7:18	320				
7:50	300		7:20	320				
7:52	360	Spill back continuous to upstream intersection	7:23	320				
8:15	360	Spill back continuous to upstream intersection	7:53	250				
8:16	170		7:52	730	Spill back continuous to upstream intersection			
8:20	170		7:54	730	Spill back continuous to upstream intersection			
			7:56	730	Spill back continuous to upstream intersection			
			8:15	730	Spill back continuous to upstream intersection			
			8:42	730	Spill back continuous to upstream intersection			
			8:44	520				
			8:46	730	Spill back continuous to upstream intersection			
			9:25	230				

Witter Dr & Duke St (Int 34)								
Time	EB	Notes	Time	WB	Notes	Time	SB	Notes
8:12	340	Queues observed in right lane & spilling from #35	7:57	740	Queue Spill Back from Int 31			
7:57	480	Queues observed in thru and right lane & spilling from #35	8:49	410				
			8:54	410				
			8:57	300				

From #35 to #33 right lane is spilling back around 7:55 - 8:12 atleast from #35 to EBR ramp, there is no queue.

W Taylor Run Pkwy & Duke St (Int 35)					
Time	EB	Notes	Time	WB	Notes
7:04	50		7:04	175	
7:06	100		7:06	125	
7:10	150		7:08	300	
7:13	125		7:11	300	Maximum Queues are observed in Right Lane
7:14	275		7:10	530	
7:59	750	Maximum Queues are observed in Right Lane & spilling to Int 34	8:01	430	
8:06	750	Maximum Queues are observed in Right Lane & spilling to Int 34	8:03	740	
7:59	150	Maximum Queues are observed in Thru Lane	8:05	380	Maximum Queues are observed in Right Lane
8:06	125	Maximum Queues are observed in Thru Lane	8:06	430	
8:49	75	Maximum Queues are observed in Thru Lane	8:51	330	
8:49	470	Maximum Queues are observed in Right Lane	8:53	330	
8:51	125	Maximum Queues are observed in Thru Lane	8:54	330	
8:51	470	Maximum Queues are observed in Right Lane	9:28	270	
8:56	650	Maximum Queues are observed in Right Lane			
9:28	150				

* ATT35: WBR is not having barrier for forced right movement, whereas EBR have barriers and is forced to stay in right lane to the ramps.

EB Duke St to SB Telegraph Rd Ramp (Int 36)					
Time	EB	Notes	Time	WB	Notes
7:09	0	No queues observed	check WB @35		

W Taylor Run Pkwy & Duke St (Int 35)									
Time	EB	Notes	Time	WB	Notes	Time	CS	Notes	
4:42	250	Proper processing of right movement is observed	4:40	200	Maximum Queues are observed in Right Lane	4:38	650	Spill back continuous to upstream intersection	
5:30	720	Good coordination and vehicle processing JUST near the intersection	5:30	330		4:40	650	Spill back continuous to upstream intersection	
5:30	720	Spill back continuous to upstream intersection	5:32	330		5:32	650		
5:35	720	Spill back continuous to upstream intersection	5:35	330		6:30	450		
5:40	720	Spill back continuous to upstream intersection	6:32	175		6:33	200		
6:30	720	Spill back continuous to upstream intersection	6:35	330		6:35	300		
6:35	720	Spill back continuous to upstream intersection							
6:40	720	Spill back continuous to upstream intersection							

EB Duke St to SB Telegraph Rd Ramp (Int 36)									
Time	EB	Notes	Time	WB	Notes	Time	SB	Notes	
4:40		No blockage observed on right turn ramp							
5:32		No blockage observed on right turn ramp							
5:35		No queues observed but traffic slow down							
6:30		No blockage observed on right turn ramp							



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix D: AM Existing Conditions Calibration Results

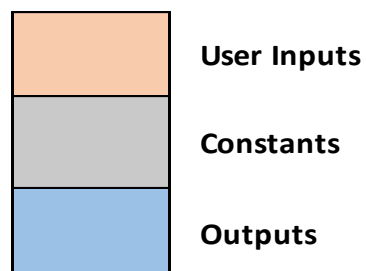


Sample Size Determination Tool, Version 2.0

Step 1: Input number of MOEs (max is 12). Clear out old data.

Step 2: Select type of MOEs

Step 3: Insert simulation results from four random seeds for selected MOEs



Sample Size (N) = Number of Model Runs

Sample Mean (Xs) = $(1/N) (X1 + X2 + X3 \dots + XN)$

Sample Standard Deviation (Ss) = $\sqrt{[(\sum(X-Xs)^2)/(N-1)]}$

Sampling Error = $t (Ss/\sqrt{N})$

Confidence Level = $Xs \pm t (Ss/\sqrt{N})$

% of Sample Mean (E) = % Tolerance * Xs Sample Size Needed = $[(t)^2 * (Ss)^2] / (E)^2$

The "t" statistic is the hypothesized number of standard deviations away from the mean corresponding to the required confidence level and sample size in a t-

Inputs

Confidence Interval:	95%
Tolerance Error:	10%
Number of MOEs:	12

Output

**Number of
Required Runs:**

8

Location (optional)	Duke St EB at Dove St		Duke St WB at Dove St		Duke St EB at W Taylor R		Duke St WB at W Taylor		Duke St EB at N Quaker		Duke St WB at N Quaker	
<i>Runs (Seeds)</i>	<i>Speed</i>	<i>Volume</i>	<i>Speed</i>	<i>Volume</i>	<i>Speed</i>	<i>Volume</i>	<i>Speed</i>	<i>Volume</i>	<i>Speed</i>	<i>Volume</i>	<i>Speed</i>	<i>Volume</i>
1	14.3	2394.7	27.8	1390.8	15.5	1846.3	6.5	2213.3	9.6	1534.0	17.1	1883.4
2	15.1	2366.0	27.3	1343.2	13.0	1917.1	7.3	2219.3	9.8	1543.5	19.0	1804.3
3	15.2	2362.2	27.3	1382.5	15.2	1888.1	6.9	2217.4	8.8	1537.4	20.1	1823.3
4	15.2	2393.0	27.6	1370.9	13.3	1920.5	6.8	2256.0	9.8	1536.8	19.7	1928.8

**Results from four random seeds*

Statistics

X_s	=	14.9	2378.9	27.5	1371.8	14.2	1893.0	6.9	2226.5	9.5	1537.9	19.0	1860.0
S_s	=	0.4	17.3	0.2	20.8	1.3	34.4	0.3	19.8	0.5	4.0	1.3	57.0
E	=	1.5	237.9	2.7	137.2	1.4	189.3	0.7	222.7	1.0	153.8	1.9	186.0
t	=	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18

Sampling Error	=	0.64	27.48	0.39	33.02	2.04	54.66	0.50	31.55	0.75	6.33	2.11	90.68
95% Interval Lower	=	14.3	2351.5	27.1	1338.8	12.2	1838.3	6.4	2195.0	8.8	1531.6	16.9	1769.3
95% Interval Upper	=	15.6	2406.4	27.9	1404.9	16.3	1947.6	7.4	2258.1	10.2	1544.3	21.1	1950.6
% of Sample Mean	=	4.26%	1.16%	1.43%	2.41%	14.34%	2.89%	7.31%	1.42%	7.87%	0.41%	11.10%	4.88%
Sample Size Needed	=	4	4	4	4	8	4	4	4	4	4	5	4



Duke Street and West Taylor Run Parkway Intersection Improvement Project

Existing AM Model Summary

AM Peak Hour: 7:30 AM – 8:30 AM

Criteria and Measures	Calibration Acceptance Targets	Current Model Standard
Hourly Flows, Model vs. Observed		AM Peak Hour
Individual Link Flows		97.5%
Within +/- 20% for <100 vph	> 85% of cases	
Within +/- 15% for ≥100 vph to <1,000 vph	> 85% of cases	
Within +/- 10% for ≥1,000 vph to <5,000 vph	> 85% of cases	
Within +/- 5% for ≥5,000 vph	> 85% of cases	
Travel Times, Model vs. Observed		
Journey Time, Network		
Within +/- 30% for arterials	> 85% of cases	100.0%
Visual Audit		
Individual Link Speeds		
Visually Acceptable Speed-Flow Relationship	To analyst's satisfaction	Acceptable
Bottlenecks		
Visually Acceptable Queuing	To analyst's satisfaction	Acceptable

Intersection Throughput

AM Peak Hour: 7:30AM – 8:30AM

Node	Intersection	Approach	Movement	Balanced Count (vph)		VISSIM Throughput (vph)		Δ		Δ %	
1	Duke St and N Quaker Ln	EB	EBL	267	1528	275	1545	8	17	3%	1%
			EBT	1261		1270		9		1%	
		WB	WBT	880	1898	837	1793	-43	-105	-5%	-6%
			WBR	1018		956		-62		-6%	
		SB	SBL	548	659	545	657	-3	-2	-1%	0%
			SBR	111		112		1		1%	
		Intersection				4085		3995		-90	



Duke Street and West Taylor Run Parkway Intersection Improvement Project

Node	Intersection	Approach	Movement	Balanced Count (vph)		VISSIM Throughput (vph)		Δ		Δ %	
2	Duke St and S Quaker Ln	EB	EBL	0	1809	0	1815	0	6	N/A	0%
			EBT	1691		1702		11		1%	
			EBR	118		113		-5		-4%	
		WB	WBL	24	1869	26	1767	2	-102	8%	-5%
			WBT	1845		1741		-104		-6%	
			WBR	0		0		N/A			
		NB	NBL	53	67	51	65	-2	-1	-4%	-1%
			NBT	0		0		N/A			
			NBR	14		15		1		7%	
		SB	SBL	2	2	2	2	0	0	0%	0%
			SBT	0		0		N/A			
			SBR	0		0		N/A			
		Intersection			3747		3649		-97		-3%
3	Duke St and Alexandria Commons	EB	EBL	40	1707	40	1718	0	11	0%	1%
			EBT	1661		1671		10		1%	
			EBR	6		7		1		17%	
		WB	WBL	0	1856	0	1751	0	-106	N/A	-6%
			WBT	1822		1719		-103		-6%	
			WBR	34		31		-3		-9%	
		NB	NBL	3	3	3	3	0	0	0%	0%
			NBT	0		0		0		N/A	
			NBR	0		0		0		N/A	
		SB	SBL	17	61	19	61	2	0	12%	0%
			SBT	0		0		N/A			
			SBR	44		42		-2		-5%	
		Intersection			3627		3533		-95		-3%



Duke Street and West Taylor Run Parkway Intersection Improvement Project

Node	Intersection	Approach	Movement	Balanced Count (vph)		VISSIM Throughput (vph)		Δ		Δ %	
4	Duke St and Sweeley St	EB	EBL	52	1678	54	1689	2	12	4%	1%
			EBT	1624		1634		10		1%	
			EBR	2		2		0		0%	
		WB	WBL	22	1911	24	1804	2	-107	9%	-6%
			WBT	1768		1668		-100		-6%	
			WBR	121		112		-9		-7%	
		NB	NBL	11	47	10	45	-1	-3	-9%	-6%
			NBT	5		5		0		0%	
			NBR	31		29		-2		-6%	
		SB	SBL	81	159	82	156	1	-3	1%	-2%
			SBT	1		1		0		0%	
			SBR	77		73		-4		-5%	
		Intersection			3795		3694		-101		-3%
5	Duke St at Roth St	EB	EBL	60	1736	56	1743	-4	7	-7%	0%
			EBT	1672		1683		11		1%	
			EBR	4		4		0		0%	
		WB	WBL	96	2252	93	2126	-4	-126	-4%	-6%
			WBT	1854		1753		-101		-5%	
			WBR	302		281		-21		-7%	
		NB	NBL	6	66	5	65	-1	-2	-17%	-3%
			NBT	6		6		0		0%	
			NBR	54		53		-1		-2%	
		SB	SBL	189	244	166	214	-23	-30	-12%	-12%
			SBT	4		3		-1		-25%	
			SBR	51		46		-6		-12%	
		Intersection			4298		4148		-151		-4%
5a	Cambridge Rd and Service Rd	EB	EBT	9	226	8	197	-2	-30	-22%	-13%
			EBR	217		189		-28		-13%	
		WB	WBL	27	27	25	25	-2	-2	-7%	-7%
			WBT	0		0		0		N/A	
		NB	NBL	359	399	308	343	-50	-56	-14%	-14%
			NBR	41		34		-6		-15%	
		Intersection			653		565		-88		-13%



Duke Street and West Taylor Run Parkway Intersection Improvement Project

Node	Intersection	Approach	Movement	Balanced Count (vph)		VISSIM Throughput (vph)		Δ		Δ %	
6	Duke St and Witter Dr	EB	EBT	1894	1915	1882	1902	-12	-13	-1%	-
			EBR	21		20		-1		-5%	1%
		WB	WBL	87	2332	81	2212	-6	-	-7%	-
			WBT	2245		2131		-114		120	-5%
		NB	NBL	7	32	7	31	0	-1	0%	-
			NBR	25		24		-1		-4%	3%
		Intersection			4279		4145		-134		-3%
7	Duke St and W Taylor Run Pkwy	EB	EBL	30	1919	27	1901	-3	-18	-10%	-
			EBT (Continue on Duke St)	928		926		-2		0%	1%
			EBT (to Telegraph Rd)	961		949		-13		-1%	-
		WB	WBT	2296	2564	2181	2429	-115	-	-5%	-
			WBR	268		248		-20		135	-7%
		SB	SBL (To Duke St)	30	354	29	350	-2	-17	-7%	-
			SBL (To Telegraph Rd)	288		284		-4		-1%	-
			SBR	36		37		1		3%	5%
		Intersection			4837		4680		-170		-4%
7a	W Taylor Run Pkwy and Service Rd	EB	EBLTR	50		49		-1		2%	
		WB	WBLTR	63		61		-2		3%	
			SBLTR	282		280		-2		1%	
		Intersection		395		390		-5		1%	
8	Duke St and S Dove St/Roberts Ln	EB	EBT	2150	2507	2052	2380	-98	-	-5%	-
			EBR	357		328		-29		127	-8%
		WB	WBT	1066	1098	1078	1111	12	12	1%	1%
			WBR	32		32		0		0%	
		NB	NBL	284	323	262	295	-22	-	-8%	-
			NBT	28		24		-4		-14%	
			NBR	11		10		-1		-9%	
		SB	SBL	16	71	15	70	-1	-2	-6%	-
			SBT	13		13		0		0%	
			SBR	42		42		-1		-2%	
		Intersection			3999		3856		-123		-3%



Duke Street and West Tavior Run Parkway Intersection Improvement Project

Travel Time | Segment-by-Segment

AM Peak Hour: 7:30AM – 8:30AM

Duke Street Eastbound Travel Time - AM Peak						
Segment	Length (mi)	StreetLight Data Travel Time (min)	Vissim Travel Time (min)	Δ (min)	Δ %	Meet TOSAM Criteria?
Eastbound Duke St (N Quaker Ln to Callahan Dr)	1.25	4.82	4.25	-0.57	-12%	TRUE
Average Speed->		15.6	17.6			
Westbound Duke St (Callahan Dr to N Quaker Ln)	1.25	4.82	4.27	-0.54	-11%	TRUE
Average Speed->		15.6	17.6			

Intersection MOE - Existing AM Peak

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	Balanced Count (vph)	VISSIM Throughput (vph)	Δ	Δ %	TOSAM Acceptance	GEH	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)						
1	Duke St and N Quaker Ln	Signalized	EBL	267	267	275	8	3%	TRUE	0	27.5	C	1545	15.1	B	18.1	B	200	63	358						
			EBT	1261	1261	1270	9	1%	TRUE	0	12.4	B						360	63	358						
			WBT	880	880	837	-43	-5%	TRUE	1	15.6	B						330	52	414						
			WBR	1018	1018	956	-62	-6%	TRUE	1	4.8	A		300	15			379								
			SBL	548	548	545	-3	-1%	TRUE	0	50.1	D		1290	124			458								
			SBR	111	111	112	1	1%	TRUE	0	34.7	C		657	47.5			D	1270	42	406					
2	Duke St and S Quaker Ln	Signalized	EBL	0	0	0	0	N/A	N/A	0	0.0	A	1815	7.2	A	6.4	A	200	62	437						
			EBT	1691	1691	1702	11	1%	TRUE	0	7.5	A						330	62	437						
			EBR	118	118	113	-5	-4%	TRUE	0	3.0	A						300	70	466						
			WBL	24	24	26	2	8%	TRUE	0	19.3	B		80	19			356								
			WBT	1845	1845	1741	-104	-6%	TRUE	2	4.0	A		210	19			356								
			WBR	0	0	0	0	N/A	N/A	0	0.0	A		210	21			370								
			NBL	53	53	51	-2	-4%	TRUE	0	46.4	D		335	17			130								
			NBT	0	0	0	0	N/A	N/A	0	0.0	A		335	17			130								
			NBR	14	14	15	1	7%	TRUE	0	27.1	C		335	13			131								
			SBL	2	2	2	0	0%	TRUE	0	38.1	D		40	0			19								
			SBT	0	0	0	0	N/A	N/A	0	0.0	A		40	0			19								
			SBR	0	0	0	0	N/A	N/A	0	0.0	A		40	0			22								
			3	Duke St and Alexandria Commons	Signalized	EBL	40	40	40	0	0%	TRUE		0	34.3			C	1718	3.2	A	5.2	A	105	10	326
						EBT	1661	1661	1671	10	1%	TRUE		0	2.4			A						210	10	326
EBR	6	6				7	1	17%	TRUE	0	1.4	A	210	12	360											
WBL	0	0				0	0	N/A	N/A	0	0.0	A	315	66	644											
WBT	1822	1822				1719	-103	-6%	TRUE	2	6.2	A	520	66	644											
WBR	34	34				31	-3	-9%	TRUE	0	11.5	B	520	24	637											
NBL	3	3				3	0	0%	TRUE	0	39.3	D	50	1	23											
NBT	0	0				0	0	N/A	N/A	0	0.0	A	50	1	23											
NBR	0	0				0	0	N/A	N/A	0	0.0	A	50	1	22											
SBL	17	17				19	2	12%	TRUE	0	56.5	E	215	9	134											
SBT	0	0				0	0	N/A	N/A	0	0.0	A	215	9	134											
SBR	44	44				42	-2	-5%	TRUE	0	17.9	B	215	12	145											
EBL	52	52				54	2	4%	TRUE	0	27.2	C	190	38	495											
EBT	1624	1624				1634	10	1%	TRUE	0	7.0	A	520	40	496											
EBR	2	2				2	0	0%	TRUE	0	2.8	A	520	41	504											
4	Duke St and Sweeley St	Signalized				WBL	22	22	24	2	9%	TRUE	0	25.2	C	1804	4.4	A		7.4	A			70	25	589
						WBT	1768	1768	1668	-100	-6%	TRUE	2	4.1	A									225	25	589
						WBR	121	121	112	-9	-7%	TRUE	1	4.3	A									225	25	605
			NBL	11	11	10	-1	-9%	TRUE	0	51.0	D	230	6	82											
			NBT	5	5	5	0	0%	TRUE	0	43.8	D	230	6	82											
			NBR	31	31	29	-2	-6%	TRUE	0	18.4	B	230	9	93											
			SBL	81	81	82	1	1%	TRUE	0	53.2	D	110	26	150											
			SBT	1	1	1	0	0%	TRUE	0	31.3	C	110	26	150											
			SBR	77	77	73	-4	-5%	TRUE	0	11.5	B	110	26	150											
			EBL	60	60	56	-4	-7%	TRUE	1	82.2	F	1743	18.4	B		16.4	B	115			196	807			
			EBT	1672	1672	1683	11	1%	TRUE	0	16.3	B							350			196	807			
			EBR	4	4	4	0	0%	TRUE	0	16.6	B							350			196	815			
			WBL	96	96	93	-4	-4%	TRUE	0	29.8	C	230	190	759											
			WBT	1854	1854	1753	-101	-5%	TRUE	2	13.1	B	670	190	759											
WBR	302	302	281	-21	-7%	TRUE	1	10.9	B	670	190	759														
NBL	6	6	5	-1	-17%	TRUE	0	35.6	D	150	6	96														
NBT	6	6	6	0	0%	TRUE	0	44.0	D	150	6	96														
NBR	54	54	53	-1	-2%	TRUE	0	14.7	B	150	7	97														
SBL	189	189	166	-23	-12%	TRUE	2	32.8	C	40	76	123														
SBT	4	4	3	-1	-25%	FALSE	1	37.8	D	40	76	123														
SBR	51	51	46	-6	-12%	TRUE	1	8.0	A	40	96	146														
51(5a)	Cambridge Rd and Service Rd	Unsignalized	EBT	9	9	8	-2	-22%	FALSE	0	252.1	F	197	245.3	F	89.5			F	1330	823	1291				
			EBR	217	217	189	-28	-13%	TRUE	2	245.0	F								1330	820	1291				
			WBL	27	27	25	-2	-7%	TRUE	0	80.2	F					825	8		74						
			WBT	0	0	0	0	N/A	N/A	0	0.0	A					825	8		87						
			NBL	359	359	308	-50	-14%	TRUE	2	0.7	A					40	3		61						
6	Duke St and Witter Dr	Signalized	NBR	41	41	34	-6	-15%	TRUE	1	0.4	A	343	0.7	A	8.0	A	40	3	61						
			EBT	1894	1894	1882	-12	-1%	TRUE	0	7.5	A						675	59	552						
			EBR	21	21	20	-1	-5%	TRUE	0	11.5	B						675	60	559						
			WBL	87	87	81	-6	-7%	TRUE	0	18.8	B						215	68	657						
			WBT	2245	2245	2131	-114	-5%	TRUE	2	7.7	A						700	68	657						
7	Duke St and W Taylor Run Pkwy	Signalized	NBL	7	7	7	0	0%	TRUE	0	47.3	D	2212	8.1	A	23.4	C	170	3	72						
			NBR	25	25	24	-1	-4%	TRUE	0	18.0	B						170	4	92						
			EBL	30	30	27	-3	-10%	TRUE	1	65.2	E						165	10	77						
			EBT (Continue on Duke St)	928	928	926	-2	0%	TRUE	0	15.9	B		710	156			786								
			EBT (to Telegraph Rd)	961	961	949	-13	-1%	TRUE	0	18.5	B		710	221			789								
			WBT	2296	2296	2181	-115	-5%	TRUE	2	21.2	C		1955	242			1394								
			WBR	268	268	248	-20	-7%	TRUE	1	49.5	D		110	131			1168								
			SBL (To Duke St)	30	30	29	-2	-7%	TRUE	0	53.0	D		140	100			470								
			SBL (To Telegraph Rd)	288	288	284	-4	-1%	TRUE	0	50.4	D		140	100			470								
			SBR	36	36	37	1	3%	TRUE	0	34.2	C		140	111			487								
71(7a)	W Taylor Run Pkwy and Service Rd	Signalized	EBL	19	19	19	0	0%	TRUE	0	23.0	C	49	28.7	C	23.0	C	70	7	84						
			EBT	8	8	8	0	0%	TRUE	0	22.3	C						70	7	84						
			EBR	23	23	22	-1	-4%	TRUE	0	36.1	D						70	7	84						
			WBL	56	56	54	-2	-4%	TRUE	0	51.0	D		320	11			98								
			WBT	6	6	7	1	17%	TRUE	0	33.7	C		320	11			98								
			WBR	0	0	0	0	N/A	N/A	0	0.0	A		320	11			98								
			NBL	15	15	14	-1	-7%	TRUE	0	5.0	A		40	2			125								
			NBT	221	221	205	-17	-8%	TRUE	1	0.9	A		40	2			144								
			NBR	62	62	57	-5	-8%	TRUE	1	0.4	A		40	2			141								
			SBL	1	1	1	0	0%	TRUE	0	23.5	C		650	72			389								
			SBT	275	275	273	-2	-1%	TRUE	0	38.0	D		650	72			389								
			SBR	6	6	6	0	0%	TRUE	0	40.7	D		180	72			389								
			8	Duke St WB and Telegraph Rd Off-ramp	Unsignalized	WBT	863	863	861	-2	0%	TRUE		0	0.3			A	861	0.3	A	1.1	A	700	0	0
						SBR	1701	1701	1580	-122	-7%	TRUE		3	1.5			A						1580	1.5	A
WBR	529	529				519	-11	-2%	TRUE	0	0.3	A	519	0.3	A	225	0	25								
10	Duke St and S Dove St/Roberts Ln	Signalized	EBT	2150	2150	2052	-98	-5%	TRUE	2	14.7	B	2380	15.0	B	14.0	B	1965	552	1496						
			EBR	357	357	328	-29	-8%	TRUE	2	17.5	B						260	154	1160						
			WBT	1066	1066	1078	12	1%	TRUE	0	9.9	A						855	30	284						
			WBR	32	32	32	0	0%	TRUE	0	6.3	A		855	0			45								
			NBL	284	284	262	-22	-8%	TRUE	1	20.6	C		185	210			1274								
			NBT	28	28	24	-4	-14%	TRUE	1	24.9	C		185	210			1274								
			NBR	11	11	10	-1	-9%	TRUE	0	21.7	C		185	208			1277								
			SBL	16	16	15	-1	-6%	TRUE	0	29.1	C		50	7			115								
			SBT	13	13	13	0	0%	TRUE	0	27.0	C		50	7			115								
SBR	42	42	42	-1	-2%	TRUE	0	6.6	A	50	7	115														



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix E: PM Existing Conditions Calibration Results



Sample Size Determination Tool, Version 2.0

Step 1: Input number of MOEs (max is 12). Clear out old data. Step 2: Select type of MOEs Step 3: Insert simulation results from four random seeds for selected MOEs	User Inputs Constants Outputs	Sample Size (N) = Number of Model Runs Sample Mean (Xs) = $(1/N) (X1 + X2 + X3 \dots + XN)$ Sample Standard Deviation (Ss) = $\sqrt{[(\sum(X-Xs)^2)/(N-1)]}$ Sampling Error = $t (Ss/\sqrt{N})$ Confidence Level = $Xs \pm t (Ss/\sqrt{N})$ % of Sample Mean (E) = % Tolerance * Xs Sample Size Needed = $[(t)^2 * (Ss)^2] / (E)^2$ <i>The "t" statistic is the hypothesized number of standard deviations away from the mean corresponding to the required confidence level and sample size in a t-</i>																																																																																																																				
Inputs Confidence Interval: 95% Tolerance Error: 10% Number of MOEs: 12		Output Number of Required Runs: 9																																																																																																																				
Location (optional) <table><thead><tr><th>Runs (Seeds)</th></tr></thead><tbody><tr><td>1</td></tr><tr><td>2</td></tr><tr><td>3</td></tr><tr><td>4</td></tr></tbody></table>	Runs (Seeds)	1	2	3	4	<table><thead><tr><th colspan="2">Duke St EB at Dove St</th><th colspan="2">Duke St WB at Dove St</th><th colspan="2">Duke St EB at W Taylor R</th><th colspan="2">Duke St WB at W Taylor</th><th colspan="2">Duke St EB at N Quaker</th><th colspan="2">Duke St WB at N Quaker</th></tr><tr><th>Speed</th><th>Volume</th><th>Speed</th><th>Volume</th><th>Speed</th><th>Volume</th><th>Speed</th><th>Volume</th><th>Speed</th><th>Volume</th><th>Speed</th><th>Volume</th></tr></thead><tbody><tr><td>12.0</td><td>1417.9</td><td>23.2</td><td>2130.9</td><td>8.2</td><td>1794.4</td><td>29.2</td><td>2356.3</td><td>6.2</td><td>1415.6</td><td>12.0</td><td>2046.6</td></tr><tr><td>11.5</td><td>1157.0</td><td>23.0</td><td>2159.1</td><td>9.2</td><td>1849.0</td><td>28.5</td><td>2387.6</td><td>6.6</td><td>1418.9</td><td>12.5</td><td>1870.7</td></tr><tr><td>11.3</td><td>1369.0</td><td>22.6</td><td>2149.0</td><td>9.2</td><td>1827.8</td><td>24.1</td><td>2345.6</td><td>7.5</td><td>1425.5</td><td>11.6</td><td>1950.0</td></tr><tr><td>10.1</td><td>1319.1</td><td>23.0</td><td>2149.2</td><td>7.6</td><td>1772.4</td><td>29.3</td><td>2365.1</td><td>7.5</td><td>1440.6</td><td>11.2</td><td>2055.5</td></tr></tbody></table> <i>*Results from four random seeds</i>	Duke St EB at Dove St		Duke St WB at Dove St		Duke St EB at W Taylor R		Duke St WB at W Taylor		Duke St EB at N Quaker		Duke St WB at N Quaker		Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	12.0	1417.9	23.2	2130.9	8.2	1794.4	29.2	2356.3	6.2	1415.6	12.0	2046.6	11.5	1157.0	23.0	2159.1	9.2	1849.0	28.5	2387.6	6.6	1418.9	12.5	1870.7	11.3	1369.0	22.6	2149.0	9.2	1827.8	24.1	2345.6	7.5	1425.5	11.6	1950.0	10.1	1319.1	23.0	2149.2	7.6	1772.4	29.3	2365.1	7.5	1440.6	11.2	2055.5																																								
Runs (Seeds)																																																																																																																						
1																																																																																																																						
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Duke St EB at Dove St		Duke St WB at Dove St		Duke St EB at W Taylor R		Duke St WB at W Taylor		Duke St EB at N Quaker		Duke St WB at N Quaker																																																																																																												
Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume	Speed	Volume																																																																																																											
12.0	1417.9	23.2	2130.9	8.2	1794.4	29.2	2356.3	6.2	1415.6	12.0	2046.6																																																																																																											
11.5	1157.0	23.0	2159.1	9.2	1849.0	28.5	2387.6	6.6	1418.9	12.5	1870.7																																																																																																											
11.3	1369.0	22.6	2149.0	9.2	1827.8	24.1	2345.6	7.5	1425.5	11.6	1950.0																																																																																																											
10.1	1319.1	23.0	2149.2	7.6	1772.4	29.3	2365.1	7.5	1440.6	11.2	2055.5																																																																																																											
Statistics <table><tbody><tr><td>Xs =</td><td>11.2</td><td>1315.8</td><td>22.9</td><td>2147.0</td><td>8.5</td><td>1810.9</td><td>27.8</td><td>2363.6</td><td>6.9</td><td>1425.1</td><td>11.8</td><td>1980.7</td></tr><tr><td>Ss =</td><td>0.8</td><td>113.3</td><td>0.2</td><td>11.7</td><td>0.8</td><td>34.1</td><td>2.5</td><td>17.8</td><td>0.7</td><td>11.1</td><td>0.6</td><td>87.5</td></tr><tr><td>E =</td><td>1.1</td><td>131.6</td><td>2.3</td><td>214.7</td><td>0.9</td><td>181.1</td><td>2.8</td><td>236.4</td><td>0.7</td><td>142.5</td><td>1.2</td><td>198.1</td></tr><tr><td>t =</td><td>3.18</td><td>3.18</td><td>3.18</td><td>3.18</td><td>3.18</td><td>3.18</td><td>3.18</td><td>3.18</td><td>3.18</td><td>3.18</td><td>3.18</td><td>3.18</td></tr></tbody></table> <table><tbody><tr><td>Sampling Error =</td><td>1.32</td><td>180.24</td><td>0.36</td><td>18.66</td><td>1.23</td><td>54.34</td><td>3.93</td><td>28.39</td><td>1.06</td><td>17.63</td><td>0.92</td><td>139.23</td></tr><tr><td>95% Interval Lower =</td><td>9.9</td><td>1135.5</td><td>22.6</td><td>2128.4</td><td>7.3</td><td>1756.6</td><td>23.8</td><td>2335.3</td><td>5.9</td><td>1407.5</td><td>10.9</td><td>1841.5</td></tr><tr><td>95% Interval Upper =</td><td>12.5</td><td>1496.0</td><td>23.3</td><td>2165.7</td><td>9.8</td><td>1865.2</td><td>31.7</td><td>2392.0</td><td>8.0</td><td>1442.8</td><td>12.7</td><td>2119.9</td></tr><tr><td>% of Sample Mean =</td><td>11.78%</td><td>13.70%</td><td>1.59%</td><td>0.87%</td><td>14.41%</td><td>3.00%</td><td>14.16%</td><td>1.20%</td><td>15.22%</td><td>1.24%</td><td>7.75%</td><td>7.03%</td></tr><tr><td>Sample Size Needed =</td><td>6</td><td>8</td><td>4</td><td>4</td><td>8</td><td>4</td><td>8</td><td>4</td><td>9</td><td>4</td><td>4</td><td>4</td></tr></tbody></table>	Xs =	11.2	1315.8	22.9	2147.0	8.5	1810.9	27.8	2363.6	6.9	1425.1	11.8	1980.7	Ss =	0.8	113.3	0.2	11.7	0.8	34.1	2.5	17.8	0.7	11.1	0.6	87.5	E =	1.1	131.6	2.3	214.7	0.9	181.1	2.8	236.4	0.7	142.5	1.2	198.1	t =	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	Sampling Error =	1.32	180.24	0.36	18.66	1.23	54.34	3.93	28.39	1.06	17.63	0.92	139.23	95% Interval Lower =	9.9	1135.5	22.6	2128.4	7.3	1756.6	23.8	2335.3	5.9	1407.5	10.9	1841.5	95% Interval Upper =	12.5	1496.0	23.3	2165.7	9.8	1865.2	31.7	2392.0	8.0	1442.8	12.7	2119.9	% of Sample Mean =	11.78%	13.70%	1.59%	0.87%	14.41%	3.00%	14.16%	1.20%	15.22%	1.24%	7.75%	7.03%	Sample Size Needed =	6	8	4	4	8	4	8	4	9	4	4	4	
Xs =	11.2	1315.8	22.9	2147.0	8.5	1810.9	27.8	2363.6	6.9	1425.1	11.8	1980.7																																																																																																										
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t =	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18	3.18																																																																																																										
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Sample Size Needed =	6	8	4	4	8	4	8	4	9	4	4	4																																																																																																										



Duke Street and West Taylor Run Parkway Intersection Improvement Project

Existing PM Model Summary

PM Peak Hour: 5:00PM – 6:00 PM

Criteria and Measures	Calibration Acceptance Targets	Current Model Standard
Hourly Flows, Model vs. Observed		PM Peak Hour
Individual Link Flows		92.0%
Within +/- 20% for <100 vph	> 85% of cases	
Within +/- 15% for ≥100 vph to <1,000 vph	> 85% of cases	
Within +/- 10% for ≥1,000 vph to <5,000 vph	> 85% of cases	
Within +/- 5% for ≥5,000 vph	> 85% of cases	
Travel Times, Model vs. Observed		
Journey Time, Network		
Within +/- 30% for arterials	> 85% of cases	100.0%
Visual Audit		
Individual Link Speeds		
Visually Acceptable Speed-Flow Relationship	To analyst's satisfaction	Acceptable
Bottlenecks		
Visually Acceptable Queuing	To analyst's satisfaction	Acceptable

Intersection Throughput

PM Peak Hour: 5:00PM – 6:00 PM

Node	Intersection	Approach	Movement	Balanced Count (vph)		VISSIM Throughput (vph)		Δ		Δ %	
1	Duke St and N Quaker Ln	EB	EBL	170	1164	168	1091	-2	-73	-1%	-6%
			EBT	994		923		-71		-7%	
		WB	WBT	1195	1898	1268	2001	73	103	6%	5%
			WBR	703		733		30		4%	
		SB	SBL	537	670	508	632	-29	-38	-5%	-6%
			SBR	133		124		-9		-7%	
		Intersection		3732		3724		-8		0%	



Duke Street and West Taylor Run Parkway Intersection Improvement Project

Node	Intersection	Approach	Movement	Balanced Count (vph)		VISSIM Throughput (vph)		Δ		Δ %	
2	Duke St and S Quaker Ln	EB	EBL	7	1531	6	1421	-1	-111	-14%	-7%
			EBT	1162		1078		-84		-7%	
			EBR	362		336		-26		-7%	
		WB	WBL	26	1827	28	1933	2	105	8%	6%
			WBT	1794		1897		103		6%	
			WBR	7		7		0		0%	
		NB	NBL	103	122	102	120	-2	-2	-2%	-2%
			NBT	0		0		0		N/A	
			NBR	19		19		0		0%	
		SB	SBL	1	2	1	2	0	0	0%	0%
			SBT	0		0		0		N/A	
			SBR	1		1		0		0%	
		Intersection			3482		3476		-8		0%
3	Duke St and Alexandria Commons	EB	EBL	62	1182	56	1098	-6	-84	-10%	-7%
			EBT	1110		1034		-76		-7%	
			EBR	10		8		-2		-20%	
		WB	WBL	7	1759	7	1874	0	115	0%	7%
			WBT	1718		1831		113		7%	
			WBR	34		36		2		6%	
		NB	NBL	16	22	15	20	-1	-2	-6%	-9%
			NBT	2		1		-1		-50%	
			NBR	4		4		0		0%	
		SB	SBL	49	144	50	141	1	-3	2%	-2%
			SBT	2		2		0		0%	
			SBR	93		89		-4		-4%	
		Intersection			3107		3133		26		1%



Duke Street and West Taylor Run Parkway Intersection Improvement Project

Node	Intersection	Approach	Movement	Balanced Count (vph)		VISSIM Throughput (vph)		Δ		Δ %	
4	Duke St and Sweeley St	EB	EBL	29	1163	27	1070	-2	-94	-7%	-8%
			EBT	1131		1041		-91		-8%	
			EBR	3		2		-1		-33%	
		WB	WBL	27	1800	31	1927	4	127	15%	7%
			WBT	1665		1782		117		7%	
			WBR	108		114		6		6%	
		NB	NBL	19	108	19	105	0	-3	0%	-3%
			NBT	6		5		-1		-17%	
			NBR	83		81		-2		-2%	
		SB	SBL	98	181	98	178	0	-3	0%	-2%
			SBT	8		7		-1		-13%	
			SBR	75		73		-2		-3%	
		Intersection			3252		3280		27		1%
5	Duke St at Roth St	EB	EBL	9	1312	7	1206	-2	-105	-22%	-8%
			EBT	1298		1196		-102		-8%	
			EBR	5		4		-1		-20%	
		WB	WBL	61	1992	67	2146	6	154	10%	8%
			WBT	1756		1888		132		8%	
			WBR	175		191		16		9%	
		NB	NBL	3	358	2	274	-1	-84	-33%	-23%
			NBT	11		9		-2		-18%	
			NBR	344		263		-81		-24%	
		SB	SBL	276	322	246	288	-30	-34	-11%	-11%
			SBT	5		6		1		20%	
			SBR	41		36		-5		-12%	
		Intersection			3984		3913		-69		-2%
5a	Cambridge Rd and Service Rd	EB	EBT	44	319	34	275	-11	-45	-25%	-14%
			EBR	275		242		-34		-12%	
		WB	WBL	47	47	46	46	-1	-1	-2%	-2%
			WBT	0		0		0		N/A	
		NB	NBL	190	225	177	208	-13	-17	-7%	-8%
			NBR	35		31		-4		-11%	
		Intersection			591		529		-63		-11%



Duke Street and West Taylor Run Parkway Intersection Improvement Project

Node	Intersection	Approach	Movement	Balanced Count (vph)		VISSIM Throughput (vph)		Δ		Δ %	
6	Duke St and Witter Dr	EB	EBT	1910	1918	1731	1737	-180	-182	-9%	-
			EBR	8		7		-2		-25%	9%
		WB	WBL	29	1997	34	2158	5	161	17%	8%
			WBT	1968		2124		156		8%	
		NB	NBL	24	95	25	94	1	-1	4%	-
			NBR	71		69		-2		-3%	1%
		Intersection			4010		3989		-22		-1%
7	Duke St and W Taylor Run Pkwy	EB	EBL	26	1981	22	1798	-4	-182	-15%	-
			EBT (Continue on Duke St)	702		643		-59		-8%	9%
			EBT (to Telegraph Rd)	1253		1134		-119		-9%	-
		WB	WBT	1978	2212	2138	2381	160	168	8%	8%
			WBR	234		242		8		3%	
		SB	SBL (To Duke St)	56	421	54	397	-2	-17	-4%	-4%
			SBL (To Telegraph Rd)	346		326		-20		-6%	
			SBR	19		17		-2		-11%	
		Intersection			4614		4575		-31		-1%
7a	W Taylor Run Pkwy and Service Rd	EB	EBLTR	81		79		-2		2%	
		WB	WBLTR	98		87		-11		11%	
		NB	SBLTR	271		270		-1		0%	
		Intersection			450		436		-14		3%
8	Duke St and S Dove St/Roberts Ln	EB	EBT	1427	1645	1369	1580	-58	-64	-4%	-
			EBR	218		212		-6		-3%	4%
		WB	WBT	2324	2365	2336	2379	12	14	1%	1%
			WBR	41		43		2		5%	
		NB	NBL	204	256	198	250	-6	-6	-3%	-2%
			NBT	31		32		1		3%	
			NBR	21		20		-1		-5%	
		SB	SBL	14	68	14	66	-1	-2	-7%	-3%
			SBT	20		20		0		0%	
			SBR	34		32		-2		-6%	
		Intersection			4334		4275		-58		-1%



Duke Street and West Tavior Run Parkway Intersection Improvement Project

Travel Time | Segment-by-Segment

PM Peak Hour 5:00 PM – 6:00 PM

PM Peak						
Segment	Length (mi)	StreetLight Data Travel Time (min)	Vissim Travel Time (min)	Δ (min)	Δ %	Meet TOSAM Criteria?
Eastbound Duke St (N Quaker Ln to Callahan Dr)	1.25	7.98	7.90	-0.09	-1%	TRUE
Average Speed->		13.1	8.7			
Westbound Duke St (Callahan Dr to N Quaker Ln)	1.25	5.13	5.33	0.19	4%	TRUE
Average Speed->		16.4	14.2			

Intersection MOE - Existing PM Peak

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	Balanced Count (vph)	VISSIM Throughput (vph)	Δ	Δ %	TOSAM Acceptance	GEH	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)					
1	Duke St and N Quaker Ln	Signalized	EBL	170	170	168	-2	-1%	TRUE	0	36.6	D	1091	48.0	D	37.8	D	200	489	1785					
			EBT	994	994	923	-71	-7%	TRUE	2	50.0	D						360	489	1785					
			WBT	1195	1195	1268	73	6%	TRUE	2	22.4	C						330	135	455					
			WBR	703	703	733	30	4%	TRUE	1	8.2	A	300	31	410										
			SBL	537	537	508	-29	-5%	TRUE	1	89.4	F	1290	341	908										
2	Duke St and S Quaker Ln	Signalized	SBR	133	133	124	-9	-7%	TRUE	1	69.2	E	632	85.4	F	22.3	C	1270	271	878					
			EBL	7	7	6	-1	-14%	TRUE	0	49.7	D						200	182	441					
			EBT	1162	1162	1078	-84	-7%	TRUE	3	39.9	D						330	182	441					
			EBR	362	362	336	-26	-7%	TRUE	1	9.0	A	300	202	471										
			WBL	26	26	28	2	8%	TRUE	0	23.5	C	80	94	367										
			WBT	1794	1794	1897	103	6%	TRUE	2	12.4	B	210	94	367										
			WBR	7	7	7	0	0%	TRUE	0	7.7	A	210	101	381										
			NBL	103	103	102	-2	-2%	TRUE	0	59.6	E	335	43	210										
			NBT	0	0	0	0	N/A	N/A	0	0.0	A	335	43	210										
			NBR	19	19	19	0	0%	TRUE	0	44.5	D	335	39	211										
			SBL	1	1	1	0	0%	TRUE	0	34.1	C	40	0	23										
			SBT	0	0	0	0	N/A	N/A	0	0.0	A	40	0	23										
			SBR	1	1	1	0	0%	TRUE	0	8.5	A	40	0	27										
			3	Duke St and Alexandria Commons	Signalized	EBL	62	62	56	-6	-10%	TRUE	1	49.4	D			1098	33.9	C	26.1	C	105	122	311
						EBT	1110	1110	1034	-76	-7%	TRUE	2	33.2	C								210	122	311
EBR	10	10				8	-2	-20%	TRUE	1	20.7	C	210	142	344										
WBL	7	7				7	0	0%	TRUE	0	14.7	B	315	158	656										
WBT	1718	1718				1831	113	7%	TRUE	3	18.1	B	520	158	656										
WBR	34	34				36	2	6%	TRUE	0	18.0	B	520	131	707										
NBL	16	16				15	-1	-6%	TRUE	0	53.3	D	50	4	50										
NBT	2	2				1	-1	-50%	FALSE	1	40.7	D	50	4	50										
NBR	4	4				4	0	0%	TRUE	0	26.0	C	50	4	49										
SBL	49	49				50	1	2%	TRUE	0	71.1	E	215	55	181										
SBT	2	2				2	0	0%	TRUE	0	52.8	D	215	55	181										
SBR	93	93				89	-4	-4%	TRUE	0	66.5	E	215	63	192										
EBL	29	29				27	-2	-7%	TRUE	0	52.4	D	190	412	687										
4	Duke St and Sweeley St	Signalized				EBT	1131	1131	1041	-91	-8%	TRUE	3	71.1	E	1070	70.6	E	34.1	C			520	412	687
						EBR	3	3	2	-1	-33%	FALSE	0	65.4	E								520	421	698
			WBL	27	27	31	4	15%	TRUE	1	23.4	C	70	96	741										
			WBT	1665	1665	1782	117	7%	TRUE	3	12.0	B	225	96	741										
			WBR	108	108	114	6	6%	TRUE	1	12.7	B	225	102	757										
			NBL	19	19	19	0	0%	TRUE	0	56.4	E	230	25	194										
			NBT	6	6	5	-1	-17%	TRUE	0	54.0	D	230	25	194										
			NBR	83	83	81	-2	-2%	TRUE	0	49.6	D	230	33	204										
			SBL	98	98	98	0	0%	TRUE	0	58.2	E	110	34	158										
			SBT	8	8	7	-1	-13%	TRUE	0	54.4	D	110	34	158										
			SBR	75	75	73	-2	-3%	TRUE	0	15.7	B	110	34	158										
			EBL	9	9	7	-2	-22%	FALSE	1	78.1	E	115	634	828										
			5	Duke St at Roth St	Signalized	EBT	1298	1298	1196	-102	-8%	TRUE	3	62.1	E	1206	62.3	E			38.8	D	350	634	828
						EBR	5	5	4	-1	-20%	TRUE	1	98.9	F								350	641	836
						WBL	61	61	67	6	10%	TRUE	1	54.3	D								230	402	772
WBT	1756	1756				1888	132	8%	TRUE	3	23.5	C	670	402	772										
WBR	175	175				191	16	9%	TRUE	1	23.5	C	670	402	772										
NBL	3	3				2	-1	-33%	FALSE	0	83.9	F	150	144	202										
NBT	11	11				9	-2	-18%	TRUE	1	81.3	F	150	144	202										
NBR	344	344				263	-81	-24%	FALSE	5	68.6	E	150	146	204										
SBL	276	276				246	-30	-11%	TRUE	2	19.0	B	40	57	117										
SBT	5	5				6	1	20%	TRUE	0	19.4	B	40	57	117										
SBR	41	41				36	-5	-12%	TRUE	1	12.2	B	40	73	141										
EBT	44	44				34	-11	-25%	FALSE	2	36.1	E	1330	51	296										
5a	Cambridge Rd and Service Rd	Unsignalized				EBR	275	275	242	-34	-12%	TRUE	2	36.9	E	275	36.8	E	25.3	D			1330	49	295
						WBL	47	47	46	-1	-2%	TRUE	0	67.9	F								825	13	98
						WBT	0	0	0	0	N/A	N/A	0	0.0	A								825	15	111
			NBL	190	190	177	-13	-7%	TRUE	1	0.7	A	40	1	45										
			NBR	35	35	31	-4	-12%	TRUE	1	0.2	A	40	1	45										
			EBT	1910	1910	1731	-180	-9%	TRUE	4	63.0	E	675	681	810										
			EBR	8	8	7	-2	-25%	FALSE	1	110.0	F	675	688	817										
			WBL	29	29	34	5	17%	TRUE	1	42.4	D	215	99	762										
			WBT	1968	1968	2124	156	8%	TRUE	3	13.9	B	700	99	762										
			NBL	24	24	25	1	4%	TRUE	0	92.8	F	170	23	178										
			NBR	71	71	69	-2	-3%	TRUE	0	54.8	D	170	33	198										
			EBL	26	26	22	-4	-15%	TRUE	1	66.9	E	165	8	63										
			7	Duke St and W Taylor Run Pkwy	Signalized	EBT (Continue on Duke St)	702	702	643	-59	-8%	TRUE	2	13.0	B	1798	26.7	C			37.9	D	710	104	795
						EBT (to Telegraph Rd)	1253	1253	1134	-119	-9%	TRUE	3	33.7	C								710	500	807
						WBT	1978	1978	2138	160	8%	TRUE	4	24.7	C								1955	325	1881
WBR	234	234				242	8	3%	TRUE	1	56.6	E	110	223	1806										
SBL (To Duke St)	56	56				54	-2	-4%	TRUE	0	155.3	F	140	737	971										
SBL (To Telegraph Rd)	346	346				326	-20	-6%	TRUE	1	145.6	F	140	737	971										
SBR	19	19				17	-2	-11%	TRUE	1	179.0	F	140	755	989										
EBL	8	8				9	1	13%	TRUE	0	97.5	F	70	46	189										
EBT	5	5				6	1	20%	TRUE	0	99.2	F	70	46	189										
EBR	66	66				62	-4	-6%	TRUE	1	111.9	F	70	46	189										
WBL	85	85				71	-14	-16%	TRUE	2	621.3	F	320	570	837										
WBT	11	11				8	-3	-27%	FALSE	1	548.7	F	320	570	837										
WBR	2	2				2	0	0%	TRUE	0	572.8	F	320	570	837										
NBL	35	35				34	-1	-3%	TRUE	0	7.3	A	40	6	124										
NBT	209	209				214	5	2%	TRUE	0	1.6	A	40	5	115										
NBR	16	16	17	1	6%	TRUE	0	0.8	A	40	7	141													
8	Duke St WB and Telegraph Rd Off-ramp	Unsignalized	SBL	0	0	0	0	N/A	N/A	0	0.0	A	266	58.1	E	107.8	F	650	122	586					
			SBT	270	270	265	-5	-2%	TRUE	0	58.2	E						650	122	586					
			SBR	1	1	1	0	0%	TRUE	0	33.0	C						180	122	585					
			WBT	916	916	918	2	0%	TRUE	0	0.2	A	700	0	0										
			SBR	1465	1465	1468	3	0%	TRUE	0	1.4	A	2400	34	846										
9	Duke St WB and Telegraph Rd On-ramp	Unsignalized	WBR	1815	1815	1646	-169	-9%	TRUE	4	0.9	A	1646	0.9	A	0.9	A	225	0	103					
			10	Duke St and S Dove St/Roberts Ln	Signalized	EBT	1427	1427	1369	-58	-4%	TRUE	2	9.8	A	1580	9.6	A	13.0	B	1965	37	375		
						EBR	218	218	212	-6	-3%	TRUE	0	8.3	A						260	7	165		
						WBT	2324	2324	2336	12	1%	TRUE	0	13.9	B						855	139	766		
						WBR	41	41	43	2	5%	TRUE	0	11.1	B	855	1	62							
NBL	204	204				198	-6	-3%	TRUE	0	26.1	C	185	51	279										
NBT	31	31				32	1	3%	TRUE	0	26.1	C	185	51	279										
NBR	21	21				20	-1	-5%	TRUE	0	17.4	B	185	50	280										
SBL	14	14				14	-1	-7%	TRUE	0	30.6	C	50	9	132										
SBT	20	20				20	0	0%	TRUE	0	23.5	C	50	9	132										
SBR	34	34				32	-2	-6%	TRUE	0	7.6	A	50	9	134										



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix F: Crash Data

OBJECTID	DOCUMENT_NBR	CRASH_YEAR	CRASH_DT	Time	CRASH_MILITARY_TM	CRASH_SEVERITY	K_PEOPLE	A_PEOPLE	B_PEOPLE	C_PEOPLE	PERSONS_INJURED	PEDESTRIANS_KILLED	PEDESTRIANS_INJURED	VEH_COUNT	COLLISION_TYPE	WEATHER_CONDITION	LIGHT_CONDITION	RD_TYPE	ROADWAY_SURFACE_COND
6025	151415115	2015	2015-05-21 17:00	11:13 AM	1113	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
7961	152555202	2015	2015-09-12 17:00	2:30 PM	1430	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
8162	152665269	2015	2015-09-23 17:00	2:57 PM	1457	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
10396	153275663	2015	2015-11-23 17:00	5:45 PM	1745	B	0	0	1	0	1	0	1	1	12. Ped	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
11317	150645346	2015	2015-03-05 17:00	4:15 PM	1615	B	0	0	2	0	2	0	0	2	1. Rear End	6. Snow	2. Daylight	NOT_RD	3. Snowy
14860	153145029	2015	2015-11-09 17:00	5:30 PM	1730	B	0	0	3	0	3	0	0	5	1. Rear End	5. Rain	4. Darkness - Road Lighted	NOT_RD	2. Wet
19267	151585097	2015	2015-06-07 17:00	6:00 AM	600	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	RD_UNKNOWN	1. Dry
21352	151255204	2015	2015-05-05 17:00	9:23 AM	923	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
22448	153225266	2015	2015-11-18 17:00	9:29 AM	929	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
23509	153075308	2015	2015-11-03 17:00	1:15 PM	1315	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
23933	150755199	2015	2015-03-16 17:00	10:50 AM	1050	B	0	0	1	0	1	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	RD_UNKNOWN	1. Dry
23988	151465450	2015	2015-05-26 17:00	4:37 PM	1637	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
24241	150545390	2015	2015-02-23 17:00	4:09 PM	1609	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	7. Other
27028	153295204	2015	2015-11-25 17:00	12:20 PM	1220	B	0	0	2	0	2	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
29874	152095347	2015	2015-07-28 17:00	8:36 PM	2036	B	0	0	1	1	2	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
33499	150625013	2015	2015-03-02 17:00	6:00 PM	1800	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
33518	152135094	2015	2015-08-01 17:00	8:04 AM	804	B	0	0	1	0	1	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
34956	152645220	2015	2015-09-21 17:00	7:30 AM	730	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
35677	153015222	2015	2015-10-28 17:00	11:00 AM	1100	O	0	0	0	0	0	0	0	2	2. Angle	5. Rain	2. Daylight	NOT_RD	2. Wet
36792	150085197	2015	2015-01-07 17:00	5:30 PM	1730	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
40710	153575227	2015	2015-12-23 17:00	11:45 AM	1145	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
42093	150045089	2015	2015-01-04 17:00	10:40 AM	1040	B	0	0	1	0	1	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	RD_RIGHT	2. Wet
43575	152745195	2015	2015-10-01 17:00	8:55 AM	855	O	0	0	0	0	0	0	0	2	2. Angle	5. Rain	2. Daylight	NOT_RD	2. Wet
43683	150555208	2015	2015-02-24 17:00	12:45 PM	1245	B	0	0	1	0	1	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
43841	152605189	2015	2015-09-17 17:00	10:10 AM	1010	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
44382	153035252	2015	2015-08-27 17:00	5:33 AM	533	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
46103	152375161	2015	2015-08-10 17:00	5:30 PM	1730	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
47500	151685161	2015	2015-06-17 17:00	9:41 AM	941	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
48139	150855126	2015	2015-03-26 17:00	9:30 AM	930	B	0	0	1	0	1	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
48164	150705284	2015	2015-03-11 17:00	2:00 PM	1400	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
48588	150665232	2015	2015-03-07 17:00	3:33 PM	1533	B	0	0	1	2	3	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
49253	152725192	2015	2015-09-29 17:00	9:31 AM	931	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
50442	152535324	2015	2015-09-10 17:00	3:33 PM	1533	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
50586	150525064	2015	2015-02-21 17:00	8:30 AM	830	B	0	0	2	0	2	0	0	2	16. Other	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
51176	153565270	2015	2015-12-22 17:00	9:30 AM	930	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	5. Rain	2. Daylight	NOT_RD	2. Wet
52357	151205378	2015	2015-04-30 17:00	2:52 PM	1452	A	0	1	0	0	1	0	1	1	12. Ped	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
53740	150565780	2015	2015-02-25 17:00	7:46 AM	746	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
54542	152515448	2015	2015-09-08 17:00	6:30 PM	1830	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
55632	151625168	2015	2015-06-11 17:00	9:58 AM	958	B	0	0	1	0	1	0	0	4	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
56507	152575347	2015	2015-09-14 17:00	2:19 PM	1419	B	0	0	1	0	1	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	RD_UNKNOWN	1. Dry
57711	151835292	2015	2015-07-02 17:00	2:20 PM	1420	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
57773	151225026	2015	2015-05-02 17:00	1:18 AM	118	B	0	0	1	0	1	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	RD_RIGHT	1. Dry
60193	150495261	2015	2015-02-18 17:00	2:30 PM	1430	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	10. Slush
65469	153235422	2015	2015-11-19 17:00	5:45 PM	1745	B	0	0	1	1	2	0	0	2	1. Rear End	5. Rain	4. Darkness - Road Lighted	NOT_RD	2. Wet
66800	152855281	2015	2015-10-12 17:00	1:49 PM	1349	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
67493	152785207	2015	2015-10-05 17:00	8:56 AM	856	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
69742	150375251	2015	2015-02-06 17:00	4:12 PM	1612	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
70259	151195106	2015	2015-04-29 17:00	7:40 AM	740	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
70592	152215228	2015	2015-08-09 17:00	1:35 PM	1335	B	0	0	1	2	3	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
72841	153365373	2015	2015-12-02 17:00	2:58 PM	1458	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
76360	151415100	2015	2015-05-21 17:00	8:55 AM	855	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
77677	151915174	2015	2015-07-10 17:00	9:47 AM	947	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
77762	151945352	2015	2015-07-13 17:00	8:32 PM	2032	O	0	0	0	0	0	0	0	2	2. Angle	5. Rain	4. Darkness - Road Lighted	NOT_RD	2. Wet
78877	151785084	2015	2015-06-27 17:00	7:15 AM	715	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	5. Rain	2. Daylight	RD_UNKNOWN	2. Wet
81133	152875277	2015	2015-10-14 17:00	8:45 AM	845	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
81195	151635296	2015	2015-06-12 17:00	4:47 PM	1647	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
81246	151205239	2015	2015-04-30 17:00	1:49 PM	1349	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
82888	152225397	2015	2015-08-10 17:00	5:20 PM	1720	O	0	0	0	0	0	0	0	4	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
83111	152115058	2015	2015-07-30 17:00	5:42 AM	542	B	0	0	1	0	1	0	1	1	12. Ped	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
84713	151125386	2015	2015-04-22 17:00	1:01 PM	1301	B	0	0	1	0	1	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
85186	153565241	2015	2015-12-22 17:00	6:40 AM	640	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	1. Dawn	NOT_RD	2. Wet
85848	152975168	2015	2015-10-24 17:00	3:24 PM	1524	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
86810	152015242	2015	2015-07-20 17:00	11:32 AM	1132	B	0	0	2	0	2	0	2	1	12. Ped	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
88117	150025141	2015	2015-01-02 17:00	12:20 PM	1220	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
91520	152265142	2015	2015-08-14 17:00	11:00 AM	1100	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
91968	153255233	2015	2015-11-21 17:00	5:00 PM	1700	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
95351	152725209	2015	2015-09-29 17:00	8:30 AM	830	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
95645	153515193	2015	2015-12-17 17:00	8:00 AM	800	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
96306	151485167	2015	2015-05-28 17:00	11:00 AM	1100	O	0	0	0	0	0</								

VDOT Crash Data_Duke Street 2015-22_8.26.22_v2.xlsx

VDOT Crash Data_Duke Street 2015-22_8.26.22_v2.xlsx

OBJECTID	DOCUMENT_NBR	CRASH_YEAR	CRASH_DT	Time	CRASH_MILITARY_TM	CRASH_SEVERITY	K_PEOPLE	A_PEOPLE	B_PEOPLE	C_PEOPLE	PERSONS_INJURED	PEDESTRIANS_KILLED	PEDESTRIANS_INJURED	VEH_COUNT	COLLISION_TYPE	WEATHER_CONDITION	LIGHT_CONDITION	RD_TYPE	ROADWAY_SURFACE_COND
138046	160755310	2016	2016-03-15 17:00	5:11 PM	1711	C	0	0	0	2	2	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
138405	160145355	2016	2016-01-06 17:00	4:00 PM	1600	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
139710	160375114	2016	2016-02-06 17:00	11:23 AM	1123	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	RD_RIGHT	1. Dry
141286	162525464	2016	2016-09-08 17:00	10:45 PM	2245	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
142899	161115198	2016	2016-04-17 17:00	5:03 PM	1703	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
147752	163415563	2016	2016-12-06 17:00	8:15 PM	2015	B	0	0	1	0	1	0	0	2	1. Rear End	5. Rain	4. Darkness - Road Lighted	NOT_RD	2. Wet
147846	160915193	2016	2016-03-31 17:00	10:52 AM	1052	B	0	0	2	1	3	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
150242	160385115	2016	2016-02-07 17:00	1:45 PM	1345	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
151130	163395267	2016	2016-12-04 17:00	4:41 PM	1641	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
153047	163515184	2016	2016-12-16 17:00	7:56 AM	756	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	5. Darkness - Road Not Lighted	NOT_RD	1. Dry
153140	163135788	2016	2016-11-08 17:00	5:56 PM	1756	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
154501	163595128	2016	2016-12-24 17:00	1:05 PM	1305	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	2. Wet
155926	160635158	2016	2016-03-03 17:00	10:35 AM	1035	B	0	0	1	2	3	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
163739	162955328	2016	2016-10-21 17:00	2:45 PM	1445	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
166959	161785048	2016	2016-06-24 17:00	1:00 PM	1300	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
172261	162315078	2016	2016-08-17 17:00	2:32 PM	1432	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
172448	162875037	2016	2016-08-18 17:00	12:20 PM	1220	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
174779	161585170	2016	2016-05-24 17:00	5:10 PM	1710	A	0	1	0	0	1	0	1	1	12. Ped	5. Rain	2. Daylight	NOT_RD	2. Wet
174933	162075340	2016	2016-07-25 17:00	6:03 PM	1803	B	0	0	1	1	2	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
176690	161395302	2016	2016-05-13 17:00	9:47 PM	2147	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
178243	163365399	2016	2016-12-01 17:00	3:32 PM	1532	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
178327	161185096	2016	2016-04-27 17:00	7:17 AM	717	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
185451	160775161	2016	2016-03-17 17:00	8:35 AM	835	C	0	0	0	1	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
185785	160505148	2016	2016-02-19 17:00	7:42 AM	742	B	0	0	1	0	1	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
189876	160135337	2016	2016-01-13 17:00	5:30 PM	1730	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
193772	161395226	2016	2016-05-18 17:00	11:45 AM	1145	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
193891	162825158	2016	2016-10-08 17:00	1:40 PM	1340	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
194344	160655173	2016	2016-03-05 17:00	3:36 PM	1536	O	0	0	0	0	0	0	0	2	15. Backed Into	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
196579	163525412	2016	2016-12-17 17:00	12:25 AM	25	B	0	0	1	0	1	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	RD_UNKNOWN	1. Dry
197643	160845286	2016	2016-03-24 17:00	6:42 PM	1842	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
197996	160725199	2016	2016-03-12 17:00	12:25 PM	1225	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
198206	160515225	2016	2016-02-20 17:00	6:29 PM	1829	B	0	0	1	0	1	0	1	1	12. Ped	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
198405	162535320	2016	2016-09-09 17:00	5:00 PM	1700	B	0	0	1	1	2	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
198526	160145138	2016	2016-01-14 17:00	9:36 AM	936	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
199580	162915295	2016	2016-10-17 17:00	11:30 AM	1130	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	RD_UNKNOWN	1. Dry
202777	161765180	2016	2016-06-24 17:00	10:50 AM	1050	B	0	0	1	0	1	0	1	1	12. Ped	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
204075	160755144	2016	2016-03-15 17:00	9:05 AM	905	O	0	0	0	0	0	0	0	2	1. Rear End	9. Other	2. Daylight	NOT_RD	2. Wet
204894	162675173	2016	2016-09-23 17:00	7:03 AM	703	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
207960	162775307	2016	2016-10-03 17:00	3:59 PM	1559	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
209828	163005125	2016	2016-10-26 17:00	6:56 AM	656	O	0	0	0	0	0	0	0	2	4. Sideswipe - Same Direction	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
214660	162665120	2016	2016-09-22 17:00	6:58 AM	658	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
218220	162635269	2016	2016-09-19 17:00	12:23 PM	1223	O	0	0	0	0	0	0	0	3	2. Angle	5. Rain	2. Daylight	NOT_RD	2. Wet
218904	161755147	2016	2016-06-21 17:00	4:41 PM	1641	B	0	0	1	0	1	0	0	1	9. Fixed Object - Off Road	5. Rain	2. Daylight	NOT_RD	2. Wet
218919	161695390	2016	2016-06-17 17:00	6:15 PM	1815	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
219268	162735226	2016	2016-09-29 17:00	10:50 AM	1050	O	0	0	0	0	0	0	0	1	16. Other	5. Rain	2. Daylight	NOT_RD	2. Wet
220749	161045298	2016	2016-04-13 17:00	3:20 PM	1520	O	0	0	0	0	0	0	0	3	16. Other	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
221588	162315280	2016	2016-08-18 17:00	4:15 PM	1615	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
224498	162525460	2016	2016-08-29 17:00	5:20 PM	1720	C	0	0	0	1	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
224827	160755162	2016	2016-03-15 17:00	10:30 AM	1030	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
226220	160995040	2016	2016-04-08 17:00	2:47 AM	247	O	0	0	0	0	0	0	0	1	16. Other	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
228747	163225122	2016	2016-11-17 17:00	7:38 AM	738	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
230373	161735320	2016	2016-06-21 17:00	1:48 PM	1348	B	0	0	1	0	1	0	0	4	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
232470	160125086	2016	2016-01-12 17:00	7:13 AM	713	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
232768	163465031	2016	2016-12-11 17:00	1:30 AM	130	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
232862	161415112	2016	2016-05-20 17:00	7:00 AM	700	C	0	0	0	1	1	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
234131	162805297	2016	2016-10-06 17:00	5:10 PM	1710	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
234207	161095301	2016	2016-04-18 17:00	7:35 AM	735	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
234354	160095133	2016	2016-01-09 17:00	10:30 AM	1030	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	5. Rain	2. Daylight	NOT_RD	2. Wet
238453	163645256	2016	2016-12-29 17:00	6:30 AM	630	B	0	0	1	0	1	0	1	1	12. Ped	5. Rain	5. Darkness - Road Not Lighted	NOT_RD	2. Wet
240657	162515038	2016	2016-09-07 17:00	2:45 AM	245	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	RD_UNKNOWN	1. Dry
241500	163265433	2016	2016-11-21 17:00	3:40 PM	1540	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	RD_UNKNOWN	1. Dry
246643	162395138	2016	2016-08-26 17:00	11:00 AM	1100	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
249499	161765091	2016	2016-06-02 17:00	7:45 AM	745	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
250712	160615314	2016	2016-03-01 17:00	3:02 PM	1502	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
250738	162885220	2016	2016-10-14 17:00	9:39 AM	939	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
250754	161545406	2016	2016-06-01 17:00	3:50 PM	1550	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
257380	173065257	2017	2017-11-01 17:00	12:45 PM	1245	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
258607	170525159	2017	2017-02-21 17:00	11:09 AM	1109	O	0	0	0	0	0	0	0	2	2. Angle	1			

PROJECT ID	RELATION TO ROADWAY	ROADWAY ALIGNMENT	ROADWAY SURFACE TYPE	ROADWAY DEFECT	ROADWAY DESCRIPTION	INTERSECTION TYPE	TRAFFIC CONTROL TYPE	TRFC CTRL STATUS TYPE	WORK_ZONE RELATED	WORK_ZONE LOCATION	WORK_ZONE TYPE	FIRST HARMFUL EVENT	FIRST HARMFUL EVENT LOC
138046	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
138405	6. Intersection at end of Ramp	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
139710	5. On Entrance/Exit Ramp	9. Other	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	28. Ran Off Road	2. Shoulder
141286	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
142899	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
147752	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	7. Slick Pavement	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
147846	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
150242	5. On Entrance/Exit Ramp	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
151130	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
153047	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
153140	5. On Entrance/Exit Ramp	10. On/Off Ramp	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
154501	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
155926	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	3. Three Approaches	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
163739	9. Within Intersection	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
166959	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	27. Other	1. On Roadway
172261	9. Within Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
172448	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
174779	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	22. Bicycle	1. On Roadway
174933	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
176690	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	15. Other Fixed Object	1. On Roadway
178243	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
178327	5. On Entrance/Exit Ramp	3. Grade - Straight	1. Concrete	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
185451	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
185785	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
189876	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	2. Two Approaches	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
193772	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
193891	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	7. Slick Pavement	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
194344	9. Within Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	3. Three Approaches	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
196579	3. Gore Area (b/w Ramp and Highway Edgelines)	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	5. Guard Rail	5. Gore
197643	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
197996	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
198206	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	19. Ped	1. On Roadway
198405	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
198526	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
199580	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	6. Parked Vehicle	1. On Roadway
202777	13. Driveway, Alley-Access - Related	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	19. Ped	8. Off Roadway, Location Unknown
204075	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
204894	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	13. Other	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
207960	1. Main-Line Roadway	1. Straight - Level	1. Concrete	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
209828	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
214660	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
218220	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
218904	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	2. Trees	4. Roadside
218919	1. Main-Line Roadway	10. On/Off Ramp	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	2. Trees	1. On Roadway
219268	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	30. Overturn (Rollover)	1. On Roadway
220749	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
221588	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
224498	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
224827	6. Intersection at end of Ramp	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	2. Two Approaches	14. Ped Crosswalk	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
226220	11. Intersection Related - Outside 150 Feet	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	13. Curb	2. Shoulder
228747	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
230373	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
232470	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
232768	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	3. Three Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	12. Building/Structure	4. Roadside
232862	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	3. Three Approaches	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
234131	9. Within Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
234207	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
234354	6. Intersection at end of Ramp	8. Dip - Curve	2. Blacktop, Asphalt, Bituminous	9. Other	4. One-Way, Not Divided	2. Two Approaches	5. Slow or Warning Sign	1. Yes - Working	2. No		2. No	8. Sign, Traffic Signal	8. Off Roadway, Location Unknown
238453	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	6. No Traffic Control Device Present	2. No		2. No	19. Ped	1. On Roadway
240657	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	15. Other Fixed Object	2. Shoulder
241500	15. Other Crossing (Crossing for Bikes, School, etc.)	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No		2. No	25. Other Movable Object	1. On Roadway
246643	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
249499	8. Non-Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	2. Yes - Working and Obscured	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
250712	9. Within Intersection	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
250738	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
250754	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
257380	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	6. Parked Vehicle	4. Roadside
258607	9. Within Intersection	1. Straight - Level	1. Concrete	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
259150	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
261157	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
266979	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
270461	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
272179	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
273369	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
273728	5. On Entrance/Exit Ramp	10. On/Off Ramp	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
274344	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
274974	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
278198	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
279536	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
280401	5. On Entrance/Exit Ramp	7. Dip - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
282458	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No		2. No	20. Motor Vehicle In Transport	1. On Roadway
284281	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	1. No Traffic Control	6. No Traffic Control Device Present	2. No		2. No		

VDOT Crash Data_Duke Street 2015-22_8.26.22_v2.xlsx

OBJECTID	DOCUMENT_NBR	CRASH_YEAR	CRASH_DT	Time	CRASH_MILITARY_TM	CRASH_SEVERITY	K_PEOPLE	A_PEOPLE	B_PEOPLE	C_PEOPLE	PERSONS_INJURED	PEDESTRIANS_KILLED	PEDESTRIANS_INJURED	VEH_COUNT	COLLISION_TYPE	WEATHER_CONDITION	LIGHT_CONDITION	RD_TYPE	ROADWAY_SURFACE_COND
330952	170595345	2017	2017-02-28 17:00	8:15 PM	2015	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	4. Darkness - Road Lighted	NOT_RD	2. Wet
331402	171675328	2017	2017-06-16 17:00	4:40 PM	1640	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
336366	170725049	2017	2017-03-13 17:00	2:00 AM	200	B	0	0	1	1	2	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	RD_UNKNOWN	1. Dry
336725	170965312	2017	2017-04-06 17:00	4:50 PM	1650	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
339623	171505041	2017	2017-05-30 17:00	3:00 AM	300	O	0	0	0	0	0	0	0	1	10. Deer	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
344499	170525244	2017	2017-02-21 17:00	2:21 PM	1421	B	0	0	1	0	1	0	0	3	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
344744	172025316	2017	2017-07-21 17:00	5:49 PM	1749	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
344954	173105528	2017	2017-11-06 17:00	8:25 PM	2025	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
349548	171985417	2017	2017-07-17 17:00	7:20 PM	1920	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
350300	171655245	2017	2017-06-14 17:00	2:00 PM	1400	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
351212	171156171	2017	2017-04-25 17:00	12:46 PM	1246	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
352729	170935012	2017	2017-04-02 17:00	11:10 PM	2310	B	0	0	2	0	2	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
356378	171645344	2017	2017-06-13 17:00	4:11 PM	1611	B	0	0	1	0	1	0	0	1	6. Fixed Object in Road	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	RD_UNKNOWN	1. Dry
362682	171645242	2017	2017-06-13 17:00	12:58 PM	1258	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
363266	172995292	2017	2017-10-26 17:00	10:50 AM	1050	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
363953	170835340	2017	2017-03-24 17:00	5:26 PM	1726	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
368996	173025366	2017	2017-10-29 17:00	7:45 PM	1945	O	0	0	0	0	0	0	0	3	1. Rear End	5. Rain	4. Darkness - Road Lighted	NOT_RD	2. Wet
370160	172875262	2017	2017-10-14 17:00	8:15 PM	2015	B	0	0	1	0	1	0	0	2	4. Sideswipe - Same Direction	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
371905	172455228	2017	2017-09-02 17:00	3:16 PM	1516	O	0	0	0	0	0	0	0	2	2. Angle	5. Rain	2. Daylight	NOT_RD	2. Wet
380359	173145003	2017	2017-11-09 17:00	6:00 PM	1800	O	0	0	0	0	0	0	0	3	1. Rear End	4. Mist	3. Dusk	NOT_RD	2. Wet
382899	183445409	2018	2018-12-10 17:00	4:15 PM	1615	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
384073	182275241	2018	2018-08-15 17:00	1:34 PM	1334	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
385832	183495203	2018	2018-12-15 17:00	12:20 PM	1220	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
386810	183415347	2018	2018-12-07 17:00	6:20 PM	1820	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
392845	182925523	2018	2018-10-19 17:00	5:39 PM	1739	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
392975	181285308	2018	2018-05-08 17:00	3:00 PM	1500	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
394851	180425046	2018	2018-02-11 17:00	1:30 AM	130	B	0	0	1	0	1	0	0	2	4. Sideswipe - Same Direction	5. Rain	4. Darkness - Road Lighted	NOT_RD	2. Wet
397149	182285320	2018	2018-08-16 17:00	5:50 PM	1750	B	0	0	1	0	1	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
398603	180585357	2018	2018-02-27 17:00	6:58 PM	1858	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
398887	181585166	2018	2018-06-07 17:00	10:13 AM	1013	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
398968	183555509	2018	2018-12-21 17:00	8:20 PM	2020	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	6. Darkness - Unknown Road Lighting	NOT_RD	2. Wet
403751	182075302	2018	2018-07-26 17:00	3:36 PM	1536	B	0	0	2	0	2	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
405084	183505162	2018	2018-12-16 17:00	1:29 PM	1329	O	0	0	0	0	0	0	0	2	2. Angle	5. Rain	2. Daylight	NOT_RD	2. Wet
406105	180065197	2018	2018-01-06 17:00	2:30 PM	1430	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
412244	183805180	2018	2018-03-19 17:00	8:44 AM	844	B	0	0	1	0	1	0	0	2	4. Sideswipe - Same Direction	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
419022	181135265	2018	2018-04-23 17:00	1:16 PM	1316	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
419225	180625215	2018	2018-03-03 17:00	12:00 PM	1200	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
422092	182715926	2018	2018-09-28 17:00	2:27 PM	1427	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
423608	182345260	2018	2018-08-22 17:00	2:00 PM	1400	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
424644	183465247	2018	2018-12-12 17:00	9:00 AM	900	O	0	0	0	0	0	0	0	4	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
424702	181575300	2018	2018-05-24 17:00	7:12 AM	712	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
425418	182225194	2018	2018-08-10 17:00	12:05 PM	1205	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
426232	182545432	2018	2018-09-11 17:00	6:57 PM	1857	B	0	0	1	0	1	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
431220	180855336	2018	2018-03-26 17:00	2:50 PM	1450	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
431405	183025525	2018	2018-10-29 17:00	5:47 PM	1747	B	0	0	1	1	2	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
433154	183405137	2018	2018-12-06 17:00	7:12 AM	712	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
434143	183185324	2018	2018-11-14 17:00	7:30 AM	730	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
435608	181375400	2018	2018-05-17 17:00	7:00 PM	1900	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	3. Dusk	NOT_RD	2. Wet
437011	182675237	2018	2018-09-24 17:00	9:20 AM	920	O	0	0	0	0	0	0	0	1	16. Other	5. Rain	2. Daylight	RD_RIGHT	2. Wet
437508	181035016	2018	2018-04-12 17:00	11:47 PM	2347	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
438704	180455221	2018	2018-02-08 17:00	5:00 PM	1700	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
439248	182235214	2018	2018-08-11 17:00	8:25 PM	2025	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
442758	181505224	2018	2018-05-30 17:00	7:40 AM	740	B	0	0	1	2	3	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
447393	180765133	2018	2018-03-17 17:00	1:00 PM	1300	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
448979	183315648	2018	2018-11-27 17:00	5:36 PM	1736	B	0	0	2	0	2	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
450120	182535426	2018	2018-09-10 17:00	5:51 PM	1751	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
453562	180555204	2018	2018-02-24 17:00	1:45 AM	145	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
453863	183625193	2018	2018-12-28 17:00	10:30 AM	1030	O	0	0	0	0	0	0	0	2	2. Angle	5. Rain	1. Dawn	NOT_RD	2. Wet
456966	182825415	2018	2018-10-09 17:00	6:00 PM	1800	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
462542	180475231	2018	2018-02-16 17:00	2:20 PM	1420	B	0	0	1	0	1	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
462930	182835261	2018	2018-10-10 17:00	12:40 PM	1240	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
463208	181655259	2018	2018-06-14 17:00	2:34 PM	1434	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
464578	182895191	2018	2018-10-16 17:00	7:15 AM	715	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
467263	182135003	2018	2018-07-27 17:00	4:30 PM	1630	B	0	0	1	0	1	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
467342	181735486	2018	2018-06-22 17:00	7:20 PM	1920	B	0	0	1	1	2	0	0	3	1. Rear End	5. Rain	3. Dusk	NOT_RD	2. Wet
468170	180345117	2018	2018-02-03 17:00	8:30 AM	830	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
475060	183605357	2018	2018-12-26 17:00	6:30 PM	1830	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
475126	183305357	2018	2018-11-26 17:00	10:50 AM	1050	B	0	0	1	1	2	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	

PROJECT ID	RELATION TO ROADWAY	ROADWAY ALIGNMENT	ROADWAY SURFACE TYPE	ROADWAY DEFECT	ROADWAY DESCRIPTION	INTERSECTION TYPE	TRAFFIC CONTROL TYPE	TRFC CTRL STATUS TYPE	WORK ZONE RELATED	WORK ZONE LOCATION	WORK ZONE TYPE	FIRST HARMFUL EVENT	FIRST HARMFUL EVENT LOC
330952	5. On Entrance/Exit Ramp	10. On/Off Ramp	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
331402	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
336366	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			2. Trees	6. Separator
336725	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
339623	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			23. Animal	1. On Roadway
344499	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
344744	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
344954	5. On Entrance/Exit Ramp	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
349548	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
350300	9. Within Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
351212	6. Intersection at end of Ramp	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	2. Two Approaches	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
352729	13. Driveway, Alley-Access - Related	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	6. Traffic Lanes Marked	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
356378	7. Other location not listed above within an interchange area (median, shoulder , roadside)	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	13. Other	1. Yes - Working	2. No			16. Other Traffic Barrier	1. On Roadway
362682	13. Driveway, Alley-Access - Related	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
363266	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
363953	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
368996	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
370160	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
371905	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
380359	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
382899	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
384073	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
385832	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
386810	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
392845	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
392975	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			25. Other Movable Object	1. On Roadway
394851	10. Intersection Related - Within 150 Feet	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
397149	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
398603	9. Within Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
398887	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
398968	1. Main-Line Roadway	5. Hillcrest - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
403751	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
405084	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	3. Three Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
406105	5. On Entrance/Exit Ramp	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
412244	1. Main-Line Roadway	1. Straight - Level	1. Concrete	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
419022	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	3. Three Approaches	4. Stop Sign	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
419225	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
422092	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
423608	11. Intersection Related - Outside 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
424644	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
424702	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
425418	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
426232	7. Other location not listed above within an interchange area (median, shoulder , roadside)	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			35. Cross Median	3. Median
431220	5. On Entrance/Exit Ramp	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	2. Yes - Working and Obscured	2. No			20. Motor Vehicle In Transport	1. On Roadway
431405	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
433154	1. Main-Line Roadway	7. Dip - Straight	1. Concrete	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
434143	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
435608	5. On Entrance/Exit Ramp	10. On/Off Ramp	1. Concrete	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
437011	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			28. Ran Off Road	8. Off Roadway, Location Unknown
437508	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
438704	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
439248	6. Intersection at end of Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	6. Roundabout	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
442758	3. Gore Area (btw Ramp and Highway Edgelines)	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			25. Other Movable Object	1. On Roadway
447393	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
448979	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
450120	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
453562	5. On Entrance/Exit Ramp	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			3. Utility Pole	1. On Roadway
453863	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	3. Three Approaches	4. Stop Sign	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
456966	1. Main-Line Roadway	1. Straight - Level	1. Concrete	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
462542	9. Within Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
462930	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
463208	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
464578	5. On Entrance/Exit Ramp	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
467263	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	3. Three Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
467342	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
468170	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			5. Guard Rail	3. Median
475060	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
475126	10. Intersection Related - Within 150 Feet	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
477835	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
480673	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
481965	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			3. Utility Pole	1. On Roadway
484803	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
487413	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	3. Three Approaches	4. Stop Sign	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
489659	3. Gore Area (btw Ramp and Highway Edgelines)	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	9. One Way Road or Street	1. Yes - Working	2. No			3. Utility Pole	3. Median
495028	1. Main-Line Roadway	3. Grade - Straight	1. Concrete	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
496079	5. On Entrance/Exit Ramp	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
496359	5. On Entrance/Exit Ramp	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
499396	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	2. Two Approaches	5. Slow or Warning Sign	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
503714	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
504554	9. Within Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
506143	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
508870	1. Main-Line Roadway	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
509335	5. On Entrance/Exit Ramp	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
509399	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present					

OBJECTID	ALCOHOL	NOTALCOHOL	BELTED	UNBELTED	BIKE	NONBIKE	DISTRACTED	NOTDISTRACTED	DROWSY	NOTDROWSY	DRUG	NOBRUG	GR	NOGR	HITRUN	NOT_HITRUN	LGTRUCK	NONLGTRUCK	MOTOR	NONMOTOR	PED	NONPED	SPEED	NOTSPEED	SCHOOL_ZONE	SENIOR	NOTSENIOR	YOUNG	NOTYOUNG	MAINLINE_YN	NIGHT	VDOT_DISTRICT	JURIS_CODE	PHYSICAL_JURIS
330952	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
331402	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
336366	Yes		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
336725	No		Belted		No		No	Yes	No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
339623	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	Yes	No	Yes	9. Northern Virginia	100	100. City of Alexandria	
344499	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
344744	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
344954	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
349548	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
350300	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
351212	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
352729	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
356378	No		Belted		No		No		No		Yes		No		No		No		No		No		No		3. No	No	Yes	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
362682	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
363266	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
363953	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
368996	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
370160	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
371905	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
380359	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
382899	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
384073	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
385832	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
386810	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
392845	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
392975	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
394851	Yes		Belted		No		No		No		No		No		Yes		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
397149	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
398603	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No	No	No	Yes	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
398887	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
398968	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	Yes	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
403751	No		Belted		No		Yes		No		No		No		No		No		No		No		Yes		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
405084	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
406105	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
412244	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
419022	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
419225	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
422092	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
423608	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
424644	No		Belted		No		Yes		No		No		No		No		No		No		No		Yes		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
424702	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
425418	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
426232	Yes		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
431220	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
431405	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No	No	No	Yes	No	No	9. Northern Virginia	100	100. City of Alexandria	
433154	No		Belted		No		No		No		No		No		No		Yes		No		No		No		3. No	No	No	Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
434143	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
435608	No		Belted		No		No		No		No		Yes		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
437011	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
437508	No		Belted		No		No		No		No		No		Yes		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
438704	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
439248	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
442758	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
447393	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
448979	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
450120	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
453562	Yes		Belted		No		Yes		Yes		No		No		No		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
453863	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
456966	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
462542	No		Belted		No		No		No		No		No		No		Yes		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
462930	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
463208	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
464578	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
467263	No		Belted		No		No		No		No		No		Yes		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
467342	No		Belted																															

OBJECTID	FUN	FAC	AREA	TYPE	SYSTEM	VSP	OWNERSHIP	INTERSECTION_ANALYSIS	PLAN_DISTRICT	MPO_NAME	RTE_MM	RNS_MP	NODE	OFFSET	ANIMAL	SPEED_DIFF	MAX
330952	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	14.04	100282	444	No		
331402	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.68	756267	1183	No		
336366	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	14.45	100021	591	No		
336725	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.81	756267	470	No		
339623	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00B	0.19	100024	549	Yes		
344499	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	14.35	100022	148	No		
344744	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.68	756267	1140	No		
344954	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	14.04	100282	444	No		
349548	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00B	0.24	100024	275	No		
350300	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.83	756267	385	No		
351212	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00B	0.23	100024	296	No		
352729	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.6	756267	1568	No		
356378	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB RMP014.00A	0.14	756267	723	No		
362682	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.48	100026	1093	No		
363266	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	14.36	100022	222	No		
363953	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB RMP014.00A	0.29	100022	1531	No		
368996	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.75	756267	776	No		
370160	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.71	756267	1019	No		
371905	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	14.35	100022	148	No		
380359	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.73	756267	871	No		
382899	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.52	100026	1320	No		
384073	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB RMP014.00A	0			No		
385832	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB RMP014.00A	0.1			No		
386810	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.84	756267	301	No		
392845	7-Local (J,6)		Urban	NonVDOT secondary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	S-VA100PR CAMBRIDGE RD	0.08			No		
392975	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	14.33	100022	69	No		
394851	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.59	756267	1653	No		
397149	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.79	756267	602	No		
398603	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.82	756267	412	No		
398887	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.52	100026	1341	No		
398968	4-Minor Arterial (H,3)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB	1.8	278992	898	No		
403751	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.85	756267	280	No		24
405084	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.6	756267	1595	No		
406105	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB RMP014.00A	0.15			No		
412244	4-Minor Arterial (H,3)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB	1.8	278992	898	No		
419022	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.6	756267	1568	No		
419225	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.7	756267	1072	No		
422092	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.79	756267	586	No		
423608	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.79	756267	597	No		
424644	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.8	756267	502	No		1
424702	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	14.22	100023	53	No		
425418	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB	14.02	100282	301	No		
426232	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	14.22	100023	48	No		
431220	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB RMP014.00A	0			No		
431405	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.75	756267	803	No		
433154	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	14	100282	206	No		
434143	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB RMP014.00A	0.13			No		
435608	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB RMP014.00A	0.18	100022	972	No		
437011	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB RMP014.00A	0.11	100022	602	No		
437508	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.95	100282	74	No		
438704	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB	14.43	100022	560	No		
439248	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00B	0.23	100024	301	No		
442758	4-Minor Arterial (H,3)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB	1.8	278992	898	No		
447393	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.67	756267	1236	No		
448979	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.84	756267	338	No		
450120	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	14.34	100022	100	No		
453562	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.92	756267	121	No		
453863			Urban	NonVDOT secondary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	S-VA100PR DUKE ST SERVICE A RD	0.3	756267	306	No		
456966	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB RMP014.00A	0	100022	0	No		
462542	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.67	756267	1204	No		
462930	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.6	756267	1568	No		
463208	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.83	756267	348	No		
464578	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB RMP014.00A	0.11			No		
467263	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.6	756267	1568	No		
467342	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.84	756267	322	No		
468170	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	14.34	100022	132	No		5
475060	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.69	756267	1082	No		
475126	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.7	756267	1030	No		
477835	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.95	100282	63	No		
480673	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.84	756267	312	No		
481965	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.54	100026	1404	No		
484803	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.49	100026	1151	No		
487413	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.6	756267	1595	No		10
489659	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00B	0.23	100024	322	No		
495028	4-Minor Arterial (H,3)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB	1.8	278992	898	No		
496079	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB RMP014.00A	0.11			No		
496359	4-Minor Arterial (H,3)	4-Two-Way Divided	Urban	NonVDOT primary	7	3	City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241SB	1.8	278992	887	No		</

OBJECTID	DOCUMENT_NBR	CRASH_YEAR	CRASH_DT	Time	CRASH_MILITARY_TM	CRASH_SEVERITY	K_PEOPLE	A_PEOPLE	B_PEOPLE	C_PEOPLE	PERSONS_INJURED	PEDESTRIANS_KILLED	PEDESTRIANS_INJURED	VEH_COUNT	COLLISION_TYPE	WEATHER_CONDITION	LIGHT_CONDITION	RD_TYPE	ROADWAY_SURFACE_COND
555176	191525176	2019	2019-06-01 17:00	3:15 PM	1515	O	0	0	0	0	0	0	0	2	5. Sideswipe - Opposite Direction	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
555316	190385363	2019	2019-02-04 17:00	11:50 AM	1150	B	0	0	2	0	2	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
556200	190575228	2019	2019-02-24 17:00	2:30 PM	1430	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
556841	190265274	2019	2019-01-26 17:00	9:18 PM	2118	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
558668	192375169	2019	2019-08-24 17:00	9:22 PM	2122	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
559475	192355371	2019	2019-08-23 17:00	6:05 PM	1805	O	0	0	0	0	0	0	0	3	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
559485	190525249	2019	2019-02-21 17:00	11:20 AM	1120	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	2. Wet
560917	192825177	2019	2019-10-09 17:00	8:40 AM	840	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
562647	192955387	2019	2019-10-22 17:00	3:51 PM	1551	O	0	0	0	0	0	0	0	2	2. Angle	5. Rain	2. Daylight	NOT_RD	2. Wet
563093	191615291	2019	2019-06-10 17:00	7:14 AM	714	O	0	0	0	0	0	0	0	3	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
563767	193445305	2019	2019-12-10 17:00	7:40 AM	740	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
566474	192275193	2019	2019-08-14 17:00	5:22 PM	1722	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
568495	190105356	2019	2019-01-10 17:00	2:55 PM	1455	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
570962	193165413	2019	2019-11-12 17:00	1:07 PM	1307	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
573178	191035171	2019	2019-04-13 17:00	12:07 PM	1207	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
575318	193365413	2019	2019-12-02 17:00	12:10 PM	1210	A	0	1	1	0	2	0	0	1	9. Fixed Object - Off Road	5. Rain	2. Daylight	RD_UNKNOWN	2. Wet
580029	192885441	2019	2019-10-15 17:00	2:51 PM	1451	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
581574	192865175	2019	2019-10-13 17:00	1:40 PM	1340	B	0	0	1	0	1	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
582349	192545175	2019	2019-09-10 17:00	5:24 PM	1724	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
583232	192765397	2019	2019-09-24 17:00	10:48 AM	1048	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
584073	192615176	2019	2019-09-15 17:00	1:10 PM	1310	C	0	0	0	1	1	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
585550	192345216	2019	2019-08-22 17:00	11:15 AM	1115	O	0	0	0	0	0	0	0	2	16. Other	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
587239	191415436	2019	2019-05-20 17:00	5:35 PM	1735	B	0	0	1	0	1	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
588738	191305252	2019	2019-05-10 17:00	2:59 PM	1459	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
589291	193365377	2019	2019-12-02 17:00	12:30 PM	1230	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
589700	191455090	2019	2019-05-25 17:00	7:43 AM	743	B	0	0	1	0	1	0	0	1	16. Other	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
593021	191175263	2019	2019-04-27 17:00	6:25 PM	1825	B	0	0	2	1	3	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
593566	193425113	2019	2019-12-08 17:00	11:02 AM	1102	B	0	0	3	0	3	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
594120	190745001	2019	2019-03-14 17:00	9:59 PM	2159	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
594831	190925259	2019	2019-04-02 17:00	1:05 PM	1305	B	0	0	1	0	1	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	RD_UNKNOWN	1. Dry
595040	190185330	2019	2019-01-18 17:00	4:18 PM	1618	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
598855	191245170	2019	2019-05-04 17:00	12:17 PM	1217	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
606320	193535225	2019	2019-12-18 17:00	5:32 PM	1732	O	0	0	0	0	0	0	0	4	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
606372	192955401	2019	2019-09-22 17:00	11:35 AM	1135	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
607977	192225157	2019	2019-08-10 17:00	1:08 PM	1308	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
608030	190855191	2019	2019-03-26 17:00	9:05 AM	905	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
611115	191245195	2019	2019-05-04 17:00	3:40 PM	1540	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
612783	190045167	2019	2019-01-04 17:00	8:53 AM	853	B	0	0	1	0	1	0	0	1	8. Non-Collision	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
613133	192965507	2019	2019-10-20 17:00	7:36 PM	1936	O	0	0	0	0	0	0	0	1	8. Non-Collision	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	RD_UNKNOWN	2. Wet
614473	191445303	2019	2019-05-24 17:00	5:35 PM	1735	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
616770	191025241	2019	2019-04-12 17:00	1:05 PM	1305	B	0	0	1	1	2	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
621760	191455114	2019	2019-05-25 17:00	11:03 AM	1103	B	0	0	2	0	2	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
623275	191395081	2019	2019-05-19 17:00	6:00 AM	600	B	0	0	1	1	2	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
625906	193185457	2019	2019-11-14 17:00	4:00 PM	1600	B	0	0	2	0	2	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
626635	190995254	2019	2019-04-09 17:00	8:08 AM	808	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
628474	190175128	2019	2019-01-16 17:00	2:40 PM	1440	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
630467	191455138	2019	2019-05-25 17:00	1:20 PM	1320	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
635773	190605410	2019	2019-03-01 17:00	7:15 PM	1915	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	4. Darkness - Road Lighted	NOT_RD	2. Wet
636520	200085427	2019	2019-11-16 17:00	7:33 AM	733	K	1	0	0	0	0	1	0	1	12. Ped	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
636603	190935305	2019	2019-04-03 17:00	6:15 PM	1815	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
637335	190615066	2019	2019-03-02 17:00	9:00 AM	900	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
640057	192645159	2019	2019-09-21 17:00	10:00 AM	1000	O	0	0	0	0	0	0	0	3	4. Sideswipe - Same Direction	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
640143	190985352	2019	2019-04-08 17:00	4:30 PM	1630	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
640960	191835345	2019	2019-07-02 17:00	1:55 PM	1355	B	0	0	1	2	3	0	0	3	16. Other	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
641081	190615167	2019	2019-03-02 17:00	2:36 PM	1436	O	0	0	0	0	0	0	0	3	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
643322	202865378	2020	2020-10-12 17:00	3:30 PM	1530	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	2. Daylight	NOT_RD	2. Wet
643863	203205152	2020	2020-11-10 17:00	3:57 PM	1557	B	0	0	1	2	3	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
648379	203295438	2020	2020-11-24 17:00	8:30 PM	2030	C	0	0	0	1	0	0	0	2	4. Sideswipe - Same Direction	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
649587	202925086	2020	2020-10-18 17:00	1:30 PM	1330	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
649721	200355295	2020	2020-02-04 17:00	4:50 PM	1650	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
650362	203365197	2020	2020-12-01 17:00	9:00 AM	900	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	5. Rain	2. Daylight	RD_UNKNOWN	2. Wet
650665	200165299	2020	2020-01-16 17:00	3:57 PM	1557	B	0	0	1	1	2	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
652043	202175004	2020	2020-08-03 17:00	6:18 PM	1818	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	5. Rain	2. Daylight	RD_UNKNOWN	2. Wet
655364	201925221	2020	2020-07-10 17:00	6:15 PM	1815	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
657485	202405238	2020	2020-08-27 17:00	1:50 PM	1350	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
660270	200755150	2020	2020-03-15 17:00	1:41 PM	1341	B	0	0	2	0	2	0	0	2	16. Other	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
667235	202905335	2020	2020-10-16 17:00	7:45 PM	1945	C	0	0	0	1	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
668015	200395066	2020	2020-02-05 17:00	2:55 PM	145														

SECTION	RELATION TO ROADWAY	ROADWAY ALIGNMENT	ROADWAY SURFACE TYPE	ROADWAY DEFECT	ROADWAY DESCRIPTION	INTERSECTION TYPE	TRAFFIC CONTROL TYPE	TRFC CTRL STATUS TYPE	WORK_ZONE RELATED	WORK_ZONE LOCATION	WORK_ZONE TYPE	FIRST HARMFUL EVENT	FIRST HARMFUL EVENT LOC
555176	9. Within Intersection	1. Straight - Level	1. Concrete	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
555316	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	5. Five-Point, or More	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
556200	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
556841	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
558668	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
559475	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
559485	5. On Entrance/Exit Ramp	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
560917	8. Non-Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
562647	5. On Entrance/Exit Ramp	10. On/Off Ramp	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
563093	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
563767	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
566474	10. Intersection Related - Within 150 Feet	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	2. Yes - Working and Obscured	2. No			20. Motor Vehicle In Transport	1. On Roadway
568495	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
570962	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
573178	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
575318	5. On Entrance/Exit Ramp	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			3. Utility Pole	8. Off Roadway, Location Unknown
580029	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
581574	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
582349	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
583232	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
584073	1. Main-Line Roadway	1. Straight - Level	1. Concrete	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
585550	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
587239	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	13. Other	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
588738	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
589291	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
589700	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			15. Other Fixed Object	1. On Roadway
593021	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
593566	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
594120	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
594831	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			8. Sign, Traffic Signal	1. On Roadway
595040	5. On Entrance/Exit Ramp	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
598855	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
606320	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
606372	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
607977	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
608030	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
611115	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
612783	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			42. Other Non-Collision	1. On Roadway
613133	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			35. Cross Median	1. On Roadway
614473	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
616770	5. On Entrance/Exit Ramp	10. On/Off Ramp	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
621760	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
623275	1. Main-Line Roadway	1. Straight - Level	1. Concrete	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
625906	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
626635	1. Main-Line Roadway	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
628474	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
630467	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
635773	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	7. Slick Pavement	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
636520	9. Within Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			19. Ped	1. On Roadway
636603	10. Intersection Related - Within 150 Feet	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
637335	1. Main-Line Roadway	7. Dip - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
640057	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
640143	1. Main-Line Roadway	1. Straight - Level	1. Concrete	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
640960	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
641081	9. Within Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
643322	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
643863	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
648379	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
649587	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
649721	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
650362	1. Main-Line Roadway	10. On/Off Ramp	2. Blacktop, Asphalt, Bituminous	7. Slick Pavement	4. One-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			15. Other Fixed Object	1. On Roadway
650665	10. Intersection Related - Within 150 Feet	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
652043	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			14. Ditch	2. Shoulder
655364	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
657485	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
660270	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
667235	10. Intersection Related - Within 150 Feet	7. Dip - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
668015	10. Intersection Related - Within 150 Feet	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
668061	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
668197	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
669164	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
670766	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
674068	7. Other location not listed above within an interchange area (median, shoulder , roadside)	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			8. Sign, Traffic Signal	2. Shoulder
677252	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
678212	5. On Entrance/Exit Ramp	8. Dip - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	5. Unknown	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			3. Utility Pole	2. Shoulder
679230	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
680206	5. On Entrance/Exit Ramp	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No			5. Guard Rail	5. Gore
688632	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
692180	6. Intersection at end of Ramp	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
692589	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	4. Stop Sign	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
692873	5. On Entrance/Exit Ramp	10. On/Off Ramp	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	2. Two Approaches	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
696221	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
697278	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
699149	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			28. Ran Off Road	4. Road

OBJECTID	ALCOHOL	NOTALCOHOL	BELTED	UNBELTED	BIKE	NONBIKE	DISTRACTED	NOTDISTRACTED	DROWSY	NOTDROWSY	DRUG	NOTDRUG	GR_NOGR	HITRUN	NOT_HITRUN	LGTRUCK	NONLGTRUCK	MOTOR	NONMOTOR	PED	NONPED	SPEED	NOTSPEED	SCHOOL_ZONE	SENIOR	NOTSENIOR	YOUNG	NOTYOUNG	MAINLINE_YN	NIGHT	VDOT_DISTRICT	JURIS_CODE	PHYSICAL_JURIS
555176	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
555316	No		Belted		No		No		No		No		No	No		Yes		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
556200	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
556841	No		Belted		No		No	Yes	No		No		No	No		No		No		No		No		3. No	No	Yes	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
558668	No		Belted		No		Yes		Yes		No		No	No		No		No		No		No		3. No	No	No	Yes	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
559475	No		Belted		No		Yes		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
559485	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
560917	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
562647	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
563093	No		Belted		No		Yes		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
563767	No		Belted		No		Yes		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
566474	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
568495	No		Belted		No		Yes		No		No		No	No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
570962	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
573178	No		Belted		No		Yes		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
575318	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
580029	No		Belted		No		Yes		No		No		No	No		Yes		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
581574	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
582349	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
583232	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
584073	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	Yes	No	Yes	9. Northern Virginia	100	100. City of Alexandria	
585550	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
587239	No		Belted		No		Yes		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
588738	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
589291	No		Belted		No		No		No		No		No	No		Yes		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
589700	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
593021	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
593566	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
594120	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
594831	No		Belted		No		Yes		No		No		No	No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
595040	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
598855	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
606320	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
606372	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
607977	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	Yes	Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
608030	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
611115	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
612783	No		Belted		No		No		No		No		No	No		No		Yes		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
613133	Yes		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	No	Yes	9. Northern Virginia	100	100. City of Alexandria	
614473	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
616770	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
621760	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
623275	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
625906	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
626635	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
628474	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
630467	No		Belted		No		Yes		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
635773	No		Belted		No		Yes		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
636520	No		Belted		No		Yes		No		No		No	No		No		No		Yes		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
636603	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
637335	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
640057	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
640143	No		Belted		No		No		No		No		No	No		No		No		No		Yes		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
640960	No		Belted		No		Yes		No		No		No	No		Yes		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
641081	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
643322	No		Belted		No		Yes		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
643863	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
648379	No		Belted		No		No		No		No		No	No		No		No		No		Yes		3. No	No	No	Yes	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
649587	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	Yes	Yes	Yes	9. Northern Virginia	100	100. City of Alexandria	
649721	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
650362	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
650665	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
652043	No		Belted		No		No		No		No		No	No		No		No		No		Yes		3. No	No	No	No	No	No	9. Northern Virginia	100	100. City of Alexandria	
655364	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
657485	No		Belted		No		No		No		No		No	No		No		No		No		No		3. No	No	No	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria	
660270	No		Unbelted		No		No		No		No		No	No		No		No		No													

VDOT Crash Data_Duke Street 2015-22_8.26.22_v2.xlsx

OBJECTID	DOCUMENT_NBR	CRASH_YEAR	CRASH_DT	Time	CRASH_MILITARY_TM	CRASH_SEVERITY	K_PEOPLE	A_PEOPLE	B_PEOPLE	C_PEOPLE	PERSONS_INJURED	PEDESTRIANS_KILLED	PEDESTRIANS_INJURED	VEH_COUNT	COLLISION_TYPE	WEATHER_CONDITION	LIGHT_CONDITION	RD_TYPE	ROADWAY_SURFACE_COND
739867	201325211	2020	2020-05-11 17:00	2:30 PM	1430	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
741639	202775117	2020	2020-10-03 17:00	11:43 AM	1143	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
750730	211985184	2021	2021-07-17 17:00	5:20 PM	1720	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
755892	212835048	2021	2021-09-21 17:00	6:03 AM	603	B	0	0	1	0	1	0	0	2	3. Head On	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
761122	211225095	2021	2021-05-02 17:00	8:05 AM	805	B	0	0	1	0	1	0	0	1	8. Non-Collision	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
761806	211885328	2021	2021-07-07 17:00	6:13 PM	1813	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
762554	213205253	2021	2021-11-16 17:00	8:00 AM	800	O	0	0	0	0	0	0	0	4	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
765042	211485028	2021	2021-05-22 17:00	7:31 PM	1931	O	0	0	0	0	0	0	0	4	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
769646	213085467	2021	2021-11-04 17:00	8:00 PM	2000	O	0	0	0	0	0	0	0	2	3. Head On	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	RD_UNKNOWN	1. Dry
769696	212705277	2021	2021-09-27 17:00	7:48 AM	748	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	1. Dawn	NOT_RD	1. Dry
771353	211475305	2021	2021-05-27 17:00	4:42 PM	1642	O	0	0	0	0	0	0	0	2	4. Sideswipe - Same Direction	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
773535	212885304	2021	2021-10-15 17:00	2:30 PM	1430	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
777176	210415030	2021	2021-01-19 17:00	10:53 AM	1053	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
779491	210475352	2021	2021-02-16 17:00	7:57 PM	1957	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
780711	210655013	2021	2021-03-05 17:00	10:20 PM	2220	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
780883	213175280	2021	2021-11-13 17:00	5:45 PM	1745	O	0	0	0	0	0	0	0	4	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
786200	213375300	2021	2021-12-03 17:00	2:36 PM	1436	B	0	0	2	0	2	0	0	4	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
787497	210635307	2021	2021-03-04 17:00	5:50 PM	1750	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
790172	210235069	2021	2021-01-22 17:00	2:32 PM	1432	C	0	0	0	1	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
792050	210845280	2021	2021-03-25 17:00	4:05 PM	1605	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	3. Dusk	NOT_RD	1. Dry
792388	211145008	2021	2021-04-23 17:00	10:20 PM	2220	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	RD_UNKNOWN	1. Dry
792507	213385151	2021	2021-12-04 17:00	12:10 PM	1210	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
795276	213505190	2021	2021-12-16 17:00	9:12 AM	912	A	0	1	0	0	1	0	1	1	12. Ped	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
799620	211125259	2021	2021-04-22 17:00	4:30 PM	1630	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
800326	210335258	2021	2021-02-01 17:00	11:49 PM	2349	O	0	0	0	0	0	0	0	2	16. Other	5. Rain	4. Darkness - Road Lighted	NOT_RD	2. Wet
804853	211985185	2021	2021-07-17 17:00	12:50 PM	1250	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
810205	212395200	2021	2021-08-27 17:00	1:37 PM	1337	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
810512	213005364	2021	2021-10-27 17:00	6:30 PM	1830	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
815924	211915198	2021	2021-07-10 17:00	4:29 PM	1629	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
821067	210745283	2021	2021-03-15 17:00	1:15 PM	1315	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
829128	212825064	2021	2021-10-08 17:00	11:50 PM	2350	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	RD_LEFT	1. Dry
833761	211805175	2021	2021-06-27 17:00	2:08 PM	1408	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
839166	212545162	2021	2021-09-11 17:00	3:20 PM	1520	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
839439	210295237	2021	2021-01-29 17:00	11:41 AM	1141	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
840797	210905186	2021	2021-03-31 17:00	9:54 AM	954	O	0	0	0	0	0	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
844764	212105261	2021	2021-07-29 17:00	4:00 PM	1600	B	0	0	1	0	1	0	0	3	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
846374	212725007	2021	2021-09-28 17:00	3:55 PM	1555	B	0	0	1	0	1	0	1	1	12. Ped	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
847007	212735279	2021	2021-09-30 17:00	7:54 AM	754	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
850003	211565209	2021	2021-06-05 17:00	3:48 PM	1548	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
853519	210605296	2021	2021-03-01 17:00	4:00 PM	1600	C	0	0	0	1	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
855016	211175006	2021	2021-04-26 17:00	5:09 PM	1709	B	0	0	1	0	1	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
859577	210965006	2021	2021-04-05 17:00	8:58 PM	2058	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
871139	221015164	2022	2022-04-11 17:00	7:55 AM	755	B	0	0	1	1	2	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
871199	220445001	2022	2022-02-12 17:00	12:35 AM	35	B	0	0	1	0	1	0	0	1	16. Other	1. No Adverse Condition (Clear/Cloudy)	6. Darkness - Unknown Road Lighting	RD_RIGHT	1. Dry
875654	220265336	2022	2022-01-09 17:00	10:38 PM	2238	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	7. Other
882643	221375257	2022	2022-05-17 17:00	3:15 PM	1515	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
882698	220215228	2022	2022-01-21 17:00	8:30 PM	2030	O	0	0	0	0	0	0	0	1	9. Fixed Object - Off Road	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
893047	221545021	2022	2022-06-02 17:00	10:34 PM	2234	B	0	0	1	1	2	0	0	2	1. Rear End	5. Rain	4. Darkness - Road Lighted	NOT_RD	2. Wet
894005	220025262	2022	2022-01-02 17:00	5:00 PM	1700	O	0	0	0	0	0	0	0	1	6. Fixed Object in Road	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
898074	220915025	2022	2022-04-01 17:00	1:19 AM	119	O	0	0	0	0	0	0	0	2	1. Rear End	5. Rain	4. Darkness - Road Lighted	NOT_RD	2. Wet
898893	220985124	2022	2022-04-08 17:00	9:40 AM	940	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
903372	221135042	2022	2022-04-23 17:00	2:33 AM	233	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
906294	220545267	2022	2022-02-23 17:00	2:22 PM	1422	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
907098	220705096	2022	2022-03-10 17:00	9:30 PM	2130	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	4. Darkness - Road Lighted	NOT_RD	1. Dry
911808	221545023	2022	2022-06-03 17:00	12:30 AM	30	O	0	0	0	0	0	0	0	1	16. Other	5. Rain	4. Darkness - Road Lighted	RD_RIGHT	2. Wet
913579	220545264	2022	2022-02-23 17:00	7:34 AM	734	O	0	0	0	0	0	0	0	4	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
916080	221685286	2022	2022-06-17 17:00	7:08 PM	1908	O	0	0	0	0	0	0	0	2	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry
920805	221725445	2022	2022-06-20 17:00	5:21 PM	1721	O	0	0	0	0	0	0	0	2	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight	NOT_RD	1. Dry

PROJECTID	RELATION TO ROADWAY	ROADWAY ALIGNMENT	ROADWAY SURFACE TYPE	ROADWAY DEFECT	ROADWAY DESCRIPTION	INTERSECTION TYPE	TRAFFIC CONTROL TYPE	TRFC_CTRL STATUS TYPE	WORK_ZONE RELATED	WORK_ZONE LOCATION	WORK_ZONE TYPE	FIRST HARMFUL EVENT	FIRST HARMFUL_EVENT LOC
739867	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
741639	1. Main-Line Roadway	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	8. Yield Sign	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
750730	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
755892	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	2. Two Approaches	14. Ped Crosswalk	1. Yes - Working	2. No			22. Bicycle	1. On Roadway
761122	5. On Entrance/Exit Ramp	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			39. Fell/Jumped From Vehicle	2. Shoulder
761806	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	2. Two Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
762554	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	13. Other	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	6. Separator
765042	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
769646	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
769696	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
771353	8. Non-Intersection	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
773535	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
777176	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
779491	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
780711	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
780883	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
786200	1. Main-Line Roadway	7. Dip - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
787497	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	14. Ped Crosswalk	3. Yes - Not Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
790172	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
792050	1. Main-Line Roadway	1. Straight - Level	1. Concrete	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
792388	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
792507	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	2. Two Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
795276	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			19. Ped	1. On Roadway
799620	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
800326	1. Main-Line Roadway	1. Straight - Level	1. Concrete	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
804853	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
810205	1. Main-Line Roadway	7. Dip - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
810512	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
815924	5. On Entrance/Exit Ramp	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
821067	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	4. Stop Sign	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
829128	7. Other location not listed above within an interchange area (median, shoulder , roadside)	6. Hillcrest - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			13. Curb	1. On Roadway
833761	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
839166	5. On Entrance/Exit Ramp	2. Curve - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	2. Two Approaches	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
839439	1. Main-Line Roadway	5. Hillcrest - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
840797	8. Non-Intersection	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
844764	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
846374	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			19. Ped	1. On Roadway
847007	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
850003	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
853519	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
855016	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
859577	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
871139	6. Intersection at end of Ramp	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	2. Two Approaches	1. No Traffic Control	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
871199	5. On Entrance/Exit Ramp	10. On/Off Ramp	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	1. No Traffic Control	6. No Traffic Control Device Present	2. No			28. Ran Off Road	8. Off Roadway, Location Unknown
875654	1. Main-Line Roadway	1. Straight - Level	1. Concrete	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
882643	5. On Entrance/Exit Ramp	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	4. One-Way, Not Divided	1. Not at Intersection	14. Ped Crosswalk	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
882698	1. Main-Line Roadway	3. Grade - Straight	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	1. Not at Intersection	6. Traffic Lanes Marked	1. Yes - Working	2. No			28. Ran Off Road	8. Off Roadway, Location Unknown
893047	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
894005	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			13. Curb	1. On Roadway
898074	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	2. Two-Way, Divided, Unprotected Median	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
898893	8. Non-Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
903372	9. Within Intersection	1. Straight - Level	1. Concrete	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
906294	10. Intersection Related - Within 150 Feet	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
907098	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	1. Two-Way, Not Divided	4. Four Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
911808	1. Main-Line Roadway	4. Grade - Curve	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	6. Roundabout	1. No Traffic Control	6. No Traffic Control Device Present	2. No			3. Utility Pole	2. Shoulder
913579	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	14. Ped Crosswalk	6. No Traffic Control Device Present	2. No			20. Motor Vehicle In Transport	1. On Roadway
916080	1. Main-Line Roadway	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	1. Not at Intersection	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway
920805	9. Within Intersection	1. Straight - Level	2. Blacktop, Asphalt, Bituminous	1. No Defects	3. Two-Way, Divided, Positive Median Barrier	3. Three Approaches	3. Traffic Signal	1. Yes - Working	2. No			20. Motor Vehicle In Transport	1. On Roadway

OBJECTID	ALCOHOL	NOTALCOHOL	BELTED	UNBELTED	BIKE	NONBIKE	DISTRACTED	NOTDISTRACTED	DROWSY	NOTDROWSY	DRUG	NODRUG	GR	NOGR	HITRUN	NOT_HITRUN	LGTRUCK	NONLGTRUCK	MOTOR	NONMOTOR	PED	NONPED	SPEED	NOTSPEED	SCHOOL_ZONE	SENIOR	NOTSENIOR	YOUNG	NOTYOUNG	MAINLINE_YN	NIGHT	VDOT_DISTRICT	JURIS_CODE	PHYSICAL_JURIS
739867	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No		No	No	No	9. Northern Virginia	100	100. City of Alexandria
741639	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		No	No	No	9. Northern Virginia	100	100. City of Alexandria
750730	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
755892	No		Belted		Yes		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
761122	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		No	No	No	9. Northern Virginia	100	100. City of Alexandria
761806	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No	Yes	Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
762554	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No		No	No	No	9. Northern Virginia	100	100. City of Alexandria
765042	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No	Yes	Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
769646	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
769696	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
771353	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		Yes		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
773535	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
777176	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
779491	No		Belted		No		No		No		No		No		No		No		No		No		Yes		3. No		No	Yes	Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
780711	No		Belted		No		No		No		No		No		No		No		No		No		Yes		3. No		No	Yes	Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
780883	No		Belted		No		No		No		No		No		No		No		No		No		Yes		3. No		No		Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
786200	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
787497	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		No	No	No	9. Northern Virginia	100	100. City of Alexandria
790172	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
792050	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
792388	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
792507	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		Yes		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
795276	No		Belted		No		No		No		No		No		No		No		No		Yes		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
799620	No		Belted		No		No		No		No		No		Yes		No		No		No		No		3. No		Yes		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
800326	No		Belted		No		No		No		No		No		No		Yes		No		No		No		3. No		No		Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
804853	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
810205	No		Belted		No		No		No		No		No		No		No		No		No		Yes		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
810512	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
815924	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		No	No	No	9. Northern Virginia	100	100. City of Alexandria
821067	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
829128	No		Belted		No		No		No		No		Yes		No		No		No		No		No		3. No		No		No	Yes	No	9. Northern Virginia	100	100. City of Alexandria
833761	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No	Yes	Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
839166	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		No	No	No	9. Northern Virginia	100	100. City of Alexandria
839439	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
840797	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		No	No	No	9. Northern Virginia	100	100. City of Alexandria
844764	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
846374	No		Belted		No		No		No		No		No		Yes		No		No		Yes		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
847007	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
850003	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
853519	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		Yes		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
855016	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		Yes		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
859577	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		Yes		Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
871139	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
871199	Yes		Belted		No		Yes		No		No		No		No		No		No		No		Yes		3. No		No		No	Yes	No	9. Northern Virginia	100	100. City of Alexandria
875654	No		Belted		No		No		No		No		No		Yes		No		No		No		No		3. No		No		Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
882643	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		No	No	No	9. Northern Virginia	100	100. City of Alexandria
882698	No		Belted		No		No		No		No		Yes		Yes		No		No		No		No		3. No		No		Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
893047	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
894005	Yes		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
898074	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		Yes		Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
898893	No		Belted		No		No		No		No		No		No		No		No		No		Yes		3. No		Yes		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
903372	No		Belted		No		Yes		Yes		No		No		No		No		No		No		No		3. No		No		Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
906294	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
907098	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No		Yes	Yes	No	9. Northern Virginia	100	100. City of Alexandria
911808	No		Belted		No		Yes		No		No		No		No		No		No		No		No		3. No		No	Yes	No	Yes	No	9. Northern Virginia	100	100. City of Alexandria
913579	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		Yes		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
916080	No		Belted		No		No		No		No		No		No		No		No		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria
920805	No		Belted		No		No		No		No		No		No		No		Yes		No		No		3. No		No		Yes	No	No	9. Northern Virginia	100	100. City of Alexandria

OBJECTID	FUN	FAC	AREA_TYPE	SYSTEM	VSP	OWNERSHIP	INTERSECTION_ANALYSIS	PLAN_DISTRICT	MPO_NAME	RTE_NM	RNS_MP	NODE	OFFSET	ANIMAL	SPEED_DIFF_MAX
739867	6-Minor Collector (S)	3-Two-Way Undivided	Urban	NonVDOT secondary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	S-VA100PR TAYLOR RUN PKWY W	0.02	100282	37	No	
741639	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00B	0.24	100024	259	No	
750730	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.58	100026	1637	No	
755892	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	14.32	100022	16	No	
761122	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB RMP014.00A	0.13	100022	671	No	
761806	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.83	756267	354	No	
762554	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00B	0.24	100024	280	No	
765042	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.83	756267	354	No	
769646	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.59	756267	1647	No	
769696	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.73	756267	882	No	
771353	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.85	756267	290	No	
773535	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.67	756267	1204	No	
777176	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.64	756267	1362	No	
779491	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.83	756267	412	No	5
780711	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.95	100282	69	No	5
780883	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.81	756267	470	No	5
786200	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB	14.02	100282	253	No	
787497	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB RMP014.00A	0.01	100022	42	No	
790172	6-Minor Collector (S)	3-Two-Way Undivided	Urban	NonVDOT secondary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	S-VA100PR TAYLOR RUN PKWY W	0.03	100282	58	No	
792050	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.76	756267	813	No	
792388	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.83	756267	359	No	
792507	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.62	756267	1484	No	
795276	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.55	100026	1463	No	
799620	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.68	756267	1183	No	
800326	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.76	756267	723	No	
804853	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.57	100026	1589	No	
810205	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.56	100026	1558	No	5
810512	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.83	756267	417	No	
815924	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB RMP014.00A	0.01	100022	26	No	
821067	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.6	756267	1568	No	
829128	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00A	0.02	100023	475	No	
833761	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.82	756267	438	No	
839166	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00B	0.24	100024	259	No	
839439	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.56	100026	1515	No	
840797	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00B	0.23	100024	296	No	
844764	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.64	756267	1368	No	
846374	6-Minor Collector (S)	3-Two-Way Undivided	Urban	NonVDOT secondary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	S-VA100PR TAYLOR RUN PKWY W	0.06	100282	227	No	
847007	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.5	100026	1214	No	
850003	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.54	100026	1420	No	
853519	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	14	100282	148	No	
855016	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.71	756267	1008	No	
859577	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.7	756267	1119	No	
871139	4-Minor Arterial (H,3)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB	1.8	278992	898	No	
871199	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB RMP014.00A	0.1	100022	523	No	20
875654	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.95	100282	58	No	
882643	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00B	0.24	100024	269	No	
882698	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	14.26	100023	169	No	
893047	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.94	100282	116	No	
894005	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.69	756267	1114	No	
898074	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.95	100282	69	No	
898893	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.85	756267	285	No	5
903372	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.95	100282	58	No	
906294	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.55	100026	1473	No	
907098	3-Principal Arterial - Other (E,2)	3-Two-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.53	100026	1368	No	
911808	3-Principal Arterial - Other (E,2)	1-One-Way Undivided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00241NB RMP002.00B	0.15	100024	760	No	
913579	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236WB	14.33	100022	53	No	
916080	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Not Intersection	Northern Virginia	NOVA	R-VA SR00236WB	13.76	756267	739	No	
920805	3-Principal Arterial - Other (E,2)	4-Two-Way Divided	Urban	NonVDOT primary	7	3. City or Town Hwy Agency	Urban Intersection	Northern Virginia	NOVA	R-VA SR00236EB	13.82	756267	422	No	



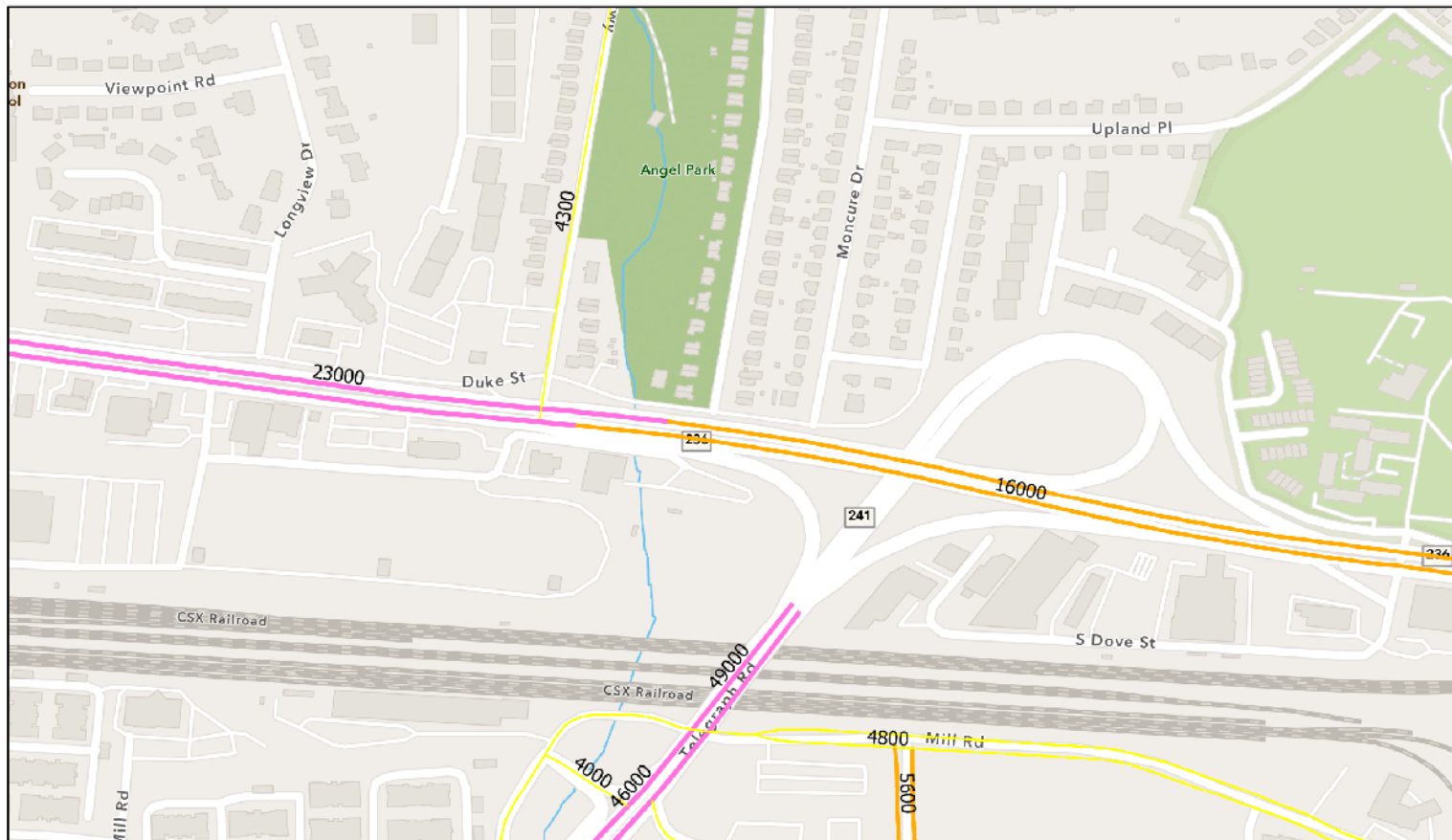
Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix G: Crash Maps



Duke Street at West Taylor Run Parkway Corridor Study

Duke St/W Taylor Run Pkwy | Average Daily Traffic (ADT)



Legend

Traffic Volumes

ADT

0 - 5000

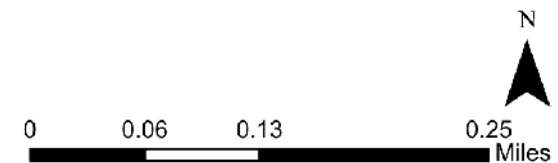
5001 - 20000

20001 - 50000

50001 - 804486

Source: VDOT Traffic Volumes
Average Daily Traffic (ADT) 2020

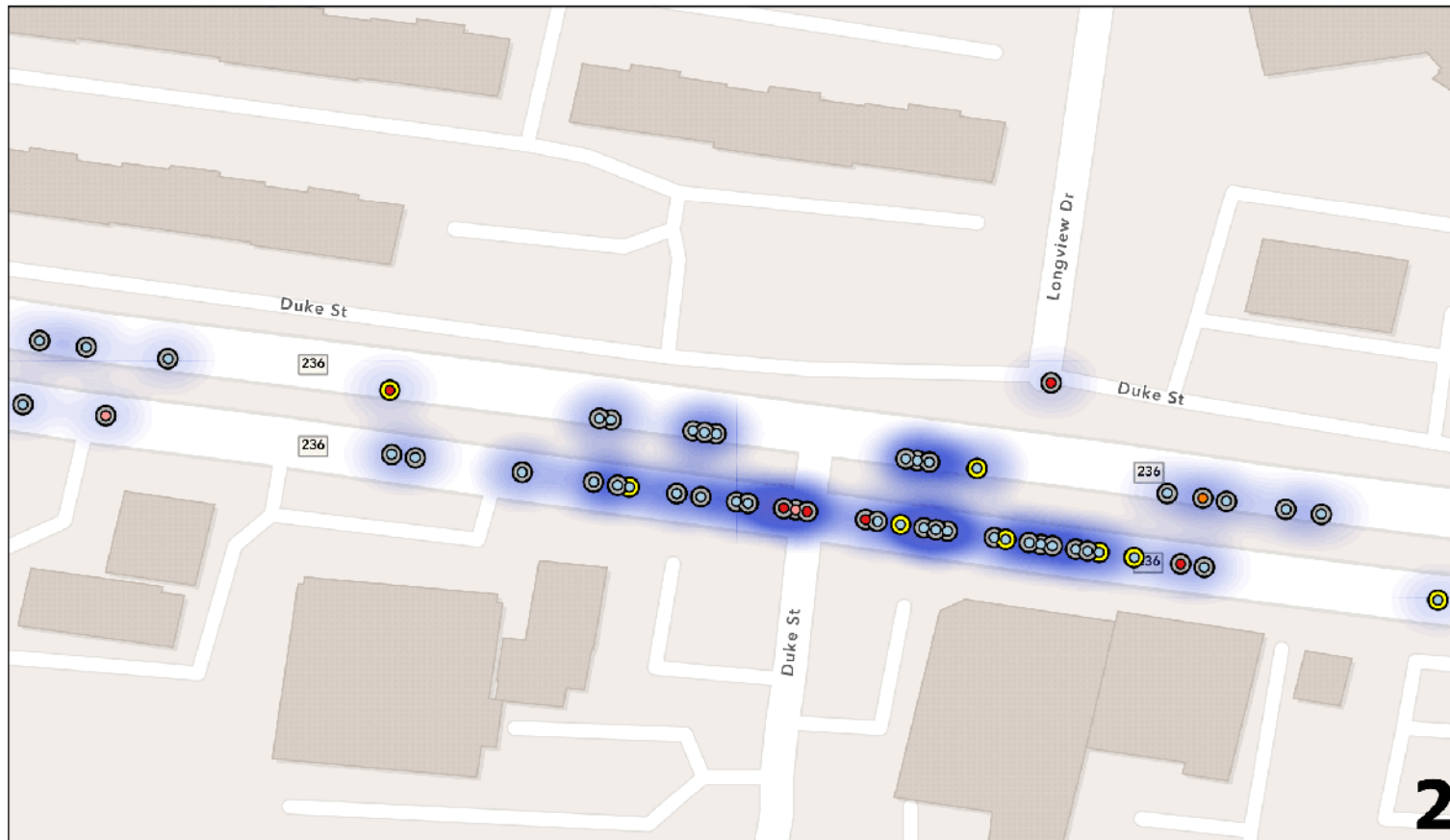
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Duke Street at West Taylor Run Parkway Corridor Study

Duke St/W Taylor Run Pkwy | Crash Incidents Map Series



Legend

Collision Type

- 1. Rear End (50)
- 16. Other (2)
- 2. Angle (8)
- 4. Sideswipe - Same Direction (1)

- 5. Sideswipe - Opposite Direction (1)

Crash Severity

- B. Visible Injury (9)
- PDO. Property Damage Only (53)

Concentration of Crash Incidents



Crash Statistics

Crash Count: 73
Crash Vehicle Count: 179
Pedestrians Injured: 0
Pedestrians Killed: 0

0 0.01 0.03

Page 2 of 5



0.05
Miles

Source: VDOT Crash Data 2015-2022

Esri, Community Maps Contributors, DCGIS, Fairfax County, VA, M-NOPPC, VGIN, OpenStreetMap, Microsoft, Esri, HERE, Garmin, SateGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, US



Duke Street at West Taylor Run Parkway Corridor Study

Duke St/W Taylor Run Pkwy | Crash Incidents Map Series



Legend

Collision Type

- 1. Rear End (61)
- 12. Ped (1)
- 16. Other (6)
- 2. Angle (12)

- 4. Sideswipe - Same Direction (4)
- 6. Fixed Object in Road (1)
- 9. Fixed Object - Off Road (5)

Crash Severity

- A. Severe Injury (2)
- B. Visible Injury (21)
- C. Nonvisible Injury (5)

- PDO, Property Damage Only (62)

Concentration of Crash Incidents

- Sparse
- Dense

Crash Statistics

Crash Count: 99
Crash Vehicle Count: 203
Pedestrians Injured: 3
Pedestrians Killed: 0

Page 3 of 5

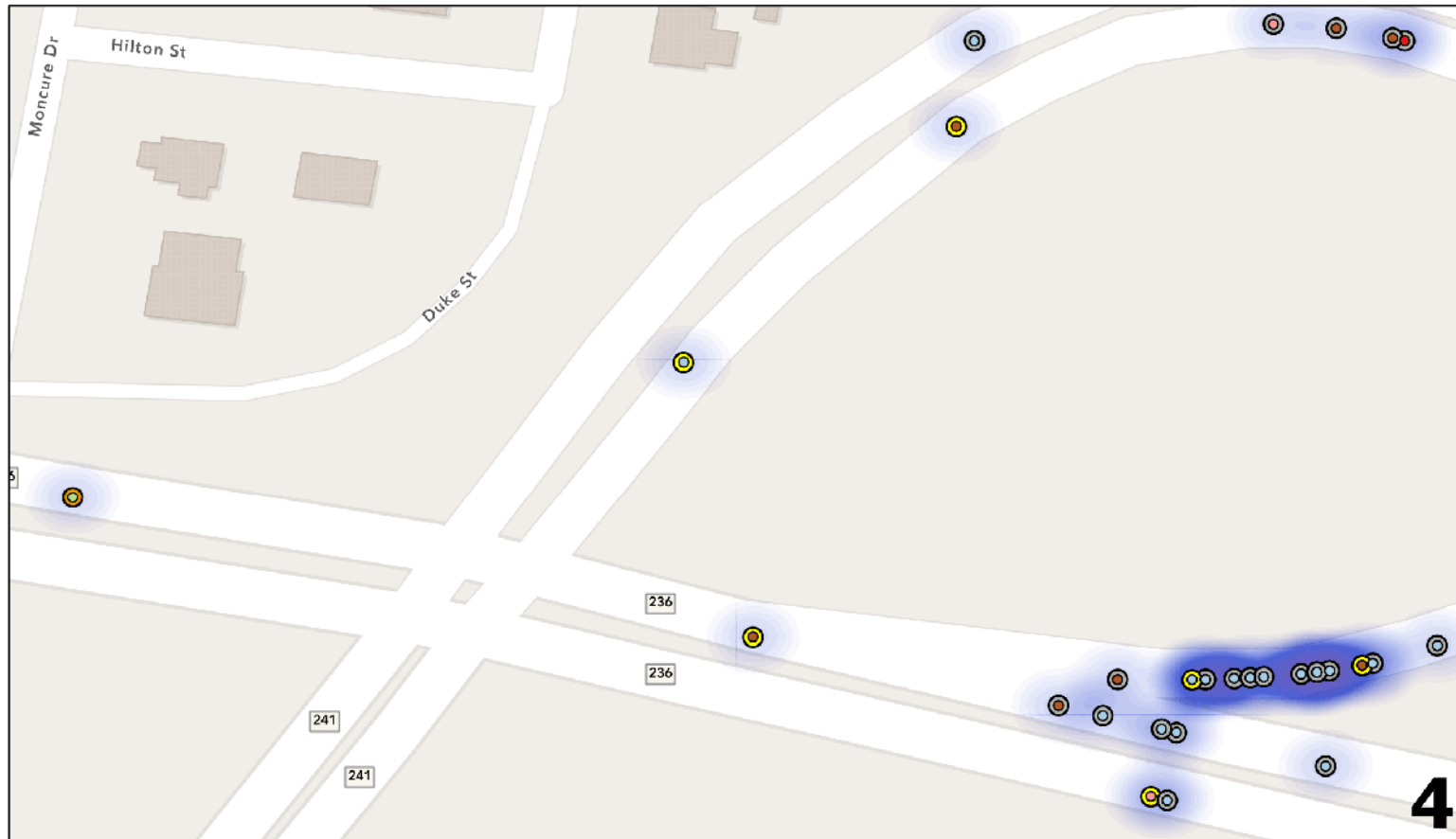


0 0.01 0.03 0.05 Miles



Duke Street at West Taylor Run Parkway Corridor Study

Duke St/W Taylor Run Pkwy | Crash Incidents Map Series



Legend

- Collision Type**
- 1. Rear End (26)
 - 12. Ped (1)
 - 16. Other (2)
 - 2. Angle (1)

- Crash Severity**
- 9. Fixed Object - Off Road (8)
 - A. Severe Injury (1)
 - B. Visible Injury (9)

- Concentration of Crash Incidents**
- PDO. Property Damage Only (29)
- Sparse
Dense

Crash Statistics

Crash Count: 55
Crash Vehicle Count: 99
Pedestrians Injured: 1
Pedestrians Killed: 0

Page 4 of 5



0 0.01 0.03 0.05 Miles

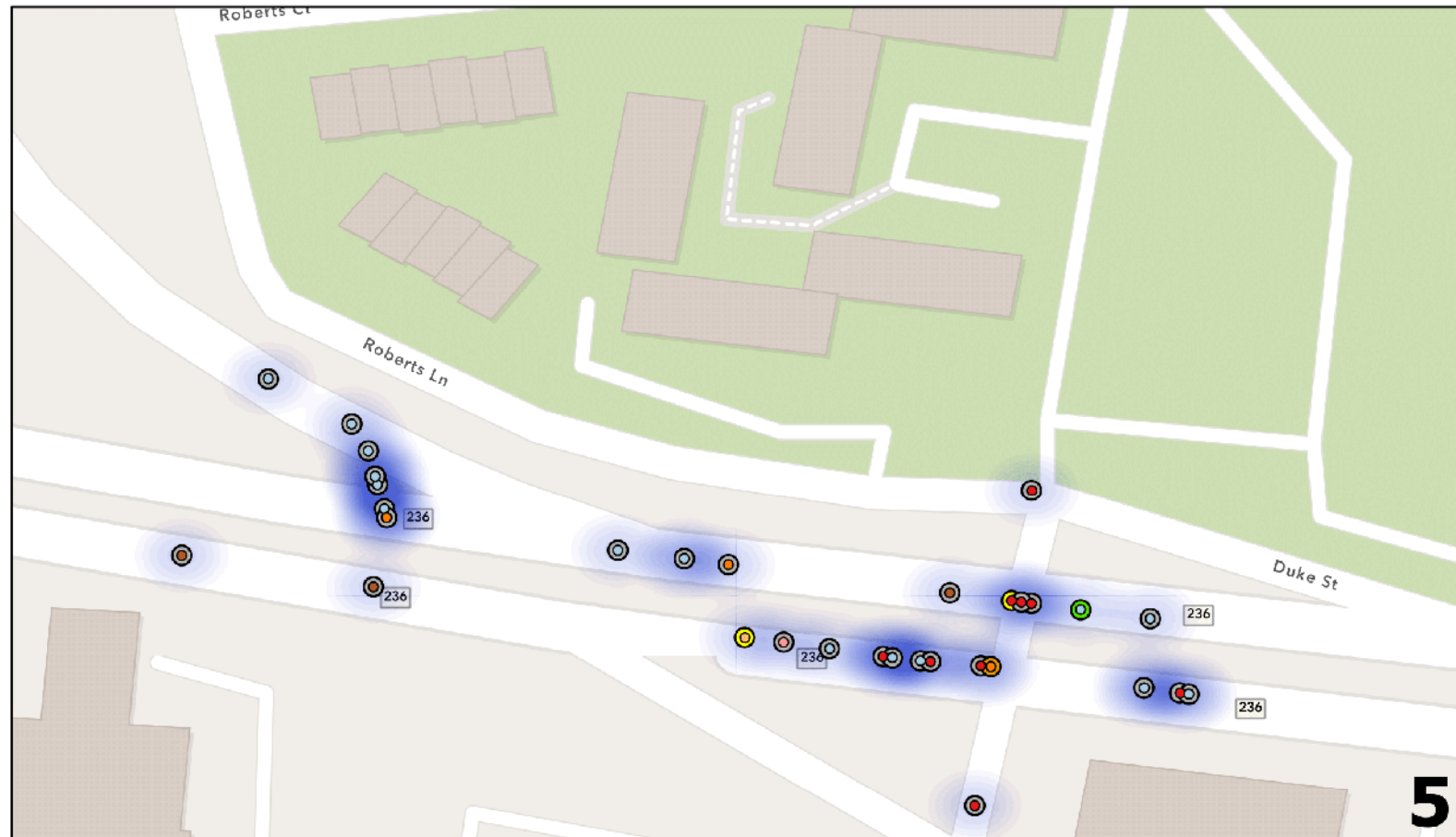
Source: VDOT Crash Data 2015-2022

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Duke Street at West Taylor Run Parkway Corridor Study

Duke St/W Taylor Run Pkwy | Crash Incidents Map Series



Legend

Collision Type

- 1. Rear End (19)
- 16. Other (1)
- 2. Angle (9)
- 3. Head On (1)

- 4. Sideswipe - Same Direction (3)
- 9. Fixed Object - Off Road (4)
- Crash Severity**
- A. Severe Injury (1)

- B. Visible Injury (4)
- C. Nonvisible Injury (1)
- PDO. Property Damage Only (31)

Concentration of Crash Incidents

Sparse
Dense

Crash Statistics

Crash Count: 41
Crash Vehicle Count: 82
Pedestrians Injured: 0
Pedestrians Killed: 0

Page 5 of 5



0 0.01 0.03 0.05 Miles



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix H: Transit Data

AT8 Transit Data

Stop ID	Stop Name	Ons	Offs
4000029	Duke St @ Dove St	0	2
4000030	Duke St @ Roberts Ln	3	8
4000034	Duke St @ Moncure Dr	17	6
4000035	Duke St @ Moncure Dr	16	97
4000038	2712 Duke St	73	6
4000039	Duke St @ W Taylor Run Pkwy	17	40
4000041	Duke St @ Witter Dr	4	3
4000044	Duke St @ Roth St	10	9
4000050	Duke St @ Cambridge Rd	12	56
4000053	Duke St @ Sweeley St	42	24
4000055	Duke St @ Yale Dr	11	42
4000056	Duke St @ Opp. Alexandria Commons	31	12
4000058	Duke St @ Alexandria Commons	41	48
4000061	Duke St @ S Quaker Ln	22	11
4000067	Duke St @ N Quaker Ln	6	33
4000071	Duke St @ Carriage House Cir	31	15
4000072	Duke St @ Normandy Hill Dr	3	17
4000076	Duke St @ Cockrell Ave	13	1
4000078	Duke St @ Fort Williams Pkwy	1	3
4000081	Duke St @ S Early St	6	40
4000083	Duke St @ N Early St	39	4
4000093	Duke St @ S French St	26	1
4000094	Duke St @ N French St	2	30
4000103	Duke St @ S Gordon St	36	4
4000108	Duke St @ S Gordon St	19	58
4000110	Duke St @ Somerville St	20	7
4000113	4600 Duke St	41	43
4000114	Duke St @ Ingram St	79	18
4000115	Duke St @ Shops at Foxchase	26	69
4000117	Duke St @ N Pickett St	40	9
4000118	Duke St @ Beatley Library	1	24
4000120	Duke St @ S Jordan St	102	13
4000121	Duke St @ S Ingram St	11	74
4000122	Duke St @ N Jordan St	29	118
4000123	Duke St @ N Pickett St	14	41
4000127	Duke St @ S Pickett St	21	7
4000131	Duke St @ S Pickett St	8	41
4000136	Duke St @ N Paxton St	102	14

Stop ID	Stop Name	Ons	Offs
4000138	Duke St @ N Paxton St	8	94
4000148	Duke St @ N Ripley St	25	4
4000149	Duke St @ N Ripley St	8	52
4000576	5801 Duke St	37	71
4000480	King St Metro Station - Bay D	758	86
4000606	King St Metro Station - Bay C	137	551
	Weekday Totals	1948	1906



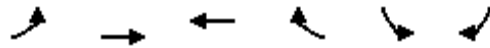
Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix I: Signal Timing Existing Conditions

Lanes, Volumes, Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø2
Lane Configurations							
Traffic Volume (vph)	267	1261	880	1018	548	111	
Future Volume (vph)	267	1261	880	1018	548	111	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0			0	0	60	
Storage Lanes	1			1	2	0	
Taper Length (ft)	25				25		
Right Turn on Red				No		Yes	
Link Speed (mph)		35	35		25		
Link Distance (ft)		662	392		404		
Travel Time (s)		12.9	7.6		11.0		
Turn Type	pm+pt	NA	NA	pt+ov	Prot		
Protected Phases	5	5 2	6	6 4	4		2
Permitted Phases	5 2						
Detector Phase	5	5 2	6	6 4	4		
Switch Phase							
Minimum Initial (s)	5.0		10.0		7.0		10.0
Minimum Split (s)	19.6		22.0		29.5		22.0
Total Split (s)	20.0		67.0		33.0		87.0
Total Split (%)	16.7%		55.8%		27.5%		73%
Yellow Time (s)	3.0		4.0		3.5		4.0
All-Red Time (s)	2.6		2.0		3.0		2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0		
Total Lost Time (s)	3.6		4.0		4.5		
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?							
Recall Mode	None		C-Max		None		C-Max

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated

Splits and Phases: 1: Duke St & N Quaker Lane



Lanes, Volumes, Timings

2: S Quaker Ln & Duke St

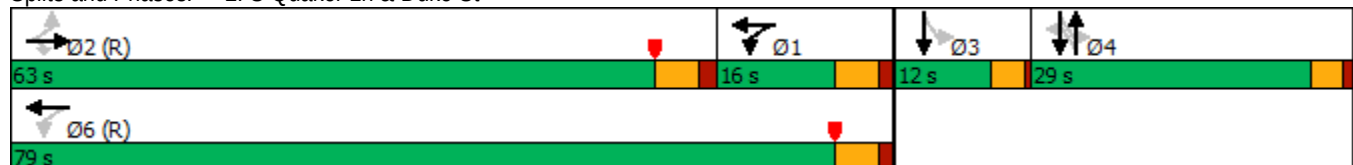
03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1691	118	24	1845	0	53	0	14	2	0	0
Future Volume (vph)	0	1691	118	24	1845	0	53	0	14	2	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	175		0	75		0	0		0	0		0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25				25
Link Distance (ft)		392			302			373				153
Travel Time (s)		7.6			5.9			10.2				4.2
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 6			4				3 4
Permitted Phases	2		2	1 6			4			3 4		
Detector Phase	2	2	2	1	1 6		4	4		3 4	3 4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0			7.0	7.0				
Minimum Split (s)	15.5	15.5	15.5	10.5			29.0	29.0				
Total Split (s)	63.0	63.0	63.0	16.0			29.0	29.0				
Total Split (%)	52.5%	52.5%	52.5%	13.3%			24.2%	24.2%				
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0				
All-Red Time (s)	1.5	1.5	1.5	1.5			1.0	1.0				
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0				-2.0				
Total Lost Time (s)	3.5	3.5	3.5	3.5				2.0				
Lead/Lag	Lead	Lead	Lead	Lag			Lag	Lag				
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	None			None	None				

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated

Splits and Phases: 2: S Quaker Ln & Duke St



Lane Group	Ø3	Ø6
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Right Turn on Red		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Turn Type		
Protected Phases	3	6
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	4.0	4.0
Minimum Split (s)	12.0	20.0
Total Split (s)	12.0	79.0
Total Split (%)	10%	66%
Yellow Time (s)	3.0	4.0
All-Red Time (s)	0.5	1.5
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	
Lead-Lag Optimize?		
Recall Mode	None	C-Max
Intersection Summary		

Lanes, Volumes, Timings

3: Duke St & Alexandria Commons

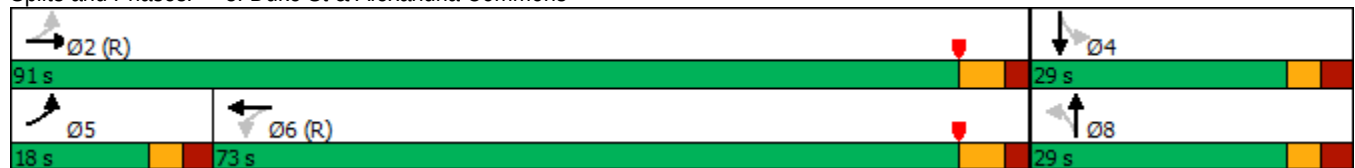
03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	1661	6	0	1822	34	3	0	0	17	0	44
Future Volume (vph)	40	1661	6	0	1822	34	3	0	0	17	0	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	375		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25				25
Link Distance (ft)		302			651			168				177
Travel Time (s)		5.9			12.7			4.6				4.8
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm		NA
Protected Phases	5	2			6			8				4
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4		4
Switch Phase												
Minimum Initial (s)	4.5	10.0		1.0	1.0		7.0	7.0		7.0		7.0
Minimum Split (s)	10.6	16.3		16.3	16.3		29.0	29.0		13.0		13.0
Total Split (s)	18.0	91.0		73.0	73.0		29.0	29.0		29.0		29.0
Total Split (%)	15.0%	75.8%		60.8%	60.8%		24.2%	24.2%		24.2%		24.2%
Yellow Time (s)	3.0	4.0		4.0	4.0		3.0	3.0		3.0		3.0
All-Red Time (s)	2.6	2.3		2.3	2.3		3.0	3.0		3.0		3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0				-2.0
Total Lost Time (s)	3.6	4.3		4.3	4.3			4.0				4.0
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?												
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None		None

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 100
 Control Type: Actuated-Coordinated

Splits and Phases: 3: Duke St & Alexandria Commons



Lanes, Volumes, Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	1624	2	22	1768	121	11	5	31	81	1	77
Future Volume (vph)	52	1624	2	22	1768	121	11	5	31	81	1	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	195		0	80		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25				25
Link Distance (ft)		651			810			270				173
Travel Time (s)		12.7			15.8			7.4				4.7
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8				4
Permitted Phases	2			6			8			4		4
Detector Phase	5	2		1	6		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	10.0	30.8		10.0	31.0		29.0	29.0		29.0	29.0	29.0
Total Split (s)	16.0	73.0		18.0	75.0		29.0	29.0		29.0	29.0	29.0
Total Split (%)	13.3%	60.8%		15.0%	62.5%		24.2%	24.2%		24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	1.8		2.6	2.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	-2.0
Total Lost Time (s)	4.0	3.8		3.6	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	None	None

Intersection Summary

Area Type: Other

Cycle Length: 120

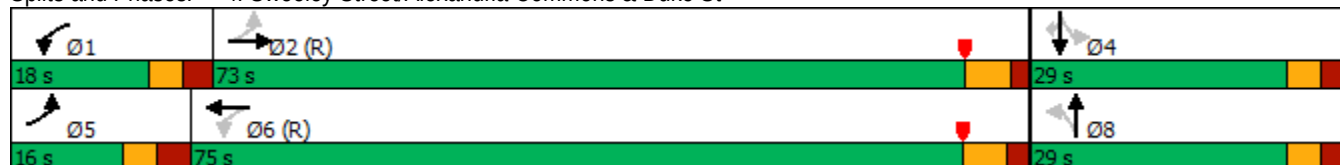
Actuated Cycle Length: 120

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

Natural Cycle: 100

Control Type: Actuated-Coordinated

Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St



Lanes, Volumes, Timings
5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	1672	4	96	1854	302	6	6	54	189	4	51
Future Volume (vph)	60	1672	4	96	1854	302	6	6	54	189	4	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	250		0	0		0	0		0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			No			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		810			823			366			181	
Travel Time (s)		15.8			16.0			10.0			4.9	
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Detector Phase	5	2		1	6	6	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	10.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	11.5	30.7		11.5	15.7	15.7	13.4	13.4		30.4	30.4	30.4
Total Split (s)	16.0	67.0		18.0	69.0	69.0	35.0	35.0		35.0	35.0	35.0
Total Split (%)	13.3%	55.8%		15.0%	57.5%	57.5%	29.2%	29.2%		29.2%	29.2%	29.2%
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.5	1.7		2.5	1.7	1.7	3.4	3.4		3.4	3.4	3.4
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	-2.0		-2.0			-2.0	-2.0
Total Lost Time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	None

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 101 (84%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated

Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



Lanes, Volumes, Timings 6: Witter Drive & Duke St

03/14/2024

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↙	↑↑↑	↖	
Traffic Volume (vph)	1894	21	87	2245	7	25
Future Volume (vph)	1894	21	87	2245	7	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	200		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Right Turn on Red		Yes				Yes
Link Speed (mph)	35			35	25	
Link Distance (ft)	823			342	743	
Travel Time (s)	16.0			6.7	20.3	
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Detector Phase	2		1	6	4	
Switch Phase						
Minimum Initial (s)	10.0		6.0	10.0	4.0	
Minimum Split (s)	27.5		12.0	15.5	13.0	
Total Split (s)	79.0		16.0	95.0	25.0	
Total Split (%)	65.8%		13.3%	79.2%	20.8%	
Yellow Time (s)	3.5		3.0	3.5	3.0	
All-Red Time (s)	2.0		3.0	2.0	3.0	
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	
Total Lost Time (s)	3.5		4.0	3.5	4.0	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	C-Max		None	C-Max	None	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 69 (58%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated

Splits and Phases: 6: Witter Drive & Duke St



Lanes, Volumes, Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	928	961	0	2296	268	0	0	0	30	288	36
Future Volume (vph)	30	928	961	0	2296	268	0	0	0	30	288	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	180		0	0		120	0		0	0		0
Storage Lanes	1		1	0		1	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		401			1255			889			130	
Travel Time (s)		7.8			24.4			24.2			3.5	
Turn Type	Prot	NA	Prot		NA	Over				Split	NA	Perm
Protected Phases	5	2	2		6	4				4	4	
Permitted Phases												4
Detector Phase	5	2	2		6	4				4	4	4
Switch Phase												
Minimum Initial (s)	6.0	7.0	7.0		7.0	7.0				7.0	7.0	7.0
Minimum Split (s)	12.5	14.0	14.0		13.0	13.0				13.0	13.0	13.0
Total Split (s)	16.0	61.0	61.0		45.0	26.0				26.0	26.0	26.0
Total Split (%)	13.3%	50.8%	50.8%		37.5%	21.7%				21.7%	21.7%	21.7%
Yellow Time (s)	3.0	4.0	4.0		4.0	3.0				3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0		2.0	3.0				3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0					-2.0	-2.0
Total Lost Time (s)	4.5	4.0	4.0		4.0	4.0					4.0	4.0
Lead/Lag	Lead				Lag	Lag				Lag	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max		C-Max	None				None	None	None

Intersection Summary

Area Type: Other

Cycle Length: 120

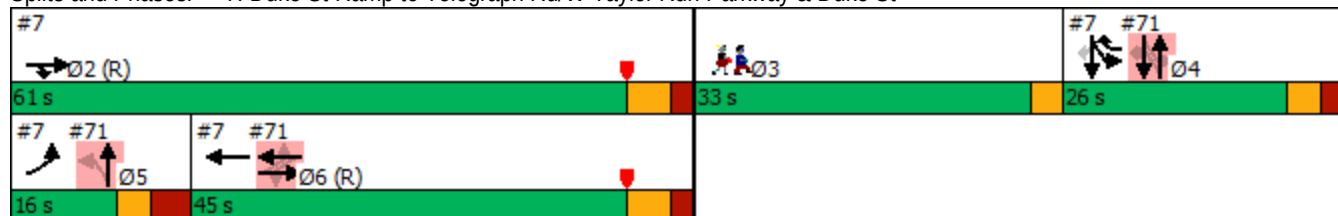
Actuated Cycle Length: 120

Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	33.0
Total Split (s)	33.0
Total Split (%)	28%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	
Recall Mode	None
Intersection Summary	

Lanes, Volumes, Timings

8: NB Telegraph Rd to EB Duke St/NB Telegraph Rd to WB Duke St & Duke St

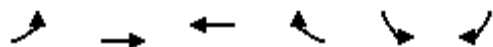
03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑				↑			↑
Traffic Volume (vph)	0	958	0	0	863	0	0	0	1549	0	0	1701
Future Volume (vph)	0	958	0	0	863	0	0	0	1549	0	0	1701
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1255			479			612			451	
Travel Time (s)		24.4			9.3			11.9			8.8	
Sign Control		Free			Free			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Lanes, Volumes, Timings

9: Duke St & WB Duke St to SB Telegraph Rd

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑	↑		
Traffic Volume (vph)	0	2507	863	529	0	0
Future Volume (vph)	0	2507	863	529	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		35	35		35	
Link Distance (ft)		479	171		535	
Travel Time (s)		9.3	3.3		10.4	
Sign Control		Free	Free		Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Lanes, Volumes, Timings
10: Dove St/Roberts Ln & Duke St

03/14/2024

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2150	1	0	1066	0	284	28	11	16	13	42
Future Volume (vph)	0	2150	1	0	1066	0	284	28	11	16	13	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			25			25			25	
Link Distance (ft)		197			310			154			114	
Travel Time (s)		3.8			8.5			4.2			3.1	
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Detector Phase		2			6		8	8		4	4	
Switch Phase												
Minimum Initial (s)		10.0			10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)		25.0			28.0		40.0	40.0		13.0	13.0	
Total Split (s)		57.0			57.0		40.0	40.0		40.0	40.0	
Total Split (%)		58.8%			58.8%		41.2%	41.2%		41.2%	41.2%	
Yellow Time (s)		4.0			4.0		3.0	3.0		3.0	3.0	
All-Red Time (s)		2.0			2.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		-2.0			-2.0			-2.0			-2.0	
Total Lost Time (s)		4.0			4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		Max			Max		None	None		None	None	

Intersection Summary

Area Type: Other

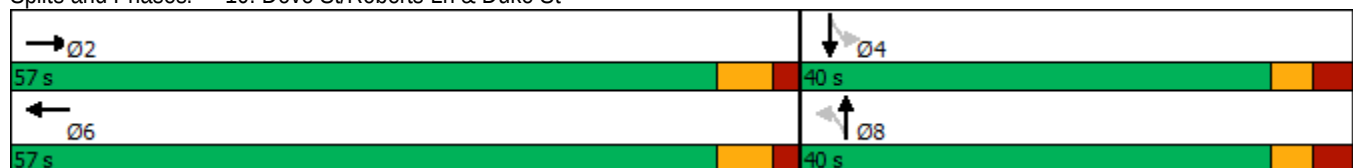
Cycle Length: 97

Actuated Cycle Length: 95.4

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Lanes, Volumes, Timings
71: W Taylor Run Parkway

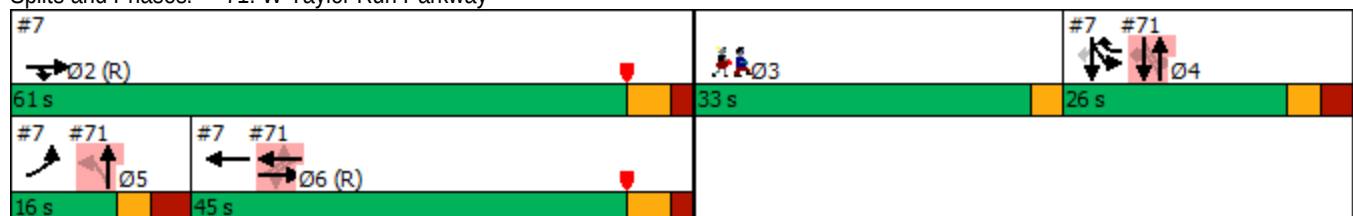
03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	8	23	56	6	0	15	221	62	1	275	6
Future Volume (vph)	19	8	23	56	6	0	15	221	62	1	275	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		136			143			130			270	
Travel Time (s)		3.7			3.9			3.5			7.4	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Detector Phase	6	6		6	6		4 5	4 5		4	4	4
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0					7.0	7.0	7.0
Minimum Split (s)	13.0	13.0		13.0	13.0					13.0	13.0	13.0
Total Split (s)	45.0	45.0		45.0	45.0					26.0	26.0	26.0
Total Split (%)	37.5%	37.5%		37.5%	37.5%					21.7%	21.7%	21.7%
Yellow Time (s)	4.0	4.0		4.0	4.0					3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		2.0	2.0					3.0	3.0	3.0
Lost Time Adjust (s)		-2.0			-2.0						-2.0	-2.0
Total Lost Time (s)		4.0			4.0						4.0	4.0
Lead/Lag	Lag	Lag		Lag	Lag					Lag	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max					None	None	None

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated

Splits and Phases: 71: W Taylor Run Parkway

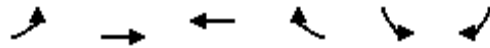


Lane Group	Ø2	Ø3	Ø5
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Right Turn on Red			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Turn Type			
Protected Phases	2	3	5
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	7.0	1.0	6.0
Minimum Split (s)	14.0	33.0	12.5
Total Split (s)	61.0	33.0	16.0
Total Split (%)	51%	28%	13%
Yellow Time (s)	4.0	3.0	3.0
All-Red Time (s)	2.0	0.0	3.5
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag		Lead	Lead
Lead-Lag Optimize?			
Recall Mode	C-Max	None	None
Intersection Summary			

Lanes, Volumes, Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR	Ø2
Lane Configurations							
Traffic Volume (vph)	170	994	1195	703	537	133	
Future Volume (vph)	170	994	1195	703	537	133	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Storage Length (ft)	0			0	0	60	
Storage Lanes	1			1	2	0	
Taper Length (ft)	25				25		
Right Turn on Red				No		Yes	
Link Speed (mph)		35	35		25		
Link Distance (ft)		442	392		404		
Travel Time (s)		8.6	7.6		11.0		
Turn Type	pm+pt	NA	NA	pt+ov	Prot		
Protected Phases	5	5 2	6	6 4	4		2
Permitted Phases	5 2						
Detector Phase	5	5 2	6	6 4	4		
Switch Phase							
Minimum Initial (s)	5.0		10.0		7.0		10.0
Minimum Split (s)	19.6		22.0		29.5		22.0
Total Split (s)	20.0		67.0		33.0		87.0
Total Split (%)	16.7%		55.8%		27.5%		73%
Yellow Time (s)	3.0		4.0		3.5		4.0
All-Red Time (s)	2.6		2.0		3.0		2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0		
Total Lost Time (s)	3.6		4.0		4.5		
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?							
Recall Mode	None		C-Max		None		C-Max

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 20 (17%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated

Splits and Phases: 1: Duke St & N Quaker Lane



Lanes, Volumes, Timings

2: S Quaker Ln & Duke St

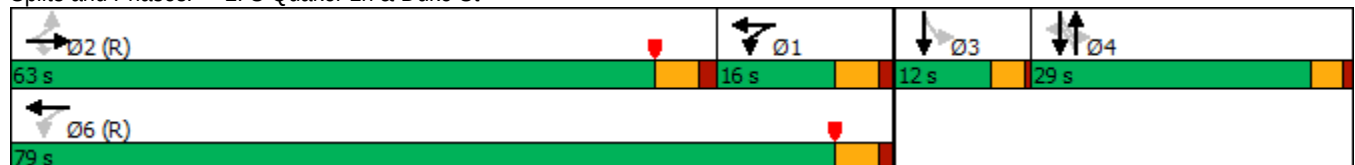
03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1162	362	26	1794	7	103	0	19	1	0	1
Future Volume (vph)	7	1162	362	26	1794	7	103	0	19	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	175		0	75		0	0		0	0		0
Storage Lanes	1		1	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		392			302			373			123	
Travel Time (s)		7.6			5.9			10.2			3.4	
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 6			4			3 4	
Permitted Phases	2		2	1 6			4			3 4		
Detector Phase	2	2	2	1	1 6		4	4		3 4	3 4	
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	5.0			7.0	7.0				
Minimum Split (s)	15.5	15.5	15.5	10.5			29.0	29.0				
Total Split (s)	63.0	63.0	63.0	16.0			29.0	29.0				
Total Split (%)	52.5%	52.5%	52.5%	13.3%			24.2%	24.2%				
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0				
All-Red Time (s)	1.5	1.5	1.5	1.5			1.0	1.0				
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0				-2.0				
Total Lost Time (s)	3.5	3.5	3.5	3.5				2.0				
Lead/Lag	Lead	Lead	Lead	Lag			Lag	Lag				
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	None			None	None				

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 52 (43%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 100
 Control Type: Actuated-Coordinated

Splits and Phases: 2: S Quaker Ln & Duke St



Lane Group	Ø3	Ø6
Lane Configurations		
Traffic Volume (vph)		
Future Volume (vph)		
Ideal Flow (vphpl)		
Storage Length (ft)		
Storage Lanes		
Taper Length (ft)		
Right Turn on Red		
Link Speed (mph)		
Link Distance (ft)		
Travel Time (s)		
Turn Type		
Protected Phases	3	6
Permitted Phases		
Detector Phase		
Switch Phase		
Minimum Initial (s)	4.0	4.0
Minimum Split (s)	12.0	20.0
Total Split (s)	12.0	79.0
Total Split (%)	10%	66%
Yellow Time (s)	3.0	4.0
All-Red Time (s)	0.5	1.5
Lost Time Adjust (s)		
Total Lost Time (s)		
Lead/Lag	Lead	
Lead-Lag Optimize?		
Recall Mode	Max	C-Max
Intersection Summary		

Lanes, Volumes, Timings

3: Duke St & Alexandria Commons

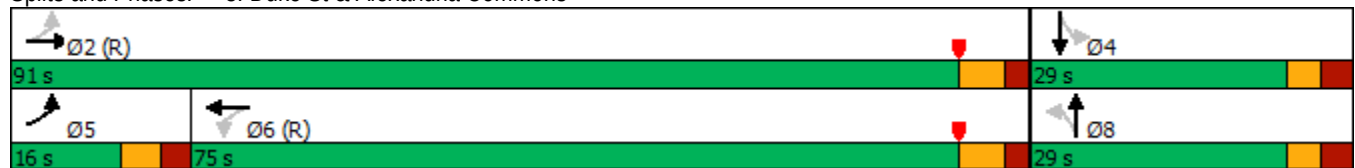
03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	1110	10	7	1718	34	16	2	4	49	2	93
Future Volume (vph)	62	1110	10	7	1718	34	16	2	4	49	2	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100		0	375		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		302			651			168			177	
Travel Time (s)		8.2			17.8			4.6			4.8	
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Detector Phase	5	2		6	6		8	8		4	4	
Switch Phase												
Minimum Initial (s)	5.0	10.0		1.0	1.0		7.0	7.0		6.7	6.7	
Minimum Split (s)	11.1	17.0		16.3	16.3		29.0	29.0		13.0	13.0	
Total Split (s)	16.0	91.0		75.0	75.0		29.0	29.0		29.0	29.0	
Total Split (%)	13.3%	75.8%		62.5%	62.5%		24.2%	24.2%		24.2%	24.2%	
Yellow Time (s)	3.5	4.0		4.0	4.0		3.0	3.0		3.0	3.0	
All-Red Time (s)	2.6	2.3		2.3	2.3		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	
Total Lost Time (s)	4.1	4.3		4.3	4.3			4.0			4.0	
Lead/Lag	Lead			Lag	Lag							
Lead-Lag Optimize?												
Recall Mode	None	C-Max		C-Max	C-Max		None	None		None	None	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 68 (57%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated

Splits and Phases: 3: Duke St & Alexandria Commons



Lanes, Volumes, Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	1131	3	27	1665	108	19	6	83	98	8	75
Future Volume (vph)	29	1131	3	27	1665	108	19	6	83	98	8	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	195		0	80		0	0		0	0		0
Storage Lanes	1		0	1		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		651			810			270			173	
Travel Time (s)		12.7			15.8			7.4			4.7	
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Detector Phase	5	2		1	6		8	8		4	4	4
Switch Phase												
Minimum Initial (s)	4.0	10.0		4.0	10.0		7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	10.0	30.8		10.0	31.0		29.0	29.0		29.0	29.0	29.0
Total Split (s)	17.0	74.0		17.0	74.0		29.0	29.0		29.0	29.0	29.0
Total Split (%)	14.2%	61.7%		14.2%	61.7%		24.2%	24.2%		24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0		3.0	4.0		3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	3.0	1.8		2.6	2.0		3.0	3.0		3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0			-2.0			-2.0	-2.0
Total Lost Time (s)	4.0	3.8		3.6	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	None	None

Intersection Summary

Area Type: Other

Cycle Length: 120

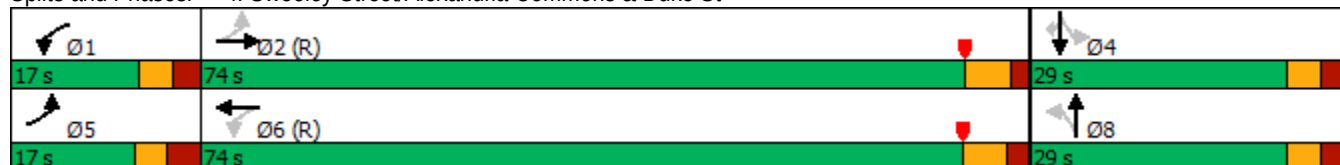
Actuated Cycle Length: 120

Offset: 67 (56%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St



Lanes, Volumes, Timings

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1298	5	61	1756	175	3	11	344	276	5	41
Future Volume (vph)	9	1298	5	61	1756	175	3	11	344	276	5	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	250		0	0		0	0		0
Storage Lanes	1		0	1		1	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			No			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		810			829			366			181	
Travel Time (s)		15.8			16.1			10.0			4.9	
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Detector Phase	5	2		1	6	6	8	8		4	4	4
Switch Phase												
Minimum Initial (s)	6.0	10.0		6.0	10.0	10.0	7.0	7.0		7.0	7.0	7.0
Minimum Split (s)	11.5	30.7		11.5	15.7	15.7	13.4	13.4		30.4	30.4	30.4
Total Split (s)	21.0	68.0		16.0	63.0	63.0	36.0	36.0		36.0	36.0	36.0
Total Split (%)	17.5%	56.7%		13.3%	52.5%	52.5%	30.0%	30.0%		30.0%	30.0%	30.0%
Yellow Time (s)	3.0	4.0		3.0	4.0	4.0	3.0	3.0		3.0	3.0	3.0
All-Red Time (s)	2.5	1.7		2.5	1.7	1.7	3.4	3.4		3.4	3.4	3.4
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0	-2.0		-2.0			-2.0	-2.0
Total Lost Time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lead/Lag	Lead	Lag		Lead	Lag	Lag						
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max	C-Max	None	None		None	None	None

Intersection Summary

Area Type: Other

Cycle Length: 120

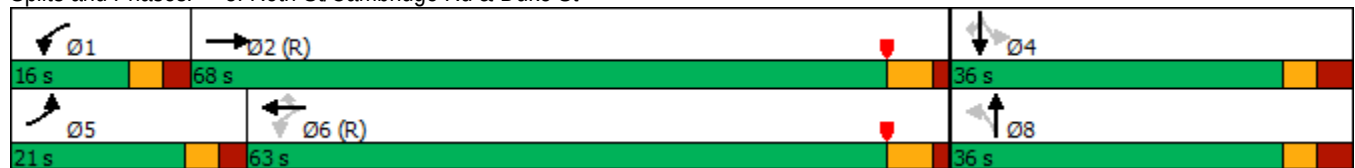
Actuated Cycle Length: 120

Offset: 64 (53%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



Lanes, Volumes, Timings

6: Witter Drive & Duke St

03/14/2024

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↖	
Traffic Volume (vph)	1910	8	29	1968	24	71
Future Volume (vph)	1910	8	29	1968	24	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	200		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)			25		25	
Right Turn on Red		Yes				Yes
Link Speed (mph)	35			35	25	
Link Distance (ft)	829			749	701	
Travel Time (s)	16.1			14.6	19.1	
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Detector Phase	2		1	6	4	
Switch Phase						
Minimum Initial (s)	10.0		6.0	10.0	4.0	
Minimum Split (s)	27.5		12.0	15.5	20.0	
Total Split (s)	67.0		16.0	83.0	37.0	
Total Split (%)	55.8%		13.3%	69.2%	30.8%	
Yellow Time (s)	3.5		3.0	3.5	3.5	
All-Red Time (s)	2.0		3.0	2.0	0.5	
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	
Total Lost Time (s)	3.5		4.0	3.5	2.0	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	C-Max		None	C-Max	None	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 78 (65%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
 Natural Cycle: 60
 Control Type: Actuated-Coordinated

Splits and Phases: 6: Witter Drive & Duke St



Lanes, Volumes, Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	702	1253	0	1978	234	0	0	0	56	346	19
Future Volume (vph)	26	702	1253	0	1978	234	0	0	0	56	346	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	180		0	0		120	0		0	0		0
Storage Lanes	1		1	0		1	0		0	0		1
Taper Length (ft)	25			25			25			25		
Right Turn on Red			No			No			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		749			1263			877			147	
Travel Time (s)		14.6			24.6			23.9			4.0	
Turn Type	Prot	NA	Prot		NA	Over				Split	NA	Perm
Protected Phases	5	2	2		6	4				4	4	
Permitted Phases												4
Detector Phase	5	2	2		6	4				4	4	4
Switch Phase												
Minimum Initial (s)	6.0	7.0	7.0		7.0	7.0				7.0	7.0	7.0
Minimum Split (s)	12.5	14.0	14.0		13.0	13.0				13.0	13.0	13.0
Total Split (s)	15.0	59.0	59.0		44.0	28.0				28.0	28.0	28.0
Total Split (%)	12.5%	49.2%	49.2%		36.7%	23.3%				23.3%	23.3%	23.3%
Yellow Time (s)	3.0	4.0	4.0		4.0	3.0				3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0		2.0	3.0				3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0	-2.0					-2.0	-2.0
Total Lost Time (s)	4.5	4.0	4.0		4.0	4.0					4.0	4.0
Lead/Lag	Lead				Lag	Lag				Lag	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	C-Max	C-Max		C-Max	None				None	None	None

Intersection Summary

Area Type: Other

Cycle Length: 120

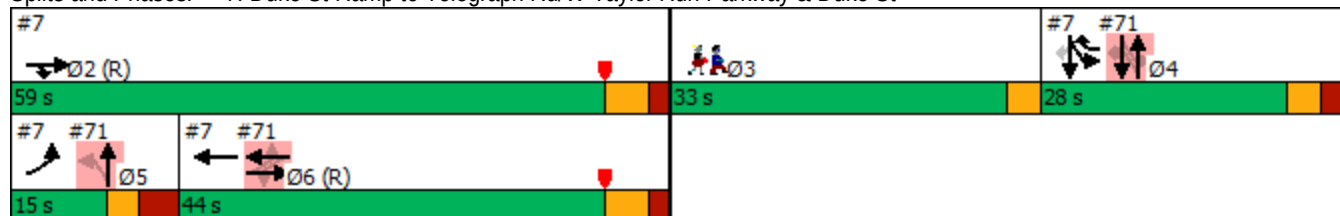
Actuated Cycle Length: 120

Offset: 89 (74%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Lane Group	Ø3
Lane Configurations	
Traffic Volume (vph)	
Future Volume (vph)	
Ideal Flow (vphpl)	
Storage Length (ft)	
Storage Lanes	
Taper Length (ft)	
Right Turn on Red	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Turn Type	
Protected Phases	3
Permitted Phases	
Detector Phase	
Switch Phase	
Minimum Initial (s)	1.0
Minimum Split (s)	33.0
Total Split (s)	33.0
Total Split (%)	28%
Yellow Time (s)	3.0
All-Red Time (s)	0.0
Lost Time Adjust (s)	
Total Lost Time (s)	
Lead/Lag	Lead
Lead-Lag Optimize?	
Recall Mode	None
Intersection Summary	

Lanes, Volumes, Timings

8: NB Telegraph Rd to EB Duke St/NB Telegraph Rd to WB Duke St & Duke St

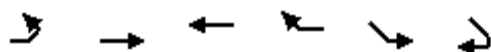
03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations		↑↑			↑↑				↑			↑
Traffic Volume (vph)	0	758	0	0	747	0	0	0	887	0	0	1465
Future Volume (vph)	0	758	0	0	747	0	0	0	887	0	0	1465
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		1263			467			543			638	
Travel Time (s)		24.6			9.1			10.6			12.4	
Sign Control		Free			Free			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Lanes, Volumes, Timings

9: Duke St & WB Duke St to SB Telegraph Rd

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SEL	SER
Lane Configurations		↑↑↑	↑↑	↑		
Traffic Volume (vph)	0	1645	747	1815	0	0
Future Volume (vph)	0	1645	747	1815	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		35	35		35	
Link Distance (ft)		467	178		746	
Travel Time (s)		9.1	3.5		14.5	
Sign Control		Free	Free		Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Lanes, Volumes, Timings
10: Dove St/Roberts Ln & Duke St

03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1427	3	0	2324	1	204	31	21	14	20	34
Future Volume (vph)	0	1427	3	0	2324	1	204	31	21	14	20	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			25			25			25	
Link Distance (ft)		194			313			146			120	
Travel Time (s)		3.8			8.5			4.0			3.3	
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Detector Phase		2			6		8	8		4	4	
Switch Phase												
Minimum Initial (s)		10.0			10.0		7.0	7.0		7.0	7.0	
Minimum Split (s)		25.0			28.0		40.0	40.0		13.0	13.0	
Total Split (s)		57.0			57.0		40.0	40.0		40.0	40.0	
Total Split (%)		58.8%			58.8%		41.2%	41.2%		41.2%	41.2%	
Yellow Time (s)		4.0			4.0		3.0	3.0		3.0	3.0	
All-Red Time (s)		2.0			2.0		3.0	3.0		3.0	3.0	
Lost Time Adjust (s)		-2.0			-2.0			-2.0			-2.0	
Total Lost Time (s)		4.0			4.0			4.0			4.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		Max			Max		None	None		None	None	

Intersection Summary

Area Type: Other

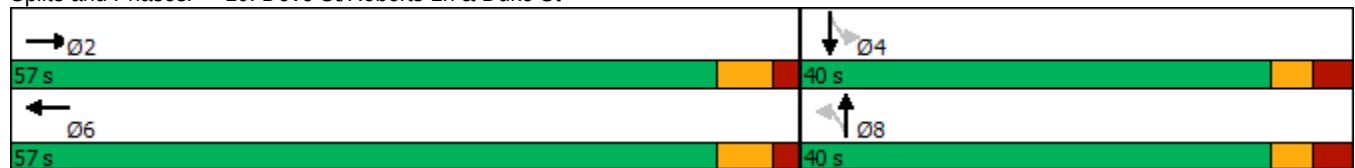
Cycle Length: 97

Actuated Cycle Length: 87.1

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Lanes, Volumes, Timings
71: W Taylor Run Parkway

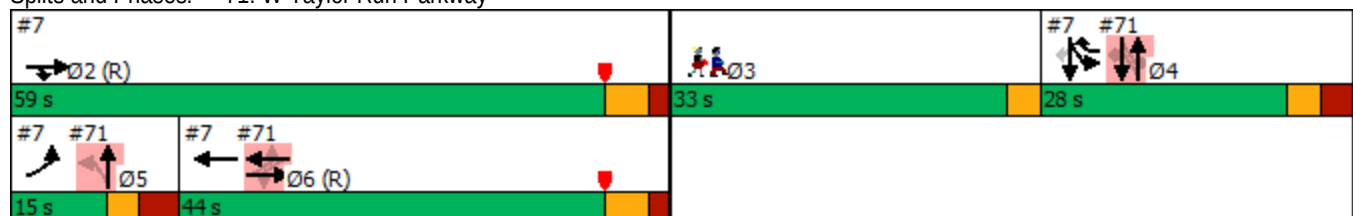
03/14/2024

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	6	66	85	11	2	35	209	16	0	270	1
Future Volume (vph)	9	6	66	85	11	2	35	209	16	0	270	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		136			143			147			270	
Travel Time (s)		3.7			3.9			4.0			7.4	
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Detector Phase	6	6		6	6		4 5	4 5		4	4	4
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0					7.0	7.0	7.0
Minimum Split (s)	13.0	13.0		13.0	13.0					13.0	13.0	13.0
Total Split (s)	44.0	44.0		44.0	44.0					28.0	28.0	28.0
Total Split (%)	36.7%	36.7%		36.7%	36.7%					23.3%	23.3%	23.3%
Yellow Time (s)	4.0	4.0		4.0	4.0					3.0	3.0	3.0
All-Red Time (s)	2.0	2.0		2.0	2.0					3.0	3.0	3.0
Lost Time Adjust (s)		-2.0			-2.0						-2.0	-2.0
Total Lost Time (s)		4.0			4.0						4.0	4.0
Lead/Lag	Lag	Lag		Lag	Lag					Lag	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max		C-Max	C-Max					None	None	None

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 89 (74%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated

Splits and Phases: 71: W Taylor Run Parkway



Lane Group	Ø2	Ø3	Ø5
Lane Configurations			
Traffic Volume (vph)			
Future Volume (vph)			
Ideal Flow (vphpl)			
Right Turn on Red			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Turn Type			
Protected Phases	2	3	5
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	7.0	1.0	6.0
Minimum Split (s)	14.0	33.0	12.5
Total Split (s)	59.0	33.0	15.0
Total Split (%)	49%	28%	13%
Yellow Time (s)	4.0	3.0	3.0
All-Red Time (s)	2.0	0.0	3.5
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag		Lead	Lead
Lead-Lag Optimize?			
Recall Mode	C-Max	None	None
Intersection Summary			



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix J: PLTS Rating

Segment 1 DUKE STREET WESTBOUND SERVICE ROAD ALONG EAST LEG

Number of lanes 2
Posted speed ≤25 MPH

Sidewalk condition Fair
Sidewalk width 5

Buffer type Landscaped
Buffer width 2

Bike lane width 0
Parking width 0

General land use Residential, central
 business districts
 (CBD), neighborhood
 commercial, parks
 and other public
 facilities,
 governmental
 buildings/plazas,
 offices/office parks

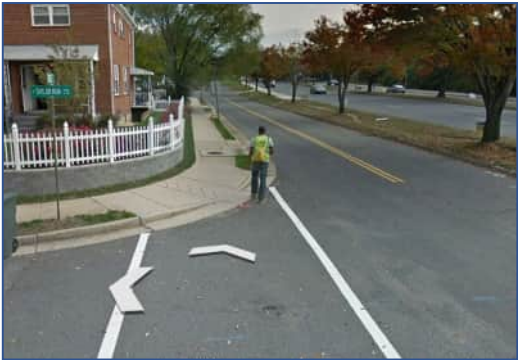
Sidewalk Condition
PLTS 3

Physical Buffer Type
PLTS 1

Total Buffering Width
PLTS 2

General Land Use
PLTS 1

Final PLTS
PLTS 2



Segment 2 DUKE STREET EASTBOUND RAMP

Number of lanes 2
Posted speed ≤25 MPH

Sidewalk condition Fair
Sidewalk width 5

Buffer type Landscaped
Buffer width 2

Bike lane width 0
Parking width 0

General land use Residential, central business districts (CBD), neighborhood commercial, parks and other public facilities, governmental buildings/plazas, offices/office parks

Sidewalk Condition
PLTS 3

Physical Buffer Type
PLTS 1

Total Buffering Width
PLTS 2

General Land Use
PLTS 1

Final PLTS
PLTS 2



Segment 3 DUKE STREET WESTBOUND SERVICE ROAD ALONG WEST LEG

Number of lanes 2
Posted speed ≤25 MPH

Sidewalk condition Fair
Sidewalk width 6

Buffer type Landscaped
Buffer width 0

Bike lane width 0
Parking width 0

General land use Residential, central business districts (CBD), neighborhood commercial, parks and other public facilities, governmental buildings/plazas, offices/office parks

Sidewalk Condition
PLTS 2

Physical Buffer Type
PLTS 1

Total Buffering Width
PLTS 2

General Land Use
PLTS 1

Final PLTS
PLTS 1



Segment 4 DUKE STREET EASTBOUND ALONG WEST LEG

Number of lanes 4 - 5
Posted speed 35 MPH

Sidewalk condition Fair
Sidewalk width 5

Buffer type Landscaped
Buffer width 2

Bike lane width 0
Parking width 2

General land use Residential, central business districts (CBD), neighborhood commercial, parks and other public facilities, governmental buildings/plazas, offices/office parks

Sidewalk Condition
PLTS 3

Physical Buffer Type
PLTS 2

Total Buffering Width
PLTS 4

General Land Use
PLTS 1

Final PLTS
PLTS 3



<u>Existing Crosswalk 5</u>	DUKE STREET EASTLEG CROSSWALK	PLTS 1
<u>Existing Crosswalk 6</u>	TELEGRAPH ROAD OFF RAMP (WESTBOUND) RRFB CROSSWALK	PLTS 3
<u>Existing Crosswalk 7</u>	TELEGRAPH ROAD ON RAMP (WESTBOUND) RRFB CROSSWALK	PLTS 3
<u>Existing Crosswalk 8</u>	TELEGRAPH ROAD ON RAMP (EASTBOUND) RRFB CROSSWALK	PLTS 3
<u>Existing Crosswalk 9</u>	TELEGRAPH ROAD OFF RAMP (EASTBOUND) RRFB CROSSWALK	PLTS 3
<u>Proposed Crosswalk 10</u>	TELEGRAPH ROAD WESTBOUND CROSSWALK	PLTS 1



Crosswalk 5



Crosswalk 6

Crosswalk 7



Crosswalk 8



Crosswalk 9





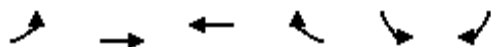
Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix K: Synchro Results 2026 No-Build Conditions

HCM Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	267	1261	880	1018	548	111
Future Volume (vph)	267	1261	880	1018	548	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1719	4988	3343	1568	2797	
Flt Permitted	0.20	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	361	4988	3343	1568	2797	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.94	0.94
Growth Factor (vph)	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	302	1425	963	1114	606	123
RTOR Reduction (vph)	0	0	0	0	14	0
Lane Group Flow (vph)	302	1425	963	1114	715	0
Confl. Peds. (#/hr)	4			4	4	2
Heavy Vehicles (%)	5%	4%	8%	3%	27%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	81.0	81.0	61.0	93.5	26.5	
Effective Green, g (s)	83.0	83.0	63.0	95.5	28.5	
Actuated g/C Ratio	0.69	0.69	0.52	0.80	0.24	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		0.2		3.0	
Lane Grp Cap (vph)	435	3450	1755	1247	664	
v/s Ratio Prot	c0.09	0.29	0.29	c0.71	c0.26	
v/s Ratio Perm	0.39					
v/c Ratio	0.69	0.41	0.55	0.89	1.08	
Uniform Delay, d1	11.5	8.0	19.0	8.7	45.8	
Progression Factor	1.00	1.00	0.63	0.76	1.00	
Incremental Delay, d2	4.8	0.1	0.9	6.4	57.2	
Delay (s)	16.3	8.1	12.9	13.0	102.9	
Level of Service	B	A	B	B	F	
Approach Delay (s)		9.5	13.0		102.9	
Approach LOS		A	B		F	
Intersection Summary						
HCM 2000 Control Delay			26.1		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.92			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			88.0%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Timing Report, Sorted By Phase

1: Duke St & N Quaker Lane

03/14/2024

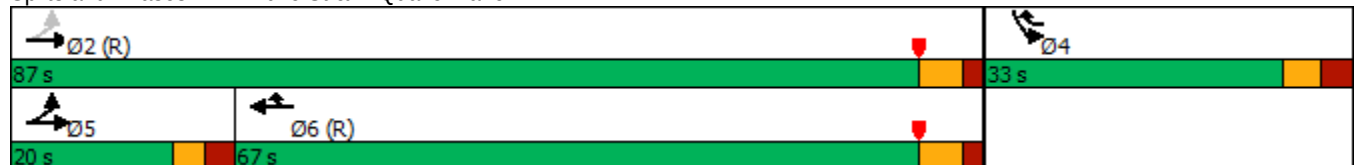


Phase Number	2	4	5	6
Movement	EBTL	SBL	EBTL	WBT
Lead/Lag			Lead	Lag
Lead-Lag Optimize				
Recall Mode	C-Max	None	None	C-Max
Maximum Split (s)	87	33	20	67
Maximum Split (%)	72.5%	27.5%	16.7%	55.8%
Minimum Split (s)	22	29.5	19.6	22
Yellow Time (s)	4	3.5	3	4
All-Red Time (s)	2	3	2.6	2
Minimum Initial (s)	10	7	5	10
Vehicle Extension (s)	0.2	3	3	0.2
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		4	4	4
Flash Dont Walk (s)		19	10	12
Dual Entry	No	No	No	No
Inhibit Max	No	No	No	No
Start Time (s)	49	16	49	69
End Time (s)	16	49	69	16
Yield/Force Off (s)	10	42.5	63.4	10
Yield/Force Off 170(s)	10	23.5	53.4	118
Local Start Time (s)	39	6	39	59
Local Yield (s)	0	32.5	53.4	0
Local Yield 170(s)	0	13.5	43.4	108

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	

Splits and Phases: 1: Duke St & N Quaker Lane



HCM Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1691	118	24	1845	0	53	0	14	2	0	0
Future Volume (vph)	0	1691	118	24	1845	0	53	0	14	2	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor		0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00	0.98	1.00	1.00			1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	1.00			0.97			1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.96			0.95	
Satd. Flow (prot)		3471	1475	1770	3438			1671			1761	
Flt Permitted		1.00	1.00	0.06	1.00			0.77			0.77	
Satd. Flow (perm)		3471	1475	105	3438			1345			1435	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.84	0.84	0.84	1.00	1.00	1.00
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	0	1912	133	27	2041	0	66	0	17	2	0	0
RTOR Reduction (vph)	0	0	28	0	0	0	0	75	0	0	0	0
Lane Group Flow (vph)	0	1912	105	27	2041	0	0	8	0	0	2	0
Confl. Peds. (#/hr)	9		4	4		9			5	5		
Heavy Vehicles (%)	2%	4%	7%	2%	5%	2%	2%	2%	21%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1			4			3	4
Permitted Phases	2		2	1	6		4			3	4	
Actuated Green, G (s)		81.0	81.0	97.0	97.0			9.2			13.5	
Effective Green, g (s)		83.0	83.0	99.0	99.0			11.2			15.5	
Actuated g/C Ratio		0.69	0.69	0.82	0.82			0.09			0.13	
Clearance Time (s)		5.5	5.5	5.5				4.0				
Vehicle Extension (s)		0.2	0.2	3.0				3.0				
Lane Grp Cap (vph)		2400	1020	260	2836			125			185	
v/s Ratio Prot		c0.55		0.01	c0.59							
v/s Ratio Perm			0.07	0.07				c0.01			c0.00	
v/c Ratio		0.80	0.10	0.10	0.72			0.06			0.01	
Uniform Delay, d1		12.7	6.1	19.8	4.5			49.6			45.6	
Progression Factor		1.19	0.94	0.20	0.28			1.00			1.00	
Incremental Delay, d2		2.3	0.2	0.1	0.6			0.2			0.0	
Delay (s)		17.4	6.0	4.1	1.9			49.8			45.6	
Level of Service		B	A	A	A			D			D	
Approach Delay (s)		16.7			1.9			49.8			45.6	
Approach LOS		B			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			10.1			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				10.5		
Intersection Capacity Utilization			67.8%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

2: S Quaker Ln & Duke St

03/14/2024



Phase Number	1	2	3	4	6
Movement	WBTL	EBTL	SBTL	NBSB	WBTL
Lead/Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize					
Recall Mode	None	C-Max	None	None	C-Max
Maximum Split (s)	16	63	12	29	79
Maximum Split (%)	13.3%	52.5%	10.0%	24.2%	65.8%
Minimum Split (s)	10.5	15.5	12	29	20
Yellow Time (s)	4	4	3	3	4
All-Red Time (s)	1.5	1.5	0.5	1	1.5
Minimum Initial (s)	5	10	4	7	4
Vehicle Extension (s)	3	0.2	0.2	3	0.2
Minimum Gap (s)	3	0.2	0.2	3	0.2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)				4	
Flash Dont Walk (s)				21	
Dual Entry	No	No	No	No	No
Inhibit Max	No	No	No	No	No
Start Time (s)	15.5	72.5	31.5	43.5	72.5
End Time (s)	31.5	15.5	43.5	72.5	31.5
Yield/Force Off (s)	26	10	40	68.5	26
Yield/Force Off 170(s)	26	10	40	47.5	26
Local Start Time (s)	5.5	62.5	21.5	33.5	62.5
Local Yield (s)	16	0	30	58.5	16
Local Yield 170(s)	16	0	30	37.5	16

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	150
Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 2: S Quaker Ln & Duke St

Ø2 (R)	Ø1	Ø3	Ø4
63 s	16 s	12 s	29 s
Ø6 (R)			
79 s			

HCM Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	1661	6	0	1822	34	3	0	0	17	0	44
Future Volume (vph)	40	1661	6	0	1822	34	3	0	0	17	0	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.3			4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			1.00			0.90	
Flt Protected	0.95	1.00			1.00			0.95			0.99	
Satd. Flow (prot)	1770	3469			3429			1770			1653	
Flt Permitted	0.06	1.00			1.00			0.65			0.91	
Satd. Flow (perm)	105	3469			3429			1215			1518	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.25	0.25	0.25	0.95	0.95	0.95
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	44	1818	7	0	1995	37	12	0	0	19	0	48
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	61	0
Lane Group Flow (vph)	44	1825	0	0	2031	0	0	12	0	0	6	0
Confl. Peds. (#/hr)	8		3	3		8			9	9		
Heavy Vehicles (%)	2%	4%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	98.9	98.9			89.1			8.8			8.8	
Effective Green, g (s)	100.9	100.9			91.1			10.8			10.8	
Actuated g/C Ratio	0.84	0.84			0.76			0.09			0.09	
Clearance Time (s)	5.6	6.3			6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0			0.2			2.0			2.0	
Lane Grp Cap (vph)	174	2916			2603			109			136	
v/s Ratio Prot	0.01	c0.53			c0.59							
v/s Ratio Perm	0.20							c0.01			0.00	
v/c Ratio	0.25	0.63			0.78			0.11			0.04	
Uniform Delay, d1	11.0	3.2			8.5			50.2			49.9	
Progression Factor	4.12	0.25			0.31			1.00			1.00	
Incremental Delay, d2	0.2	0.7			1.2			0.2			0.0	
Delay (s)	45.4	1.4			3.8			50.3			49.9	
Level of Service	D	A			A			D			D	
Approach Delay (s)		2.5			3.8			50.3			49.9	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			4.1									
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			120.0									
Intersection Capacity Utilization			69.7%									
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

3: Duke St & Alexandria Commons

03/14/2024

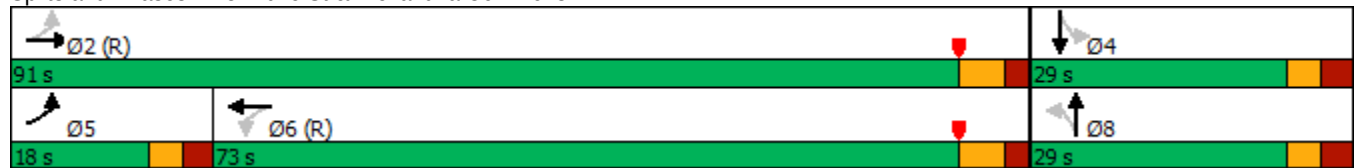


Phase Number	2	4	5	6	8
Movement	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag			Lead	Lag	
Lead-Lag Optimize					
Recall Mode	C-Max	None	None	C-Max	None
Maximum Split (s)	91	29	18	73	29
Maximum Split (%)	75.8%	24.2%	15.0%	60.8%	24.2%
Minimum Split (s)	16.3	13	10.6	16.3	29
Yellow Time (s)	4	3	3	4	3
All-Red Time (s)	2.3	3	2.6	2.3	3
Minimum Initial (s)	10	7	4.5	1	7
Vehicle Extension (s)	2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)					4
Flash Dont Walk (s)					19
Dual Entry	No	Yes	No	No	Yes
Inhibit Max	No	No	No	No	No
Start Time (s)	61.3	32.3	61.3	79.3	32.3
End Time (s)	32.3	61.3	79.3	32.3	61.3
Yield/Force Off (s)	26	55.3	73.7	26	55.3
Yield/Force Off 170(s)	26	55.3	73.7	26	36.3
Local Start Time (s)	35.3	6.3	35.3	53.3	6.3
Local Yield (s)	0	29.3	47.7	0	29.3
Local Yield 170(s)	0	29.3	47.7	0	10.3

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	100
Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 3: Duke St & Alexandria Commons



HCM Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	1624	2	22	1768	121	11	5	31	81	1	77
Future Volume (vph)	52	1624	2	22	1768	121	11	5	31	81	1	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3471		1656	3405			1617			1760	1559
Flt Permitted	0.05	1.00		0.08	1.00			0.92			0.70	1.00
Satd. Flow (perm)	86	3471		140	3405			1504			1298	1559
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.90	0.90	0.90	0.76	0.76	0.76
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	58	1797	2	25	1999	137	13	6	36	111	1	105
RTOR Reduction (vph)	0	0	0	0	3	0	0	31	0	0	0	90
Lane Group Flow (vph)	58	1799	0	25	2133	0	0	24	0	0	112	15
Confl. Peds. (#/hr)	3		3	3		3	2		6	6		2
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	9%	2%	3%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	89.2	84.6		85.6	82.5			14.9			14.9	14.9
Effective Green, g (s)	93.2	86.6		89.6	84.5			16.9			16.9	16.9
Actuated g/C Ratio	0.78	0.72		0.75	0.70			0.14			0.14	0.14
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	159	2504		168	2397			211			182	219
v/s Ratio Prot	c0.02	0.52		0.01	c0.63							
v/s Ratio Perm	0.26			0.10				0.02			c0.09	0.01
v/c Ratio	0.36	0.72		0.15	0.89			0.11			0.62	0.07
Uniform Delay, d1	20.7	9.7		8.5	14.1			45.0			48.5	44.7
Progression Factor	1.87	0.73		0.08	0.34			1.00			1.00	1.00
Incremental Delay, d2	0.4	1.5		0.0	1.9			0.1			4.3	0.0
Delay (s)	39.1	8.5		0.7	6.7			45.1			52.8	44.8
Level of Service	D	A		A	A			D			D	D
Approach Delay (s)		9.4			6.6			45.1			48.9	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			10.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			79.8%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

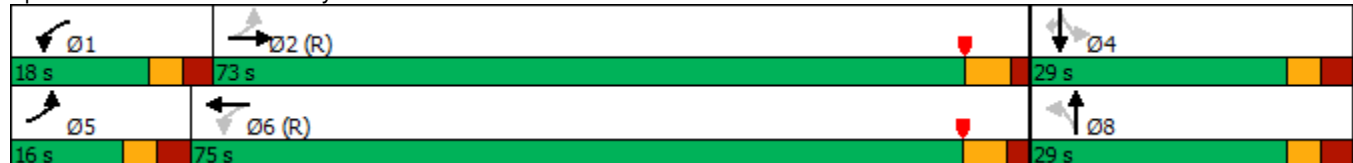


Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	18	73	29	16	75	29
Maximum Split (%)	15.0%	60.8%	24.2%	13.3%	62.5%	24.2%
Minimum Split (s)	10	30.8	29	10	31	29
Yellow Time (s)	3	4	3	3	4	3
All-Red Time (s)	2.6	1.8	3	3	2	3
Minimum Initial (s)	4	10	7	4	10	7
Vehicle Extension (s)	2	0.2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		4	4		4	4
Flash Dont Walk (s)		21	19		21	19
Dual Entry	No	No	Yes	No	No	Yes
Inhibit Max	No	No	No	No	No	No
Start Time (s)	35	53	6	35	51	6
End Time (s)	53	6	35	51	6	35
Yield/Force Off (s)	47.4	0.2	29	45	0	29
Yield/Force Off 170(s)	47.4	99.2	10	45	99	10
Local Start Time (s)	35	53	6	35	51	6
Local Yield (s)	47.4	0.2	29	45	0	29
Local Yield 170(s)	47.4	99.2	10	45	99	10

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	110
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

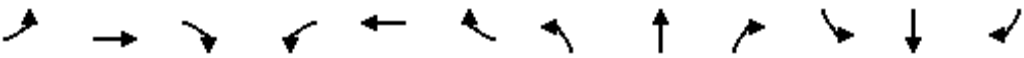
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St



HCM Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	1672	4	96	1854	302	6	6	54	189	4	51
Future Volume (vph)	60	1672	4	96	1854	302	6	6	54	189	4	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	3470		1656	3438	1583		1450			1758	1527
Flt Permitted	0.95	1.00		0.06	1.00	1.00		0.97			0.68	1.00
Satd. Flow (perm)	1770	3470		96	3438	1583		1413			1261	1527
Peak-hour factor, PHF	0.91	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.97	0.88	0.88	0.88
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	69	1911	5	107	2073	338	6	6	58	223	5	60
RTOR Reduction (vph)	0	0	0	0	0	0	0	45	0	0	0	47
Lane Group Flow (vph)	69	1916	0	107	2073	338	0	25	0	0	228	13
Confl. Peds. (#/hr)			4	4			16					16
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	17%	2%	17%	2%	50%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	7.5	69.6		79.1	70.6	70.6		24.3			24.3	24.3
Effective Green, g (s)	9.5	71.6		83.1	72.6	72.6		26.3			26.3	26.3
Actuated g/C Ratio	0.08	0.60		0.69	0.60	0.60		0.22			0.22	0.22
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	140	2070		202	2079	957		309			276	334
v/s Ratio Prot	0.04	0.55		c0.05	c0.60							
v/s Ratio Perm				0.32		0.21		0.02			c0.18	0.01
v/c Ratio	0.49	0.93		0.53	1.00	0.35		0.08			0.83	0.04
Uniform Delay, d1	52.9	21.8		26.8	23.6	11.9		37.2			44.7	36.9
Progression Factor	0.87	1.03		1.52	0.91	0.54		1.00			1.00	1.00
Incremental Delay, d2	0.7	6.7		1.0	17.2	0.8		0.0			17.2	0.0
Delay (s)	46.8	29.3		41.6	38.6	7.2		37.3			61.8	36.9
Level of Service	D	C		D	D	A		D			E	D
Approach Delay (s)		29.9			34.5			37.3			56.6	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			34.0				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			11.6		
Intersection Capacity Utilization			87.3%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

5: Roth St/Cambridge Rd & Duke St

03/14/2024

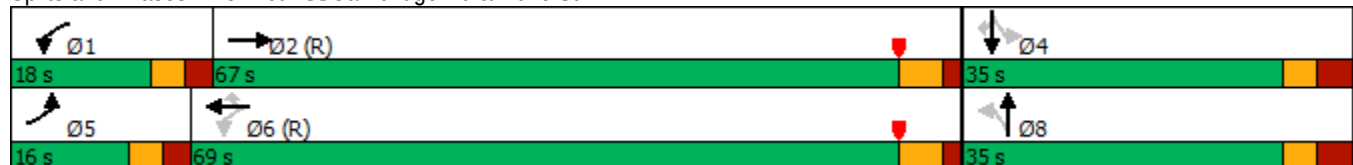


Phase Number	1	2	4	5	6	8
Movement	WBL	EBT	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	18	67	35	16	69	35
Maximum Split (%)	15.0%	55.8%	29.2%	13.3%	57.5%	29.2%
Minimum Split (s)	11.5	30.7	30.4	11.5	15.7	13.4
Yellow Time (s)	3	4	3	3	4	3
All-Red Time (s)	2.5	1.7	3.4	2.5	1.7	3.4
Minimum Initial (s)	6	10	7	6	10	7
Vehicle Extension (s)	2	0.2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	4			
Flash Dont Walk (s)		18	20			
Dual Entry	No	No	Yes	No	No	Yes
Inhibit Max	No	No	No	No	No	No
Start Time (s)	21.7	39.7	106.7	21.7	37.7	106.7
End Time (s)	39.7	106.7	21.7	37.7	106.7	21.7
Yield/Force Off (s)	34.2	101	15.3	32.2	101	15.3
Yield/Force Off 170(s)	34.2	83	115.3	32.2	101	15.3
Local Start Time (s)	40.7	58.7	5.7	40.7	56.7	5.7
Local Yield (s)	53.2	0	34.3	51.2	0	34.3
Local Yield 170(s)	53.2	102	14.3	51.2	0	34.3

Intersection Summary

Cycle Length 120
Control Type Actuated-Coordinated
Natural Cycle 110
Offset: 101 (84%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

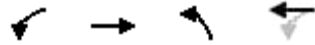
03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	1894	21	87	2245	7	25
Future Volume (vph)	1894	21	87	2245	7	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.89	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	4979		1719	4988	1538	
Flt Permitted	1.00		0.06	1.00	0.99	
Satd. Flow (perm)	4979		114	4988	1538	
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.73	0.73
Growth Factor (vph)	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	2118	23	99	2566	10	36
RTOR Reduction (vph)	1	0	0	0	34	0
Lane Group Flow (vph)	2140	0	99	2566	12	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	4%	2%	5%	4%	14%	8%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	86.6		102.6	102.6	5.9	
Effective Green, g (s)	88.6		104.6	104.6	7.9	
Actuated g/C Ratio	0.74		0.87	0.87	0.07	
Clearance Time (s)	5.5		6.0	5.5	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3676		259	4347	101	
v/s Ratio Prot	0.43		0.04	c0.51	c0.01	
v/s Ratio Perm			0.29			
v/c Ratio	0.58		0.38	0.59	0.12	
Uniform Delay, d1	7.2		16.6	2.0	52.8	
Progression Factor	1.85		1.11	1.53	1.00	
Incremental Delay, d2	0.3		0.4	0.3	0.5	
Delay (s)	13.6		18.8	3.4	53.3	
Level of Service	B		B	A	D	
Approach Delay (s)	13.6			3.9	53.3	
Approach LOS	B			A	D	
Intersection Summary						
HCM 2000 Control Delay		8.7		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.58				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		11.5
Intersection Capacity Utilization		56.9%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

Timing Report, Sorted By Phase

6: Witter Drive & Duke St

03/14/2024



Phase Number	1	2	4	6
Movement	WBL	EBT	NBL	WBTL
Lead/Lag	Lag	Lead		
Lead-Lag Optimize				
Recall Mode	None	C-Max	None	C-Max
Maximum Split (s)	16	79	25	95
Maximum Split (%)	13.3%	65.8%	20.8%	79.2%
Minimum Split (s)	12	27.5	13	15.5
Yellow Time (s)	3	3.5	3	3.5
All-Red Time (s)	3	2	3	2
Minimum Initial (s)	6	10	4	10
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7		
Flash Dont Walk (s)		15		
Dual Entry	No	No	No	No
Inhibit Max	No	No	No	No
Start Time (s)	74.5	115.5	90.5	115.5
End Time (s)	90.5	74.5	115.5	90.5
Yield/Force Off (s)	84.5	69	109.5	85
Yield/Force Off 170(s)	84.5	54	109.5	85
Local Start Time (s)	5.5	46.5	21.5	46.5
Local Yield (s)	15.5	0	40.5	16
Local Yield 170(s)	15.5	105	40.5	16

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	60
Offset: 69 (58%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	

Splits and Phases: 6: Witter Drive & Duke St

→ Ø2 (R)	79 s	↖ Ø1	16 s	↖ Ø4	25 s
↖ Ø6 (R)	95 s				

HCM Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	928	961	0	2296	268	0	0	0	30	288	36
Future Volume (vph)	30	928	961	0	2296	268	0	0	0	30	288	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00					1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00					1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00					1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00					1.00	1.00
Satd. Flow (prot)	1641	3167	1743		4715	1583					1854	1552
Flt Permitted	0.95	1.00	1.00		1.00	1.00					1.00	1.00
Satd. Flow (perm)	1641	3167	1743		4715	1583					1854	1552
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	1.00	1.00	1.00	0.87	0.87	0.87
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	35	1084	1123	0	2540	297	0	0	0	36	344	43
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	35
Lane Group Flow (vph)	35	1084	1123	0	2540	297	0	0	0	0	380	8
Confl. Peds. (#/hr)										3		5
Heavy Vehicles (%)	10%	14%	9%	2%	10%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Prot		NA	Over				Split	NA	Perm
Protected Phases	5	2	2		6	4				4	4	
Permitted Phases												4
Actuated Green, G (s)	7.9	79.0	79.0		64.6	20.0					20.0	20.0
Effective Green, g (s)	9.9	81.0	81.0		66.6	22.0					22.0	22.0
Actuated g/C Ratio	0.08	0.68	0.68		0.55	0.18					0.18	0.18
Clearance Time (s)	6.5	6.0	6.0		6.0	6.0					6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2	3.0					3.0	3.0
Lane Grp Cap (vph)	135	2137	1176		2616	290					339	284
v/s Ratio Prot	0.02	0.34	c0.64		0.54	0.19					c0.20	
v/s Ratio Perm												0.01
v/c Ratio	0.26	0.51	0.95		0.97	1.02					1.12	0.03
Uniform Delay, d1	51.6	9.6	17.8		25.8	49.0					49.0	40.2
Progression Factor	1.15	0.59	1.04		1.00	1.00					0.47	1.00
Incremental Delay, d2	0.9	0.7	15.5		12.0	59.2					76.6	0.0
Delay (s)	60.1	6.5	34.2		37.8	108.2					99.6	40.2
Level of Service	E	A	C		D	F					F	D
Approach Delay (s)		21.2			45.1			0.0			93.5	
Approach LOS		C			D			A			F	
Intersection Summary												
HCM 2000 Control Delay			39.1		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			0.98									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					15.5		
Intersection Capacity Utilization			86.0%		ICU Level of Service					E		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

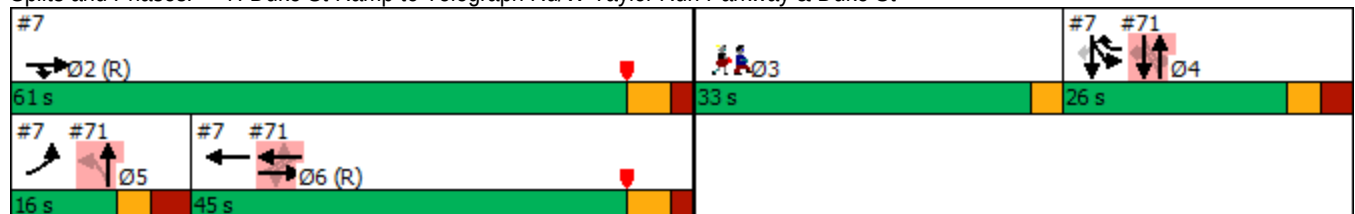


Phase Number	2	3	4	5	6
Node Number	7	0	7	7	7
Movement	EBT	Ped	SBTL	EBL	WBT
Lead/Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize					
Recall Mode	C-Max	None	None	None	C-Max
Maximum Split (s)	61	33	26	16	45
Maximum Split (%)	50.8%	27.5%	21.7%	13.3%	37.5%
Minimum Split (s)	14	33	13	12.5	13
Yellow Time (s)	4	3	3	3	4
All-Red Time (s)	2	0	3	3.5	2
Minimum Initial (s)	7	1	7	6	7
Vehicle Extension (s)	3	0.2	3	3	0.2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)		4			
Flash Dont Walk (s)		26			
Dual Entry	No	No	No	No	No
Inhibit Max	No	No	No	No	No
Start Time (s)	113	54	87	113	9
End Time (s)	54	87	113	9	54
Yield/Force Off (s)	48	84	107	2.5	48
Yield/Force Off 170(s)	48	58	107	2.5	48
Local Start Time (s)	65	6	39	65	81
Local Yield (s)	0	36	59	74.5	0
Local Yield 170(s)	0	10	59	74.5	0

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	150
Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	

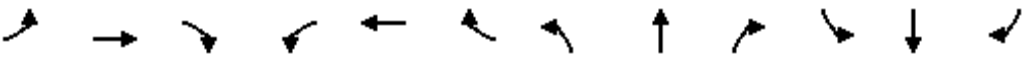
Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2150	1	0	1066	0	284	28	11	16	13	42
Future Volume (vph)	0	2150	1	0	1066	0	284	28	11	16	13	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			1.00			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5036			4891			1756			1666	
Flt Permitted		1.00			1.00			0.70			0.89	
Satd. Flow (perm)		5036			4891			1279			1492	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.76	0.76	0.76	0.77	0.77	0.77
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	0	2484	1	0	1205	0	389	38	15	22	18	57
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	33	0
Lane Group Flow (vph)	0	2485	0	0	1205	0	0	441	0	0	64	0
Confl. Peds. (#/hr)	18		3	3		18			8	8		
Heavy Vehicles (%)	2%	3%	2%	2%	5%	2%	3%	2%	9%	2%	2%	5%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		51.0			51.0			33.2			33.2	
Effective Green, g (s)		53.0			53.0			35.2			35.2	
Actuated g/C Ratio		0.55			0.55			0.37			0.37	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			0.2			3.0			3.0	
Lane Grp Cap (vph)		2774			2694			467			545	
v/s Ratio Prot		c0.49			0.25							
v/s Ratio Perm								c0.34			0.04	
v/c Ratio		0.90			0.45			0.94			0.12	
Uniform Delay, d1		19.2			12.9			29.5			20.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		5.0			0.5			27.8			0.1	
Delay (s)		24.2			13.4			57.4			20.3	
Level of Service		C			B			E			C	
Approach Delay (s)		24.2			13.4			57.4			20.3	
Approach LOS		C			B			E			C	
Intersection Summary												
HCM 2000 Control Delay			24.5			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			96.2			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			75.9%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

10: Dove St/Roberts Ln & Duke St

03/14/2024



Phase Number	2	4	6	8
Movement	EBT	SBTL	WBT	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	57	40	57	40
Maximum Split (%)	58.8%	41.2%	58.8%	41.2%
Minimum Split (s)	25	13	28	40
Yellow Time (s)	4	3	4	3
All-Red Time (s)	2	3	2	3
Minimum Initial (s)	10	7	10	7
Vehicle Extension (s)	3	3	0.2	3
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7		7	7
Flash Dont Walk (s)	12		12	27
Dual Entry	No	Yes	No	Yes
Inhibit Max	No	No	No	No
Start Time (s)	0	57	0	57
End Time (s)	57	0	57	0
Yield/Force Off (s)	51	91	51	91
Yield/Force Off 170(s)	39	91	39	64
Local Start Time (s)	46	6	46	6
Local Yield (s)	0	40	0	40
Local Yield 170(s)	85	40	85	13

Intersection Summary

Cycle Length	97
Control Type	Semi Act-Uncoord
Natural Cycle	90

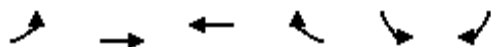
Splits and Phases: 10: Dove St/Roberts Ln & Duke St

→ Ø2	↓ Ø4
57 s	40 s
← Ø6	↑ Ø8
57 s	40 s

HCM Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑↑	↑↑	↰	↰↰	
Traffic Volume (vph)	170	994	1195	703	537	133
Future Volume (vph)	170	994	1195	703	537	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1719	5036	3539	1583	3356	
Flt Permitted	0.11	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	193	5036	3539	1583	3356	
Peak-hour factor, PHF	0.89	0.89	0.97	0.97	0.90	0.90
Growth Factor (vph)	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	199	1162	1281	754	621	154
RTOR Reduction (vph)	0	0	0	0	19	0
Lane Group Flow (vph)	199	1162	1281	754	756	0
Confl. Peds. (#/hr)	2			2		1
Heavy Vehicles (%)	5%	3%	2%	2%	2%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	81.0	81.0	61.0	93.5	26.5	
Effective Green, g (s)	83.0	83.0	63.0	95.5	28.5	
Actuated g/C Ratio	0.69	0.69	0.52	0.80	0.24	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	342	3483	1857	1259	797	
v/s Ratio Prot	c0.08	0.23	c0.36	0.48	c0.23	
v/s Ratio Perm	0.32					
v/c Ratio	0.58	0.33	0.69	0.60	0.95	
Uniform Delay, d1	16.8	7.4	21.2	4.8	45.0	
Progression Factor	1.00	1.00	1.35	1.30	1.00	
Incremental Delay, d2	2.5	0.1	1.4	0.5	20.1	
Delay (s)	19.3	7.5	30.1	6.7	65.1	
Level of Service	B	A	C	A	E	
Approach Delay (s)		9.2	21.4		65.1	
Approach LOS		A	C		E	
Intersection Summary						
HCM 2000 Control Delay			25.6		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.74			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			74.9%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Timing Report, Sorted By Phase

1: Duke St & N Quaker Lane

03/14/2024

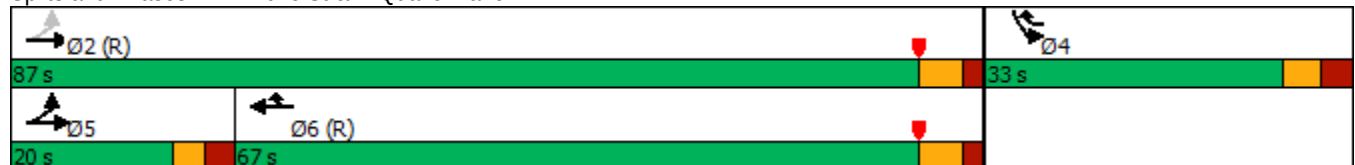


Phase Number	2	4	5	6
Movement	EBTL	SBL	EBTL	WBT
Lead/Lag			Lead	Lag
Lead-Lag Optimize				
Recall Mode	C-Max	None	None	C-Max
Maximum Split (s)	87	33	20	67
Maximum Split (%)	72.5%	27.5%	16.7%	55.8%
Minimum Split (s)	22	29.5	19.6	22
Yellow Time (s)	4	3.5	3	4
All-Red Time (s)	2	3	2.6	2
Minimum Initial (s)	10	7	5	10
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		4	4	4
Flash Dont Walk (s)		19	10	12
Dual Entry	No	No	No	No
Inhibit Max	No	No	No	No
Start Time (s)	59	26	59	79
End Time (s)	26	59	79	26
Yield/Force Off (s)	20	52.5	73.4	20
Yield/Force Off 170(s)	20	33.5	63.4	8
Local Start Time (s)	39	6	39	59
Local Yield (s)	0	32.5	53.4	0
Local Yield 170(s)	0	13.5	43.4	108

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 20 (17%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	

Splits and Phases: 1: Duke St & N Quaker Lane



HCM Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1162	362	26	1794	7	103	0	19	1	0	1
Future Volume (vph)	7	1162	362	26	1794	7	103	0	19	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.98			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1769	3539	1537	1569	3537			1743			1695	
Flt Permitted	0.06	1.00	1.00	0.15	1.00			0.75			0.96	
Satd. Flow (perm)	104	3539	1537	241	3537			1370			1675	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.80	0.80	0.80	0.25	0.25	0.25
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	8	1272	396	28	1964	8	134	0	25	4	0	4
RTOR Reduction (vph)	0	0	155	0	0	0	0	92	0	0	6	0
Lane Group Flow (vph)	8	1272	241	28	1972	0	0	67	0	0	2	0
Confl. Peds. (#/hr)	9		11	11		9			7	7		
Heavy Vehicles (%)	2%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1			4			3	4
Permitted Phases	2		2	1	6		4			3	4	
Actuated Green, G (s)	69.8	69.8	69.8	85.8	85.8			12.7			24.7	
Effective Green, g (s)	71.8	71.8	71.8	87.8	87.8			14.7			26.7	
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73			0.12			0.22	
Clearance Time (s)	5.5	5.5	5.5	5.5				4.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0				3.0				
Lane Grp Cap (vph)	62	2117	919	314	2587			167			372	
v/s Ratio Prot		0.36		0.01	c0.56							
v/s Ratio Perm	0.08		0.16	0.06				c0.05			c0.00	
v/c Ratio	0.13	0.60	0.26	0.09	0.76			0.40			0.00	
Uniform Delay, d1	10.5	15.1	11.5	14.8	9.8			48.6			36.3	
Progression Factor	1.36	1.23	3.38	0.51	0.32			1.00			1.00	
Incremental Delay, d2	3.6	1.1	0.6	0.1	0.9			1.6			0.0	
Delay (s)	17.9	19.7	39.3	7.6	4.0			50.2			36.3	
Level of Service	B	B	D	A	A			D			D	
Approach Delay (s)		24.4			4.1			50.2			36.3	
Approach LOS		C			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			14.9			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			72.0%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

2: S Quaker Ln & Duke St

03/14/2024



Phase Number	1	2	3	4	6
Movement	WBTL	EBTL	SBTL	NBSB	WBTL
Lead/Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize					
Recall Mode	None	C-Max	Max	None	C-Max
Maximum Split (s)	16	63	12	29	79
Maximum Split (%)	13.3%	52.5%	10.0%	24.2%	65.8%
Minimum Split (s)	10.5	15.5	12	29	20
Yellow Time (s)	4	4	3	3	4
All-Red Time (s)	1.5	1.5	0.5	1	1.5
Minimum Initial (s)	5	10	4	7	4
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)				4	
Flash Dont Walk (s)				21	
Dual Entry	No	No	No	No	No
Inhibit Max	No	No	No	No	No
Start Time (s)	57.5	114.5	73.5	85.5	114.5
End Time (s)	73.5	57.5	85.5	114.5	73.5
Yield/Force Off (s)	68	52	82	110.5	68
Yield/Force Off 170(s)	68	52	82	89.5	68
Local Start Time (s)	5.5	62.5	21.5	33.5	62.5
Local Yield (s)	16	0	30	58.5	16
Local Yield 170(s)	16	0	30	37.5	16

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	110
Offset: 52 (43%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 2: S Quaker Ln & Duke St

Ø2 (R)	Ø1	Ø3	Ø4
63 s	16 s	12 s	29 s
Ø6 (R)			
79 s			

HCM Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	1110	10	7	1718	34	16	2	4	49	2	93
Future Volume (vph)	62	1110	10	7	1718	34	16	2	4	49	2	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.3		4.3	4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.98			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1770	3534		1766	3527			1745			1665	
Flt Permitted	0.05	1.00		0.23	1.00			0.60			0.89	
Satd. Flow (perm)	101	3534		420	3527			1094			1500	
Peak-hour factor, PHF	0.94	0.94	0.94	0.95	0.95	0.95	0.69	0.69	0.69	0.80	0.80	0.80
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	69	1228	11	8	1881	37	24	3	6	64	3	121
RTOR Reduction (vph)	0	0	0	0	1	0	0	5	0	0	59	0
Lane Group Flow (vph)	69	1239	0	8	1917	0	0	28	0	0	129	0
Confl. Peds. (#/hr)	2		15	15		2			9	9		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	93.0	93.0		81.9	81.9			14.7			14.7	
Effective Green, g (s)	95.0	95.0		83.9	83.9			16.7			16.7	
Actuated g/C Ratio	0.79	0.79		0.70	0.70			0.14			0.14	
Clearance Time (s)	6.1	6.3		6.3	6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0		0.2	0.2			2.0			2.0	
Lane Grp Cap (vph)	177	2797		293	2465			152			208	
v/s Ratio Prot	0.02	c0.35			c0.54							
v/s Ratio Perm	0.29			0.02				0.03			c0.09	
v/c Ratio	0.39	0.44		0.03	0.78			0.18			0.62	
Uniform Delay, d1	15.8	4.0		5.5	11.9			45.6			48.7	
Progression Factor	3.76	0.01		0.87	0.43			1.00			1.00	
Incremental Delay, d2	0.4	0.4		0.1	1.6			0.2			4.1	
Delay (s)	59.7	0.5		4.9	6.7			45.8			52.8	
Level of Service	E	A		A	A			D			D	
Approach Delay (s)		3.6			6.7			45.8			52.8	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			8.4			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.4			
Intersection Capacity Utilization			69.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

3: Duke St & Alexandria Commons

03/14/2024

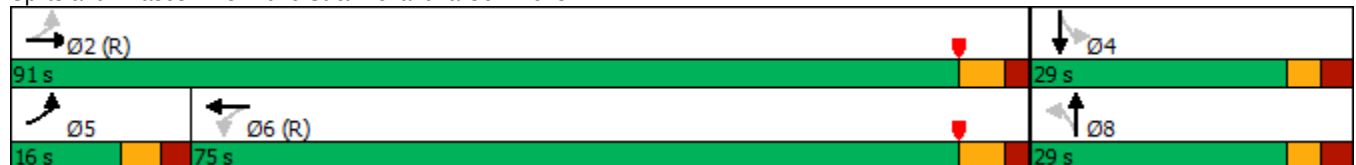


Phase Number	2	4	5	6	8
Movement	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag			Lead	Lag	
Lead-Lag Optimize					
Recall Mode	C-Max	None	None	C-Max	None
Maximum Split (s)	91	29	16	75	29
Maximum Split (%)	75.8%	24.2%	13.3%	62.5%	24.2%
Minimum Split (s)	17	13	11.1	16.3	29
Yellow Time (s)	4	3	3.5	4	3
All-Red Time (s)	2.3	3	2.6	2.3	3
Minimum Initial (s)	10	6.7	5	1	7
Vehicle Extension (s)	2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)					4
Flash Dont Walk (s)					19
Dual Entry	Yes	Yes	No	Yes	Yes
Inhibit Max	No	No	No	No	No
Start Time (s)	103.3	74.3	103.3	119.3	74.3
End Time (s)	74.3	103.3	119.3	74.3	103.3
Yield/Force Off (s)	68	97.3	113.2	68	97.3
Yield/Force Off 170(s)	68	97.3	113.2	68	78.3
Local Start Time (s)	35.3	6.3	35.3	51.3	6.3
Local Yield (s)	0	29.3	45.2	0	29.3
Local Yield 170(s)	0	29.3	45.2	0	10.3

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 68 (57%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 3: Duke St & Alexandria Commons



HCM Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	1131	3	27	1665	108	19	6	83	98	8	75
Future Volume (vph)	29	1131	3	27	1665	108	19	6	83	98	8	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1752	3538		1769	3502			1626			1770	1583
Flt Permitted	0.05	1.00		0.17	1.00			0.93			0.46	1.00
Satd. Flow (perm)	91	3538		311	3502			1519			851	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.68	0.68	0.68	0.84	0.84	0.84
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	33	1279	3	29	1804	117	29	9	127	121	10	93
RTOR Reduction (vph)	0	0	0	0	3	0	0	104	0	0	0	76
Lane Group Flow (vph)	33	1282	0	29	1918	0	0	61	0	0	131	17
Confl. Peds. (#/hr)	1		10	10		1			7	7		
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	83.2	79.9		82.4	79.2			19.5			19.5	19.5
Effective Green, g (s)	87.2	81.9		86.4	81.2			21.5			21.5	21.5
Actuated g/C Ratio	0.73	0.68		0.72	0.68			0.18			0.18	0.18
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	139	2414		287	2369			272			152	283
v/s Ratio Prot	c0.01	0.36		0.00	c0.55							
v/s Ratio Perm	0.16			0.07				0.04			c0.15	0.01
v/c Ratio	0.24	0.53		0.10	0.81			0.22			0.86	0.06
Uniform Delay, d1	15.2	9.5		6.3	13.9			42.1			47.8	40.9
Progression Factor	2.69	0.33		1.10	0.73			1.00			1.00	1.00
Incremental Delay, d2	0.3	0.8		0.0	1.8			0.2			35.3	0.0
Delay (s)	41.0	3.9		7.0	11.9			42.3			83.1	40.9
Level of Service	D	A		A	B			D			F	D
Approach Delay (s)		4.8			11.8			42.3			65.6	
Approach LOS		A			B			D			E	
Intersection Summary												
HCM 2000 Control Delay			14.0			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			77.1%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	17	74	29	17	74	29
Maximum Split (%)	14.2%	61.7%	24.2%	14.2%	61.7%	24.2%
Minimum Split (s)	10	30.8	29	10	31	29
Yellow Time (s)	3	4	3	3	4	3
All-Red Time (s)	2.6	1.8	3	3	2	3
Minimum Initial (s)	4	10	7	4	10	7
Vehicle Extension (s)	2	0.2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	3	0.2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		4	4		4	4
Flash Dont Walk (s)		21	19		21	19
Dual Entry	No	No	Yes	No	No	Yes
Inhibit Max	No	No	No	No	No	No
Start Time (s)	102	119	73	102	119	73
End Time (s)	119	73	102	119	73	102
Yield/Force Off (s)	113.4	67.2	96	113	67	96
Yield/Force Off 170(s)	113.4	46.2	77	113	46	77
Local Start Time (s)	35	52	6	35	52	6
Local Yield (s)	46.4	0.2	29	46	0	29
Local Yield 170(s)	46.4	99.2	10	46	99	10

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 67 (56%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

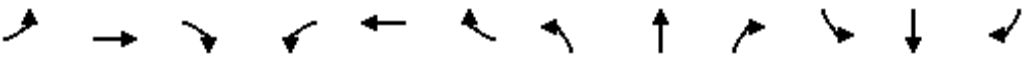
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St

Ø1	Ø2 (R)	Ø4
17 s	74 s	29 s
Ø5	Ø6 (R)	Ø8
17 s	74 s	29 s

HCM Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1298	5	61	1756	175	3	11	344	276	5	41
Future Volume (vph)	9	1298	5	61	1756	175	3	11	344	276	5	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.87			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1626	3537		1752	3539	1550		1620			1770	1550
Flt Permitted	0.95	1.00		0.09	1.00	1.00		1.00			0.24	1.00
Satd. Flow (perm)	1626	3537		164	3539	1550		1616			437	1550
Peak-hour factor, PHF	0.93	0.93	0.93	0.97	0.97	0.97	0.96	0.96	0.96	0.86	0.86	0.86
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	10	1452	6	65	1883	188	3	12	373	334	6	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	141	0	0	0	37
Lane Group Flow (vph)	10	1458	0	65	1883	188	0	247	0	0	340	13
Confl. Peds. (#/hr)	1		2	2		1	6					6
Heavy Vehicles (%)	11%	2%	2%	3%	2%	2%	2%	2%	2%	2%	20%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	1.4	67.6		76.6	71.4	71.4		29.6			29.6	29.6
Effective Green, g (s)	3.4	69.6		80.3	73.4	73.4		31.6			31.6	31.6
Actuated g/C Ratio	0.03	0.58		0.67	0.61	0.61		0.26			0.26	0.26
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	46	2051		205	2164	948		425			115	408
v/s Ratio Prot	0.01	0.41		c0.02	c0.53							
v/s Ratio Perm				0.19		0.12		0.15			c0.78	0.01
v/c Ratio	0.22	0.71		0.32	0.87	0.20		0.58			2.96	0.03
Uniform Delay, d1	57.0	18.0		14.0	19.3	10.3		38.4			44.2	32.8
Progression Factor	1.08	0.70		1.71	1.67	1.51		1.00			1.00	1.00
Incremental Delay, d2	0.7	1.8		0.3	4.6	0.4		1.3			903.5	0.0
Delay (s)	62.2	14.4		24.2	37.0	16.0		39.7			947.7	32.9
Level of Service	E	B		C	D	B		D			F	C
Approach Delay (s)		14.7			34.7			39.7			830.4	
Approach LOS		B			C			D			F	
Intersection Summary												
HCM 2000 Control Delay			99.3									F
HCM 2000 Volume to Capacity ratio			1.46									
Actuated Cycle Length (s)			120.0								11.6	
Intersection Capacity Utilization			103.2%								G	
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

5: Roth St/Cambridge Rd & Duke St

03/14/2024

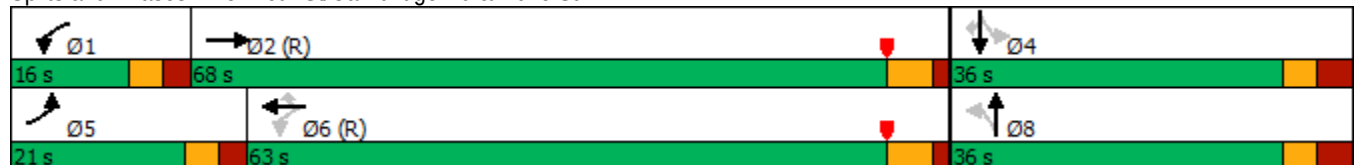


Phase Number	1	2	4	5	6	8
Movement	WBL	EBT	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	16	68	36	21	63	36
Maximum Split (%)	13.3%	56.7%	30.0%	17.5%	52.5%	30.0%
Minimum Split (s)	11.5	30.7	30.4	11.5	15.7	13.4
Yellow Time (s)	3	4	3	3	4	3
All-Red Time (s)	2.5	1.7	3.4	2.5	1.7	3.4
Minimum Initial (s)	6	10	7	6	10	7
Vehicle Extension (s)	2	0.2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	4			
Flash Dont Walk (s)		18	20			
Dual Entry	No	No	Yes	No	No	Yes
Inhibit Max	No	No	No	No	No	No
Start Time (s)	105.7	1.7	69.7	105.7	6.7	69.7
End Time (s)	1.7	69.7	105.7	6.7	69.7	105.7
Yield/Force Off (s)	116.2	64	99.3	1.2	64	99.3
Yield/Force Off 170(s)	116.2	46	79.3	1.2	64	99.3
Local Start Time (s)	41.7	57.7	5.7	41.7	62.7	5.7
Local Yield (s)	52.2	0	35.3	57.2	0	35.3
Local Yield 170(s)	52.2	102	15.3	57.2	0	35.3

Intersection Summary

Cycle Length 120
Control Type Actuated-Coordinated
Natural Cycle 150
Offset: 64 (53%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

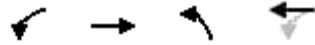
03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	1910	8	29	1968	24	71
Future Volume (vph)	1910	8	29	1968	24	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	2.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.90	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	5081		1770	5085	1642	
Flt Permitted	1.00		0.07	1.00	0.99	
Satd. Flow (perm)	5081		139	5085	1642	
Peak-hour factor, PHF	0.98	0.98	0.95	0.95	0.59	0.59
Growth Factor (vph)	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	2027	8	32	2154	42	125
RTOR Reduction (vph)	0	0	0	0	113	0
Lane Group Flow (vph)	2035	0	32	2154	54	0
Confl. Peds. (#/hr)		9	9			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	89.0		101.0	101.0	9.5	
Effective Green, g (s)	91.0		103.0	103.0	11.5	
Actuated g/C Ratio	0.76		0.86	0.86	0.10	
Clearance Time (s)	5.5		6.0	5.5	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3853		228	4364	157	
v/s Ratio Prot	c0.40		0.01	c0.42	c0.03	
v/s Ratio Perm			0.11			
v/c Ratio	0.53		0.14	0.49	0.34	
Uniform Delay, d1	5.8		5.9	2.1	50.7	
Progression Factor	0.75		1.34	2.26	1.00	
Incremental Delay, d2	0.0		0.2	0.2	1.3	
Delay (s)	4.5		8.1	5.0	52.0	
Level of Service	A		A	A	D	
Approach Delay (s)	4.5			5.0	52.0	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay		6.5		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.52				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		9.5
Intersection Capacity Utilization		52.1%		ICU Level of Service		A
Analysis Period (min)		15				
c Critical Lane Group						

Timing Report, Sorted By Phase

6: Witter Drive & Duke St

03/14/2024



Phase Number	1	2	4	6
Movement	WBL	EBT	NBL	WBTL
Lead/Lag	Lag	Lead		
Lead-Lag Optimize				
Recall Mode	None	C-Max	None	C-Max
Maximum Split (s)	16	67	37	83
Maximum Split (%)	13.3%	55.8%	30.8%	69.2%
Minimum Split (s)	12	27.5	20	15.5
Yellow Time (s)	3	3.5	3.5	3.5
All-Red Time (s)	3	2	0.5	2
Minimum Initial (s)	6	10	4	10
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7		
Flash Dont Walk (s)		15		
Dual Entry	No	No	Yes	No
Inhibit Max	No	No	No	No
Start Time (s)	83.5	16.5	99.5	16.5
End Time (s)	99.5	83.5	16.5	99.5
Yield/Force Off (s)	93.5	78	12.5	94
Yield/Force Off 170(s)	93.5	63	12.5	94
Local Start Time (s)	5.5	58.5	21.5	58.5
Local Yield (s)	15.5	0	54.5	16
Local Yield 170(s)	15.5	105	54.5	16

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	60
Offset: 78 (65%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	

Splits and Phases: 6: Witter Drive & Duke St



HCM Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	702	1253	0	1978	234	0	0	0	56	346	19
Future Volume (vph)	26	702	1253	0	1978	234	0	0	0	56	346	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00					1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00					1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00					1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00					0.99	1.00
Satd. Flow (prot)	1570	3374	1810		4893	1553					1797	1583
Flt Permitted	0.95	1.00	1.00		1.00	1.00					0.99	1.00
Satd. Flow (perm)	1570	3374	1810		4893	1553					1797	1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	27	737	1316	0	2236	265	0	0	0	61	379	21
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	17
Lane Group Flow (vph)	27	737	1316	0	2236	265	0	0	0	0	440	4
Confl. Peds. (#/hr)									7	7		
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA	Over				Split	NA	Perm
Protected Phases	5	2	2		6	4				4	4	
Permitted Phases												4
Actuated Green, G (s)	7.3	77.0	77.0		63.2	22.0					22.0	22.0
Effective Green, g (s)	9.3	79.0	79.0		65.2	24.0					24.0	24.0
Actuated g/C Ratio	0.08	0.66	0.66		0.54	0.20					0.20	0.20
Clearance Time (s)	6.5	6.0	6.0		6.0	6.0					6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2	3.0					3.0	3.0
Lane Grp Cap (vph)	121	2221	1191		2658	310					359	316
v/s Ratio Prot	0.02	0.22	c0.73		0.46	0.17					c0.24	
v/s Ratio Perm												0.00
v/c Ratio	0.22	0.33	1.10		0.84	0.85					1.23	0.01
Uniform Delay, d1	52.0	9.0	20.5		23.0	46.3					48.0	38.5
Progression Factor	1.15	0.44	0.61		1.00	1.00					0.59	1.00
Incremental Delay, d2	0.8	0.4	58.5		3.4	19.9					121.1	0.0
Delay (s)	60.6	4.3	71.1		26.5	66.2					149.4	38.5
Level of Service	E	A	E		C	E					F	D
Approach Delay (s)		47.3			30.7			0.0			144.3	
Approach LOS		D			C			A			F	
Intersection Summary												
HCM 2000 Control Delay			47.9		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			1.12									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					15.5		
Intersection Capacity Utilization			109.5%		ICU Level of Service					H		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Phase Number	2	3	4	5	6
Node Number	7	0	7	7	7
Movement	EBT	Ped	SBTL	EBL	WBT
Lead/Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize					
Recall Mode	C-Max	None	None	None	C-Max
Maximum Split (s)	59	33	28	15	44
Maximum Split (%)	49.2%	27.5%	23.3%	12.5%	36.7%
Minimum Split (s)	14	33	13	12.5	13
Yellow Time (s)	4	3	3	3	4
All-Red Time (s)	2	0	3	3.5	2
Minimum Initial (s)	7	1	7	6	7
Vehicle Extension (s)	3	0.2	3	3	0.2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)		4			
Flash Dont Walk (s)		26			
Dual Entry	No	No	No	No	No
Inhibit Max	No	No	No	No	No
Start Time (s)	36	95	8	36	51
End Time (s)	95	8	36	51	95
Yield/Force Off (s)	89	5	30	44.5	89
Yield/Force Off 170(s)	89	99	30	44.5	89
Local Start Time (s)	67	6	39	67	82
Local Yield (s)	0	36	61	75.5	0
Local Yield 170(s)	0	10	61	75.5	0

Intersection Summary

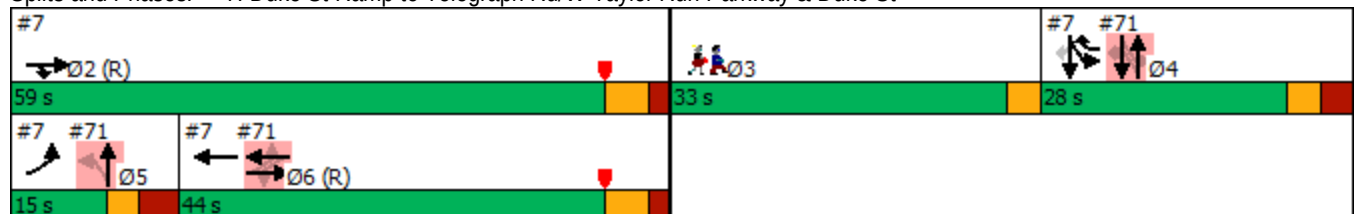
Cycle Length 120

Control Type Actuated-Coordinated

Natural Cycle 150

Offset: 89 (74%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1427	3	0	2324	1	204	31	21	14	20	34
Future Volume (vph)	0	1427	3	0	2324	1	204	31	21	14	20	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.99			0.93	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5084			5034			1767			1593	
Flt Permitted		1.00			1.00			0.75			0.91	
Satd. Flow (perm)		5084			5034			1375			1473	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Growth Factor (vph)	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%	104%
Adj. Flow (vph)	0	1562	3	0	2492	1	253	38	26	16	22	38
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	1	0
Lane Group Flow (vph)	0	1565	0	0	2493	0	0	314	0	0	75	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		51.3			51.3			24.5			24.5	
Effective Green, g (s)		53.3			53.3			26.5			26.5	
Actuated g/C Ratio		0.61			0.61			0.30			0.30	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3086			3055			415			444	
v/s Ratio Prot		0.31			c0.50							
v/s Ratio Perm								c0.23			0.05	
v/c Ratio		0.51			0.82			0.76			0.17	
Uniform Delay, d1		9.8			13.4			27.7			22.5	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.6			2.5			7.6			0.2	
Delay (s)		10.4			16.0			35.4			22.7	
Level of Service		B			B			D			C	
Approach Delay (s)		10.4			16.0			35.4			22.7	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			15.5				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			87.8				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			77.2%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

10: Dove St/Roberts Ln & Duke St

03/14/2024

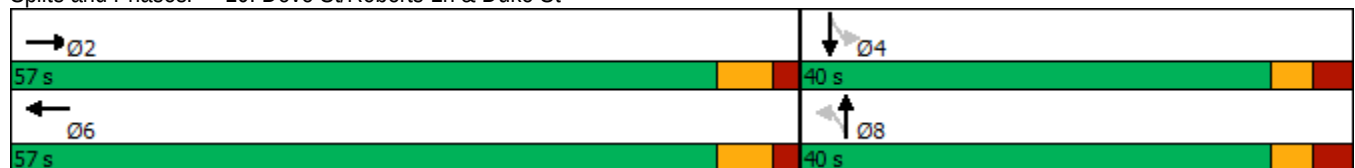


Phase Number	2	4	6	8
Movement	EBT	SBTL	WBT	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	57	40	57	40
Maximum Split (%)	58.8%	41.2%	58.8%	41.2%
Minimum Split (s)	25	13	28	40
Yellow Time (s)	4	3	4	3
All-Red Time (s)	2	3	2	3
Minimum Initial (s)	10	7	10	7
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7		7	7
Flash Dont Walk (s)	12		12	27
Dual Entry	No	No	No	No
Inhibit Max	No	No	No	No
Start Time (s)	0	57	0	57
End Time (s)	57	0	57	0
Yield/Force Off (s)	51	91	51	91
Yield/Force Off 170(s)	39	91	39	64
Local Start Time (s)	46	6	46	6
Local Yield (s)	0	40	0	40
Local Yield 170(s)	85	40	85	13

Intersection Summary

Cycle Length	97
Control Type	Semi Act-Uncoord
Natural Cycle	90

Splits and Phases: 10: Dove St/Roberts Ln & Duke St





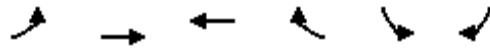
Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix L: Synchro Results 2036 No-Build Conditions

HCM Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	267	1261	880	1018	548	111
Future Volume (vph)	267	1261	880	1018	548	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1719	4988	3343	1568	2797	
Flt Permitted	0.18	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	332	4988	3343	1568	2797	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.94	0.94
Growth Factor (vph)	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	316	1494	1010	1168	635	129
RTOR Reduction (vph)	0	0	0	0	14	0
Lane Group Flow (vph)	316	1494	1010	1168	750	0
Confl. Peds. (#/hr)	4			4	4	2
Heavy Vehicles (%)	5%	4%	8%	3%	27%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	81.0	81.0	61.0	93.5	26.5	
Effective Green, g (s)	83.0	83.0	63.0	95.5	28.5	
Actuated g/C Ratio	0.69	0.69	0.52	0.80	0.24	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		0.2		3.0	
Lane Grp Cap (vph)	419	3450	1755	1247	664	
v/s Ratio Prot	c0.10	0.30	0.30	c0.74	c0.27	
v/s Ratio Perm	0.42					
v/c Ratio	0.75	0.43	0.58	0.94	1.13	
Uniform Delay, d1	13.0	8.1	19.4	9.8	45.8	
Progression Factor	1.00	1.00	0.65	0.79	1.00	
Incremental Delay, d2	7.5	0.1	0.9	9.5	76.1	
Delay (s)	20.5	8.2	13.4	17.2	121.8	
Level of Service	C	A	B	B	F	
Approach Delay (s)		10.4	15.5		121.8	
Approach LOS		B	B		F	
Intersection Summary						
HCM 2000 Control Delay			30.6		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.97			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			91.9%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

Timing Report, Sorted By Phase

1: Duke St & N Quaker Lane

03/14/2024

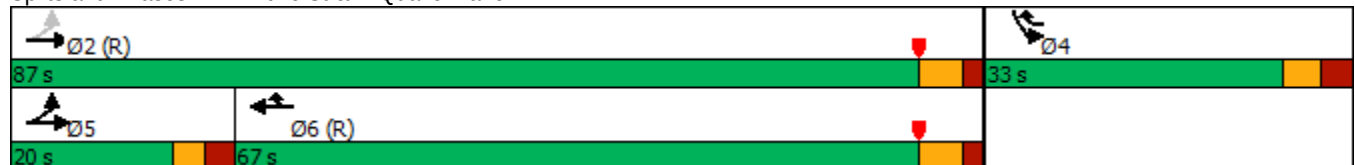


Phase Number	2	4	5	6
Movement	EBTL	SBL	EBTL	WBT
Lead/Lag			Lead	Lag
Lead-Lag Optimize				
Recall Mode	C-Max	None	None	C-Max
Maximum Split (s)	87	33	20	67
Maximum Split (%)	72.5%	27.5%	16.7%	55.8%
Minimum Split (s)	22	29.5	19.6	22
Yellow Time (s)	4	3.5	3	4
All-Red Time (s)	2	3	2.6	2
Minimum Initial (s)	10	7	5	10
Vehicle Extension (s)	0.2	3	3	0.2
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		4	4	4
Flash Dont Walk (s)		19	10	12
Dual Entry	No	No	No	No
Inhibit Max	No	No	No	No
Start Time (s)	49	16	49	69
End Time (s)	16	49	69	16
Yield/Force Off (s)	10	42.5	63.4	10
Yield/Force Off 170(s)	10	23.5	53.4	118
Local Start Time (s)	39	6	39	59
Local Yield (s)	0	32.5	53.4	0
Local Yield 170(s)	0	13.5	43.4	108

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	

Splits and Phases: 1: Duke St & N Quaker Lane



HCM Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1691	118	24	1845	0	53	0	14	2	0	0
Future Volume (vph)	0	1691	118	24	1845	0	53	0	14	2	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor		0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00	0.98	1.00	1.00			1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	1.00			0.97			1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.96			0.95	
Satd. Flow (prot)		3471	1475	1770	3438			1670			1761	
Flt Permitted		1.00	1.00	0.05	1.00			0.78			0.77	
Satd. Flow (perm)		3471	1475	88	3438			1351			1422	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.84	0.84	0.84	1.00	1.00	1.00
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	0	2003	140	28	2139	0	69	0	18	2	0	0
RTOR Reduction (vph)	0	0	29	0	0	0	0	78	0	0	0	0
Lane Group Flow (vph)	0	2003	111	28	2139	0	0	9	0	0	2	0
Confl. Peds. (#/hr)	9		4	4		9			5	5		
Heavy Vehicles (%)	2%	4%	7%	2%	5%	2%	2%	2%	21%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1			4			3	4
Permitted Phases	2		2	1	6		4			3	4	
Actuated Green, G (s)		79.6	79.6	95.6	95.6			10.6			14.9	
Effective Green, g (s)		81.6	81.6	97.6	97.6			12.6			16.9	
Actuated g/C Ratio		0.68	0.68	0.81	0.81			0.10			0.14	
Clearance Time (s)		5.5	5.5	5.5				4.0				
Vehicle Extension (s)		0.2	0.2	3.0				3.0				
Lane Grp Cap (vph)		2360	1003	246	2796			141			200	
v/s Ratio Prot		c0.58		0.01	c0.62							
v/s Ratio Perm			0.08	0.08				c0.01			c0.00	
v/c Ratio		0.85	0.11	0.11	0.77			0.06			0.01	
Uniform Delay, d1		14.5	6.6	25.6	5.5			48.4			44.4	
Progression Factor		1.20	0.92	0.29	0.27			1.00			1.00	
Incremental Delay, d2		3.2	0.2	0.1	0.8			0.2			0.0	
Delay (s)		20.6	6.3	7.5	2.3			48.6			44.4	
Level of Service		C	A	A	A			D			D	
Approach Delay (s)		19.7			2.3			48.6			44.4	
Approach LOS		B			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			11.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				10.5		
Intersection Capacity Utilization			70.4%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

2: S Quaker Ln & Duke St

03/14/2024



Phase Number	1	2	3	4	6
Movement	WBTL	EBTL	SBTL	NBSB	WBTL
Lead/Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize					
Recall Mode	None	C-Max	None	None	C-Max
Maximum Split (s)	16	63	12	29	79
Maximum Split (%)	13.3%	52.5%	10.0%	24.2%	65.8%
Minimum Split (s)	10.5	15.5	12	29	20
Yellow Time (s)	4	4	3	3	4
All-Red Time (s)	1.5	1.5	0.5	1	1.5
Minimum Initial (s)	5	10	4	7	4
Vehicle Extension (s)	3	0.2	0.2	3	0.2
Minimum Gap (s)	3	0.2	0.2	3	0.2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)				4	
Flash Dont Walk (s)				21	
Dual Entry	No	No	No	No	No
Inhibit Max	No	No	No	No	No
Start Time (s)	15.5	72.5	31.5	43.5	72.5
End Time (s)	31.5	15.5	43.5	72.5	31.5
Yield/Force Off (s)	26	10	40	68.5	26
Yield/Force Off 170(s)	26	10	40	47.5	26
Local Start Time (s)	5.5	62.5	21.5	33.5	62.5
Local Yield (s)	16	0	30	58.5	16
Local Yield 170(s)	16	0	30	37.5	16

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	150
Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 2: S Quaker Ln & Duke St

Ø2 (R)	Ø1	Ø3	Ø4
63 s	16 s	12 s	29 s
Ø6 (R)			
79 s			

HCM Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	1661	6	0	1822	34	3	0	0	17	0	44
Future Volume (vph)	40	1661	6	0	1822	34	3	0	0	17	0	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.3			4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			1.00			0.90	
Flt Protected	0.95	1.00			1.00			0.95			0.99	
Satd. Flow (prot)	1770	3469			3429			1770			1653	
Flt Permitted	0.05	1.00			1.00			0.64			0.90	
Satd. Flow (perm)	85	3469			3429			1188			1515	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.25	0.25	0.25	0.95	0.95	0.95
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	46	1906	7	0	2091	39	13	0	0	20	0	50
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	64	0
Lane Group Flow (vph)	46	1913	0	0	2129	0	0	13	0	0	6	0
Confl. Peds. (#/hr)	8		3	3		8			9	9		
Heavy Vehicles (%)	2%	4%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	98.9	98.9			89.1			8.8			8.8	
Effective Green, g (s)	100.9	100.9			91.1			10.8			10.8	
Actuated g/C Ratio	0.84	0.84			0.76			0.09			0.09	
Clearance Time (s)	5.6	6.3			6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0			0.2			2.0			2.0	
Lane Grp Cap (vph)	158	2916			2603			106			136	
v/s Ratio Prot	0.01	c0.55			c0.62							
v/s Ratio Perm	0.23							c0.01			0.00	
v/c Ratio	0.29	0.66			0.82			0.12			0.05	
Uniform Delay, d1	14.2	3.4			9.2			50.2			49.9	
Progression Factor	3.89	0.37			0.30			1.00			1.00	
Incremental Delay, d2	0.2	0.7			1.3			0.2			0.1	
Delay (s)	55.6	1.9			4.1			50.4			49.9	
Level of Service	E	A			A			D			D	
Approach Delay (s)		3.2			4.1			50.4			49.9	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			4.6									
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			120.0								11.9	
Intersection Capacity Utilization			72.3%								C	
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

3: Duke St & Alexandria Commons

03/14/2024

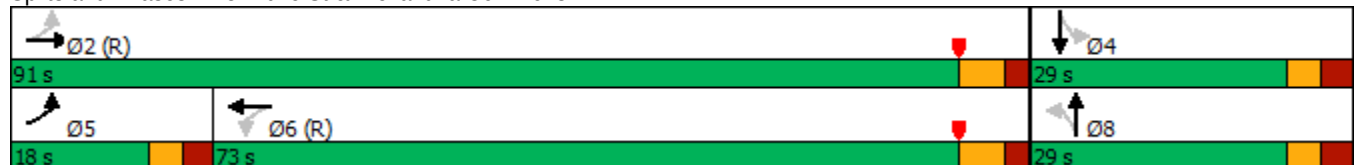


Phase Number	2	4	5	6	8
Movement	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag			Lead	Lag	
Lead-Lag Optimize					
Recall Mode	C-Max	None	None	C-Max	None
Maximum Split (s)	91	29	18	73	29
Maximum Split (%)	75.8%	24.2%	15.0%	60.8%	24.2%
Minimum Split (s)	16.3	13	10.6	16.3	29
Yellow Time (s)	4	3	3	4	3
All-Red Time (s)	2.3	3	2.6	2.3	3
Minimum Initial (s)	10	7	4.5	1	7
Vehicle Extension (s)	2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)					4
Flash Dont Walk (s)					19
Dual Entry	No	Yes	No	No	Yes
Inhibit Max	No	No	No	No	No
Start Time (s)	61.3	32.3	61.3	79.3	32.3
End Time (s)	32.3	61.3	79.3	32.3	61.3
Yield/Force Off (s)	26	55.3	73.7	26	55.3
Yield/Force Off 170(s)	26	55.3	73.7	26	36.3
Local Start Time (s)	35.3	6.3	35.3	53.3	6.3
Local Yield (s)	0	29.3	47.7	0	29.3
Local Yield 170(s)	0	29.3	47.7	0	10.3

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	110
Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 3: Duke St & Alexandria Commons



HCM Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	1624	2	22	1768	121	11	5	31	81	1	77
Future Volume (vph)	52	1624	2	22	1768	121	11	5	31	81	1	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3471		1656	3405			1616			1760	1559
Flt Permitted	0.05	1.00		0.07	1.00			0.92			0.70	1.00
Satd. Flow (perm)	86	3471		117	3405			1505			1285	1559
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.90	0.90	0.90	0.76	0.76	0.76
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	60	1883	2	26	2095	143	13	6	38	116	1	110
RTOR Reduction (vph)	0	0	0	0	3	0	0	33	0	0	0	94
Lane Group Flow (vph)	60	1885	0	26	2235	0	0	24	0	0	117	16
Confl. Peds. (#/hr)	3		3	3		3	2		6	6		2
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	9%	2%	3%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	88.9	84.2		85.1	82.0			15.3			15.3	15.3
Effective Green, g (s)	92.9	86.2		89.1	84.0			17.3			17.3	17.3
Actuated g/C Ratio	0.77	0.72		0.74	0.70			0.14			0.14	0.14
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	160	2493		152	2383			216			185	224
v/s Ratio Prot	c0.02	0.54		0.01	c0.66							
v/s Ratio Perm	0.27			0.12				0.02			c0.09	0.01
v/c Ratio	0.38	0.76		0.17	0.94			0.11			0.63	0.07
Uniform Delay, d1	24.9	10.4		10.1	15.7			44.7			48.4	44.4
Progression Factor	1.76	0.68		0.08	0.40			1.00			1.00	1.00
Incremental Delay, d2	0.4	1.7		0.0	1.0			0.1			5.1	0.0
Delay (s)	44.2	8.8		0.8	7.2			44.8			53.5	44.4
Level of Service	D	A		A	A			D			D	D
Approach Delay (s)		9.9			7.1			44.8			49.1	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			10.9			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			82.4%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	18	73	29	16	75	29
Maximum Split (%)	15.0%	60.8%	24.2%	13.3%	62.5%	24.2%
Minimum Split (s)	10	30.8	29	10	31	29
Yellow Time (s)	3	4	3	3	4	3
All-Red Time (s)	2.6	1.8	3	3	2	3
Minimum Initial (s)	4	10	7	4	10	7
Vehicle Extension (s)	2	0.2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		4	4		4	4
Flash Dont Walk (s)		21	19		21	19
Dual Entry	No	No	Yes	No	No	Yes
Inhibit Max	No	No	No	No	No	No
Start Time (s)	35	53	6	35	51	6
End Time (s)	53	6	35	51	6	35
Yield/Force Off (s)	47.4	0.2	29	45	0	29
Yield/Force Off 170(s)	47.4	99.2	10	45	99	10
Local Start Time (s)	35	53	6	35	51	6
Local Yield (s)	47.4	0.2	29	45	0	29
Local Yield 170(s)	47.4	99.2	10	45	99	10

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	120
Offset: 0 (0%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

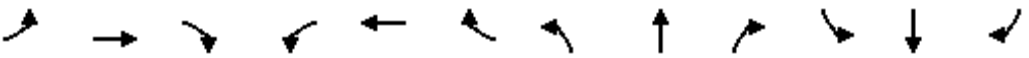
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St



HCM Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	1672	4	96	1854	302	6	6	54	189	4	51
Future Volume (vph)	60	1672	4	96	1854	302	6	6	54	189	4	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	3470		1656	3438	1583		1454			1758	1527
Flt Permitted	0.95	1.00		0.06	1.00	1.00		0.97			0.67	1.00
Satd. Flow (perm)	1770	3470		97	3438	1583		1412			1242	1527
Peak-hour factor, PHF	0.91	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.97	0.88	0.88	0.88
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	72	2003	5	113	2173	354	7	7	61	234	5	63
RTOR Reduction (vph)	0	0	0	0	0	0	0	47	0	0	0	49
Lane Group Flow (vph)	72	2008	0	113	2173	354	0	28	0	0	239	14
Confl. Peds. (#/hr)			4	4			16					16
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	17%	2%	17%	2%	50%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	7.6	68.5		78.3	69.6	69.6		25.2			25.2	25.2
Effective Green, g (s)	9.6	70.5		82.3	71.6	71.6		27.2			27.2	27.2
Actuated g/C Ratio	0.08	0.59		0.69	0.60	0.60		0.23			0.23	0.23
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	141	2038		205	2051	944		320			281	346
v/s Ratio Prot	0.04	0.58		c0.05	c0.63							
v/s Ratio Perm				0.33		0.22		0.02			c0.19	0.01
v/c Ratio	0.51	0.99		0.55	1.06	0.38		0.09			0.85	0.04
Uniform Delay, d1	52.9	24.2		30.1	24.2	12.6		36.6			44.5	36.2
Progression Factor	0.86	1.07		1.47	0.90	0.54		1.00			1.00	1.00
Incremental Delay, d2	0.9	13.7		1.5	36.0	0.9		0.0			20.4	0.0
Delay (s)	46.5	39.5		45.5	57.9	7.7		36.6			64.9	36.2
Level of Service	D	D		D	E	A		D			E	D
Approach Delay (s)		39.7			50.6			36.6			58.9	
Approach LOS		D			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			46.5				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			11.6		
Intersection Capacity Utilization			90.2%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

5: Roth St/Cambridge Rd & Duke St

03/14/2024

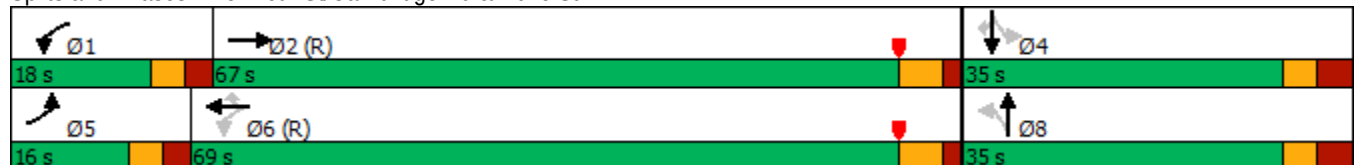


Phase Number	1	2	4	5	6	8
Movement	WBL	EBT	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	18	67	35	16	69	35
Maximum Split (%)	15.0%	55.8%	29.2%	13.3%	57.5%	29.2%
Minimum Split (s)	11.5	30.7	30.4	11.5	15.7	13.4
Yellow Time (s)	3	4	3	3	4	3
All-Red Time (s)	2.5	1.7	3.4	2.5	1.7	3.4
Minimum Initial (s)	6	10	7	6	10	7
Vehicle Extension (s)	2	0.2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	4			
Flash Dont Walk (s)		18	20			
Dual Entry	No	No	Yes	No	No	Yes
Inhibit Max	No	No	No	No	No	No
Start Time (s)	21.7	39.7	106.7	21.7	37.7	106.7
End Time (s)	39.7	106.7	21.7	37.7	106.7	21.7
Yield/Force Off (s)	34.2	101	15.3	32.2	101	15.3
Yield/Force Off 170(s)	34.2	83	115.3	32.2	101	15.3
Local Start Time (s)	40.7	58.7	5.7	40.7	56.7	5.7
Local Yield (s)	53.2	0	34.3	51.2	0	34.3
Local Yield 170(s)	53.2	102	14.3	51.2	0	34.3

Intersection Summary

Cycle Length 120
Control Type Actuated-Coordinated
Natural Cycle 120
Offset: 101 (84%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

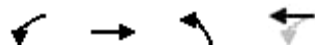
03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	1894	21	87	2245	7	25
Future Volume (vph)	1894	21	87	2245	7	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.89	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	4978		1719	4988	1538	
Flt Permitted	1.00		0.05	1.00	0.99	
Satd. Flow (perm)	4978		99	4988	1538	
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.73	0.73
Growth Factor (vph)	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	2220	25	104	2689	10	37
RTOR Reduction (vph)	1	0	0	0	35	0
Lane Group Flow (vph)	2244	0	104	2689	12	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	4%	2%	5%	4%	14%	8%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	86.6		102.6	102.6	5.9	
Effective Green, g (s)	88.6		104.6	104.6	7.9	
Actuated g/C Ratio	0.74		0.87	0.87	0.07	
Clearance Time (s)	5.5		6.0	5.5	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3675		248	4347	101	
v/s Ratio Prot	0.45		0.04	c0.54	c0.01	
v/s Ratio Perm			0.32			
v/c Ratio	0.61		0.42	0.62	0.12	
Uniform Delay, d1	7.5		17.6	2.1	52.8	
Progression Factor	1.91		1.05	1.66	1.00	
Incremental Delay, d2	0.3		0.4	0.2	0.5	
Delay (s)	14.6		18.9	3.8	53.3	
Level of Service	B		B	A	D	
Approach Delay (s)	14.6			4.4	53.3	
Approach LOS	B			A	D	
Intersection Summary						
HCM 2000 Control Delay		9.3		HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio		0.61				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)	11.5	
Intersection Capacity Utilization		59.0%		ICU Level of Service	B	
Analysis Period (min)		15				
c Critical Lane Group						

Timing Report, Sorted By Phase

6: Witter Drive & Duke St

03/14/2024



Phase Number	1	2	4	6
Movement	WBL	EBT	NBL	WBTL
Lead/Lag	Lag	Lead		
Lead-Lag Optimize				
Recall Mode	None	C-Max	None	C-Max
Maximum Split (s)	16	79	25	95
Maximum Split (%)	13.3%	65.8%	20.8%	79.2%
Minimum Split (s)	12	27.5	13	15.5
Yellow Time (s)	3	3.5	3	3.5
All-Red Time (s)	3	2	3	2
Minimum Initial (s)	6	10	4	10
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7		
Flash Dont Walk (s)		15		
Dual Entry	No	No	No	No
Inhibit Max	No	No	No	No
Start Time (s)	74.5	115.5	90.5	115.5
End Time (s)	90.5	74.5	115.5	90.5
Yield/Force Off (s)	84.5	69	109.5	85
Yield/Force Off 170(s)	84.5	54	109.5	85
Local Start Time (s)	5.5	46.5	21.5	46.5
Local Yield (s)	15.5	0	40.5	16
Local Yield 170(s)	15.5	105	40.5	16

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	60
Offset: 69 (58%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	

Splits and Phases: 6: Witter Drive & Duke St



HCM Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	928	961	0	2296	268	0	0	0	30	288	36
Future Volume (vph)	30	928	961	0	2296	268	0	0	0	30	288	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00					1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00					1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00					1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00					1.00	1.00
Satd. Flow (prot)	1641	3167	1743		4715	1583					1854	1552
Flt Permitted	0.95	1.00	1.00		1.00	1.00					1.00	1.00
Satd. Flow (perm)	1641	3167	1743		4715	1583					1854	1552
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	1.00	1.00	1.00	0.87	0.87	0.87
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	37	1137	1177	0	2662	311	0	0	0	38	361	45
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	37
Lane Group Flow (vph)	37	1137	1177	0	2662	311	0	0	0	0	399	8
Confl. Peds. (#/hr)										3		5
Heavy Vehicles (%)	10%	14%	9%	2%	10%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Prot		NA	Over				Split	NA	Perm
Protected Phases	5	2	2		6	4				4	4	
Permitted Phases												4
Actuated Green, G (s)	8.2	79.0	79.0		64.3	20.0					20.0	20.0
Effective Green, g (s)	10.2	81.0	81.0		66.3	22.0					22.0	22.0
Actuated g/C Ratio	0.08	0.68	0.68		0.55	0.18					0.18	0.18
Clearance Time (s)	6.5	6.0	6.0		6.0	6.0					6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2	3.0					3.0	3.0
Lane Grp Cap (vph)	139	2137	1176		2605	290					339	284
v/s Ratio Prot	0.02	0.36	c0.68		0.56	0.20					c0.22	
v/s Ratio Perm												0.01
v/c Ratio	0.27	0.53	1.00		1.02	1.07					1.18	0.03
Uniform Delay, d1	51.4	9.9	19.5		26.9	49.0					49.0	40.2
Progression Factor	1.15	0.53	1.05		1.00	1.00					0.47	1.00
Incremental Delay, d2	0.9	0.8	24.1		23.4	73.4					96.6	0.0
Delay (s)	59.8	6.0	44.5		50.3	122.4					119.7	40.3
Level of Service	E	A	D		D	F					F	D
Approach Delay (s)		26.2			57.8			0.0			111.6	
Approach LOS		C			E			A			F	
Intersection Summary												
HCM 2000 Control Delay			49.0		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			1.02									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					15.5		
Intersection Capacity Utilization			89.9%		ICU Level of Service					E		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Phase Number	2	3	4	5	6
Node Number	7	0	7	7	7
Movement	EBT	Ped	SBTL	EBL	WBT
Lead/Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize					
Recall Mode	C-Max	None	None	None	C-Max
Maximum Split (s)	61	33	26	16	45
Maximum Split (%)	50.8%	27.5%	21.7%	13.3%	37.5%
Minimum Split (s)	14	33	13	12.5	13
Yellow Time (s)	4	3	3	3	4
All-Red Time (s)	2	0	3	3.5	2
Minimum Initial (s)	7	1	7	6	7
Vehicle Extension (s)	3	0.2	3	3	0.2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)		4			
Flash Dont Walk (s)		26			
Dual Entry	No	No	No	No	No
Inhibit Max	No	No	No	No	No
Start Time (s)	113	54	87	113	9
End Time (s)	54	87	113	9	54
Yield/Force Off (s)	48	84	107	2.5	48
Yield/Force Off 170(s)	48	58	107	2.5	48
Local Start Time (s)	65	6	39	65	81
Local Yield (s)	0	36	59	74.5	0
Local Yield 170(s)	0	10	59	74.5	0

Intersection Summary

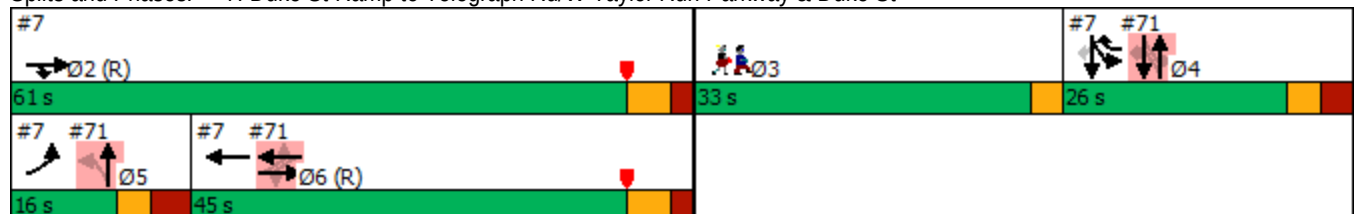
Cycle Length 120

Control Type Actuated-Coordinated

Natural Cycle 150

Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2150	1	0	1066	0	284	28	11	16	13	42
Future Volume (vph)	0	2150	1	0	1066	0	284	28	11	16	13	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			1.00			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5036			4891			1756			1665	
Flt Permitted		1.00			1.00			0.69			0.88	
Satd. Flow (perm)		5036			4891			1273			1484	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.76	0.76	0.76	0.77	0.77	0.77
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	0	2604	1	0	1263	0	407	40	16	23	18	59
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	28	0
Lane Group Flow (vph)	0	2605	0	0	1263	0	0	462	0	0	72	0
Confl. Peds. (#/hr)	18		3	3		18			8	8		
Heavy Vehicles (%)	2%	3%	2%	2%	5%	2%	3%	2%	9%	2%	2%	5%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		51.0			51.0			34.0			34.0	
Effective Green, g (s)		53.0			53.0			36.0			36.0	
Actuated g/C Ratio		0.55			0.55			0.37			0.37	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			0.2			3.0			3.0	
Lane Grp Cap (vph)		2751			2672			472			550	
v/s Ratio Prot		c0.52			0.26							
v/s Ratio Perm								c0.36			0.05	
v/c Ratio		0.95			0.47			0.98			0.13	
Uniform Delay, d1		20.7			13.5			30.1			20.2	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		8.6			0.6			35.7			0.1	
Delay (s)		29.3			14.1			65.8			20.3	
Level of Service		C			B			E			C	
Approach Delay (s)		29.3			14.1			65.8			20.3	
Approach LOS		C			B			E			C	
Intersection Summary												
HCM 2000 Control Delay			28.5			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			97.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			78.7%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

10: Dove St/Roberts Ln & Duke St

03/14/2024



Phase Number	2	4	6	8
Movement	EBT	SBTL	WBT	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	57	40	57	40
Maximum Split (%)	58.8%	41.2%	58.8%	41.2%
Minimum Split (s)	25	13	28	40
Yellow Time (s)	4	3	4	3
All-Red Time (s)	2	3	2	3
Minimum Initial (s)	10	7	10	7
Vehicle Extension (s)	3	3	0.2	3
Minimum Gap (s)	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7		7	7
Flash Dont Walk (s)	12		12	27
Dual Entry	No	Yes	No	Yes
Inhibit Max	No	No	No	No
Start Time (s)	0	57	0	57
End Time (s)	57	0	57	0
Yield/Force Off (s)	51	91	51	91
Yield/Force Off 170(s)	39	91	39	64
Local Start Time (s)	46	6	46	6
Local Yield (s)	0	40	0	40
Local Yield 170(s)	85	40	85	13
Intersection Summary				
Cycle Length	97			
Control Type	Semi Act-Uncoord			
Natural Cycle	90			

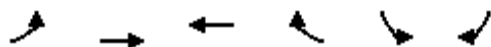
Splits and Phases: 10: Dove St/Roberts Ln & Duke St

→ Ø2	↓ Ø4
57 s	40 s
← Ø6	↑ Ø8
57 s	40 s

HCM Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	170	994	1195	703	537	133
Future Volume (vph)	170	994	1195	703	537	133
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1719	5036	3539	1583	3356	
Flt Permitted	0.09	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	166	5036	3539	1583	3356	
Peak-hour factor, PHF	0.89	0.89	0.97	0.97	0.90	0.90
Growth Factor (vph)	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	208	1217	1343	790	650	161
RTOR Reduction (vph)	0	0	0	0	19	0
Lane Group Flow (vph)	208	1217	1343	790	792	0
Confl. Peds. (#/hr)	2			2		1
Heavy Vehicles (%)	5%	3%	2%	2%	2%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	81.0	81.0	61.0	93.5	26.5	
Effective Green, g (s)	83.0	83.0	63.0	95.5	28.5	
Actuated g/C Ratio	0.69	0.69	0.52	0.80	0.24	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	327	3483	1857	1259	797	
v/s Ratio Prot	c0.09	0.24	c0.38	0.50	c0.24	
v/s Ratio Perm	0.35					
v/c Ratio	0.64	0.35	0.72	0.63	0.99	
Uniform Delay, d1	23.0	7.5	21.8	5.0	45.7	
Progression Factor	1.00	1.00	1.30	1.25	1.00	
Incremental Delay, d2	4.0	0.1	1.5	0.6	30.1	
Delay (s)	27.1	7.6	29.8	6.8	75.8	
Level of Service	C	A	C	A	E	
Approach Delay (s)		10.4	21.3		75.8	
Approach LOS		B	C		E	
Intersection Summary						
HCM 2000 Control Delay			27.9		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.78			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			78.0%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Timing Report, Sorted By Phase

1: Duke St & N Quaker Lane

03/14/2024

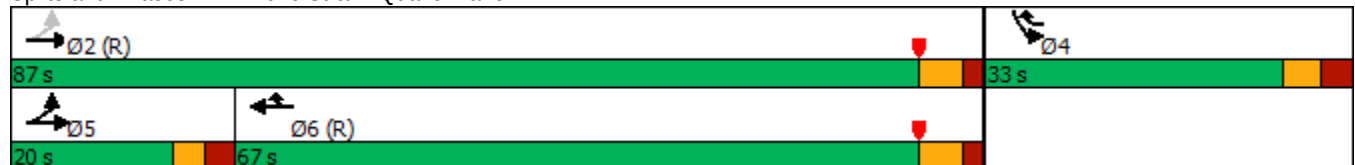


Phase Number	2	4	5	6
Movement	EBTL	SBL	EBTL	WBT
Lead/Lag			Lead	Lag
Lead-Lag Optimize				
Recall Mode	C-Max	None	None	C-Max
Maximum Split (s)	87	33	20	67
Maximum Split (%)	72.5%	27.5%	16.7%	55.8%
Minimum Split (s)	22	29.5	19.6	22
Yellow Time (s)	4	3.5	3	4
All-Red Time (s)	2	3	2.6	2
Minimum Initial (s)	10	7	5	10
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		4	4	4
Flash Dont Walk (s)		19	10	12
Dual Entry	No	No	No	No
Inhibit Max	No	No	No	No
Start Time (s)	59	26	59	79
End Time (s)	26	59	79	26
Yield/Force Off (s)	20	52.5	73.4	20
Yield/Force Off 170(s)	20	33.5	63.4	8
Local Start Time (s)	39	6	39	59
Local Yield (s)	0	32.5	53.4	0
Local Yield 170(s)	0	13.5	43.4	108

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 20 (17%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow	

Splits and Phases: 1: Duke St & N Quaker Lane



HCM Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1162	362	26	1794	7	103	0	19	1	0	1
Future Volume (vph)	7	1162	362	26	1794	7	103	0	19	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.98			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1769	3539	1537	1569	3537			1744			1695	
Flt Permitted	0.06	1.00	1.00	0.13	1.00			0.75			0.96	
Satd. Flow (perm)	104	3539	1537	214	3537			1370			1675	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.80	0.80	0.80	0.25	0.25	0.25
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	8	1333	415	30	2058	8	140	0	26	4	0	4
RTOR Reduction (vph)	0	0	157	0	0	0	0	92	0	0	6	0
Lane Group Flow (vph)	8	1333	258	30	2066	0	0	74	0	0	2	0
Confl. Peds. (#/hr)	9		11	11		9			7	7		
Heavy Vehicles (%)	2%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 6			4			3 4	
Permitted Phases	2		2	1 6			4			3 4		
Actuated Green, G (s)	69.4	69.4	69.4	85.4	85.4			13.1			25.1	
Effective Green, g (s)	71.4	71.4	71.4	87.4	87.4			15.1			27.1	
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73			0.13			0.23	
Clearance Time (s)	5.5	5.5	5.5	5.5				4.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0				3.0				
Lane Grp Cap (vph)	61	2105	914	297	2576			172			378	
v/s Ratio Prot		0.38		0.01	c0.58							
v/s Ratio Perm	0.08		0.17	0.06				c0.05			c0.00	
v/c Ratio	0.13	0.63	0.28	0.10	0.80			0.43			0.00	
Uniform Delay, d1	10.7	15.8	11.8	16.5	10.6			48.5			36.0	
Progression Factor	1.36	1.23	2.99	0.50	0.32			1.00			1.00	
Incremental Delay, d2	3.6	1.2	0.6	0.1	1.1			1.7			0.0	
Delay (s)	18.1	20.7	36.1	8.3	4.5			50.2			36.0	
Level of Service	B	C	D	A	A			D			D	
Approach Delay (s)		24.3			4.6			50.2			36.0	
Approach LOS		C			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			15.1			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			74.9%			ICU Level of Service				D		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

2: S Quaker Ln & Duke St

03/14/2024



Phase Number	1	2	3	4	6
Movement	WBTL	EBTL	SBTL	NBSB	WBTL
Lead/Lag	Lag	Lead	Lead	Lag	
Lead-Lag Optimize					
Recall Mode	None	C-Max	Max	None	C-Max
Maximum Split (s)	16	63	12	29	79
Maximum Split (%)	13.3%	52.5%	10.0%	24.2%	65.8%
Minimum Split (s)	10.5	15.5	12	29	20
Yellow Time (s)	4	4	3	3	4
All-Red Time (s)	1.5	1.5	0.5	1	1.5
Minimum Initial (s)	5	10	4	7	4
Vehicle Extension (s)	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)				4	
Flash Dont Walk (s)				21	
Dual Entry	No	No	No	No	No
Inhibit Max	No	No	No	No	No
Start Time (s)	57.5	114.5	73.5	85.5	114.5
End Time (s)	73.5	57.5	85.5	114.5	73.5
Yield/Force Off (s)	68	52	82	110.5	68
Yield/Force Off 170(s)	68	52	82	89.5	68
Local Start Time (s)	5.5	62.5	21.5	33.5	62.5
Local Yield (s)	16	0	30	58.5	16
Local Yield 170(s)	16	0	30	37.5	16

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	120
Offset: 52 (43%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 2: S Quaker Ln & Duke St

Ø2 (R)	Ø1	Ø3	Ø4
63 s	16 s	12 s	29 s
Ø6 (R)			
79 s			

HCM Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	1110	10	7	1718	34	16	2	4	49	2	93
Future Volume (vph)	62	1110	10	7	1718	34	16	2	4	49	2	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.3		4.3	4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.98			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1770	3533		1766	3527			1746			1665	
Flt Permitted	0.05	1.00		0.21	1.00			0.59			0.89	
Satd. Flow (perm)	85	3533		395	3527			1076			1500	
Peak-hour factor, PHF	0.94	0.94	0.94	0.95	0.95	0.95	0.69	0.69	0.69	0.80	0.80	0.80
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	72	1287	12	8	1971	39	25	3	6	67	3	127
RTOR Reduction (vph)	0	0	0	0	1	0	0	5	0	0	59	0
Lane Group Flow (vph)	72	1299	0	8	2009	0	0	29	0	0	138	0
Confl. Peds. (#/hr)	2		15	15		2			9	9		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	92.6	92.6		81.4	81.4			15.1			15.1	
Effective Green, g (s)	94.6	94.6		83.4	83.4			17.1			17.1	
Actuated g/C Ratio	0.79	0.79		0.70	0.70			0.14			0.14	
Clearance Time (s)	6.1	6.3		6.3	6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0		0.2	0.2			2.0			2.0	
Lane Grp Cap (vph)	166	2785		274	2451			153			213	
v/s Ratio Prot	0.03	c0.37			c0.57							
v/s Ratio Perm	0.31			0.02				0.03			c0.09	
v/c Ratio	0.43	0.47		0.03	0.82			0.19			0.65	
Uniform Delay, d1	19.9	4.3		5.7	13.0			45.3			48.6	
Progression Factor	3.03	0.01		0.93	0.46			1.00			1.00	
Incremental Delay, d2	0.5	0.4		0.1	1.9			0.2			5.0	
Delay (s)	60.9	0.5		5.4	7.8			45.6			53.6	
Level of Service	E	A		A	A			D			D	
Approach Delay (s)		3.7			7.8			45.6			53.6	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			9.1			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.4			
Intersection Capacity Utilization			72.4%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

3: Duke St & Alexandria Commons

03/14/2024

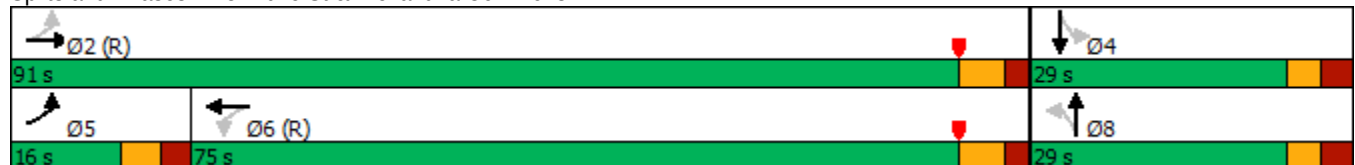


Phase Number	2	4	5	6	8
Movement	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag			Lead	Lag	
Lead-Lag Optimize					
Recall Mode	C-Max	None	None	C-Max	None
Maximum Split (s)	91	29	16	75	29
Maximum Split (%)	75.8%	24.2%	13.3%	62.5%	24.2%
Minimum Split (s)	17	13	11.1	16.3	29
Yellow Time (s)	4	3	3.5	4	3
All-Red Time (s)	2.3	3	2.6	2.3	3
Minimum Initial (s)	10	6.7	5	1	7
Vehicle Extension (s)	2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)					4
Flash Dont Walk (s)					19
Dual Entry	Yes	Yes	No	Yes	Yes
Inhibit Max	No	No	No	No	No
Start Time (s)	103.3	74.3	103.3	119.3	74.3
End Time (s)	74.3	103.3	119.3	74.3	103.3
Yield/Force Off (s)	68	97.3	113.2	68	97.3
Yield/Force Off 170(s)	68	97.3	113.2	68	78.3
Local Start Time (s)	35.3	6.3	35.3	51.3	6.3
Local Yield (s)	0	29.3	45.2	0	29.3
Local Yield 170(s)	0	29.3	45.2	0	10.3

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	100
Offset: 68 (57%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

Splits and Phases: 3: Duke St & Alexandria Commons



HCM Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	1131	3	27	1665	108	19	6	83	98	8	75
Future Volume (vph)	29	1131	3	27	1665	108	19	6	83	98	8	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1752	3537		1769	3502			1626			1769	1583
Flt Permitted	0.05	1.00		0.15	1.00			0.93			0.45	1.00
Satd. Flow (perm)	91	3537		280	3502			1519			836	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.68	0.68	0.68	0.84	0.84	0.84
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	34	1340	4	31	1890	123	30	10	133	127	10	97
RTOR Reduction (vph)	0	0	0	0	3	0	0	103	0	0	0	79
Lane Group Flow (vph)	34	1344	0	31	2010	0	0	70	0	0	137	18
Confl. Peds. (#/hr)	1		10	10		1			7	7		
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	82.5	79.2		81.7	78.5			20.2			20.2	20.2
Effective Green, g (s)	86.5	81.2		85.7	80.5			22.2			22.2	22.2
Actuated g/C Ratio	0.72	0.68		0.71	0.67			0.18			0.18	0.18
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	138	2393		264	2349			281			154	292
v/s Ratio Prot	c0.01	0.38		0.01	c0.57						c0.16	0.01
v/s Ratio Perm	0.17			0.08				0.05				0.01
v/c Ratio	0.25	0.56		0.12	0.86			0.25			0.89	0.06
Uniform Delay, d1	18.2	10.1		7.0	15.3			41.8			47.7	40.3
Progression Factor	2.66	0.31		1.07	0.69			1.00			1.00	1.00
Incremental Delay, d2	0.3	0.9		0.0	2.3			0.2			40.6	0.0
Delay (s)	48.7	4.0		7.5	12.8			42.0			88.3	40.3
Level of Service	D	A		A	B			D			F	D
Approach Delay (s)		5.1			12.8			42.0			68.4	
Approach LOS		A			B			D			E	
Intersection Summary												
HCM 2000 Control Delay			14.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			79.8%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Phase Number	1	2	4	5	6	8
Movement	WBL	EBTL	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	17	74	29	17	74	29
Maximum Split (%)	14.2%	61.7%	24.2%	14.2%	61.7%	24.2%
Minimum Split (s)	10	30.8	29	10	31	29
Yellow Time (s)	3	4	3	3	4	3
All-Red Time (s)	2.6	1.8	3	3	2	3
Minimum Initial (s)	4	10	7	4	10	7
Vehicle Extension (s)	2	0.2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	3	0.2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		4	4		4	4
Flash Dont Walk (s)		21	19		21	19
Dual Entry	No	No	Yes	No	No	Yes
Inhibit Max	No	No	No	No	No	No
Start Time (s)	102	119	73	102	119	73
End Time (s)	119	73	102	119	73	102
Yield/Force Off (s)	113.4	67.2	96	113	67	96
Yield/Force Off 170(s)	113.4	46.2	77	113	46	77
Local Start Time (s)	35	52	6	35	52	6
Local Yield (s)	46.4	0.2	29	46	0	29
Local Yield 170(s)	46.4	99.2	10	46	99	10

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	90
Offset: 67 (56%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow	

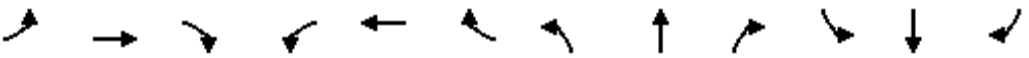
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St

Ø1	Ø2 (R)	Ø4
17 s	74 s	29 s
Ø5	Ø6 (R)	Ø8
17 s	74 s	29 s

HCM Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1298	5	61	1756	175	3	11	344	276	5	41
Future Volume (vph)	9	1298	5	61	1756	175	3	11	344	276	5	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.87			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1626	3537		1752	3539	1550		1620			1770	1550
Flt Permitted	0.95	1.00		0.07	1.00	1.00		1.00			0.22	1.00
Satd. Flow (perm)	1626	3537		137	3539	1550		1616			406	1550
Peak-hour factor, PHF	0.93	0.93	0.93	0.97	0.97	0.97	0.96	0.96	0.96	0.86	0.86	0.86
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	11	1521	6	69	1973	197	3	12	391	350	6	52
RTOR Reduction (vph)	0	0	0	0	0	0	0	138	0	0	0	38
Lane Group Flow (vph)	11	1527	0	69	1973	197	0	268	0	0	356	14
Confl. Peds. (#/hr)	1		2	2		1	6					6
Heavy Vehicles (%)	11%	2%	2%	3%	2%	2%	2%	2%	2%	2%	20%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	1.4	67.3		76.9	71.4	71.4		29.6			29.6	29.6
Effective Green, g (s)	3.4	69.3		80.3	73.4	73.4		31.6			31.6	31.6
Actuated g/C Ratio	0.03	0.58		0.67	0.61	0.61		0.26			0.26	0.26
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	46	2042		192	2164	948		425			106	408
v/s Ratio Prot	0.01	0.43		c0.02	c0.56							
v/s Ratio Perm				0.22		0.13		0.17			c0.88	0.01
v/c Ratio	0.24	0.75		0.36	0.91	0.21		0.63			3.36	0.03
Uniform Delay, d1	57.0	18.9		15.7	20.5	10.4		39.0			44.2	32.9
Progression Factor	1.08	0.69		2.06	1.66	1.51		1.00			1.00	1.00
Incremental Delay, d2	0.8	2.2		0.4	6.4	0.4		2.1			1085.0	0.0
Delay (s)	62.1	15.1		32.7	40.5	16.1		41.1			1129.2	32.9
Level of Service	E	B		C	D	B		D			F	C
Approach Delay (s)		15.4			38.1			41.1			989.4	
Approach LOS		B			D			D			F	
Intersection Summary												
HCM 2000 Control Delay			115.3				HCM 2000 Level of Service				F	
HCM 2000 Volume to Capacity ratio			1.60									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			11.6		
Intersection Capacity Utilization			107.4%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

5: Roth St/Cambridge Rd & Duke St

03/14/2024

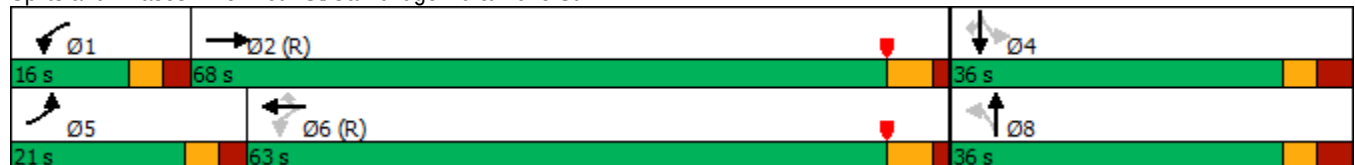


Phase Number	1	2	4	5	6	8
Movement	WBL	EBT	SBTL	EBL	WBTL	NBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	None	C-Max	None	None	C-Max	None
Maximum Split (s)	16	68	36	21	63	36
Maximum Split (%)	13.3%	56.7%	30.0%	17.5%	52.5%	30.0%
Minimum Split (s)	11.5	30.7	30.4	11.5	15.7	13.4
Yellow Time (s)	3	4	3	3	4	3
All-Red Time (s)	2.5	1.7	3.4	2.5	1.7	3.4
Minimum Initial (s)	6	10	7	6	10	7
Vehicle Extension (s)	2	0.2	2	2	0.2	2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		7	4			
Flash Dont Walk (s)		18	20			
Dual Entry	No	No	Yes	No	No	Yes
Inhibit Max	No	No	No	No	No	No
Start Time (s)	105.7	1.7	69.7	105.7	6.7	69.7
End Time (s)	1.7	69.7	105.7	6.7	69.7	105.7
Yield/Force Off (s)	116.2	64	99.3	1.2	64	99.3
Yield/Force Off 170(s)	116.2	46	79.3	1.2	64	99.3
Local Start Time (s)	41.7	57.7	5.7	41.7	62.7	5.7
Local Yield (s)	52.2	0	35.3	57.2	0	35.3
Local Yield 170(s)	52.2	102	15.3	57.2	0	35.3

Intersection Summary

Cycle Length 120
Control Type Actuated-Coordinated
Natural Cycle 150
Offset: 64 (53%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

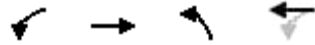
03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	1910	8	29	1968	24	71
Future Volume (vph)	1910	8	29	1968	24	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	2.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.90	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	5081		1770	5085	1642	
Flt Permitted	1.00		0.07	1.00	0.99	
Satd. Flow (perm)	5081		122	5085	1642	
Peak-hour factor, PHF	0.98	0.98	0.95	0.95	0.59	0.59
Growth Factor (vph)	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	2124	9	33	2258	44	131
RTOR Reduction (vph)	0	0	0	0	113	0
Lane Group Flow (vph)	2133	0	33	2258	62	0
Confl. Peds. (#/hr)		9	9			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	88.5		100.5	100.5	10.0	
Effective Green, g (s)	90.5		102.5	102.5	12.0	
Actuated g/C Ratio	0.75		0.85	0.85	0.10	
Clearance Time (s)	5.5		6.0	5.5	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3831		214	4343	164	
v/s Ratio Prot	c0.42		0.01	c0.44	c0.04	
v/s Ratio Perm			0.12			
v/c Ratio	0.56		0.15	0.52	0.38	
Uniform Delay, d1	6.3		7.1	2.3	50.5	
Progression Factor	0.74		1.18	2.25	1.00	
Incremental Delay, d2	0.1		0.2	0.2	1.4	
Delay (s)	4.7		8.6	5.4	51.9	
Level of Service	A		A	A	D	
Approach Delay (s)	4.7			5.4	51.9	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay		6.8		HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio		0.55				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)	9.5	
Intersection Capacity Utilization		54.3%		ICU Level of Service	A	
Analysis Period (min)		15				
c Critical Lane Group						

Timing Report, Sorted By Phase

6: Witter Drive & Duke St

03/14/2024



Phase Number	1	2	4	6
Movement	WBL	EBT	NBL	WBTL
Lead/Lag	Lag	Lead		
Lead-Lag Optimize				
Recall Mode	None	C-Max	None	C-Max
Maximum Split (s)	16	67	37	83
Maximum Split (%)	13.3%	55.8%	30.8%	69.2%
Minimum Split (s)	12	27.5	20	15.5
Yellow Time (s)	3	3.5	3.5	3.5
All-Red Time (s)	3	2	0.5	2
Minimum Initial (s)	6	10	4	10
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)		7		
Flash Dont Walk (s)		15		
Dual Entry	No	No	Yes	No
Inhibit Max	No	No	No	No
Start Time (s)	83.5	16.5	99.5	16.5
End Time (s)	99.5	83.5	16.5	99.5
Yield/Force Off (s)	93.5	78	12.5	94
Yield/Force Off 170(s)	93.5	63	12.5	94
Local Start Time (s)	5.5	58.5	21.5	58.5
Local Yield (s)	15.5	0	54.5	16
Local Yield 170(s)	15.5	105	54.5	16

Intersection Summary

Cycle Length	120
Control Type	Actuated-Coordinated
Natural Cycle	65
Offset: 78 (65%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow	

Splits and Phases: 6: Witter Drive & Duke St



HCM Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	702	1253	0	1978	234	0	0	0	56	346	19
Future Volume (vph)	26	702	1253	0	1978	234	0	0	0	56	346	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0	4.0					4.0	4.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00					1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00					1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00					1.00	1.00
Frt	1.00	1.00	1.00		1.00	0.85					1.00	0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00					0.99	1.00
Satd. Flow (prot)	1570	3374	1810		4893	1553					1797	1583
Flt Permitted	0.95	1.00	1.00		1.00	1.00					0.99	1.00
Satd. Flow (perm)	1570	3374	1810		4893	1553					1797	1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	29	773	1380	0	2344	277	0	0	0	64	397	22
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	18
Lane Group Flow (vph)	29	773	1380	0	2344	277	0	0	0	0	461	4
Confl. Peds. (#/hr)									7	7		
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA	Over				Split	NA	Perm
Protected Phases	5	2	2		6	4				4	4	
Permitted Phases												4
Actuated Green, G (s)	7.4	77.0	77.0		63.1	22.0					22.0	22.0
Effective Green, g (s)	9.4	79.0	79.0		65.1	24.0					24.0	24.0
Actuated g/C Ratio	0.08	0.66	0.66		0.54	0.20					0.20	0.20
Clearance Time (s)	6.5	6.0	6.0		6.0	6.0					6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2	3.0					3.0	3.0
Lane Grp Cap (vph)	122	2221	1191		2654	310					359	316
v/s Ratio Prot	0.02	0.23	c0.76		0.48	0.18					c0.26	
v/s Ratio Perm												0.00
v/c Ratio	0.24	0.35	1.16		0.88	0.89					1.28	0.01
Uniform Delay, d1	51.9	9.1	20.5		24.1	46.8					48.0	38.5
Progression Factor	1.16	0.42	0.61		1.00	1.00					0.60	1.00
Incremental Delay, d2	0.9	0.4	79.9		4.7	26.0					144.6	0.0
Delay (s)	61.4	4.2	92.5		28.8	72.8					173.2	38.5
Level of Service	E	A	F		C	E					F	D
Approach Delay (s)		60.8			33.5			0.0			167.1	
Approach LOS		E			C			A			F	
Intersection Summary												
HCM 2000 Control Delay			57.0		HCM 2000 Level of Service					E		
HCM 2000 Volume to Capacity ratio			1.17									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					15.5		
Intersection Capacity Utilization			114.5%		ICU Level of Service					H		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Phase Number	2	3	4	5	6
Node Number	7	0	7	7	7
Movement	EBT	Ped	SBTL	EBL	WBT
Lead/Lag		Lead	Lag	Lead	Lag
Lead-Lag Optimize					
Recall Mode	C-Max	None	None	None	C-Max
Maximum Split (s)	59	33	28	15	44
Maximum Split (%)	49.2%	27.5%	23.3%	12.5%	36.7%
Minimum Split (s)	14	33	13	12.5	13
Yellow Time (s)	4	3	3	3	4
All-Red Time (s)	2	0	3	3.5	2
Minimum Initial (s)	7	1	7	6	7
Vehicle Extension (s)	3	0.2	3	3	0.2
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2
Time Before Reduce (s)	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0
Walk Time (s)		4			
Flash Dont Walk (s)		26			
Dual Entry	No	No	No	No	No
Inhibit Max	No	No	No	No	No
Start Time (s)	36	95	8	36	51
End Time (s)	95	8	36	51	95
Yield/Force Off (s)	89	5	30	44.5	89
Yield/Force Off 170(s)	89	99	30	44.5	89
Local Start Time (s)	67	6	39	67	82
Local Yield (s)	0	36	61	75.5	0
Local Yield 170(s)	0	10	61	75.5	0

Intersection Summary

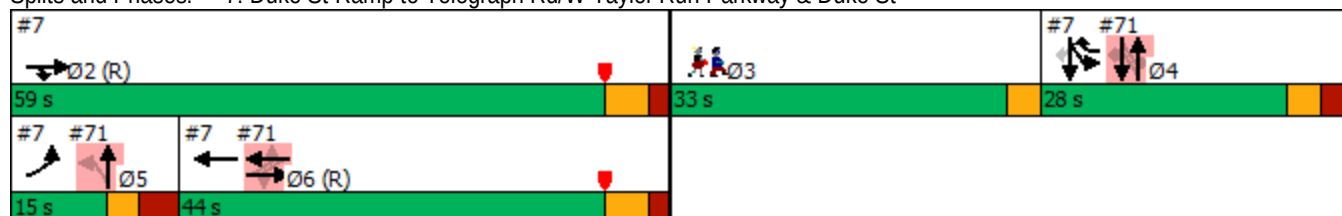
Cycle Length 120

Control Type Actuated-Coordinated

Natural Cycle 150

Offset: 89 (74%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1427	3	0	2324	1	204	31	21	14	20	34
Future Volume (vph)	0	1427	3	0	2324	1	204	31	21	14	20	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.99			0.93	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5084			5034			1768			1592	
Flt Permitted		1.00			1.00			0.74			0.92	
Satd. Flow (perm)		5084			5034			1366			1472	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Growth Factor (vph)	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%	109%
Adj. Flow (vph)	0	1637	3	0	2612	1	265	40	27	16	23	40
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	1	0
Lane Group Flow (vph)	0	1640	0	0	2613	0	0	329	0	0	78	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		51.3			51.3			25.5			25.5	
Effective Green, g (s)		53.3			53.3			27.5			27.5	
Actuated g/C Ratio		0.60			0.60			0.31			0.31	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3051			3021			423			455	
v/s Ratio Prot		0.32			c0.52							
v/s Ratio Perm								c0.24			0.05	
v/c Ratio		0.54			0.86			0.78			0.17	
Uniform Delay, d1		10.5			14.8			27.9			22.3	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.7			3.6			8.7			0.2	
Delay (s)		11.2			18.4			36.6			22.5	
Level of Service		B			B			D			C	
Approach Delay (s)		11.2			18.4			36.6			22.5	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			17.2				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			88.8				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			79.9%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Timing Report, Sorted By Phase

10: Dove St/Roberts Ln & Duke St

03/14/2024



Phase Number	2	4	6	8
Movement	EBT	SBTL	WBT	NBTL
Lead/Lag				
Lead-Lag Optimize				
Recall Mode	Max	None	Max	None
Maximum Split (s)	57	40	57	40
Maximum Split (%)	58.8%	41.2%	58.8%	41.2%
Minimum Split (s)	25	13	28	40
Yellow Time (s)	4	3	4	3
All-Red Time (s)	2	3	2	3
Minimum Initial (s)	10	7	10	7
Vehicle Extension (s)	3	3	3	3
Minimum Gap (s)	3	3	3	3
Time Before Reduce (s)	0	0	0	0
Time To Reduce (s)	0	0	0	0
Walk Time (s)	7		7	7
Flash Dont Walk (s)	12		12	27
Dual Entry	No	No	No	No
Inhibit Max	No	No	No	No
Start Time (s)	0	57	0	57
End Time (s)	57	0	57	0
Yield/Force Off (s)	51	91	51	91
Yield/Force Off 170(s)	39	91	39	64
Local Start Time (s)	46	6	46	6
Local Yield (s)	0	40	0	40
Local Yield 170(s)	85	40	85	13
Intersection Summary				
Cycle Length	97			
Control Type	Semi Act-Uncoord			
Natural Cycle	90			

Splits and Phases: 10: Dove St/Roberts Ln & Duke St

→ Ø2	↓ Ø4
57 s	40 s
← Ø6	↑ Ø8
57 s	40 s



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix M: VISSIM Results for 2026 & 2036 No-Build Conditions

Intersection MOE - 2026 No Build AM Peak

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	VISSIM Throughput (vph)	A	A %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)
1	Duke St and N Quaker Ln	Signalized	EBL	272	280	8	3%	28.4	C	1572	14.8	B	18.2	B	200	66	366
			EBT	1286	1293	6	0%	11.8	B						360	66	366
			WBT	898	855	-43	-5%	16.1	B	1827	10.4	B			330	58	422
			WBR	1039	972	-66	-6%	5.3	A						300	19	399
			SBL	559	557	-2	0%	50.2	D	671	47.5	D			1290	126	438
			SBR	113	114	1	1%	34.2	C						1270	46	396
2	Duke St and S Quaker Ln	Signalized	EBL	0	0	0	N/A	0.0	A	1849	6.6	A	6.3	A	200	55	438
			EBT	1725	1734	8	0%	6.8	A						330	55	438
			EBR	120	116	-5	-4%	2.8	A						300	62	466
			WBL	24	26	1	4%	17.2	B	1799	4.5	A			80	20	356
			WBT	1882	1774	-109	-6%	4.3	A						210	20	356
			WBR	0	0	0	N/A	0.0	A						210	21	371
			NBL	54	52	-2	-4%	49.5	D						335	19	136
			NBT	0	0	0	N/A	0.0	A	67	44.4	D			335	19	136
			NBR	14	15	1	7%	26.5	C						335	15	137
			SBL	2	2	0	0%	39.0	D						40	0	21
			SBT	0	0	0	N/A	0.0	A	2	39.0	D			40	0	21
			SBR	0	0	0	N/A	0.0	A						40	0	24
			EBL	41	41	1	2%	38.7	D						105	12	332
			EBT	1695	1702	7	0%	2.5	A	1750	3.3	A			210	12	332
			EBR	6	7	0	0%	2.3	A						210	14	366
3	Duke St and Alexandria Commons	Signalized	WBL	0	0	0	N/A	0.0	A	1788	6.8	A	5.5	A	315	76	651
			WBT	1859	1755	-104	-6%	6.7	A						520	76	651
			WBR	35	32	-2	-6%	12.2	B						520	32	673
			NBL	3	3	0	0%	39.3	D						50	1	23
			NBT	0	0	0	N/A	0.0	A	3	39.3	D			50	1	23
			NBR	0	0	0	N/A	0.0	A						50	1	22
			SBL	17	19	1	6%	58.0	E						215	9	135
			SBT	0	0	0	N/A	0.0	A	61	30.3	C			215	9	135
			SBR	45	42	-3	-7%	18.1	B						215	12	145
			EBL	53	55	2	4%	27.6	C						190	38	500
			EBT	1657	1667	10	1%	7.2	A	1724	7.9	A			520	40	500
			EBR	2	2	0	0%	4.0	A						520	41	508
			WBL	22	23	1	4%	27.1	C						70	27	581
			WBT	1804	1699	-104	-6%	4.7	A	1837	5.0	A			225	27	581
			WBR	123	114	-9	-7%	5.2	A						225	28	597
4	Duke St and Sweeley St	Signalized	NBL	11	10	-1	-9%	50.7	D				7.8	A	230	6	84
			NBT	5	5	0	0%	52.5	D	45	29.5	C			230	6	84
			NBR	32	30	-2	-6%	18.3	B						230	9	95
			SBL	83	84	1	1%	53.4	D						110	27	145
			SBT	1	1	0	0%	39.8	D	161	33.9	C			110	27	145
			SBR	79	76	-3	-4%	12.3	B						110	27	145
			EBL	61	57	-5	-8%	80.4	F						115	200	820
			EBT	1706	1716	10	1%	16.3	B	1777	18.3	B			350	200	820
			EBR	4	4	0	0%	17.9	B						350	200	827
			WBL	98	93	-5	-5%	30.7	C						230	189	756
			WBT	1891	1782	-110	-6%	13.5	B	2160	13.9	B			670	189	756
			WBR	308	285	-23	-7%	10.5	B						670	189	756
			NBL	6	5	-1	-16%	32.9	C						150	5	91
			NBT	6	6	0	0%	39.1	D	65	18.4	B			150	5	91
			NBR	55	54	-1	-2%	14.7	B						150	7	93
5	Duke St at Roth St/Cambridge Rd	Signalized	SBL	193	168	-25	-13%	33.1	C				16.5	B	40	76	118
			SBT	4	3	-1	-25%	24.1	C	217	27.7	C			40	76	118
			SBR	52	47	-5	-10%	8.4	A						40	95	141
			EBT	9	7	-2	-21%	244.4	F						40		
			EBR	221	192	-29	-13%	241.2	F	200	241.4	F			1330	899	1331
			WBL	28	26	-2	-7%	79.7	F						1330	895	1331
			WBT	0	0	0	N/A	0.0	A	26	79.7	F			825	8	75
			NBL	366	314	-52	-14%	0.6	A						825	8	88
			NBR	42	34	-8	-19%	0.4	A	348	0.6	A			40	1	37
			EBT	1932	1918	-14	-1%	8.5	A						40	1	37
			EBR	21	21	0	0%	12.0	B	1939	8.5	A			675	66	528
			WBL	89	82	-6	-7%	19.8	B						675	68	535
			WBT	2290	2151	-139	-6%	7.8	A	2234	8.2	A			215	63	677
			NBL	7	7	-1	-14%	55.4	E						700	3	677
			NBR	26	25	0	0%	19.2	B	32	26.6	C			170	3	78
6	Duke St and Witter Dr	Signalized	EBL	31	27	-3	-10%	58.9	E				8.5	A	170	5	97
			EBT (Continue on Duke St)	947	946	-1	0%	15.7	B	1942	17.9	B			165	9	92
			EBT (to Telegraph Rd)	980	969	-12	-1%	18.8	B						710	156	781
			WBT	2342	2195	-148	-6%	21.8	C						710	227	787
			WBR	273	246	-27	-10%	48.1	D	2441	24.5	C			1955	252	1005
			SBL (To Duke St)	31	29	-2	-7%	10.6	B						110	129	941
			SBL (To Telegraph Rd)	294	290	-4	-1%	9.7	A	356	9.2	A			140	29	118
			SBR	37	37	0	0%	4.5	A						140	29	118
			EBL	19	19	-1	-5%	22.8	C						140	37	135
			EBT	8	8	0	0%	20.5	C	49	27.8	C			70	7	90
			EBR	23	22	-2	-9%	35.0	D						70	7	90
			WBL	57	55	-2	-4%	48.6	D						320	11	98
			WBT	6	6	0	0%	29.7	C	62	46.6	D			320	11	98
			WBR	0	0	0	N/A	0.0	A						320	11	98
			NBL	15	14	-2	-13%	5.4	A						40	2	123
7	Duke St and W Taylor Run Pkwy	Signalized	NBT	225	204	-22	-10%	0.9	A	274	1.0	A	22.9	C	40	2	141
			NBR	63	57	-7	-11%	0.4	A						40	2	138
			SBL	1	1	0	0%	26.4	C						650	72	347
			SBT	281	278	-2	-1%	38.0	D	285	37.9	D			650	72	347
			SBR	6	6	-1	-16%	37.5	D						180	71	346
			EBL	19	19	-1	-5%	22.8	C						70	7	90
			EBT	8	8	0	0%	20.5	C	49	27.8	C			70	7	90
			EBR	23	22	-2	-9%	35.0	D						70	7	90
			WBL	57	55	-2	-4%	48.6	D						320	11	98
			WBT	6	6	0	0%	29.7	C	62	46.6	D			320	11	98
			WBR	0	0	0	N/A	0.0	A						320	11	98
			NBL	15	14	-2	-13%	5.4	A						40	2	123
			NBT	225	204	-22	-10%	0.9	A	274	1.0	A			40	2	141
			NBR	63	57	-7	-11%	0.4	A						40	2	138
			8	Duke St and S Dove St/Roberts Ln	Signalized	SBL	1	1	0	0%	26.4	C					
SBT	281	278				-2	-1%	38.0	D	285	37.9	D	650	72	347		
SBR	6	6				-1	-16%	37.5	D				180	71	346		
EBL	19	19				-1	-5%	22.8	C				70	7	90		
EBT	8	8				0	0%	20.5	C	49	27.8	C	70	7	90		
EBR	23	22				-2	-9%	35.0	D				70	7	90		
WBL	57	55				-2	-4%	48.6	D				320	11	98		
WBT	6	6				0	0%	29.7	C	62	46.6	D	320	11	98		
WBR	0	0				0	N/A	0.0	A				320	11	98		
NBL	15	14				-2	-13%	5.4	A				40	2	123		
NBT	225	204				-22	-10%	0.9	A	274	1.0	A	40	2	141		
NBR	63	57				-7	-11%	0.4	A				40	2	138		
SBL	1	1				0	0%	26.4	C				650	72	347		
SBT	281	278				-2	-1%	38.0	D	285	37.9	D	650	72	347		
SBR	6	6				-1	-16%	37.5	D				180	71	346		
9	Duke St WB and Telegraph Rd Off-ramp	Unsignaliz	WBT	881	876	-5	-1%	0.3	A	876	0.3	A	1.1	A	375	0	10
			SBR	1735	1564	-171	-10%	1.5	A	1564	1.5	A			2400	836	1366
9	Duke St WB and Telegraph Rd On-ramp	Unsignaliz	WBR	540	525	-15	-3%	0.3	A	525	0.3	A	0.3	A	225	0	20
10	Duke St and S Dove St/Roberts Ln	Signalized	EBT	2193	2062	-132	-6%	15.4	B	2389	15.9	B	14.8	B	1965	117	459
			EBR	364	327	-37	-10%	19.1	B						260	39	454
			WBT	1088	1100	13	1%	10.8	B	1134	10.7	B			855	34	310
			WBR	33	33	1	3%	6.9	A						855	0	43
			NBL	290	260	-30	-10%	21.3	C						185	89	565
			NBT	29	24	-5	-18%	22.1	C	294	21.3	C			185	89	565
			NBR	11	10	-1	-9%	17.1	B						185	85	568
			SBL	16	15	-2	-12%	33.5	C						50	7	116
			SBT	13	14	0	0%	24.1	C	70	15.3	B			50	7	116
			SBR	43	42	-1	-2%	6.1	A						50	8	118

Intersection MOE - 2026 No Build PM Peak

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	VISSIM Throughput (vph)	Δ	Δ %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)					
1	Duke St and N Quaker Ln	Signalized	EBL	173	167	-6	-3%	40.2	D	1081	57.2	E	42.1	D	200	961	2177					
			EBT	1014	914	-100	-10%	60.3	E						360	961	2177					
			WBT	1219	1227	8	1%	21.6	C						330	125	454					
			WBR	717	705	-12	-2%	7.5	A						300	25	407					
			SBL	548	532	-16	-3%	95.6	F						1290	310	801					
2	Duke St and S Quaker Ln	Signalized	SBR	136	131	-5	-4%	77.4	E	663	92.0	F	22.7	C	1270	236	778					
			EBL	7	6	-1	-14%	58.1	E						200	189	443					
			EBT	1185	1094	-91	-8%	41.3	D						330	189	443					
			EBR	369	339	-30	-8%	8.4	A						300	209	472					
			WBL	27	29	2	8%	25.7	C						80	87	364					
			WBT	1830	1826	-4	0%	12.0	B						210	87	364					
			WBR	7	6	-1	-14%	8.3	A						210	93	379					
			NBL	105	103	-2	-2%	55.0	E						335	40	210					
			NBT	0	0	0	N/A	0.0	A	335	40	210										
			NBR	19	19	0	0%	39.6	D	335	36	211										
			SBL	1	1	0	0%	27.8	C	40	0	23										
			SBT	0	0	0	N/A	0.0	A	40	0	23										
			SBR	1	1	0	0%	8.3	A	40	0	27										
			3	Duke St and Alexandria Commons	Signalized	EBL	63	57	-6	-9%	47.5	D			1110	34.6	C	25.1	C	105	127	326
						EBT	1132	1045	-88	-8%	34.0	C								210	127	326
						EBR	10	8	-2	-20%	25.6	C								210	148	359
WBL	7	6				-1	-14%	20.8	C	315	133	650										
WBT	1753	1753				0	0%	16.1	B	520	133	650										
WBR	35	34				-1	-3%	16.1	B	520	105	701										
NBL	16	16				-1	-6%	51.0	D	50	4	48										
NBT	2	1				-1	-49%	31.6	C	50	4	48										
NBR	4	4				0	0%	22.7	C	50	4	48										
SBL	50	51				1	2%	66.3	E	215	50	182										
SBT	2	2				0	0%	66.2	E	215	50	182										
SBR	95	92				-3	-3%	57.2	E	215	57	193										
4	Duke St and Sweeley St	Signalized				EBL	30	28	-2	-7%	48.8	D	1081	73.5	E	34.9	C			190	434	888
						EBT	1154	1051	-103	-9%	74.2	E								520	434	888
						EBR	3	3	-1	-33%	68.2	E								520	444	898
			WBL	28	30	2	7%	21.1	C	70	75	739										
			WBT	1699	1694	-4	0%	10.7	B	225	75	739										
			WBR	110	109	-1	-1%	10.3	B	225	80	755										
			NBL	19	18	-1	-5%	55.3	E	230	25	186										
			NBT	6	5	-1	-16%	49.7	D	230	25	186										
			NBR	85	86	1	1%	47.6	D	230	32	197										
			SBL	100	100	0	0%	58.5	E	110	34	158										
			SBT	8	7	-1	-12%	46.0	D	110	34	158										
			SBR	77	76	-1	-1%	15.0	B	110	34	158										
			5	Duke St at Roth St	Signalized	EBL	9	7	-2	-22%	84.2	F	1232	61.1	E			38.6	D	115	644	840
						EBT	1324	1222	-102	-8%	60.9	E								350	644	840
						EBR	5	4	-2	-39%	99.4	F								350	652	848
						WBL	62	64	2	3%	53.4	D								230	338	765
WBT	1791	1788				-3	0%	22.5	C	670	338	765										
WBR	179	177				-1	-1%	21.8	C	670	338	765										
NBL	3	2				-1	-33%	61.3	E	150	145	204										
NBT	11	7				-4	-36%	89.2	F	150	145	204										
NBR	351	246				-105	-30%	73.9	E	150	147	206										
SBL	282	250				-32	-11%	19.2	B	40	59	117										
SBT	5	6				1	20%	10.6	B	40	59	117										
SBR	42	37				-5	-12%	12.6	B	40	75	141										
51(5a)	Cambridge Rd and Service Rd	Unsignalized				EBT	45	35	-10	-22%	41.1	E	282	39.8	E	28.1	D			1330	58	315
						EBR	281	247	-34	-12%	39.6	E								1330	56	315
						WBL	48	46	-2	-4%	70.6	F								825	14	101
			WBT	0	0	0	N/A	0.0	A	825	16	114										
			NBL	193	163	-30	-16%	0.7	A	40	0	34										
6	Duke St and Witter Dr	Signalized	NBR	36	29	-7	-19%	0.2	A	192	0.6	A	28.1	D	40	0	34					
			EBT	1949	1753	-196	-10%	62.9	E						675	682	807					
			EBR	8	6	-2	-25%	118.4	F						675	690	814					
			WBL	30	32	3	10%	42.2	D						215	58	693					
			WBT	2008	2012	4	0%	10.1	B						700	58	693					
7	Duke St and W Taylor Run Pkwy	Signalized	NBL	24	25	0	0%	72.9	E	93	55.1	E	25.3	C	170	20	169					
			NBR	72	68	-4	-6%	48.7	D						170	28	189					
			EBL	27	22	-4	-15%	67.5	E						165	8	74					
			EBT (Continue on Duke St)	716	650	-67	-9%	13.3	B						710	92	788					
			EBT (to Telegraph Rd)	1278	1143	-135	-11%	33.8	C	710	507	807										
			WBT	2018	2031	13	1%	23.0	C	1955	214	900										
			WBR	239	232	-7	-3%	55.2	E	110	130	852										
			SBL (To Duke St)	57	55	-3	-5%	10.5	B	140	63	139										
71(7a)	W Taylor Run Pkwy and Service Rd	Signalized	SBL (To Telegraph Rd)	353	332	-21	-6%	11.6	B	403	12.0	B	109.3	F	140	63	139					
			SBR	19	17	-3	-15%	23.6	C						140	74	156					
			EBL	8	9	1	12%	110.0	F						70	54	206					
			EBT	5	6	1	20%	117.1	F						70	54	206					
			EBR	67	62	-5	-7%	129.6	F						70	54	206					
			WBL	87	71	-16	-18%	613.1	F	320	601	860										
			WBT	11	8	-4	-36%	544.4	F	320	601	860										
			WBR	2	2	0	0%	542.9	F	320	601	860										
			NBL	36	33	-3	-8%	7.9	A	40	6	128										
			NBT	213	207	-6	-3%	1.5	A	40	5	119										
8	Duke St WB and Telegraph Rd Off-ramp	Unsignal	NBR	16	15	-2	-12%	1.3	A	271	57.7	E	0.8	A	40	7	145					
			SBL	0	0	0	N/A	0.0	A						650	122	530					
			SBT	275	270	-5	-2%	57.8	E						650	122	530					
			SBR	1	1	0	0%	33.0	C						180	121	530					
			WBT	762	767	5	1%	0.1	A						375	0	0					
9	Duke St WB and Telegraph Rd On-ramp	Unsignal	SBR	1495	1500	5	0%	1.2	A	1500	1.2	A	0.9	A	2400	6	177					
			WBR	1851	1846	-5	0%	0.9	A						225	1	180					
10	Duke St and S Dove St/Roberts Ln	Signalized	EBT	1456	1387	-69	-5%	10.5	B	1600	10.3	B	13.8	B	1965	41	368					
			EBR	222	213	-9	-4%	9.0	A						260	7	182					
			WBT	2371	2379	8	0%	14.9	B						855	181	882					
			WBR	42	40	-2	-5%	10.0	A						855	0	43					
			NBL	208	200	-8	-4%	25.6	C						185	50	296					
			NBT	32	33	1	3%	24.5	C	185	50	296										
			NBR	21	20	-1	-5%	19.2	B	185	48	299										
			SBL	14	13	-1	-7%	30.4	C	50	7	117										
			SBT	20	19	-1	-5%	20.2	C	50	7	117										
			SBR	35	33	-2	-6%	7.5	A	50	7	118										

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	VISSIM Throughput (vph)	Δ	Δ %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)
1	Duke St and N Quaker Ln	Signalized	EBL	279	289	9	3%	30.6	C	1614	15.7	B	19.2	B	200	72	368
			EBT	1319	1326	7	1%	12.4	B						360	72	368
			WBT	920	853	-67	-7%	16.5	B	1829	10.5	B			330	59	441
			WBR	1065	975	-90	-8%	5.2	A						300	20	416
			SBL	573	570	-3	-1%	53.0	D	687	50.6	D			1290	139	482
2	Duke St and S Quaker Ln	Signalized	SBR	116	117	1	1%	38.6	D						1270	53	413
			EBL	0	0	0	N/A	0.0	A						200	61	437
			EBT	1769	1777	8	0%	7.2	A	1896	6.9	A	330	61	437		
			EBR	123	120	-4	-3%	3.0	A				300	69	466		
			WBL	25	26	1	4%	21.8	C				80	21	348		
		Signalized	WBT	1930	1775	-155	-8%	4.3	A	1801	4.5	A	210	21	348		
			WBR	0	0	0	N/A	0.0	A				210	22	363		
			NBL	55	53	-2	-4%	48.9	D	69	44.2	D	335	19	137		
			NBT	0	0	0	N/A	0.0	A				335	19	137		
			NBR	15	16	1	7%	28.2	C				335	15	139		
			SBL	2	2	0	0%	38.4	D				40	0	21		
			SBT	0	0	0	N/A	0.0	A	2	38.4	D	40	0	21		
			SBR	0	0	0	N/A	0.0	A				40	0	24		
			Signalized	EBL	42	43	1	2%	41.2	D				105	14	321	
				EBT	1737	1746	9	1%	2.6	A	1795	3.5	A	210	14	321	
EBR	6	6		0	0%	1.3	A				210	15	354				
WBL	0	0		0	N/A	0.0	A				315	69	652				
WBT	1906	1756		-150	-8%	6.4	A	1788	6.5	A	520	69	652				
3	Duke St and Alexandria Commons	Signalized	WBR	36	32	-4	-11%	11.8	B						520	31	647
			NBL	3	3	0	0%	43.4	D				50	1	23		
			NBT	0	0	0	N/A	0.0	A	3	43.4	D	50	1	23		
			NBR	0	0	0	N/A	0.0	A				50	1	22		
			SBL	18	19	1	6%	57.7	E	61	30.6	C	215	9	141		
		Signalized	SBT	0	0	0	N/A	0.0	A				215	9	141		
			SBR	46	42	-4	-9%	18.3	B				215	12	152		
			EBL	54	55	1	2%	30.5	C				190	50	576		
			EBT	1699	1710	11	1%	8.3	A	1767	9.0	A	520	51	576		
			EBR	2	2	0	0%	9.9	A				520	53	585		
			WBL	23	24	1	4%	29.0	C				70	32	713		
			WBT	1849	1701	-148	-8%	4.7	A	1839	5.0	A	225	33	729		
			WBR	127	115	-12	-9%	5.7	A				225	33	729		
			NBL	12	12	0	0%	46.8	D				230	7	85		
			NBT	5	5	0	0%	52.5	D	49	28.8	C	230	7	85		
Signalized	NBR	32	32	-1	-3%	17.8	B				230	10	95				
	SBL	85	86	1	1%	52.3	D				110	26	150				
	SBT	1	1	0	0%	35.9	D	165	33.3	C	110	26	150				
	SBR	81	78	-3	-4%	12.4	B				110	26	150				
	EBL																

Intersection MOE - 2036 No Build PM Peak

Node	Intersection	Movement	Peak Hour Demand (vph)	VISSIM Throughput (vph)	Δ	Δ %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)
1	Duke St and N Quaker Ln	EBL	178	149	-29	-16%	54.1	D	973	92.5	F	54.8	D	200	1995	3005
		EBT	1040	824	-216	-21%	99.4	F						360	1995	3005
		WBT	1250	1258	8	1%	21.6	C						330	129	452
		WBR	735	725	-10	-1%	7.4	A						300	24	416
		SBL	562	525	-37	-7%	120.6	F						1290	556	1164
2	Duke St and S Quaker Ln	SBR	118	110	-8	-7%	100.0	F	635	117.0	F	27.4	C	1270	475	1148
		EBL	7	5	-2	-27%	54.3	D						200	246	450
		EBT	1215	1022	-193	-16%	56.9	E						330	246	450
		EBR	379	319	-60	-16%	9.2	A						300	270	479
		WBL	27	28	1	4%	21.6	C						80	95	366
		WBT	1876	1874	-2	0%	12.2	B						210	95	366
		WBR	7	6	-1	-14%	7.5	A						210	101	380
		NBL	108	105	-2	-2%	63.1	E						335	48	241
		NBT	0	0	0	N/A	0.0	A						335	48	241
		NBR	20	20	0	0%	60.2	E						335	46	243
		SBL	1	1	0	0%	36.3	D						40	0	23
		SBT	0	0	0	N/A	0.0	A						40	0	23
		SBR	1	1	0	0%	14.4	B						40	0	27
		3	Duke St and Alexandria Commons	EBL	65	54	-11	-17%						54.8	D	1046
EBT	1161			985	-176	-15%	46.8	D	210	169	328					
EBR	10			8	-3	-29%	35.2	D	210	196	361					
WBL	7			6	-1	-14%	16.7	B	315	160	651					
WBT	1797			1798	1	0%	18.2	B	520	160	651					
WBR	36			36	0	0%	19.1	B	520	138	703					
NBL	17			17	0	0%	61.0	E	50	5	64					
NBT	2			1	-1	-48%	32.7	C	50	5	64					
NBR	4			4	0	0%	35.7	D	50	5	63					
SBL	51			52	1	2%	69.5	E	215	52	181					
SBT	2			2	0	0%	58.0	E	215	52	181					
SBR	97			94	-4	-4%	59.2	E	215	59	192					
EBL	30			25	-5	-16%	54.7	D	190	497	696					
4	Duke St and Sweeley St			EBT	1183	1014	-169	-14%	85.7	F	1042	84.9	F	38.7	D	
		EBR	3	2	-1	-32%	86.4	F	520	507						706
		WBL	28	30	2	7%	21.2	C	70	90						774
		WBT	1742	1741	0	0%	11.9	B	225	90						774
		WBR	113	112	-1	-1%	12.1	B	225	96						790
		NBL	20	19	-1	-5%	56.4	E	230	28						201
		NBT	6	5	-1	-16%	58.5	E	230	28						201
		NBR	87	87	0	0%	52.1	D	230	36						212
		SBL	103	103	0	0%	56.5	E	110	34						158
		SBT	8	8	-1	-12%	57.3	E	110	34						158
		SBR	78	78	-1	-1%	16.3	B	110	34						158
		EBL	9	6	-3	-32%	83.6	F	115	855						837
		EBT	1358	1194	-164	-12%	63.4	E	350	855						837
		EBR	5	3	-2	-38%	101.5	F	350	663						845
5	Duke St at Roth St	WBL	64	66	2	3%	52.3	D	2093	23.8	C	39.0	D	230	359	774
		WBT	1837	1843	6	0%	23.0	C						670	359	774
		WBR	183	183	0	0%	22.1	C						670	359	774
		NBL	3	3	-1	-32%	64.7	E						150	145	200
		NBT	12	8	-3	-26%	90.0	F						150	145	200
		NBR	360	259	-101	-28%	69.4	E						150	147	202
		SBL	289	256	-33	-11%	18.9	B						40	61	117
		SBT	5	6	1	19%	26.7	C						40	61	117
		SBR	43	38	-5	-12%	11.1	B						40	78	141
		EBT	45	34	-11	-24%	43.8	E						289	44.3	332
		EBR	288	254	-33	-11%	44.3	E						1330	66	331
		WBL	49	46	-3	-6%	75.1	F						825	14	101
		WBT	0	0	0	N/A	0.0	A						825	17	115
		51(5a)	Cambridge Rd and Service Rd	NBL	198	168	-30	-15%						1.3	A	199
NBR	38			31	-7	-19%	0.2	A	40	2	78					
EBT	1998			1746	-252	-13%	62.8	E	675	679	811					
EBR	8			6	-3	-36%	107.9	F	675	686	819					
WBL	30			32	1	3%	43.1	D	215	73	693					
6	Duke St and Witter Dr	WBT	2058	2073	15	1%	11.6	B	2105	12.1	B	35.7	D	700	73	693
		NBL	25	26	1	4%	75.3	E						170	20	170
		NBR	74	73	-1	-1%	46.9	D						170	29	190
		EBL	27	22	-5	-18%	65.7	E						165	7	67
		EBT (Continue on Duke St)	734	648	-86	-12%	13.8	B						710	102	791
7	Duke St and W Taylor Run Pkwy	EBT (To Telegraph Rd)	1311	1141	-169	-13%	33.4	C	1811	26.8	C	25.5	C	710	502	798
		WBT	2069	2085	16	1%	23.7	C						1955	228	908
		WBR	245	236	-9	-4%	54.9	D						110	137	883
		SBL (To Duke St)	59	55	-4	-7%	12.0	B						140	61	139
		SBL (To Telegraph Rd)	362	339	-23	-6%	10.9	B						140	61	139
		SBR	20	18	-2	-10%	26.3	C						140	72	156
		EBL	8	9	1	12%	112.9	F						70	65	234
71(7a)	W Taylor Run Pkwy and Service Rd	EBT	5	7	1	19%	118.8	F	81	136.7	F	114.4	F	70	65	234
		EBR	69	65	-4	-6%	141.8	F						70	65	234
		WBL	89	68	-21	-24%	664.1	F						320	772	940
		WBT	12	9	-3	-26%	637.2	F						320	772	940
		WBR	2	2	0	0%	640.8	F	79	660.6	F			320	772	940
		NBL	37	33	-4	-11%	8.8	A						320	772	940
		NBT	219	209	-9	-4%	1.6	A						40	7	132
		NBR	17	16	-1	-6%	1.1	A						40	8	148
		SBL	0	0	0	N/A	0.0	A	258	2.5	A			650	126	595
		SBT	282	277	-5	-2%	56.3	E						650	126	595
		SBR	1	1	0	0%	22.9	C						180	125	594
		EBT	1493	1412	-81	-5%	10.4	B						1627	10.3	B
		EBR	228	215	-13	-6%	9.8	A	2400	27	406					
		WBT	2431	2456	25	1%	15.2	B	225	1	194					
WBR	43	42	-1	-2%	10.8	B	1965	41	361							
10	Duke St and S Dove St/Roberts Ln	NBL	213	199	-14	-7%	25.1	C	2498	15.1	B	13.9	B	260	9	221
		NBT	32	34	1	3%	27.3	C						855	190	927
		NBR	22	20	-2	-9%	17.0	B						855	0	51
		SBL	15	14	-1	-7%	29.8	C						185	53	335
		SBT	21	20	-1	-5%	17.2	B						185	53	335
		SBR	36	35	-1	-3%	6.5	A						185	51	338
		EBT	1493	1412	-81	-5%	10.4	B						50	7	124
		EBR	228	215	-13	-6%	9.8	A						50	7	124
		WBT	2431	2456	25	1%	15.2	B						50	7	124
		WBR	43	42	-1	-2%	10.8	B						50	7	123



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix N: TDM Growth Rate Calculations No-Build and Build Conditions

TDM Volumes

Segment_ID	GrowthRatebySegment	Direction	AM Peak Period Volume		PM Peak Period Volume		Average Weekday Traffic (AWDT)	
			2018	2045	2018	2045	2018	2045
E1	Van Dorn and N Pickett	EB	3,052	3,192	4,423	5,294	16,710	17,939
E2	N Pickett and Jordan	EB	4,406	4,522	3,709	4,938	15,872	17,137
E3	Jordan and N Quaker	EB	3,873	3,561	3,897	4,309	16,197	15,190
E4	N Quaker and Telegraph	EB	3,966	4,333	6,227	6,811	22,996	22,507
E5	Telegraph and Diagnoal	EB	3,546	2,795	3,949	4,005	16,066	14,600
W1	Telegraph and Diagnoal	WB	2,155	2,334	5,301	4,075	16,523	14,495
W2	N Quaker and Telegraph	WB	3,603	3,916	6,837	6,283	23,206	20,867
W3	Jordan and N Quaker	WB	1,970	2,448	5,656	5,370	16,223	15,498
W4	N Pickett and Jordan	WB	2,005	2,866	6,158	6,785	16,415	17,986
W5	Van Dorn and N Pickett	WB	2,574	3,538	4,593	5,501	16,384	19,083

Updated 2045 No Build with West Taylor Run restrictions

2018 Volume Percentage Distrubution

		AM	PM	Daily
E4	N Quaker e EB	0.29886	0.279045	0.291856
E5	Telegraph i EB	0.267236	0.176975	0.203903
W1	Telegraph i WB	0.162404	0.237563	0.209713
W2	N Quaker e WB	0.271501	0.306417	0.294528

Compound Average Growth Rate

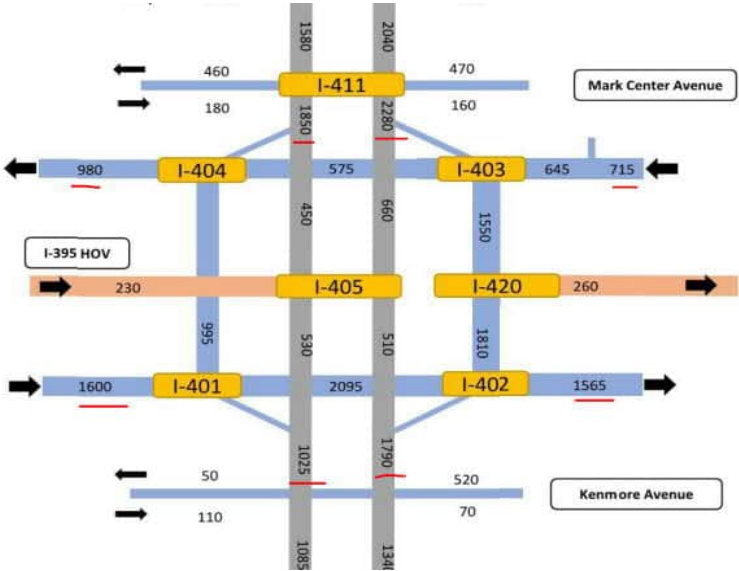
Segment_ID	GrowthRatebySegment	Direction	AM Peak Period (6-9 AM)	PM Peak Period (3-7 PM)	Daily
			2045	2045	2045
E1	Van Dorn and N Pickett	EB	0.2%	0.7%	0.3%
E2	N Pickett and Jordan	EB	0.1%	1.1%	0.3%
E3	Jordan and N Quaker	EB	-0.3%	0.4%	-0.2%
E4	N Quaker and Telegraph	EB	0.3%	0.3%	-0.1%
E5	Telegraph and Diagnoal	EB	-0.9%	0.1%	-0.4%
W1	Telegraph and Diagnoal	WB	0.3%	-1.0%	-0.5%
W2	N Quaker and Telegraph	WB	0.3%	-0.3%	-0.4%
W3	Jordan and N Quaker	WB	0.8%	-0.2%	-0.2%
W4	N Pickett and Jordan	WB	1.3%	0.4%	0.3%
W5	Van Dorn and N Pickett	WB	1.2%	0.7%	0.6%

	AM Peak Period (6-9 AM)	PM Peak Period (3-7 PM)	Daily
Overall segment	2045	2045	2045
Van Dorn and N Pickett	0.7%	0.7%	0.4%
N Pickett and Jordan	0.7%	0.7%	0.3%
Jordan and N Quaker	0.2%	0.1%	-0.2%
N Quaker and Diagnoal	0.0%	-0.2%	-0.3%

<- Weighted Average

Seminary Ramp at I-395 HOV Study (2019) https://www.virginiadot.org/projects/resources/NorthernVirginia/I-395_Seminary_Road_HOV_Ramp_Interchange_Modification_Report_-_Oct_2019.pdf

	2018 NB		2020 NB		2040 NB	
	AM	2018 NB PM	AM	2020 NB PM	AM	2040 NB PM
Peak Hour Volumes	11299	10427	10950	9983	11605	10700
Growth Rate	AM Peak		PM Peak			
	2020	2040	2020	2040		
	-1.6%	0.1%	-2.2%	-0.2%		





Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix O: Synchro Screening Results (2036 Build Alternative 1)

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

10/31/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	30	928	961	2296	318	36	
Future Volume (vph)	30	928	961	2296	318	36	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	13.0	58.0	58.0	45.0	29.0	29.0	33.0
Total Split (%)	10.8%	48.3%	48.3%	37.5%	24.2%	24.2%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	8.4	80.4	80.4	70.0	25.0	25.0	
Actuated g/C Ratio	0.07	0.67	0.67	0.58	0.21	0.21	
v/c Ratio	0.30	0.52	0.97	0.93	1.04	0.10	
Control Delay	58.9	16.5	40.7	31.0	76.2	0.9	
Queue Delay	0.0	0.0	0.0	1.2	20.6	2.4	
Total Delay	58.9	16.5	40.7	32.2	96.8	3.2	
LOS	E	B	D	C	F	A	
Approach Delay		29.3		32.2			
Approach LOS		C		C			

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 86 (72%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 35.4

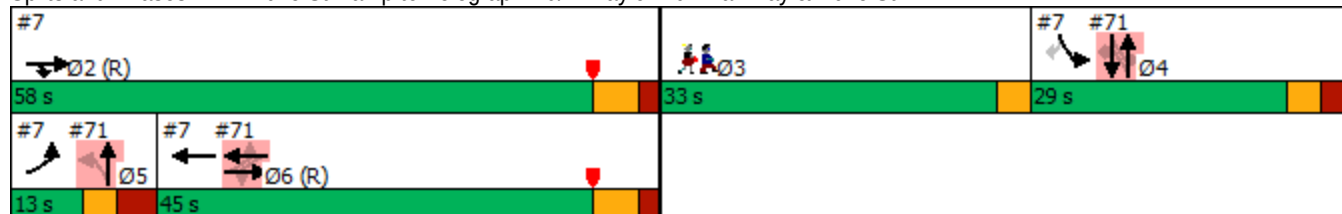
Intersection LOS: D

Intersection Capacity Utilization 71.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

10/31/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	35	1095	1134	2565	384	43
v/c Ratio	0.30	0.52	0.97	0.93	1.04	0.10
Control Delay	58.9	16.5	40.7	31.0	76.2	0.9
Queue Delay	0.0	0.0	0.0	1.2	20.6	2.4
Total Delay	58.9	16.5	40.7	32.2	96.8	3.2
Queue Length 50th (ft)	27	203	677	612	~97	1
Queue Length 95th (ft)	m47	433	#1422	#1144	m#412	m0
Internal Link Dist (ft)		321		722		
Turn Bay Length (ft)	180					
Base Capacity (vph)	116	2122	1167	2750	368	413
Starvation Cap Reductn	0	0	0	0	26	293
Spillback Cap Reductn	0	0	0	69	0	7
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.52	0.97	0.96	1.12	0.36

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

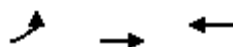
10/31/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	928	961	0	2296	0	0	0	0	318	0	36
Future Volume (vph)	30	928	961	0	2296	0	0	0	0	318	0	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1641	3167	1743		4715					1770		1553
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1641	3167	1743		4715					1770		1553
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	1.00	1.00	1.00	0.87	0.87	0.87
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	35	1095	1134	0	2565	0	0	0	0	384	0	43
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	34
Lane Group Flow (vph)	35	1095	1134	0	2565	0	0	0	0	384	0	9
Confl. Peds. (#/hr)										3		5
Heavy Vehicles (%)	10%	14%	9%	2%	10%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	5.2	76.0	76.0		64.3					23.0		23.0
Effective Green, g (s)	7.2	78.0	78.0		66.3					25.0		25.0
Actuated g/C Ratio	0.06	0.65	0.65		0.55					0.21		0.21
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	98	2058	1132		2605					368		323
v/s Ratio Prot	0.02	0.35	c0.65		0.54					c0.22		
v/s Ratio Perm												0.01
v/c Ratio	0.36	0.53	1.00		0.98					1.04		0.03
Uniform Delay, d1	54.2	11.2	21.0		26.4					47.5		37.8
Progression Factor	0.99	1.24	1.15		0.97					0.44		1.00
Incremental Delay, d2	1.9	0.8	25.0		14.4					51.9		0.0
Delay (s)	55.6	14.7	49.2		39.9					72.6		37.8
Level of Service	E	B	D		D					E		D
Approach Delay (s)		32.6			39.9			0.0			69.1	
Approach LOS		C			D			A			E	
Intersection Summary												
HCM 2000 Control Delay			39.1		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					15.5		
Intersection Capacity Utilization			71.7%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

8: Duke Street eastbound and Telegraph Road on-ramp

10/31/2022



Lane Group	EBL	EBT	WBT
Lane Configurations			
Traffic Volume (vph)	288	958	863
Future Volume (vph)	288	958	863
Turn Type	Prot	NA	NA
Protected Phases	5	Free	6
Permitted Phases			
Detector Phase	5		6
Switch Phase			
Minimum Initial (s)	4.0		4.0
Minimum Split (s)	8.0		23.0
Total Split (s)	53.0		67.0
Total Split (%)	44.2%		55.8%
Yellow Time (s)	3.5		4.0
All-Red Time (s)	0.5		2.0
Lost Time Adjust (s)	-2.0		-2.0
Total Lost Time (s)	2.0		4.0
Lead/Lag	Lead		Lag
Lead-Lag Optimize?			
Recall Mode	None		C-Max
Act Effect Green (s)	28.4	120.0	85.6
Actuated g/C Ratio	0.24	1.00	0.71
v/c Ratio	0.72	0.28	0.36
Control Delay	49.8	0.2	14.7
Queue Delay	0.0	0.0	0.0
Total Delay	49.8	0.2	14.7
LOS	D	A	B
Approach Delay		11.6	14.7
Approach LOS		B	B

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2: and 6:WBT, Start of Green

Natural Cycle: 40

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 12.9

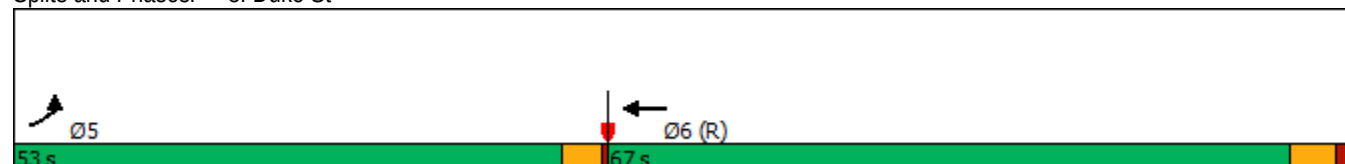
Intersection LOS: B

Intersection Capacity Utilization 142.3%

ICU Level of Service H

Analysis Period (min) 15

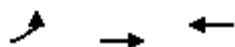
Splits and Phases: 8: Duke St



Queues

8: Duke Street eastbound and Telegraph Road on-ramp

10/31/2022



Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	302	1006	906
v/c Ratio	0.72	0.28	0.36
Control Delay	49.8	0.2	14.7
Queue Delay	0.0	0.0	0.0
Total Delay	49.8	0.2	14.7
Queue Length 50th (ft)	246	0	227
Queue Length 95th (ft)	m190	m0	m313
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	752	3539	2524
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.40	0.28	0.36

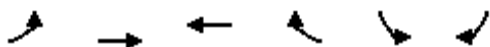
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

8: Duke Street eastbound and Telegraph Road on-ramp

10/31/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	288	958	863	0	0	0
Future Volume (vph)	288	958	863	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	302	1006	906	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	302	1006	906	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	5	Free	6			
Permitted Phases						
Actuated Green, G (s)	26.4	120.0	83.6			
Effective Green, g (s)	28.4	120.0	85.6			
Actuated g/C Ratio	0.24	1.00	0.71			
Clearance Time (s)	4.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	418	3539	2524			
v/s Ratio Prot	c0.17	0.28	c0.26			
v/s Ratio Perm						
v/c Ratio	0.72	0.28	0.36			
Uniform Delay, d1	42.2	0.0	6.6			
Progression Factor	1.01	1.00	1.95			
Incremental Delay, d2	4.6	0.2	0.3			
Delay (s)	47.4	0.2	13.3			
Level of Service	D	A	B			
Approach Delay (s)		11.1	13.3		0.0	
Approach LOS		B	B		A	
Intersection Summary						
HCM 2000 Control Delay			12.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.45			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	6.0
Intersection Capacity Utilization			142.3%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

10/31/2022



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑↑↑	↑↑↑		↑↓		↑↓
Traffic Volume (vph)	2150	1066	284	28	16	13
Future Volume (vph)	2150	1066	284	28	16	13
Turn Type	NA	NA	Perm	NA	Perm	NA
Protected Phases	2	6		8		4
Permitted Phases			8		4	
Detector Phase	2	6	8	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.0	28.0	40.0	40.0	13.0	13.0
Total Split (s)	68.0	68.0	52.0	52.0	52.0	52.0
Total Split (%)	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.0	4.0		4.0		4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	66.1	66.1		45.9		45.9
Actuated g/C Ratio	0.55	0.55		0.38		0.38
v/c Ratio	0.90	0.45		0.93		0.16
Control Delay	30.5	17.2		62.4		13.6
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	30.5	17.2		62.4		13.6
LOS	C	B		E		B
Approach Delay	30.5	17.2		62.4		13.6
Approach LOS	C	B		E		B

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 29.6

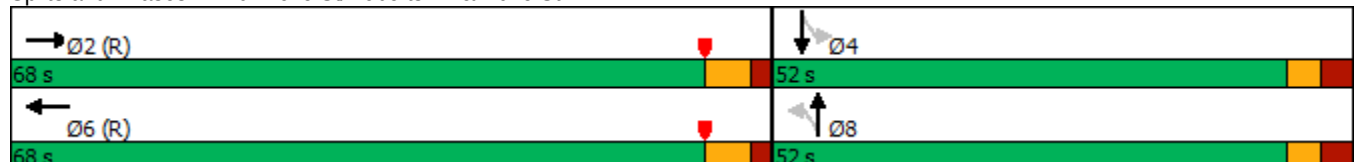
Intersection LOS: C

Intersection Capacity Utilization 76.4%

ICU Level of Service D

Analysis Period (min) 15

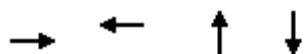
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

10/31/2022



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	2508	1217	446	97
v/c Ratio	0.90	0.45	0.93	0.16
Control Delay	30.5	17.2	62.4	13.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	30.5	17.2	62.4	13.6
Queue Length 50th (ft)	647	205	317	24
Queue Length 95th (ft)	663	244	359	48
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	2772	2692	502	619
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.90	0.45	0.89	0.16
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

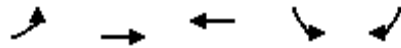
10/31/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2150	0	0	1066	0	284	28	11	16	13	42
Future Volume (vph)	0	2150	0	0	1066	0	284	28	11	16	13	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			1.00			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5036			4891			1756			1666	
Flt Permitted		1.00			1.00			0.68			0.88	
Satd. Flow (perm)		5036			4891			1255			1479	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.76	0.76	0.76	0.77	0.77	0.77
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	0	2508	0	0	1217	0	392	39	15	22	18	57
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	28	0
Lane Group Flow (vph)	0	2508	0	0	1217	0	0	445	0	0	69	0
Confl. Peds. (#/hr)	18		3	3		18			8	8		
Heavy Vehicles (%)	2%	3%	2%	2%	5%	2%	3%	2%	9%	2%	2%	5%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		64.1			64.1			43.9			43.9	
Effective Green, g (s)		66.1			66.1			45.9			45.9	
Actuated g/C Ratio		0.55			0.55			0.38			0.38	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			0.2			3.0			3.0	
Lane Grp Cap (vph)		2773			2694			480			565	
v/s Ratio Prot		c0.50			0.25							
v/s Ratio Perm								c0.35			0.05	
v/c Ratio		0.90			0.45			0.93			0.12	
Uniform Delay, d1		24.1			16.1			35.5			24.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		5.4			0.5			24.1			0.1	
Delay (s)		29.5			16.7			59.6			24.1	
Level of Service		C			B			E			C	
Approach Delay (s)		29.5			16.7			59.6			24.1	
Approach LOS		C			B			E			C	
Intersection Summary												
HCM 2000 Control Delay			28.9			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			76.4%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

11: Duke St & Callahan Dr

10/31/2022



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	429	1748	715	131	383
Future Volume (vph)	429	1748	715	131	383
Turn Type	Prot	NA	NA	Prot	pt+ov
Protected Phases	3	1 3	1	2	2 3
Permitted Phases					
Detector Phase	3	1 3	1	2	2 3
Switch Phase					
Minimum Initial (s)	8.0		10.0	8.0	
Minimum Split (s)	14.3		43.5	14.8	
Total Split (s)	57.0		47.0	26.0	
Total Split (%)	43.8%		36.2%	20.0%	
Yellow Time (s)	3.5		4.0	3.0	
All-Red Time (s)	2.8		2.5	3.8	
Lost Time Adjust (s)	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.3		4.5	4.8	
Lead/Lag			Lead	Lag	
Lead-Lag Optimize?					
Recall Mode	None		C-Max	None	
Act Effect Green (s)	52.7	102.7	45.7	18.0	75.0
Actuated g/C Ratio	0.41	0.79	0.35	0.14	0.58
v/c Ratio	0.70	0.50	0.63	0.66	0.29
Control Delay	38.4	5.5	20.5	66.5	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.4	5.5	20.5	66.5	13.2
LOS	D	A	C	E	B
Approach Delay		12.0	20.5	26.8	
Approach LOS		B	C	C	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 64 (49%), Referenced to phase 1:EBWB, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 16.4
Intersection Capacity Utilization 74.7%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 11: Duke St & Callahan Dr



Queues

11: Duke St & Callahan Dr

10/31/2022

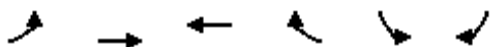


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	484	1974	1042	160	468
v/c Ratio	0.70	0.50	0.63	0.66	0.29
Control Delay	38.4	5.5	20.5	66.5	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.4	5.5	20.5	66.5	13.2
Queue Length 50th (ft)	334	179	239	129	100
Queue Length 95th (ft)	465	230	280	190	119
Internal Link Dist (ft)		565	511	483	
Turn Bay Length (ft)	315			175	
Base Capacity (vph)	696	3939	1647	284	1585
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	267	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.70	0.54	0.63	0.56	0.30
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

11: Duke St & Callahan Dr

10/31/2022

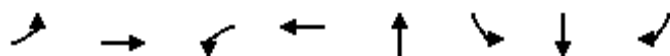


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	429	1748	715	148	131	383
Future Volume (vph)	429	1748	715	148	131	383
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		2%	2%		1%	
Total Lost time (s)	4.3	4.5	4.5		4.8	4.8
Lane Util. Factor	1.00	0.91	0.91		1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frft	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1718	4986	4620		1744	2773
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1718	4986	4620		1744	2773
Peak-hour factor, PHF	0.93	0.93	0.87	0.87	0.86	0.86
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	484	1974	863	179	160	468
RTOR Reduction (vph)	0	0	23	0	0	13
Lane Group Flow (vph)	484	1974	1019	0	160	455
Confl. Peds. (#/hr)	64			64		
Heavy Vehicles (%)	4%	3%	5%	10%	3%	2%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	3	1 3	1		2	2 3
Permitted Phases						
Actuated Green, G (s)	50.7	100.7	43.7		16.0	73.5
Effective Green, g (s)	52.7	98.4	45.7		18.0	75.5
Actuated g/C Ratio	0.41	0.76	0.35		0.14	0.58
Clearance Time (s)	6.3		6.5		6.8	
Vehicle Extension (s)	4.0		2.0		2.0	
Lane Grp Cap (vph)	696	3774	1624		241	1610
v/s Ratio Prot	c0.28	0.40	c0.22		c0.09	0.16
v/s Ratio Perm						
v/c Ratio	0.70	0.52	0.63		0.66	0.28
Uniform Delay, d1	32.0	6.4	35.1		53.1	13.7
Progression Factor	1.00	1.00	0.55		1.00	1.00
Incremental Delay, d2	3.3	0.2	1.6		5.2	0.0
Delay (s)	35.3	6.5	20.7		58.4	13.7
Level of Service	D	A	C		E	B
Approach Delay (s)		12.2	20.7		25.1	
Approach LOS		B	C		C	
Intersection Summary						
HCM 2000 Control Delay			16.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.66			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	13.6
Intersection Capacity Utilization			74.7%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Timings

71: W Taylor Run Pkwy and Service Rd

10/31/2022



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations											
Traffic Volume (vph)	19	8	56	6	30	1	275	6			
Future Volume (vph)	19	8	56	6	30	1	275	6			
Turn Type	Perm	NA	Perm	NA	NA	Perm	NA	Perm			
Protected Phases		6		6	4 5		4		2	3	5
Permitted Phases	6		6			4		4			
Detector Phase	6	6	6	6	4 5	4	4	4			
Switch Phase											
Minimum Initial (s)	7.0	7.0	7.0	7.0		7.0	7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0		13.0	13.0	13.0	14.0	33.0	12.5
Total Split (s)	45.0	45.0	45.0	45.0		29.0	29.0	29.0	58.0	33.0	13.0
Total Split (%)	37.5%	37.5%	37.5%	37.5%		24.2%	24.2%	24.2%	48%	28%	11%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0		3.0	3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0			-2.0	-2.0			
Total Lost Time (s)		4.0		4.0			4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag		Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max		None	None	None	C-Max	None	None
Act Effect Green (s)		70.0		70.0	37.9		25.0	25.0			
Actuated g/C Ratio		0.58		0.58	0.32		0.21	0.21			
v/c Ratio		0.07		0.10	0.06		0.86	0.02			
Control Delay		10.9		16.4	1.9		67.6	0.0			
Queue Delay		0.1		0.1	2.5		0.6	0.0			
Total Delay		10.9		16.5	4.4		68.1	0.0			
LOS		B		B	A		E	A			
Approach Delay		10.9		16.5	4.4		66.7				
Approach LOS		B		B	A		E				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 86 (72%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 47.5

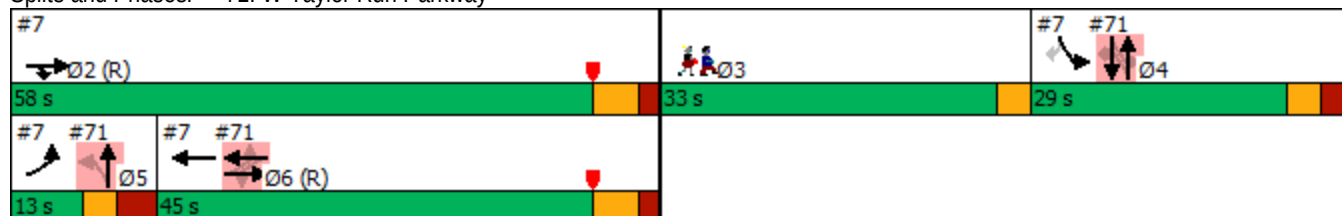
Intersection LOS: D

Intersection Capacity Utilization 30.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Pkwy and Service Rd

10/31/2022



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	68	83	34	333	7
v/c Ratio	0.07	0.10	0.06	0.86	0.02
Control Delay	10.9	16.4	1.9	67.6	0.0
Queue Delay	0.1	0.1	2.5	0.6	0.0
Total Delay	10.9	16.5	4.4	68.1	0.0
Queue Length 50th (ft)	11	25	0	251	0
Queue Length 95th (ft)	43	72	3	#384	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	925	807	589	388	411
Starvation Cap Reductn	0	0	485	0	0
Spillback Cap Reductn	309	272	0	4	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.11	0.16	0.33	0.87	0.02

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Pkwy and Service Rd

10/31/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	8	23	56	6	0	0	30	0	1	275	6
Future Volume (vph)	19	8	23	56	6	0	0	30	0	1	275	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			1.00			1.00			1.00	0.98
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.94			1.00			1.00			1.00	0.85
Flt Protected		0.98			0.96			1.00			1.00	1.00
Satd. Flow (prot)		1710			1782			1863			1862	1544
Flt Permitted		0.90			0.74			1.00			1.00	1.00
Satd. Flow (perm)		1569			1384			1863			1862	1544
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.87
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	26	11	31	75	8	0	0	34	0	1	332	7
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	54	0	0	83	0	0	34	0	0	333	1
Confl. Peds. (#/hr)	10					10	2		1	1		2
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		64.3			64.3			34.2			23.0	23.0
Effective Green, g (s)		66.3			66.3			36.2			25.0	25.0
Actuated g/C Ratio		0.55			0.55			0.30			0.21	0.21
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		866			764			562			387	321
v/s Ratio Prot								c0.02				
v/s Ratio Perm		0.03			c0.06						0.18	0.00
v/c Ratio		0.06			0.11			0.06			0.86	0.00
Uniform Delay, d1		12.4			12.8			29.8			45.8	37.6
Progression Factor		1.00			1.00			0.06			1.00	1.00
Incremental Delay, d2		0.1			0.3			0.0			17.4	0.0
Delay (s)		12.6			13.1			1.8			63.2	37.6
Level of Service		B			B			A			E	D
Approach Delay (s)		12.6			13.1			1.8			62.7	
Approach LOS		B			B			A			E	
Intersection Summary												
HCM 2000 Control Delay		44.4			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.28										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			15.5				
Intersection Capacity Utilization		30.2%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

130: Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

10/31/2022

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	529	0	0	288	0
Future Volume (Veh/h)	0	529	0	0	288	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	555	0	0	302	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				278	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				278	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				56	100
cM capacity (veh/h)	1622				689	1084
Direction, Lane #	NB 1	NB 2	NE 1			
Volume Total	278	278	302			
Volume Left	0	0	302			
Volume Right	0	0	0			
cSH	1700	1700	689			
Volume to Capacity	0.16	0.16	0.44			
Queue Length 95th (ft)	0	0	56			
Control Delay (s)	0.0	0.0	14.2			
Lane LOS			B			
Approach Delay (s)	0.0		14.2			
Approach LOS			B			
Intersection Summary						
Average Delay		5.0				
Intersection Capacity Utilization		38.8%	ICU Level of Service	A		
Analysis Period (min)		15				

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/07/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	26	702	1253	1978	402	19	
Future Volume (vph)	26	702	1253	1978	402	19	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	15.0	58.0	58.0	43.0	29.0	29.0	33.0
Total Split (%)	12.5%	48.3%	48.3%	35.8%	24.2%	24.2%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.4	80.4	80.4	69.0	25.0	25.0	
Actuated g/C Ratio	0.08	0.67	0.67	0.58	0.21	0.21	
v/c Ratio	0.23	0.33	1.10	0.80	1.24	0.05	
Control Delay	69.5	4.7	74.3	32.3	152.8	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.2	1.4	
Total Delay	69.5	4.7	74.3	32.3	153.1	1.6	
LOS	E	A	E	C	F	A	
Approach Delay		49.6		32.3			
Approach LOS		D		C			

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 50.8

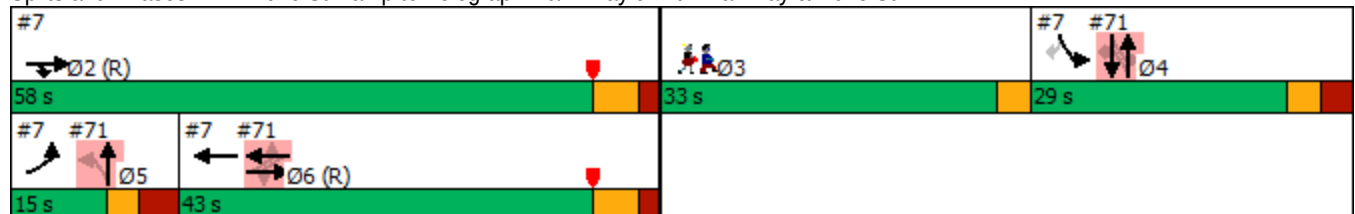
Intersection LOS: D

Intersection Capacity Utilization 84.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/07/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	28	745	1329	2258	444	21
v/c Ratio	0.23	0.33	1.10	0.80	1.24	0.05
Control Delay	69.5	4.7	74.3	32.3	152.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.2	1.4
Total Delay	69.5	4.7	74.3	32.3	153.1	1.6
Queue Length 50th (ft)	23	35	~625	552	~429	0
Queue Length 95th (ft)	m35	170	#1784	#973	#607	m0
Internal Link Dist (ft)		321		722		
Turn Bay Length (ft)	180					
Base Capacity (vph)	137	2260	1212	2814	358	420
Starvation Cap Reductn	0	0	0	0	8	322
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.33	1.10	0.80	1.27	0.21

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

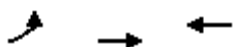
11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	702	1253	0	1978	0	0	0	0	402	0	19
Future Volume (vph)	26	702	1253	0	1978	0	0	0	0	402	0	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1570	3374	1810		4893					1719		1583
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1570	3374	1810		4893					1719		1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	28	745	1329	0	2258	0	0	0	0	444	0	21
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	17
Lane Group Flow (vph)	28	745	1329	0	2258	0	0	0	0	444	0	4
Confl. Peds. (#/hr)									7	7		
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	6.2	76.0	76.0		63.3					23.0		23.0
Effective Green, g (s)	8.2	78.0	78.0		65.3					25.0		25.0
Actuated g/C Ratio	0.07	0.65	0.65		0.54					0.21		0.21
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	107	2193	1176		2662					358		329
v/s Ratio Prot	0.02	0.22	c0.73		0.46					c0.26		
v/s Ratio Perm												0.00
v/c Ratio	0.26	0.34	1.13		0.85					1.24		0.01
Uniform Delay, d1	53.0	9.4	21.0		23.2					47.5		37.7
Progression Factor	1.27	0.41	0.88		1.42					0.55		1.00
Incremental Delay, d2	1.1	0.4	68.5		3.6					126.0		0.0
Delay (s)	68.4	4.3	86.9		36.4					151.9		37.7
Level of Service	E	A	F		D					F		D
Approach Delay (s)		57.3			36.4			0.0			146.7	
Approach LOS		E			D			A			F	
Intersection Summary												
HCM 2000 Control Delay			56.1		HCM 2000 Level of Service					E		
HCM 2000 Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					15.5		
Intersection Capacity Utilization			84.8%		ICU Level of Service					E		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022

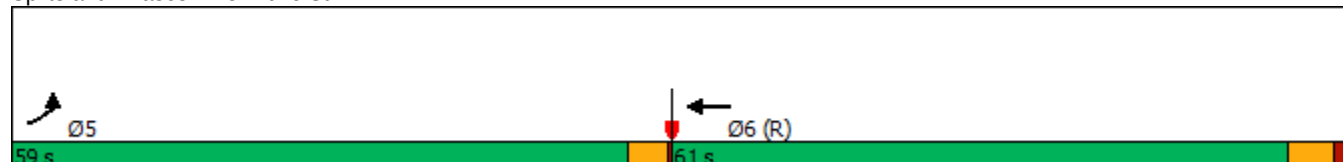


Lane Group	EBL	EBT	WBT
Lane Configurations			
Traffic Volume (vph)	346	758	747
Future Volume (vph)	346	758	747
Turn Type	Prot	NA	NA
Protected Phases	5	Free	6
Permitted Phases			
Detector Phase	5		6
Switch Phase			
Minimum Initial (s)	4.0		4.0
Minimum Split (s)	8.0		22.0
Total Split (s)	59.0		61.0
Total Split (%)	49.2%		50.8%
Yellow Time (s)	3.5		4.0
All-Red Time (s)	0.5		2.0
Lost Time Adjust (s)	-2.0		-2.0
Total Lost Time (s)	2.0		4.0
Lead/Lag	Lead		Lag
Lead-Lag Optimize?			Yes
Recall Mode	None		C-Max
Act Effect Green (s)	33.1	120.0	80.9
Actuated g/C Ratio	0.28	1.00	0.67
v/c Ratio	0.74	0.22	0.33
Control Delay	41.5	0.1	12.8
Queue Delay	0.0	0.0	0.0
Total Delay	41.5	0.1	12.8
LOS	D	A	B
Approach Delay		13.1	12.8
Approach LOS		B	B

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2: and 6:WBT, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 13.0
 Intersection LOS: B
 Intersection Capacity Utilization 123.6%
 ICU Level of Service H
 Analysis Period (min) 15

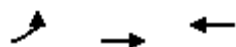
Splits and Phases: 8: Duke St



Queues

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022



Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	363	796	784
v/c Ratio	0.74	0.22	0.33
Control Delay	41.5	0.1	12.8
Queue Delay	0.0	0.0	0.0
Total Delay	41.5	0.1	12.8
Queue Length 50th (ft)	239	0	171
Queue Length 95th (ft)	m173	m0	294
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	840	3539	2384
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.43	0.22	0.33

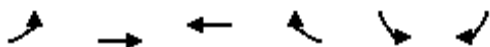
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	346	758	747	0	0	0
Future Volume (vph)	346	758	747	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	363	796	784	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	363	796	784	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	5	Free	6			
Permitted Phases						
Actuated Green, G (s)	31.1	120.0	78.9			
Effective Green, g (s)	33.1	120.0	80.9			
Actuated g/C Ratio	0.28	1.00	0.67			
Clearance Time (s)	4.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	488	3539	2385			
v/s Ratio Prot	c0.21	0.22	c0.22			
v/s Ratio Perm						
v/c Ratio	0.74	0.22	0.33			
Uniform Delay, d1	39.6	0.0	8.2			
Progression Factor	0.88	1.00	1.37			
Incremental Delay, d2	4.5	0.1	0.3			
Delay (s)	39.5	0.1	11.5			
Level of Service	D	A	B			
Approach Delay (s)		12.4	11.5		0.0	
Approach LOS		B	B		A	
Intersection Summary						
HCM 2000 Control Delay		12.1		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.45				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		123.6%		ICU Level of Service		H
Analysis Period (min)		15				
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

11/07/2022

	→	←	↖	↑	↘	↓
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑↑↑↑	↑↑↑↑		↕		↕
Traffic Volume (vph)	1427	2324	204	31	14	20
Future Volume (vph)	1427	2324	204	31	14	20
Turn Type	NA	NA	Perm	NA	Perm	NA
Protected Phases	2	6		8		4
Permitted Phases			8		4	
Detector Phase	2	6	8	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.0	28.0	40.0	40.0	13.0	13.0
Total Split (s)	75.0	75.0	45.0	45.0	45.0	45.0
Total Split (%)	62.5%	62.5%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.0	4.0		4.0		4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	None	None	None	None
Act Efect Green (s)	77.4	77.4		34.6		31.5
Actuated g/C Ratio	0.64	0.64		0.29		0.26
v/c Ratio	0.48	0.78		0.83		0.20
Control Delay	10.3	16.8		57.7		30.5
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	10.3	16.8		57.7		30.5
LOS	B	B		E		C
Approach Delay	10.3	16.8		57.7		30.5
Approach LOS	B	B		E		C
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 3 (3%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow						
Natural Cycle: 90						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.83						
Intersection Signal Delay: 17.7				Intersection LOS: B		
Intersection Capacity Utilization 77.7%				ICU Level of Service D		
Analysis Period (min) 15						

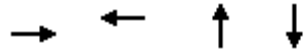
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

11/07/2022



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1577	2516	320	77
v/c Ratio	0.48	0.78	0.83	0.20
Control Delay	10.3	16.8	57.7	30.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.3	16.8	57.7	30.5
Queue Length 50th (ft)	179	400	226	42
Queue Length 95th (ft)	226	495	292	77
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3279	3246	454	504
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.48	0.78	0.70	0.15
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

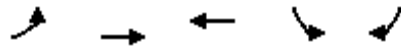
11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1427	0	0	2324	0	204	31	21	14	20	34
Future Volume (vph)	0	1427	0	0	2324	0	204	31	21	14	20	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.99			0.93	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5085			5034			1767			1591	
Flt Permitted		1.00			1.00			0.72			0.92	
Satd. Flow (perm)		5085			5034			1322			1473	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	0	1577	0	0	2516	0	255	39	26	16	23	38
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	1577	0	0	2516	0	0	317	0	0	75	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		75.4			75.4			32.6			32.6	
Effective Green, g (s)		77.4			77.4			34.6			34.6	
Actuated g/C Ratio		0.65			0.65			0.29			0.29	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3279			3246			381			424	
v/s Ratio Prot		0.31			c0.50							
v/s Ratio Perm								c0.24			0.05	
v/c Ratio		0.48			0.78			0.83			0.18	
Uniform Delay, d1		11.0			15.1			40.0			32.0	
Progression Factor		0.83			0.96			1.00			1.00	
Incremental Delay, d2		0.5			1.1			14.4			0.2	
Delay (s)		9.6			15.5			54.3			32.2	
Level of Service		A			B			D			C	
Approach Delay (s)		9.6			15.5			54.3			32.2	
Approach LOS		A			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			16.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			77.7%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

11: Duke St & Callahan Dr

11/07/2022

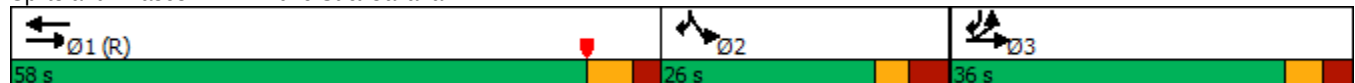


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations	↰	↑↑↑	↑↑↑	↰	↰
Traffic Volume (vph)	305	1157	1586	87	779
Future Volume (vph)	305	1157	1586	87	779
Turn Type	Prot	NA	NA	Prot	pt+ov
Protected Phases	3	1 3	1	2	2 3
Permitted Phases					
Detector Phase	3	1 3	1	2	2 3
Switch Phase					
Minimum Initial (s)	8.0		10.0	8.0	
Minimum Split (s)	14.3		43.5	14.8	
Total Split (s)	36.0		58.0	26.0	
Total Split (%)	30.0%		48.3%	21.7%	
Yellow Time (s)	3.5		4.0	3.0	
All-Red Time (s)	2.8		2.5	3.8	
Lost Time Adjust (s)	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.3		4.5	4.8	
Lead/Lag			Lead	Lag	
Lead-Lag Optimize?					
Recall Mode	None		C-Max	None	
Act Effect Green (s)	31.7	89.5	53.5	21.2	57.2
Actuated g/C Ratio	0.26	0.75	0.45	0.18	0.48
v/c Ratio	0.74	0.34	0.88	0.35	0.70
Control Delay	66.9	5.5	12.7	47.4	28.0
Queue Delay	0.0	0.0	1.3	0.0	0.0
Total Delay	66.9	5.5	14.0	47.4	28.0
LOS	E	A	B	D	C
Approach Delay		18.3	14.0	30.0	
Approach LOS		B	B	C	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 118 (98%), Referenced to phase 1:EBWB, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 19.1
 Intersection LOS: B
 Intersection Capacity Utilization 73.6%
 ICU Level of Service D
 Analysis Period (min) 15

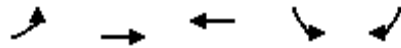
Splits and Phases: 11: Duke St & Callahan Dr



Queues

11: Duke St & Callahan Dr

11/07/2022



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	337	1279	1933	104	929
v/c Ratio	0.74	0.34	0.88	0.35	0.70
Control Delay	66.9	5.5	12.7	47.4	28.0
Queue Delay	0.0	0.0	1.3	0.0	0.0
Total Delay	66.9	5.5	14.0	47.4	28.0
Queue Length 50th (ft)	277	104	247	71	310
Queue Length 95th (ft)	375	150	m263	124	381
Internal Link Dist (ft)		565	511	483	
Turn Bay Length (ft)	315			175	
Base Capacity (vph)	453	3754	2187	293	1325
Starvation Cap Reductn	0	0	108	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.74	0.34	0.93	0.35	0.70

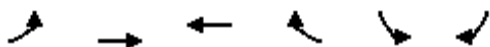
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

11: Duke St & Callahan Dr

11/07/2022

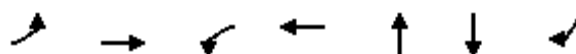


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	305	1157	1586	200	87	779
Future Volume (vph)	305	1157	1586	200	87	779
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		2%	2%		1%	
Total Lost time (s)	4.3	4.5	4.5		4.8	4.8
Lane Util. Factor	1.00	0.91	0.91		1.00	0.88
Flpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1718	5034	4878		1663	2773
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1718	5034	4878		1663	2773
Peak-hour factor, PHF	0.95	0.95	0.97	0.97	0.88	0.88
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	337	1279	1717	216	104	929
RTOR Reduction (vph)	0	0	13	0	0	4
Lane Group Flow (vph)	337	1279	1920	0	104	925
Confl. Peds. (#/hr)	45			45	1	
Heavy Vehicles (%)	4%	2%	2%	6%	8%	2%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	3	1 3	1		2	2 3
Permitted Phases						
Actuated Green, G (s)	29.7	87.5	51.5		19.2	55.7
Effective Green, g (s)	31.7	85.2	53.5		21.2	57.7
Actuated g/C Ratio	0.26	0.71	0.45		0.18	0.48
Clearance Time (s)	6.3		6.5		6.8	
Vehicle Extension (s)	4.0		2.0		2.0	
Lane Grp Cap (vph)	453	3574	2174		293	1333
v/s Ratio Prot	0.20	0.25	c0.39		0.06	c0.33
v/s Ratio Perm						
v/c Ratio	0.74	0.36	0.88		0.35	0.69
Uniform Delay, d1	40.4	6.8	30.4		43.4	24.3
Progression Factor	1.39	1.02	0.33		1.00	1.00
Incremental Delay, d2	6.3	0.1	2.4		0.3	1.3
Delay (s)	62.6	6.9	12.5		43.7	25.6
Level of Service	E	A	B		D	C
Approach Delay (s)		18.6	12.5		27.4	
Approach LOS		B	B		C	
Intersection Summary						
HCM 2000 Control Delay			18.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	13.6
Intersection Capacity Utilization			73.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Timings

71: W Taylor Run Pkwy and Service Rd

11/07/2022



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations		↔		↔	↔	↔	↔			
Traffic Volume (vph)	9	6	85	11	26	270	1			
Future Volume (vph)	9	6	85	11	26	270	1			
Turn Type	Perm	NA	Perm	NA	NA	NA	Perm			
Protected Phases		6		6	4 5	4		2	3	5
Permitted Phases	6		6				4			
Detector Phase	6	6	6	6	4 5	4	4			
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0		7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0		13.0	13.0	14.0	33.0	12.5
Total Split (s)	43.0	43.0	43.0	43.0		29.0	29.0	58.0	33.0	15.0
Total Split (%)	35.8%	35.8%	35.8%	35.8%		24.2%	24.2%	48%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0		3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0		-2.0	-2.0			
Total Lost Time (s)		4.0		4.0		4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag		Lag	Lag		Lead	Lead
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max		None	None	C-Max	None	None
Act Effect Green (s)		69.0		69.0	38.9	25.0	25.0			
Actuated g/C Ratio		0.58		0.58	0.32	0.21	0.21			
v/c Ratio		0.11		0.53	0.05	0.77	0.00			
Control Delay		6.6		17.9	3.1	59.1	0.0			
Queue Delay		0.1		5.4	1.7	0.3	0.0			
Total Delay		6.7		23.3	4.8	59.4	0.0			
LOS		A		C	A	E	A			
Approach Delay		6.7		23.3	4.8	59.2				
Approach LOS		A		C	A	E				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 32.7

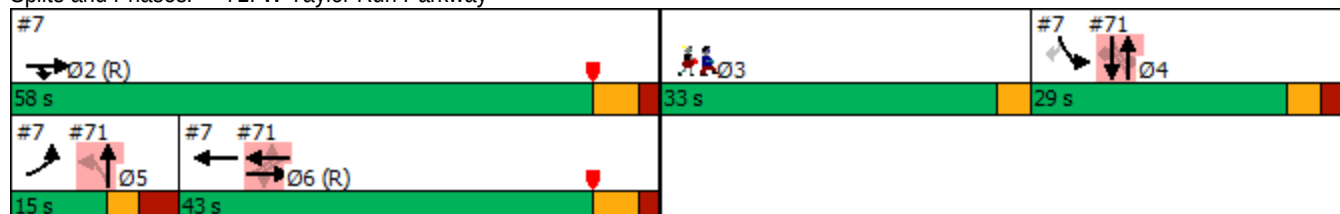
Intersection LOS: C

Intersection Capacity Utilization 51.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Pkwy and Service Rd

11/07/2022



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	106	466	29	298	1
v/c Ratio	0.11	0.53	0.05	0.77	0.00
Control Delay	6.6	17.9	3.1	59.1	0.0
Queue Delay	0.1	5.4	1.7	0.3	0.0
Total Delay	6.7	23.3	4.8	59.4	0.0
Queue Length 50th (ft)	6	141	1	219	0
Queue Length 95th (ft)	41	310	4	#346	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	935	876	621	388	420
Starvation Cap Reductn	0	0	510	0	0
Spillback Cap Reductn	367	340	0	5	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.19	0.87	0.26	0.78	0.00

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Pkwy and Service Rd

11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Volume (vph)	9	6	66	85	11	246	0	26	0	0	270	1
Future Volume (vph)	9	6	66	85	11	246	0	26	0	0	270	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.97			1.00			1.00	1.00
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.89			0.90			1.00			1.00	0.85
Flt Protected		0.99			0.99			1.00			1.00	1.00
Satd. Flow (prot)		1648			1614			1863			1863	1583
Flt Permitted		0.94			0.89			1.00			1.00	1.00
Satd. Flow (perm)		1564			1454			1863			1863	1583
Peak-hour factor, PHF	0.81	0.81	0.81	0.77	0.77	0.77	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	12	8	86	116	15	335	0	29	0	0	298	1
RTOR Reduction (vph)	0	39	0	0	52	0	0	0	0	0	0	1
Lane Group Flow (vph)	0	67	0	0	414	0	0	29	0	0	298	0
Confl. Peds. (#/hr)	22					22			7	7		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	2%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA			NA			NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		63.3			63.3			35.2			23.0	23.0
Effective Green, g (s)		65.3			65.3			37.2			25.0	25.0
Actuated g/C Ratio		0.54			0.54			0.31			0.21	0.21
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		851			791			577			388	329
v/s Ratio Prot								c0.02			c0.16	
v/s Ratio Perm		0.04			c0.28							0.00
v/c Ratio		0.08			0.52			0.05			0.77	0.00
Uniform Delay, d1		13.0			17.4			29.0			44.8	37.6
Progression Factor		1.00			1.00			0.11			1.00	1.00
Incremental Delay, d2		0.2			2.5			0.0			8.8	0.0
Delay (s)		13.2			19.9			3.1			53.6	37.6
Level of Service		B			B			A			D	D
Approach Delay (s)		13.2			19.9			3.1			53.6	
Approach LOS		B			B			A			D	
Intersection Summary												
HCM 2000 Control Delay			29.8									
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			120.0								15.5	
Intersection Capacity Utilization			51.2%								A	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

130: Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

11/07/2022

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	1815	0	0	346	0
Future Volume (Veh/h)	0	1815	0	0	346	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1906	0	0	363	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				953	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				953	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	100
cM capacity (veh/h)	1622				257	1084
Direction, Lane #	NB 1	NB 2	NE 1			
Volume Total	953	953	363			
Volume Left	0	0	363			
Volume Right	0	0	0			
cSH	1700	1700	257			
Volume to Capacity	0.56	0.56	1.41			
Queue Length 95th (ft)	0	0	501			
Control Delay (s)	0.0	0.0	243.9			
Lane LOS			F			
Approach Delay (s)	0.0		243.9			
Approach LOS			F			
Intersection Summary						
Average Delay		39.0				
Intersection Capacity Utilization		79.5%	ICU Level of Service	D		
Analysis Period (min)		15				



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix P: Synchro Screening Results (2036 Build Alternative 1A)

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/02/2022



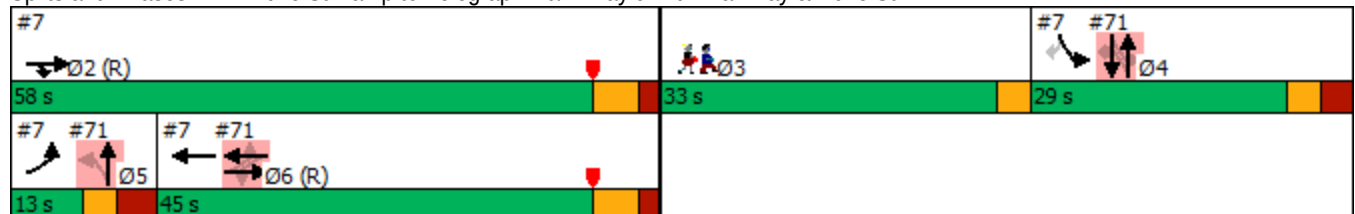
Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	30	928	961	2296	318	36	
Future Volume (vph)	30	928	961	2296	318	36	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	13.0	58.0	58.0	45.0	29.0	29.0	33.0
Total Split (%)	10.8%	48.3%	48.3%	37.5%	24.2%	24.2%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	8.4	80.4	80.4	70.0	25.0	25.0	
Actuated g/C Ratio	0.07	0.67	0.67	0.58	0.21	0.21	
v/c Ratio	0.30	0.52	0.97	0.93	1.04	0.10	
Control Delay	58.9	16.5	40.7	29.1	76.2	0.9	
Queue Delay	0.0	0.0	0.0	1.2	20.6	2.4	
Total Delay	58.9	16.5	40.7	30.4	96.8	3.2	
LOS	E	B	D	C	F	A	
Approach Delay		29.3		30.4			
Approach LOS		C		C			

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 86 (72%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 34.5
 Intersection Capacity Utilization 71.7%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/02/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	35	1095	1134	2565	384	43
v/c Ratio	0.30	0.52	0.97	0.93	1.04	0.10
Control Delay	58.9	16.5	40.7	29.1	76.2	0.9
Queue Delay	0.0	0.0	0.0	1.2	20.6	2.4
Total Delay	58.9	16.5	40.7	30.4	96.8	3.2
Queue Length 50th (ft)	27	203	677	604	~97	1
Queue Length 95th (ft)	m47	433	#1422	#1143	m#412	m0
Internal Link Dist (ft)		321		722		
Turn Bay Length (ft)	180					
Base Capacity (vph)	116	2122	1167	2750	368	413
Starvation Cap Reductn	0	0	0	0	26	293
Spillback Cap Reductn	0	0	0	69	0	7
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.52	0.97	0.96	1.12	0.36

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

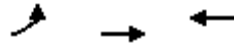
11/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	928	961	0	2296	0	0	0	0	318	0	36
Future Volume (vph)	30	928	961	0	2296	0	0	0	0	318	0	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1641	3167	1743		4715					1770		1553
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1641	3167	1743		4715					1770		1553
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	1.00	1.00	1.00	0.87	0.87	0.87
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	35	1095	1134	0	2565	0	0	0	0	384	0	43
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	34
Lane Group Flow (vph)	35	1095	1134	0	2565	0	0	0	0	384	0	9
Confl. Peds. (#/hr)										3		5
Heavy Vehicles (%)	10%	14%	9%	2%	10%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	5.2	76.0	76.0		64.3					23.0		23.0
Effective Green, g (s)	7.2	78.0	78.0		66.3					25.0		25.0
Actuated g/C Ratio	0.06	0.65	0.65		0.55					0.21		0.21
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	98	2058	1132		2605					368		323
v/s Ratio Prot	0.02	0.35	c0.65		0.54					c0.22		
v/s Ratio Perm												0.01
v/c Ratio	0.36	0.53	1.00		0.98					1.04		0.03
Uniform Delay, d1	54.2	11.2	21.0		26.4					47.5		37.8
Progression Factor	0.99	1.24	1.15		0.87					0.44		1.00
Incremental Delay, d2	1.9	0.8	25.0		14.4					51.9		0.0
Delay (s)	55.6	14.7	49.2		37.2					72.6		37.8
Level of Service	E	B	D		D					E		D
Approach Delay (s)		32.6			37.2			0.0			69.1	
Approach LOS		C			D			A			E	
Intersection Summary												
HCM 2000 Control Delay			37.8		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					15.5		
Intersection Capacity Utilization			71.7%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

8: Duke Street eastbound and Telegraph Road on-ramp

11/02/2022

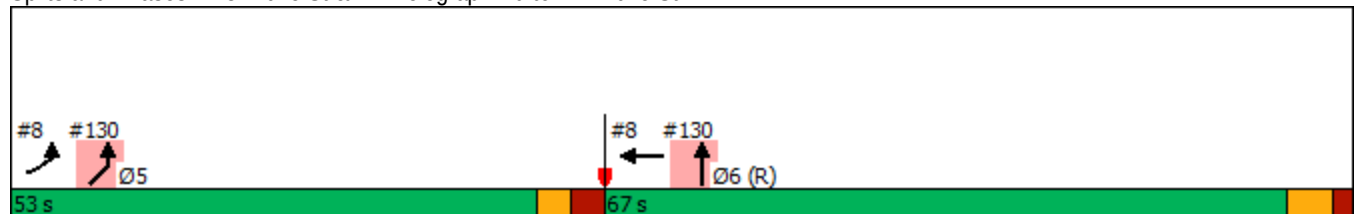


Lane Group	EBL	EBT	WBT
Lane Configurations			
Traffic Volume (vph)	288	958	863
Future Volume (vph)	288	958	863
Turn Type	Prot	NA	NA
Protected Phases	5	Free	6
Permitted Phases			
Detector Phase	5		6
Switch Phase			
Minimum Initial (s)	4.0		4.0
Minimum Split (s)	10.0		23.0
Total Split (s)	53.0		67.0
Total Split (%)	44.2%		55.8%
Yellow Time (s)	3.0		4.0
All-Red Time (s)	3.0		2.0
Lost Time Adjust (s)	-2.0		-2.0
Total Lost Time (s)	4.0		4.0
Lead/Lag	Lead		Lag
Lead-Lag Optimize?			
Recall Mode	None		C-Max
Act Effect Green (s)	28.4	120.0	83.6
Actuated g/C Ratio	0.24	1.00	0.70
v/c Ratio	0.72	0.28	0.37
Control Delay	49.6	0.2	5.3
Queue Delay	0.0	0.0	0.0
Total Delay	49.6	0.2	5.3
LOS	D	A	A
Approach Delay		11.6	5.3
Approach LOS		B	A

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2: and 6:WBT, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 9.0
 Intersection LOS: A
 Intersection Capacity Utilization 48.5%
 ICU Level of Service A
 Analysis Period (min) 15

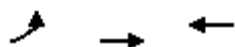
Splits and Phases: 8: Duke St & NB Telegraph Rd to WB Duke St



Queues

8: Duke Street eastbound and Telegraph Road on-ramp

11/02/2022



Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	302	1006	906
v/c Ratio	0.72	0.28	0.37
Control Delay	49.6	0.2	5.3
Queue Delay	0.0	0.0	0.0
Total Delay	49.6	0.2	5.3
Queue Length 50th (ft)	247	0	85
Queue Length 95th (ft)	m187	m0	m120
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	722	3539	2464
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.42	0.28	0.37

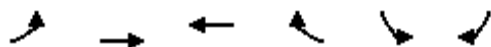
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

8: Duke Street eastbound and Telegraph Road on-ramp

11/02/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	288	958	863	0	0	0
Future Volume (vph)	288	958	863	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.98
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	302	1006	906	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	302	1006	906	0	0	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	NA	NA			
Protected Phases	5	Free	6			
Permitted Phases						
Actuated Green, G (s)	26.4	120.0	81.6			
Effective Green, g (s)	28.4	120.0	83.6			
Actuated g/C Ratio	0.24	1.00	0.70			
Clearance Time (s)	6.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	418	3539	2465			
v/s Ratio Prot	c0.17	0.28	c0.26			
v/s Ratio Perm						
v/c Ratio	0.72	0.28	0.37			
Uniform Delay, d1	42.2	0.0	7.4			
Progression Factor	1.01	1.00	0.60			
Incremental Delay, d2	4.6	0.2	0.4			
Delay (s)	47.4	0.2	4.8			
Level of Service	D	A	A			
Approach Delay (s)		11.1	4.8		0.0	
Approach LOS		B	A		A	
Intersection Summary						
HCM 2000 Control Delay			8.5	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.46			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		8.0
Intersection Capacity Utilization			48.5%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

11/02/2022



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑↑↑	↑↑↑		↕		↕
Traffic Volume (vph)	2150	1066	284	28	16	13
Future Volume (vph)	2150	1066	284	28	16	13
Turn Type	NA	NA	Perm	NA	Perm	NA
Protected Phases	2	6		8		4
Permitted Phases			8		4	
Detector Phase	2	6	8	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.0	28.0	40.0	40.0	13.0	13.0
Total Split (s)	68.0	68.0	52.0	52.0	52.0	52.0
Total Split (%)	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.0	4.0		4.0		4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	66.1	66.1		45.9		45.9
Actuated g/C Ratio	0.55	0.55		0.38		0.38
v/c Ratio	0.90	0.45		0.93		0.16
Control Delay	31.1	17.2		62.4		13.6
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	31.1	17.2		62.4		13.6
LOS	C	B		E		B
Approach Delay	31.1	17.2		62.4		13.6
Approach LOS	C	B		E		B

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 46 (38%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 30.0

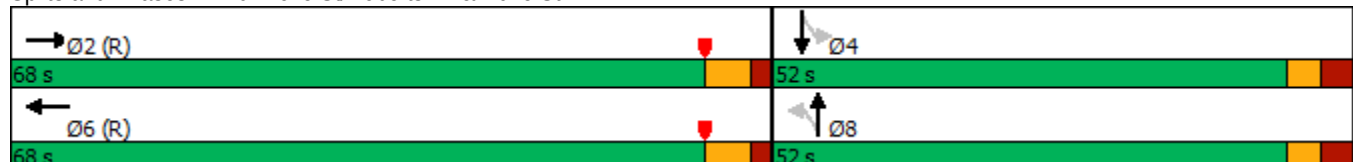
Intersection LOS: C

Intersection Capacity Utilization 76.4%

ICU Level of Service D

Analysis Period (min) 15

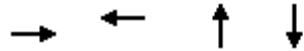
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

11/02/2022



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	2508	1217	446	97
v/c Ratio	0.90	0.45	0.93	0.16
Control Delay	31.1	17.2	62.4	13.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	31.1	17.2	62.4	13.6
Queue Length 50th (ft)	609	205	317	24
Queue Length 95th (ft)	759	244	359	48
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	2772	2692	502	619
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.90	0.45	0.89	0.16
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

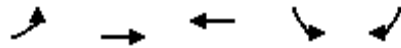
11/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2150	0	0	1066	0	284	28	11	16	13	42
Future Volume (vph)	0	2150	0	0	1066	0	284	28	11	16	13	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			1.00			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5036			4891			1756			1666	
Flt Permitted		1.00			1.00			0.68			0.88	
Satd. Flow (perm)		5036			4891			1255			1479	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.76	0.76	0.76	0.77	0.77	0.77
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	0	2508	0	0	1217	0	392	39	15	22	18	57
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	28	0
Lane Group Flow (vph)	0	2508	0	0	1217	0	0	445	0	0	69	0
Confl. Peds. (#/hr)	18		3	3		18			8	8		
Heavy Vehicles (%)	2%	3%	2%	2%	5%	2%	3%	2%	9%	2%	2%	5%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		64.1			64.1			43.9			43.9	
Effective Green, g (s)		66.1			66.1			45.9			45.9	
Actuated g/C Ratio		0.55			0.55			0.38			0.38	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			0.2			3.0			3.0	
Lane Grp Cap (vph)		2773			2694			480			565	
v/s Ratio Prot		c0.50			0.25							
v/s Ratio Perm								c0.35			0.05	
v/c Ratio		0.90			0.45			0.93			0.12	
Uniform Delay, d1		24.1			16.1			35.5			24.0	
Progression Factor		1.03			1.00			1.00			1.00	
Incremental Delay, d2		5.4			0.5			24.1			0.1	
Delay (s)		30.2			16.7			59.6			24.1	
Level of Service		C			B			E			C	
Approach Delay (s)		30.2			16.7			59.6			24.1	
Approach LOS		C			B			E			C	
Intersection Summary												
HCM 2000 Control Delay			29.3				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			76.4%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

11: Duke St & Callahan Dr

11/02/2022



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	429	1748	715	131	383
Future Volume (vph)	429	1748	715	131	383
Turn Type	Prot	NA	NA	Prot	pt+ov
Protected Phases	3	1 3	1	2	2 3
Permitted Phases					
Detector Phase	3	1 3	1	2	2 3
Switch Phase					
Minimum Initial (s)	8.0		10.0	8.0	
Minimum Split (s)	14.3		43.5	14.8	
Total Split (s)	57.0		47.0	26.0	
Total Split (%)	43.8%		36.2%	20.0%	
Yellow Time (s)	3.5		4.0	3.0	
All-Red Time (s)	2.8		2.5	3.8	
Lost Time Adjust (s)	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.3		4.5	4.8	
Lead/Lag			Lead	Lag	
Lead-Lag Optimize?					
Recall Mode	None		C-Max	None	
Act Effect Green (s)	52.7	102.7	45.7	18.0	75.0
Actuated g/C Ratio	0.41	0.79	0.35	0.14	0.58
v/c Ratio	0.70	0.50	0.63	0.66	0.29
Control Delay	38.4	5.5	25.5	66.5	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.4	5.5	25.5	66.5	13.2
LOS	D	A	C	E	B
Approach Delay		12.0	25.5	26.8	
Approach LOS		B	C	C	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 54 (42%), Referenced to phase 1:EBWB, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 17.6
Intersection Capacity Utilization 74.7%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 11: Duke St & Callahan Dr



Queues

11: Duke St & Callahan Dr

11/02/2022

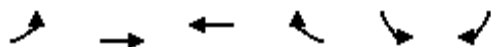


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	484	1974	1042	160	468
v/c Ratio	0.70	0.50	0.63	0.66	0.29
Control Delay	38.4	5.5	25.5	66.5	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.4	5.5	25.5	66.5	13.2
Queue Length 50th (ft)	334	179	273	129	100
Queue Length 95th (ft)	465	230	316	190	119
Internal Link Dist (ft)		565	511	483	
Turn Bay Length (ft)	315			175	
Base Capacity (vph)	696	3939	1647	284	1585
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	267	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.70	0.54	0.63	0.56	0.30
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

11: Duke St & Callahan Dr

11/02/2022

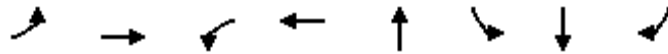


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	429	1748	715	148	131	383
Future Volume (vph)	429	1748	715	148	131	383
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		2%	2%		1%	
Total Lost time (s)	4.3	4.5	4.5		4.8	4.8
Lane Util. Factor	1.00	0.91	0.91		1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1718	4986	4620		1744	2773
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1718	4986	4620		1744	2773
Peak-hour factor, PHF	0.93	0.93	0.87	0.87	0.86	0.86
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	484	1974	863	179	160	468
RTOR Reduction (vph)	0	0	23	0	0	13
Lane Group Flow (vph)	484	1974	1019	0	160	455
Confl. Peds. (#/hr)	64			64		
Heavy Vehicles (%)	4%	3%	5%	10%	3%	2%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	3	1 3	1		2	2 3
Permitted Phases						
Actuated Green, G (s)	50.7	100.7	43.7		16.0	73.5
Effective Green, g (s)	52.7	98.4	45.7		18.0	75.5
Actuated g/C Ratio	0.41	0.76	0.35		0.14	0.58
Clearance Time (s)	6.3		6.5		6.8	
Vehicle Extension (s)	4.0		2.0		2.0	
Lane Grp Cap (vph)	696	3774	1624		241	1610
v/s Ratio Prot	c0.28	0.40	c0.22		c0.09	0.16
v/s Ratio Perm						
v/c Ratio	0.70	0.52	0.63		0.66	0.28
Uniform Delay, d1	32.0	6.4	35.1		53.1	13.7
Progression Factor	1.00	1.00	0.69		1.00	1.00
Incremental Delay, d2	3.3	0.2	1.6		5.2	0.0
Delay (s)	35.3	6.5	25.9		58.4	13.7
Level of Service	D	A	C		E	B
Approach Delay (s)		12.2	25.9		25.1	
Approach LOS		B	C		C	
Intersection Summary						
HCM 2000 Control Delay			17.6		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.66			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	13.6
Intersection Capacity Utilization			74.7%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Timings

71: W Taylor Run Pkwy and Service Rd

11/02/2022



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations		↔		↔	↔		↔	↔			
Traffic Volume (vph)	19	8	56	6	30	1	275	6			
Future Volume (vph)	19	8	56	6	30	1	275	6			
Turn Type	Perm	NA	Perm	NA	NA	Perm	NA	Perm			
Protected Phases		6		6	4 5		4		2	3	5
Permitted Phases	6		6			4		4			
Detector Phase	6	6	6	6	4 5	4	4	4			
Switch Phase											
Minimum Initial (s)	7.0	7.0	7.0	7.0		7.0	7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0		13.0	13.0	13.0	14.0	33.0	12.5
Total Split (s)	45.0	45.0	45.0	45.0		29.0	29.0	29.0	58.0	33.0	13.0
Total Split (%)	37.5%	37.5%	37.5%	37.5%		24.2%	24.2%	24.2%	48%	28%	11%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0		3.0	3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0			-2.0	-2.0			
Total Lost Time (s)		4.0		4.0			4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag		Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max		None	None	None	C-Max	None	None
Act Effect Green (s)		70.0		70.0	37.9		25.0	25.0			
Actuated g/C Ratio		0.58		0.58	0.32		0.21	0.21			
v/c Ratio		0.07		0.10	0.06		0.86	0.02			
Control Delay		10.9		16.4	1.9		67.6	0.0			
Queue Delay		0.1		0.1	2.5		0.6	0.0			
Total Delay		10.9		16.5	4.4		68.1	0.0			
LOS		B		B	A		E	A			
Approach Delay		10.9		16.5	4.4		66.7				
Approach LOS		B		B	A		E				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 86 (72%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 47.5

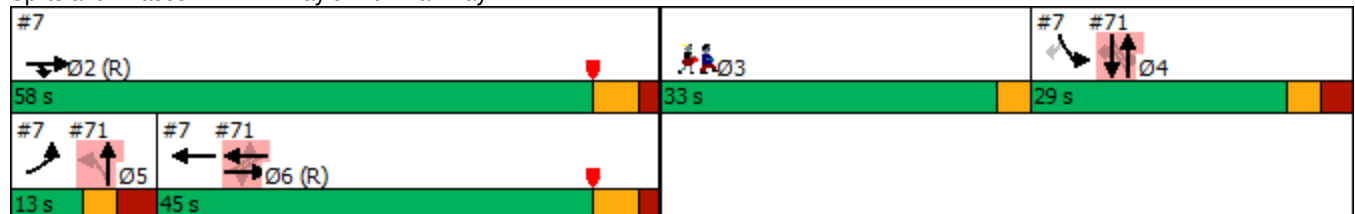
Intersection LOS: D

Intersection Capacity Utilization 30.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Pkwy and Service Rd

11/02/2022



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	68	83	34	333	7
v/c Ratio	0.07	0.10	0.06	0.86	0.02
Control Delay	10.9	16.4	1.9	67.6	0.0
Queue Delay	0.1	0.1	2.5	0.6	0.0
Total Delay	10.9	16.5	4.4	68.1	0.0
Queue Length 50th (ft)	11	25	0	251	0
Queue Length 95th (ft)	43	72	3	#384	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	925	807	589	388	411
Starvation Cap Reductn	0	0	485	0	0
Spillback Cap Reductn	309	272	0	4	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.11	0.16	0.33	0.87	0.02

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Pkwy and Service Rd

11/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	8	23	56	6	0	0	30	0	1	275	6
Future Volume (vph)	19	8	23	56	6	0	0	30	0	1	275	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			1.00			1.00			1.00	0.98
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.94			1.00			1.00			1.00	0.85
Flt Protected		0.98			0.96			1.00			1.00	1.00
Satd. Flow (prot)		1710			1782			1863			1862	1544
Flt Permitted		0.90			0.74			1.00			1.00	1.00
Satd. Flow (perm)		1569			1384			1863			1862	1544
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.87
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	26	11	31	75	8	0	0	34	0	1	332	7
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	54	0	0	83	0	0	34	0	0	333	1
Confl. Peds. (#/hr)	10					10	2		1	1		2
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		64.3			64.3			34.2			23.0	23.0
Effective Green, g (s)		66.3			66.3			36.2			25.0	25.0
Actuated g/C Ratio		0.55			0.55			0.30			0.21	0.21
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		866			764			562			387	321
v/s Ratio Prot								c0.02				
v/s Ratio Perm		0.03			c0.06						0.18	0.00
v/c Ratio		0.06			0.11			0.06			0.86	0.00
Uniform Delay, d1		12.4			12.8			29.8			45.8	37.6
Progression Factor		1.00			1.00			0.06			1.00	1.00
Incremental Delay, d2		0.1			0.3			0.0			17.4	0.0
Delay (s)		12.6			13.1			1.8			63.2	37.6
Level of Service		B			B			A			E	D
Approach Delay (s)		12.6			13.1			1.8			62.7	
Approach LOS		B			B			A			E	
Intersection Summary												
HCM 2000 Control Delay		44.4										
HCM 2000 Volume to Capacity ratio		0.28										
Actuated Cycle Length (s)		120.0										
Intersection Capacity Utilization		30.2%										
Analysis Period (min)		15										
c Critical Lane Group												

Timings

130: Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

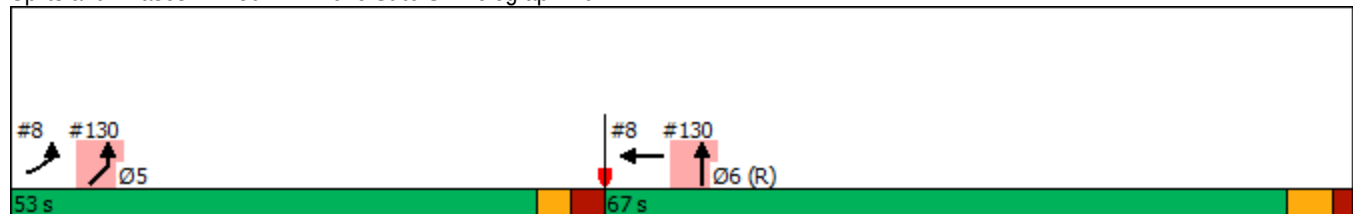
11/02/2022

	↑	↗
Lane Group	NBT	NEL
Lane Configurations	↑↑	↗
Traffic Volume (vph)	529	288
Future Volume (vph)	529	288
Turn Type	NA	Prot
Protected Phases	6	5
Permitted Phases		
Detector Phase	6	5
Switch Phase		
Minimum Initial (s)	4.0	4.0
Minimum Split (s)	23.0	10.0
Total Split (s)	67.0	53.0
Total Split (%)	55.8%	44.2%
Yellow Time (s)	4.0	3.0
All-Red Time (s)	2.0	3.0
Lost Time Adjust (s)	-2.0	-2.0
Total Lost Time (s)	4.0	4.0
Lead/Lag	Lag	Lead
Lead-Lag Optimize?		
Recall Mode	C-Max	None
Act Effct Green (s)	83.6	28.4
Actuated g/C Ratio	0.70	0.24
v/c Ratio	0.23	0.48
Control Delay	4.6	2.8
Queue Delay	0.0	0.3
Total Delay	4.6	3.0
LOS	A	A
Approach Delay	4.6	3.0
Approach LOS	A	A

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2: and 6:WBT, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 4.1
 Intersection LOS: A
 Intersection Capacity Utilization 38.8%
 ICU Level of Service A
 Analysis Period (min) 15

Splits and Phases: 130: WB Duke St to SB Telegraph Rd



Queues

130: Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

11/02/2022



Lane Group	NBT	NEL
Lane Group Flow (vph)	555	302
v/c Ratio	0.23	0.48
Control Delay	4.6	2.8
Queue Delay	0.0	0.3
Total Delay	4.6	3.0
Queue Length 50th (ft)	46	1
Queue Length 95th (ft)	m71	14
Internal Link Dist (ft)	346	253
Turn Bay Length (ft)		
Base Capacity (vph)	2464	886
Starvation Cap Reductn	0	183
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.23	0.43

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

130: Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

11/02/2022



Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		↑↑			↘	
Traffic Volume (vph)	0	529	0	0	288	0
Future Volume (vph)	0	529	0	0	288	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	
Lane Util. Factor		0.95			1.00	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3539			1770	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3539			1770	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	0	555	0	0	302	0
RTOR Reduction (vph)	0	0	0	0	211	0
Lane Group Flow (vph)	0	555	0	0	91	0
Turn Type		NA			Prot	
Protected Phases		6			5	
Permitted Phases						
Actuated Green, G (s)		81.6			26.4	
Effective Green, g (s)		83.6			28.4	
Actuated g/C Ratio		0.70			0.24	
Clearance Time (s)		6.0			6.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		2465			418	
v/s Ratio Prot		c0.16			c0.05	
v/s Ratio Perm						
v/c Ratio		0.23			0.22	
Uniform Delay, d1		6.5			36.9	
Progression Factor		0.61			0.07	
Incremental Delay, d2		0.2			0.2	
Delay (s)		4.2			2.8	
Level of Service		A			A	
Approach Delay (s)		4.2	0.0		2.8	
Approach LOS		A	A		A	
Intersection Summary						
HCM 2000 Control Delay		3.7			HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio		0.22				
Actuated Cycle Length (s)		120.0			Sum of lost time (s)	8.0
Intersection Capacity Utilization		38.8%			ICU Level of Service	A
Analysis Period (min)		15				
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/07/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	26	702	1253	1978	402	19	
Future Volume (vph)	26	702	1253	1978	402	19	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	15.0	58.0	58.0	43.0	29.0	29.0	33.0
Total Split (%)	12.5%	48.3%	48.3%	35.8%	24.2%	24.2%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.4	80.4	80.4	69.0	25.0	25.0	
Actuated g/C Ratio	0.08	0.67	0.67	0.58	0.21	0.21	
v/c Ratio	0.23	0.33	1.10	0.80	1.24	0.05	
Control Delay	69.5	4.7	74.3	25.1	152.8	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.2	1.4	
Total Delay	69.5	4.7	74.3	25.1	153.1	1.6	
LOS	E	A	E	C	F	A	
Approach Delay		49.6		25.1			
Approach LOS		D		C			

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 47.5

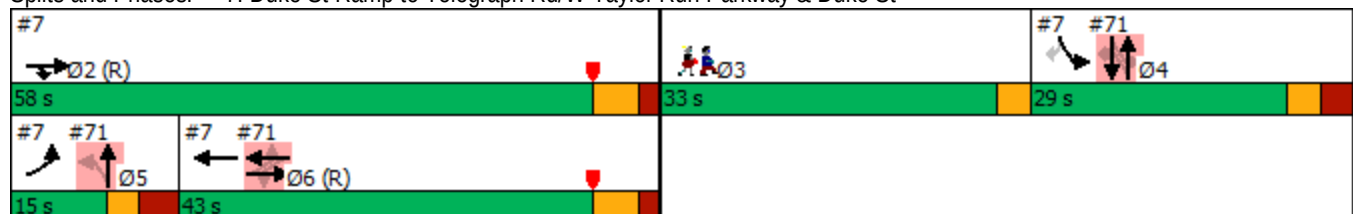
Intersection LOS: D

Intersection Capacity Utilization 84.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/07/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	28	745	1329	2258	444	21
v/c Ratio	0.23	0.33	1.10	0.80	1.24	0.05
Control Delay	69.5	4.7	74.3	25.1	152.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.2	1.4
Total Delay	69.5	4.7	74.3	25.1	153.1	1.6
Queue Length 50th (ft)	23	35	~625	500	~429	0
Queue Length 95th (ft)	m35	170	#1784	#973	#607	m0
Internal Link Dist (ft)		321		722		
Turn Bay Length (ft)	180					
Base Capacity (vph)	137	2260	1212	2814	358	420
Starvation Cap Reductn	0	0	0	0	8	322
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.33	1.10	0.80	1.27	0.21

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

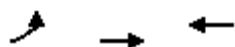
11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	702	1253	0	1978	0	0	0	0	402	0	19
Future Volume (vph)	26	702	1253	0	1978	0	0	0	0	402	0	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1570	3374	1810		4893					1719		1583
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1570	3374	1810		4893					1719		1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	28	745	1329	0	2258	0	0	0	0	444	0	21
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	17
Lane Group Flow (vph)	28	745	1329	0	2258	0	0	0	0	444	0	4
Confl. Peds. (#/hr)										7	7	
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	6.2	76.0	76.0		63.3					23.0		23.0
Effective Green, g (s)	8.2	78.0	78.0		65.3					25.0		25.0
Actuated g/C Ratio	0.07	0.65	0.65		0.54					0.21		0.21
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	107	2193	1176		2662					358		329
v/s Ratio Prot	0.02	0.22	c0.73		0.46					c0.26		
v/s Ratio Perm												0.00
v/c Ratio	0.26	0.34	1.13		0.85					1.24		0.01
Uniform Delay, d1	53.0	9.4	21.0		23.2					47.5		37.7
Progression Factor	1.27	0.41	0.88		1.00					0.55		1.00
Incremental Delay, d2	1.1	0.4	68.5		3.6					126.0		0.0
Delay (s)	68.4	4.3	86.9		26.7					151.9		37.7
Level of Service	E	A	F		C					F		D
Approach Delay (s)		57.3			26.7			0.0			146.7	
Approach LOS		E			C			A			F	
Intersection Summary												
HCM 2000 Control Delay			51.6									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			84.8%									ICU Level of Service E
Analysis Period (min)			15									
c Critical Lane Group												

Timings

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022



Lane Group	EBL	EBT	WBT
Lane Configurations			
Traffic Volume (vph)	346	758	747
Future Volume (vph)	346	758	747
Turn Type	Prot	NA	NA
Protected Phases	5	Free	6
Permitted Phases			
Detector Phase	5		6
Switch Phase			
Minimum Initial (s)	4.0		4.0
Minimum Split (s)	8.0		22.0
Total Split (s)	59.0		61.0
Total Split (%)	49.2%		50.8%
Yellow Time (s)	3.5		4.0
All-Red Time (s)	0.5		2.0
Lost Time Adjust (s)	-2.0		-2.0
Total Lost Time (s)	2.0		4.0
Lead/Lag	Lead		Lag
Lead-Lag Optimize?			Yes
Recall Mode	None		C-Max
Act Effect Green (s)	33.7	120.0	80.3
Actuated g/C Ratio	0.28	1.00	0.67
v/c Ratio	0.73	0.22	0.33
Control Delay	34.4	0.1	3.6
Queue Delay	0.0	0.0	0.0
Total Delay	34.4	0.1	3.6
LOS	C	A	A
Approach Delay		10.8	3.6
Approach LOS		B	A

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 21 (18%), Referenced to phase 6:WBT, Start of Green

Natural Cycle: 50

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 7.9

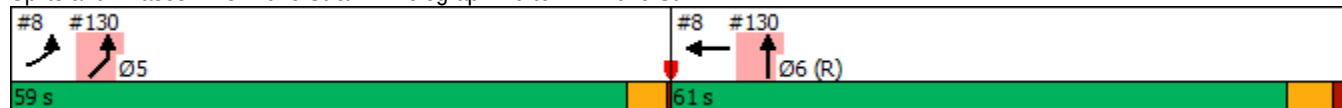
Intersection LOS: A

Intersection Capacity Utilization 48.5%

ICU Level of Service A

Analysis Period (min) 15

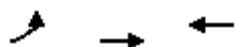
Splits and Phases: 8: Duke St & NB Telegraph Rd to WB Duke St



Queues

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022



Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	363	796	784
v/c Ratio	0.73	0.22	0.33
Control Delay	34.4	0.1	3.6
Queue Delay	0.0	0.0	0.0
Total Delay	34.4	0.1	3.6
Queue Length 50th (ft)	243	0	42
Queue Length 95th (ft)	m151	m0	61
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	840	3539	2368
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.43	0.22	0.33

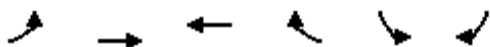
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	346	758	747	0	0	0
Future Volume (vph)	346	758	747	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.98
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	363	796	784	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	363	796	784	0	0	0
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	NA	NA			
Protected Phases	5	Free	6			
Permitted Phases						
Actuated Green, G (s)	31.7	120.0	78.3			
Effective Green, g (s)	33.7	120.0	80.3			
Actuated g/C Ratio	0.28	1.00	0.67			
Clearance Time (s)	4.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	497	3539	2368			
v/s Ratio Prot	c0.21	0.22	c0.22			
v/s Ratio Perm						
v/c Ratio	0.73	0.22	0.33			
Uniform Delay, d1	39.0	0.0	8.4			
Progression Factor	0.72	1.00	0.35			
Incremental Delay, d2	4.1	0.1	0.3			
Delay (s)	32.3	0.1	3.2			
Level of Service	C	A	A			
Approach Delay (s)		10.2	3.2		0.0	
Approach LOS		B	A		A	
Intersection Summary						
HCM 2000 Control Delay			7.4	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.45			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		6.0
Intersection Capacity Utilization			48.5%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

11/07/2022



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑↑↑	↑↑↑		↑↓		↑↓
Traffic Volume (vph)	1427	2324	204	31	14	20
Future Volume (vph)	1427	2324	204	31	14	20
Turn Type	NA	NA	Perm	NA	Perm	NA
Protected Phases	2	6		8		4
Permitted Phases			8		4	
Detector Phase	2	6	8	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.0	28.0	40.0	40.0	13.0	13.0
Total Split (s)	75.0	75.0	45.0	45.0	45.0	45.0
Total Split (%)	62.5%	62.5%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.0	4.0		4.0		4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	77.4	77.4		34.6		31.5
Actuated g/C Ratio	0.64	0.64		0.29		0.26
v/c Ratio	0.48	0.78		0.83		0.20
Control Delay	13.5	16.2		57.7		30.5
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	13.5	16.2		57.7		30.5
LOS	B	B		E		C
Approach Delay	13.5	16.2		57.7		30.5
Approach LOS	B	B		E		C

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 18.4

Intersection LOS: B

Intersection Capacity Utilization 77.7%

ICU Level of Service D

Analysis Period (min) 15

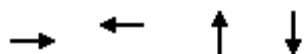
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

11/07/2022



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1577	2516	320	77
v/c Ratio	0.48	0.78	0.83	0.20
Control Delay	13.5	16.2	57.7	30.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.5	16.2	57.7	30.5
Queue Length 50th (ft)	239	536	226	42
Queue Length 95th (ft)	394	672	292	77
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3279	3246	454	504
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.48	0.78	0.70	0.15
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

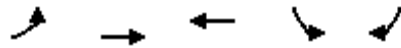
11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1427	0	0	2324	0	204	31	21	14	20	34
Future Volume (vph)	0	1427	0	0	2324	0	204	31	21	14	20	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.99			0.93	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5085			5034			1767			1591	
Flt Permitted		1.00			1.00			0.72			0.92	
Satd. Flow (perm)		5085			5034			1322			1473	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	0	1577	0	0	2516	0	255	39	26	16	23	38
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	1577	0	0	2516	0	0	317	0	0	75	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		75.4			75.4			32.6			32.6	
Effective Green, g (s)		77.4			77.4			34.6			34.6	
Actuated g/C Ratio		0.65			0.65			0.29			0.29	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3279			3246			381			424	
v/s Ratio Prot		0.31			c0.50							
v/s Ratio Perm								c0.24			0.05	
v/c Ratio		0.48			0.78			0.83			0.18	
Uniform Delay, d1		11.0			15.1			40.0			32.0	
Progression Factor		1.10			0.91			1.00			1.00	
Incremental Delay, d2		0.5			1.1			14.4			0.2	
Delay (s)		12.6			14.9			54.3			32.2	
Level of Service		B			B			D			C	
Approach Delay (s)		12.6			14.9			54.3			32.2	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			17.2				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			77.7%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

11: Duke St & Callahan Dr

11/07/2022

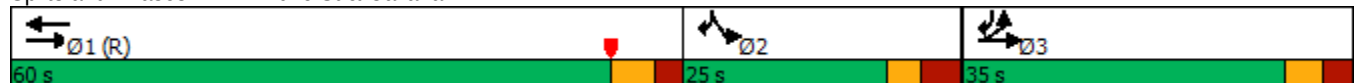


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	305	1157	1586	87	779
Future Volume (vph)	305	1157	1586	87	779
Turn Type	Prot	NA	NA	Prot	pt+ov
Protected Phases	3	1 3	1	2	2 3
Permitted Phases					
Detector Phase	3	1 3	1	2	2 3
Switch Phase					
Minimum Initial (s)	8.0		10.0	8.0	
Minimum Split (s)	14.3		43.5	14.8	
Total Split (s)	35.0		60.0	25.0	
Total Split (%)	29.2%		50.0%	20.8%	
Yellow Time (s)	3.5		4.0	3.0	
All-Red Time (s)	2.8		2.5	3.8	
Lost Time Adjust (s)	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.3		4.5	4.8	
Lead/Lag			Lead	Lag	
Lead-Lag Optimize?					
Recall Mode	None		C-Max	None	
Act Effect Green (s)	30.7	90.5	55.5	20.2	55.2
Actuated g/C Ratio	0.26	0.75	0.46	0.17	0.46
v/c Ratio	0.77	0.34	0.85	0.37	0.73
Control Delay	41.7	5.5	10.6	48.7	30.1
Queue Delay	0.0	0.0	0.9	0.0	0.0
Total Delay	41.7	5.5	11.5	48.7	30.1
LOS	D	A	B	D	C
Approach Delay		13.0	11.5	32.0	
Approach LOS		B	B	C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 118 (98%), Referenced to phase 1:EBWB, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.85
Intersection Signal Delay: 16.7
Intersection Capacity Utilization 73.6%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

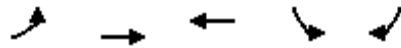
Splits and Phases: 11: Duke St & Callahan Dr



Queues

11: Duke St & Callahan Dr

11/07/2022



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	337	1279	1933	104	929
v/c Ratio	0.77	0.34	0.85	0.37	0.73
Control Delay	41.7	5.5	10.6	48.7	30.1
Queue Delay	0.0	0.0	0.9	0.0	0.0
Total Delay	41.7	5.5	11.5	48.7	30.1
Queue Length 50th (ft)	250	204	244	72	321
Queue Length 95th (ft)	#308	48	m262	125	394
Internal Link Dist (ft)		565	511	483	
Turn Bay Length (ft)	315			175	
Base Capacity (vph)	439	3796	2269	279	1279
Starvation Cap Reductn	0	0	131	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.77	0.34	0.90	0.37	0.73

Intersection Summary

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

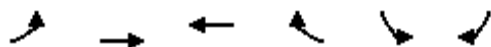
Queue shown is maximum after two cycles.

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

HCM Signalized Intersection Capacity Analysis

11: Duke St & Callahan Dr

11/07/2022

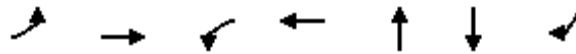


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	305	1157	1586	200	87	779
Future Volume (vph)	305	1157	1586	200	87	779
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		2%	2%		1%	
Total Lost time (s)	4.3	4.5	4.5		4.8	4.8
Lane Util. Factor	1.00	0.91	0.91		1.00	0.88
Flpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1718	5034	4878		1663	2773
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1718	5034	4878		1663	2773
Peak-hour factor, PHF	0.95	0.95	0.97	0.97	0.88	0.88
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	337	1279	1717	216	104	929
RTOR Reduction (vph)	0	0	13	0	0	4
Lane Group Flow (vph)	337	1279	1920	0	104	925
Confl. Peds. (#/hr)	45			45	1	
Heavy Vehicles (%)	4%	2%	2%	6%	8%	2%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	3	1 3	1		2	2 3
Permitted Phases						
Actuated Green, G (s)	28.7	88.5	53.5		18.2	53.7
Effective Green, g (s)	30.7	86.2	55.5		20.2	55.7
Actuated g/C Ratio	0.26	0.72	0.46		0.17	0.46
Clearance Time (s)	6.3		6.5		6.8	
Vehicle Extension (s)	4.0		2.0		2.0	
Lane Grp Cap (vph)	439	3616	2256		279	1287
v/s Ratio Prot	0.20	0.25	c0.39		0.06	c0.33
v/s Ratio Perm						
v/c Ratio	0.77	0.35	0.85		0.37	0.72
Uniform Delay, d1	41.3	6.4	28.6		44.3	25.8
Progression Factor	0.72	1.08	0.31		1.00	1.00
Incremental Delay, d2	7.6	0.1	1.8		0.3	1.6
Delay (s)	37.3	6.9	10.6		44.6	27.5
Level of Service	D	A	B		D	C
Approach Delay (s)		13.3	10.6		29.2	
Approach LOS		B	B		C	
Intersection Summary						
HCM 2000 Control Delay			15.7		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	13.6
Intersection Capacity Utilization			73.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Timings

71: W Taylor Run Pkwy and Service Rd

11/07/2022



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations		↔		↔	↔	↔	↔			
Traffic Volume (vph)	9	6	85	11	26	270	1			
Future Volume (vph)	9	6	85	11	26	270	1			
Turn Type	Perm	NA	Perm	NA	NA	NA	Perm			
Protected Phases		6		6	4 5	4		2	3	5
Permitted Phases	6		6				4			
Detector Phase	6	6	6	6	4 5	4	4			
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0		7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0		13.0	13.0	14.0	33.0	12.5
Total Split (s)	43.0	43.0	43.0	43.0		29.0	29.0	58.0	33.0	15.0
Total Split (%)	35.8%	35.8%	35.8%	35.8%		24.2%	24.2%	48%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0		3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0		-2.0	-2.0			
Total Lost Time (s)		4.0		4.0		4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag		Lag	Lag		Lead	Lead
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max		None	None	C-Max	None	None
Act Effect Green (s)		69.0		69.0	38.9	25.0	25.0			
Actuated g/C Ratio		0.58		0.58	0.32	0.21	0.21			
v/c Ratio		0.11		0.53	0.05	0.77	0.00			
Control Delay		6.6		17.9	3.1	59.1	0.0			
Queue Delay		0.1		5.4	1.7	0.3	0.0			
Total Delay		6.7		23.3	4.8	59.4	0.0			
LOS		A		C	A	E	A			
Approach Delay		6.7		23.3	4.8	59.2				
Approach LOS		A		C	A	E				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 32.7

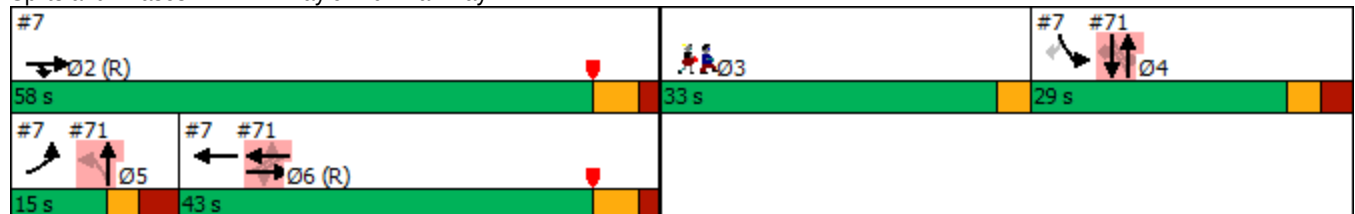
Intersection LOS: C

Intersection Capacity Utilization 51.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Pkwy and Service Rd

11/07/2022



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	106	466	29	298	1
v/c Ratio	0.11	0.53	0.05	0.77	0.00
Control Delay	6.6	17.9	3.1	59.1	0.0
Queue Delay	0.1	5.4	1.7	0.3	0.0
Total Delay	6.7	23.3	4.8	59.4	0.0
Queue Length 50th (ft)	6	141	1	219	0
Queue Length 95th (ft)	41	310	4	#346	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	935	876	621	388	420
Starvation Cap Reductn	0	0	510	0	0
Spillback Cap Reductn	367	340	0	5	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.19	0.87	0.26	0.78	0.00

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Pkwy and Service Rd

11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	6	66	85	11	246	0	26	0	0	270	1
Future Volume (vph)	9	6	66	85	11	246	0	26	0	0	270	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.97			1.00			1.00	1.00
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.89			0.90			1.00			1.00	0.85
Flt Protected		0.99			0.99			1.00			1.00	1.00
Satd. Flow (prot)		1648			1614			1863			1863	1583
Flt Permitted		0.94			0.89			1.00			1.00	1.00
Satd. Flow (perm)		1564			1454			1863			1863	1583
Peak-hour factor, PHF	0.81	0.81	0.81	0.77	0.77	0.77	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	12	8	86	116	15	335	0	29	0	0	298	1
RTOR Reduction (vph)	0	39	0	0	52	0	0	0	0	0	0	1
Lane Group Flow (vph)	0	67	0	0	414	0	0	29	0	0	298	0
Confl. Peds. (#/hr)	22					22			7	7		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	2%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA			NA			NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		63.3			63.3			35.2			23.0	23.0
Effective Green, g (s)		65.3			65.3			37.2			25.0	25.0
Actuated g/C Ratio		0.54			0.54			0.31			0.21	0.21
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		851			791			577			388	329
v/s Ratio Prot								c0.02			c0.16	
v/s Ratio Perm		0.04			c0.28							0.00
v/c Ratio		0.08			0.52			0.05			0.77	0.00
Uniform Delay, d1		13.0			17.4			29.0			44.8	37.6
Progression Factor		1.00			1.00			0.11			1.00	1.00
Incremental Delay, d2		0.2			2.5			0.0			8.8	0.0
Delay (s)		13.2			19.9			3.1			53.6	37.6
Level of Service		B			B			A			D	D
Approach Delay (s)		13.2			19.9			3.1			53.6	
Approach LOS		B			B			A			D	
Intersection Summary												
HCM 2000 Control Delay			29.8				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			15.5		
Intersection Capacity Utilization			51.2%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

130: Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

11/07/2022

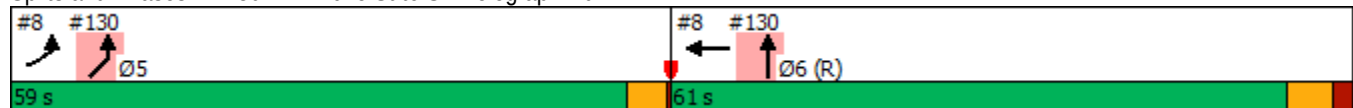
	↑	↗
Lane Group	NBT	NEL
Lane Configurations	↑↑	↗
Traffic Volume (vph)	1815	346
Future Volume (vph)	1815	346
Turn Type	NA	Prot
Protected Phases	6	5
Permitted Phases		
Detector Phase	6	5
Switch Phase		
Minimum Initial (s)	4.0	4.0
Minimum Split (s)	22.0	8.0
Total Split (s)	61.0	59.0
Total Split (%)	50.8%	49.2%
Yellow Time (s)	4.0	3.5
All-Red Time (s)	2.0	0.5
Lost Time Adjust (s)	-2.0	-2.0
Total Lost Time (s)	4.0	2.0
Lead/Lag	Lag	Lead
Lead-Lag Optimize?	Yes	
Recall Mode	C-Max	None
Act Effect Green (s)	80.3	33.7
Actuated g/C Ratio	0.67	0.28
v/c Ratio	0.80	0.73
Control Delay	8.1	14.2
Queue Delay	0.0	0.0
Total Delay	8.1	14.2
LOS	A	B
Approach Delay	8.1	14.2
Approach LOS	A	B

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 21 (18%), Referenced to phase 6:WBT, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 9.1
 Intersection Capacity Utilization 79.5%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service D

Splits and Phases: 130: WB Duke St to SB Telegraph Rd



Queues

130: Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

11/07/2022



Lane Group	NBT	NEL
Lane Group Flow (vph)	1906	363
v/c Ratio	0.80	0.73
Control Delay	8.1	14.2
Queue Delay	0.0	0.0
Total Delay	8.1	14.2
Queue Length 50th (ft)	131	12
Queue Length 95th (ft)	#300	26
Internal Link Dist (ft)	346	253
Turn Bay Length (ft)		
Base Capacity (vph)	2368	842
Starvation Cap Reductn	0	2
Spillback Cap Reductn	0	0
Storage Cap Reductn	0	0
Reduced v/c Ratio	0.80	0.43

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

130:Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

11/07/2022



Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		↑↑			↘	
Traffic Volume (vph)	0	1815	0	0	346	0
Future Volume (vph)	0	1815	0	0	346	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			2.0	
Lane Util. Factor		0.95			1.00	
Frt		1.00			1.00	
Flt Protected		1.00			0.95	
Satd. Flow (prot)		3539			1770	
Flt Permitted		1.00			0.95	
Satd. Flow (perm)		3539			1770	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	0	1906	0	0	363	0
RTOR Reduction (vph)	0	0	0	0	3	0
Lane Group Flow (vph)	0	1906	0	0	360	0
Turn Type		NA			Prot	
Protected Phases		6			5	
Permitted Phases						
Actuated Green, G (s)		78.3			31.7	
Effective Green, g (s)		80.3			33.7	
Actuated g/C Ratio		0.67			0.28	
Clearance Time (s)		6.0			4.0	
Vehicle Extension (s)		3.0			3.0	
Lane Grp Cap (vph)		2368			497	
v/s Ratio Prot		c0.54			c0.20	
v/s Ratio Perm						
v/c Ratio		0.80			0.72	
Uniform Delay, d1		14.2			39.0	
Progression Factor		0.33			0.16	
Incremental Delay, d2		2.1			4.8	
Delay (s)		6.8			10.9	
Level of Service		A			B	
Approach Delay (s)		6.8	0.0		10.9	
Approach LOS		A	A		B	
Intersection Summary						
HCM 2000 Control Delay		7.4		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.78				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		79.5%		ICU Level of Service		D
Analysis Period (min)		15				
c Critical Lane Group						



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix Q: Synchro Screening Results (2036 Build Alternative 2)

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/02/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	30	928	961	2296	318	36	
Future Volume (vph)	30	928	961	2296	318	36	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	13.0	58.0	58.0	45.0	29.0	29.0	33.0
Total Split (%)	10.8%	48.3%	48.3%	37.5%	24.2%	24.2%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	8.4	80.4	80.4	70.0	25.0	25.0	
Actuated g/C Ratio	0.07	0.67	0.67	0.58	0.21	0.21	
v/c Ratio	0.30	0.52	0.97	0.93	1.04	0.10	
Control Delay	58.9	16.5	40.7	31.0	76.2	0.9	
Queue Delay	0.0	0.0	0.0	1.2	20.6	2.4	
Total Delay	58.9	16.5	40.7	32.2	96.8	3.2	
LOS	E	B	D	C	F	A	
Approach Delay		29.3		32.2			
Approach LOS		C		C			

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 86 (72%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 35.4

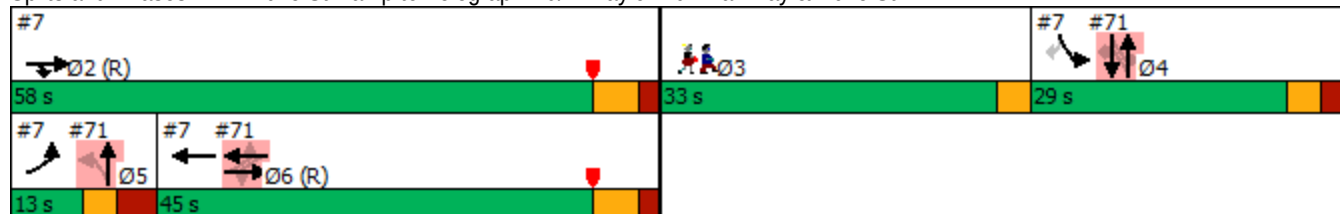
Intersection LOS: D

Intersection Capacity Utilization 71.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/02/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	35	1095	1134	2565	384	43
v/c Ratio	0.30	0.52	0.97	0.93	1.04	0.10
Control Delay	58.9	16.5	40.7	31.0	76.2	0.9
Queue Delay	0.0	0.0	0.0	1.2	20.6	2.4
Total Delay	58.9	16.5	40.7	32.2	96.8	3.2
Queue Length 50th (ft)	27	203	677	612	~97	1
Queue Length 95th (ft)	m47	433	#1422	#1144	m#412	m0
Internal Link Dist (ft)		321		722		
Turn Bay Length (ft)	180					
Base Capacity (vph)	116	2122	1167	2750	368	413
Starvation Cap Reductn	0	0	0	0	26	293
Spillback Cap Reductn	0	0	0	69	0	7
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.52	0.97	0.96	1.12	0.36

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

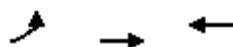
11/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  							
Traffic Volume (vph)	30	928	961	0	2296	0	0	0	0	318	0	36
Future Volume (vph)	30	928	961	0	2296	0	0	0	0	318	0	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1641	3167	1743		4715					1770		1553
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1641	3167	1743		4715					1770		1553
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	1.00	1.00	1.00	0.87	0.87	0.87
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	35	1095	1134	0	2565	0	0	0	0	384	0	43
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	34
Lane Group Flow (vph)	35	1095	1134	0	2565	0	0	0	0	384	0	9
Confl. Peds. (#/hr)										3		5
Heavy Vehicles (%)	10%	14%	9%	2%	10%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	5.2	76.0	76.0		64.3					23.0		23.0
Effective Green, g (s)	7.2	78.0	78.0		66.3					25.0		25.0
Actuated g/C Ratio	0.06	0.65	0.65		0.55					0.21		0.21
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	98	2058	1132		2605					368		323
v/s Ratio Prot	0.02	0.35	c0.65		0.54					c0.22		
v/s Ratio Perm												0.01
v/c Ratio	0.36	0.53	1.00		0.98					1.04		0.03
Uniform Delay, d1	54.2	11.2	21.0		26.4					47.5		37.8
Progression Factor	0.99	1.24	1.15		0.97					0.44		1.00
Incremental Delay, d2	1.9	0.8	25.0		14.4					51.9		0.0
Delay (s)	55.6	14.7	49.2		39.9					72.6		37.8
Level of Service	E	B	D		D					E		D
Approach Delay (s)		32.6			39.9			0.0			69.1	
Approach LOS		C			D			A			E	
Intersection Summary												
HCM 2000 Control Delay			39.1		HCM 2000 Level of Service					D		
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					15.5		
Intersection Capacity Utilization			71.7%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

8: Duke Street eastbound and Telegraph Road on-ramp

11/02/2022



Lane Group	EBL	EBT	WBT
Lane Configurations			
Traffic Volume (vph)	288	958	863
Future Volume (vph)	288	958	863
Turn Type	Prot	NA	NA
Protected Phases	5	Free	6
Permitted Phases			
Detector Phase	5		6
Switch Phase			
Minimum Initial (s)	4.0		4.0
Minimum Split (s)	8.0		23.0
Total Split (s)	53.0		67.0
Total Split (%)	44.2%		55.8%
Yellow Time (s)	3.5		4.0
All-Red Time (s)	0.5		2.0
Lost Time Adjust (s)	-2.0		-2.0
Total Lost Time (s)	2.0		4.0
Lead/Lag	Lead		Lag
Lead-Lag Optimize?			
Recall Mode	None		C-Max
Act Effect Green (s)	28.4	120.0	85.6
Actuated g/C Ratio	0.24	1.00	0.71
v/c Ratio	0.72	0.28	0.36
Control Delay	49.8	0.2	14.7
Queue Delay	0.0	0.0	0.0
Total Delay	49.8	0.2	14.7
LOS	D	A	B
Approach Delay		11.6	14.7
Approach LOS		B	B

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2: and 6:WBT, Start of Green

Natural Cycle: 40

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 12.9

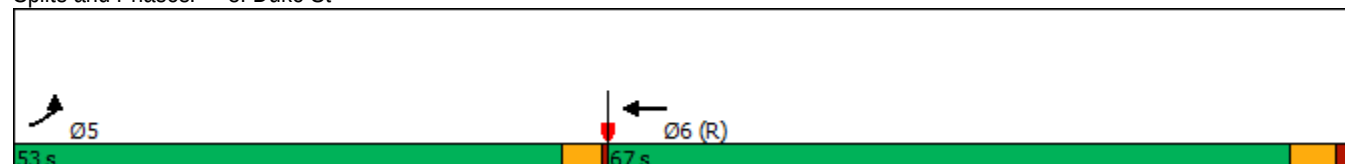
Intersection LOS: B

Intersection Capacity Utilization 142.3%

ICU Level of Service H

Analysis Period (min) 15

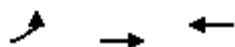
Splits and Phases: 8: Duke St



Queues

8: Duke Street eastbound and Telegraph Road on-ramp

11/02/2022



Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	302	1006	906
v/c Ratio	0.72	0.28	0.36
Control Delay	49.8	0.2	14.7
Queue Delay	0.0	0.0	0.0
Total Delay	49.8	0.2	14.7
Queue Length 50th (ft)	246	0	227
Queue Length 95th (ft)	m190	m0	m313
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	752	3539	2524
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.40	0.28	0.36

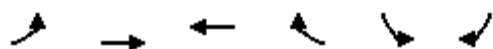
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

8: Duke Street eastbound and Telegraph Road on-ramp

11/02/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	288	958	863	0	0	0
Future Volume (vph)	288	958	863	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	302	1006	906	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	302	1006	906	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	5	Free	6			
Permitted Phases						
Actuated Green, G (s)	26.4	120.0	83.6			
Effective Green, g (s)	28.4	120.0	85.6			
Actuated g/C Ratio	0.24	1.00	0.71			
Clearance Time (s)	4.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	418	3539	2524			
v/s Ratio Prot	c0.17	0.28	c0.26			
v/s Ratio Perm						
v/c Ratio	0.72	0.28	0.36			
Uniform Delay, d1	42.2	0.0	6.6			
Progression Factor	1.01	1.00	1.95			
Incremental Delay, d2	4.6	0.2	0.3			
Delay (s)	47.4	0.2	13.3			
Level of Service	D	A	B			
Approach Delay (s)		11.1	13.3		0.0	
Approach LOS		B	B		A	
Intersection Summary						
HCM 2000 Control Delay			12.0	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.45			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		6.0
Intersection Capacity Utilization			142.3%	ICU Level of Service		H
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

11/02/2022



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑↑↑	↑↑↑		↑↓		↑↓
Traffic Volume (vph)	2150	1066	284	28	16	13
Future Volume (vph)	2150	1066	284	28	16	13
Turn Type	NA	NA	Perm	NA	Perm	NA
Protected Phases	2	6		8		4
Permitted Phases			8		4	
Detector Phase	2	6	8	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.0	28.0	40.0	40.0	13.0	13.0
Total Split (s)	68.0	68.0	52.0	52.0	52.0	52.0
Total Split (%)	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.0	4.0		4.0		4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	66.1	66.1		45.9		45.9
Actuated g/C Ratio	0.55	0.55		0.38		0.38
v/c Ratio	0.90	0.45		0.93		0.16
Control Delay	30.5	17.2		62.4		13.6
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	30.5	17.2		62.4		13.6
LOS	C	B		E		B
Approach Delay	30.5	17.2		62.4		13.6
Approach LOS	C	B		E		B

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 29.6

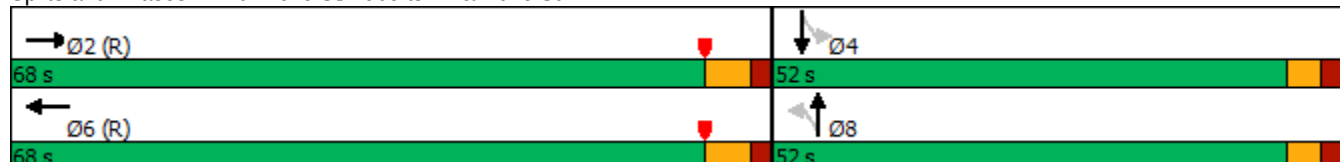
Intersection LOS: C

Intersection Capacity Utilization 76.4%

ICU Level of Service D

Analysis Period (min) 15

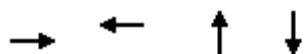
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

11/02/2022



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	2508	1217	446	97
v/c Ratio	0.90	0.45	0.93	0.16
Control Delay	30.5	17.2	62.4	13.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	30.5	17.2	62.4	13.6
Queue Length 50th (ft)	647	205	317	24
Queue Length 95th (ft)	663	244	359	48
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	2772	2692	502	619
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.90	0.45	0.89	0.16
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

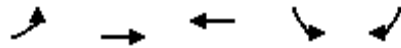
11/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2150	0	0	1066	0	284	28	11	16	13	42
Future Volume (vph)	0	2150	0	0	1066	0	284	28	11	16	13	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			1.00			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5036			4891			1756			1666	
Flt Permitted		1.00			1.00			0.68			0.88	
Satd. Flow (perm)		5036			4891			1255			1479	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.76	0.76	0.76	0.77	0.77	0.77
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	0	2508	0	0	1217	0	392	39	15	22	18	57
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	28	0
Lane Group Flow (vph)	0	2508	0	0	1217	0	0	445	0	0	69	0
Confl. Peds. (#/hr)	18		3	3		18			8	8		
Heavy Vehicles (%)	2%	3%	2%	2%	5%	2%	3%	2%	9%	2%	2%	5%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		64.1			64.1			43.9			43.9	
Effective Green, g (s)		66.1			66.1			45.9			45.9	
Actuated g/C Ratio		0.55			0.55			0.38			0.38	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			0.2			3.0			3.0	
Lane Grp Cap (vph)		2773			2694			480			565	
v/s Ratio Prot		c0.50			0.25							
v/s Ratio Perm								c0.35			0.05	
v/c Ratio		0.90			0.45			0.93			0.12	
Uniform Delay, d1		24.1			16.1			35.5			24.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		5.4			0.5			24.1			0.1	
Delay (s)		29.5			16.7			59.6			24.1	
Level of Service		C			B			E			C	
Approach Delay (s)		29.5			16.7			59.6			24.1	
Approach LOS		C			B			E			C	
Intersection Summary												
HCM 2000 Control Delay			28.9				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			76.4%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

11: Duke St & Callahan Dr

11/02/2022



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	429	1748	715	131	383
Future Volume (vph)	429	1748	715	131	383
Turn Type	Prot	NA	NA	Prot	pt+ov
Protected Phases	3	1 3	1	2	2 3
Permitted Phases					
Detector Phase	3	1 3	1	2	2 3
Switch Phase					
Minimum Initial (s)	8.0		10.0	8.0	
Minimum Split (s)	14.3		43.5	14.8	
Total Split (s)	57.0		47.0	26.0	
Total Split (%)	43.8%		36.2%	20.0%	
Yellow Time (s)	3.5		4.0	3.0	
All-Red Time (s)	2.8		2.5	3.8	
Lost Time Adjust (s)	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.3		4.5	4.8	
Lead/Lag			Lead	Lag	
Lead-Lag Optimize?					
Recall Mode	None		C-Max	None	
Act Effect Green (s)	52.7	102.7	45.7	18.0	75.0
Actuated g/C Ratio	0.41	0.79	0.35	0.14	0.58
v/c Ratio	0.70	0.50	0.63	0.66	0.29
Control Delay	38.4	5.5	20.5	66.5	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.4	5.5	20.5	66.5	13.2
LOS	D	A	C	E	B
Approach Delay		12.0	20.5	26.8	
Approach LOS		B	C	C	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 64 (49%), Referenced to phase 1:EBWB, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 16.4
Intersection Capacity Utilization 74.7%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 11: Duke St & Callahan Dr



Queues

11: Duke St & Callahan Dr

11/02/2022

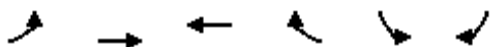


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	484	1974	1042	160	468
v/c Ratio	0.70	0.50	0.63	0.66	0.29
Control Delay	38.4	5.5	20.5	66.5	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.4	5.5	20.5	66.5	13.2
Queue Length 50th (ft)	334	179	239	129	100
Queue Length 95th (ft)	465	230	280	190	119
Internal Link Dist (ft)		565	511	483	
Turn Bay Length (ft)	315			175	
Base Capacity (vph)	696	3939	1647	284	1585
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	267	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.70	0.54	0.63	0.56	0.30
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

11: Duke St & Callahan Dr

11/02/2022

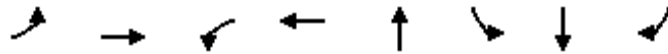


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	429	1748	715	148	131	383
Future Volume (vph)	429	1748	715	148	131	383
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		2%	2%		1%	
Total Lost time (s)	4.3	4.5	4.5		4.8	4.8
Lane Util. Factor	1.00	0.91	0.91		1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frft	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1718	4986	4620		1744	2773
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1718	4986	4620		1744	2773
Peak-hour factor, PHF	0.93	0.93	0.87	0.87	0.86	0.86
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	484	1974	863	179	160	468
RTOR Reduction (vph)	0	0	23	0	0	13
Lane Group Flow (vph)	484	1974	1019	0	160	455
Confl. Peds. (#/hr)	64			64		
Heavy Vehicles (%)	4%	3%	5%	10%	3%	2%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	3	1 3	1		2	2 3
Permitted Phases						
Actuated Green, G (s)	50.7	100.7	43.7		16.0	73.5
Effective Green, g (s)	52.7	98.4	45.7		18.0	75.5
Actuated g/C Ratio	0.41	0.76	0.35		0.14	0.58
Clearance Time (s)	6.3		6.5		6.8	
Vehicle Extension (s)	4.0		2.0		2.0	
Lane Grp Cap (vph)	696	3774	1624		241	1610
v/s Ratio Prot	c0.28	0.40	c0.22		c0.09	0.16
v/s Ratio Perm						
v/c Ratio	0.70	0.52	0.63		0.66	0.28
Uniform Delay, d1	32.0	6.4	35.1		53.1	13.7
Progression Factor	1.00	1.00	0.55		1.00	1.00
Incremental Delay, d2	3.3	0.2	1.6		5.2	0.0
Delay (s)	35.3	6.5	20.7		58.4	13.7
Level of Service	D	A	C		E	B
Approach Delay (s)		12.2	20.7		25.1	
Approach LOS		B	C		C	
Intersection Summary						
HCM 2000 Control Delay			16.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.66			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	13.6
Intersection Capacity Utilization			74.7%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Timings

71: W Taylor Run Pkwy and Service Rd

11/02/2022



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations											
Traffic Volume (vph)	19	8	56	6	30	1	275	6			
Future Volume (vph)	19	8	56	6	30	1	275	6			
Turn Type	Perm	NA	Perm	NA	NA	Perm	NA	Perm			
Protected Phases		6		6	4 5		4		2	3	5
Permitted Phases	6		6			4		4			
Detector Phase	6	6	6	6	4 5	4	4	4			
Switch Phase											
Minimum Initial (s)	7.0	7.0	7.0	7.0		7.0	7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0		13.0	13.0	13.0	14.0	33.0	12.5
Total Split (s)	45.0	45.0	45.0	45.0		29.0	29.0	29.0	58.0	33.0	13.0
Total Split (%)	37.5%	37.5%	37.5%	37.5%		24.2%	24.2%	24.2%	48%	28%	11%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0		3.0	3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0			-2.0	-2.0			
Total Lost Time (s)		4.0		4.0			4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag		Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max		None	None	None	C-Max	None	None
Act Effect Green (s)		70.0		70.0	37.9		25.0	25.0			
Actuated g/C Ratio		0.58		0.58	0.32		0.21	0.21			
v/c Ratio		0.07		0.10	0.06		0.86	0.02			
Control Delay		10.9		16.4	1.9		67.6	0.0			
Queue Delay		0.1		0.1	2.5		0.6	0.0			
Total Delay		10.9		16.5	4.4		68.1	0.0			
LOS		B		B	A		E	A			
Approach Delay		10.9		16.5	4.4		66.7				
Approach LOS		B		B	A		E				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 86 (72%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 47.5

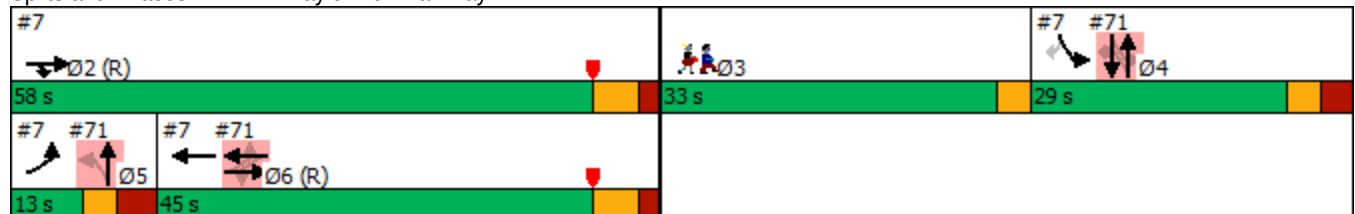
Intersection LOS: D

Intersection Capacity Utilization 30.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Pkwy and Service Rd

11/02/2022



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	68	83	34	333	7
v/c Ratio	0.07	0.10	0.06	0.86	0.02
Control Delay	10.9	16.4	1.9	67.6	0.0
Queue Delay	0.1	0.1	2.5	0.6	0.0
Total Delay	10.9	16.5	4.4	68.1	0.0
Queue Length 50th (ft)	11	25	0	251	0
Queue Length 95th (ft)	43	72	3	#384	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	925	807	589	388	411
Starvation Cap Reductn	0	0	485	0	0
Spillback Cap Reductn	309	272	0	4	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.11	0.16	0.33	0.87	0.02

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Pkwy and Service Rd

11/02/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	8	23	56	6	0	0	30	0	1	275	6
Future Volume (vph)	19	8	23	56	6	0	0	30	0	1	275	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			1.00			1.00			1.00	0.98
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.94			1.00			1.00			1.00	0.85
Flt Protected		0.98			0.96			1.00			1.00	1.00
Satd. Flow (prot)		1710			1782			1863			1862	1544
Flt Permitted		0.90			0.74			1.00			1.00	1.00
Satd. Flow (perm)		1569			1384			1863			1862	1544
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.87
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	26	11	31	75	8	0	0	34	0	1	332	7
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	54	0	0	83	0	0	34	0	0	333	1
Confl. Peds. (#/hr)	10					10	2		1	1		2
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		64.3			64.3			34.2			23.0	23.0
Effective Green, g (s)		66.3			66.3			36.2			25.0	25.0
Actuated g/C Ratio		0.55			0.55			0.30			0.21	0.21
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		866			764			562			387	321
v/s Ratio Prot								c0.02				
v/s Ratio Perm		0.03			c0.06						0.18	0.00
v/c Ratio		0.06			0.11			0.06			0.86	0.00
Uniform Delay, d1		12.4			12.8			29.8			45.8	37.6
Progression Factor		1.00			1.00			0.06			1.00	1.00
Incremental Delay, d2		0.1			0.3			0.0			17.4	0.0
Delay (s)		12.6			13.1			1.8			63.2	37.6
Level of Service		B			B			A			E	D
Approach Delay (s)		12.6			13.1			1.8			62.7	
Approach LOS		B			B			A			E	
Intersection Summary												
HCM 2000 Control Delay		44.4										
HCM 2000 Volume to Capacity ratio		0.28										
Actuated Cycle Length (s)		120.0										
Intersection Capacity Utilization		30.2%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

130: Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

11/02/2022

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	529	0	0	288	0
Future Volume (Veh/h)	0	529	0	0	288	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	555	0	0	302	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				555	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				555	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				39	100
cM capacity (veh/h)	1623				493	1085
Direction, Lane #	NB 1	NE 1				
Volume Total	555	302				
Volume Left	0	302				
Volume Right	0	0				
cSH	1700	493				
Volume to Capacity	0.33	0.61				
Queue Length 95th (ft)	0	101				
Control Delay (s)	0.0	23.2				
Lane LOS		C				
Approach Delay (s)	0.0	23.2				
Approach LOS		C				
Intersection Summary						
Average Delay		8.2				
Intersection Capacity Utilization		52.7%		ICU Level of Service		A
Analysis Period (min)		15				

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/07/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	26	702	1253	1978	402	19	
Future Volume (vph)	26	702	1253	1978	402	19	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	15.0	58.0	58.0	43.0	29.0	29.0	33.0
Total Split (%)	12.5%	48.3%	48.3%	35.8%	24.2%	24.2%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.4	80.4	80.4	69.0	25.0	25.0	
Actuated g/C Ratio	0.08	0.67	0.67	0.58	0.21	0.21	
v/c Ratio	0.23	0.33	1.10	0.80	1.24	0.05	
Control Delay	69.5	4.7	74.3	32.3	152.8	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.2	1.4	
Total Delay	69.5	4.7	74.3	32.3	153.1	1.6	
LOS	E	A	E	C	F	A	
Approach Delay		49.6		32.3			
Approach LOS		D		C			

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 50.8

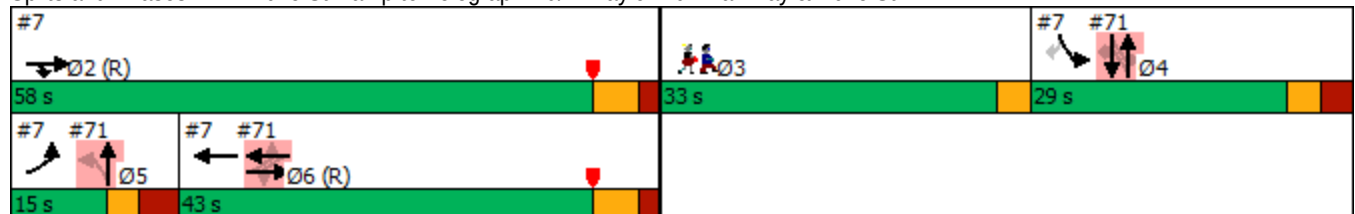
Intersection LOS: D

Intersection Capacity Utilization 84.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/07/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	28	745	1329	2258	444	21
v/c Ratio	0.23	0.33	1.10	0.80	1.24	0.05
Control Delay	69.5	4.7	74.3	32.3	152.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.2	1.4
Total Delay	69.5	4.7	74.3	32.3	153.1	1.6
Queue Length 50th (ft)	23	35	~625	552	~429	0
Queue Length 95th (ft)	m35	170	#1784	#973	#607	m0
Internal Link Dist (ft)		321		722		
Turn Bay Length (ft)	180					
Base Capacity (vph)	137	2260	1212	2814	358	420
Starvation Cap Reductn	0	0	0	0	8	322
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.33	1.10	0.80	1.27	0.21

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

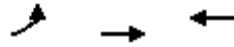
11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	702	1253	0	1978	0	0	0	0	402	0	19
Future Volume (vph)	26	702	1253	0	1978	0	0	0	0	402	0	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1570	3374	1810		4893					1719		1583
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1570	3374	1810		4893					1719		1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	28	745	1329	0	2258	0	0	0	0	444	0	21
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	17
Lane Group Flow (vph)	28	745	1329	0	2258	0	0	0	0	444	0	4
Confl. Peds. (#/hr)										7	7	
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	6.2	76.0	76.0		63.3					23.0		23.0
Effective Green, g (s)	8.2	78.0	78.0		65.3					25.0		25.0
Actuated g/C Ratio	0.07	0.65	0.65		0.54					0.21		0.21
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	107	2193	1176		2662					358		329
v/s Ratio Prot	0.02	0.22	c0.73		0.46					c0.26		
v/s Ratio Perm												0.00
v/c Ratio	0.26	0.34	1.13		0.85					1.24		0.01
Uniform Delay, d1	53.0	9.4	21.0		23.2					47.5		37.7
Progression Factor	1.27	0.41	0.88		1.42					0.55		1.00
Incremental Delay, d2	1.1	0.4	68.5		3.6					126.0		0.0
Delay (s)	68.4	4.3	86.9		36.4					151.9		37.7
Level of Service	E	A	F		D					F		D
Approach Delay (s)		57.3			36.4			0.0			146.7	
Approach LOS		E			D			A			F	
Intersection Summary												
HCM 2000 Control Delay			56.1									HCM 2000 Level of Service E
HCM 2000 Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			84.8%									ICU Level of Service E
Analysis Period (min)			15									
c Critical Lane Group												

Timings

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022

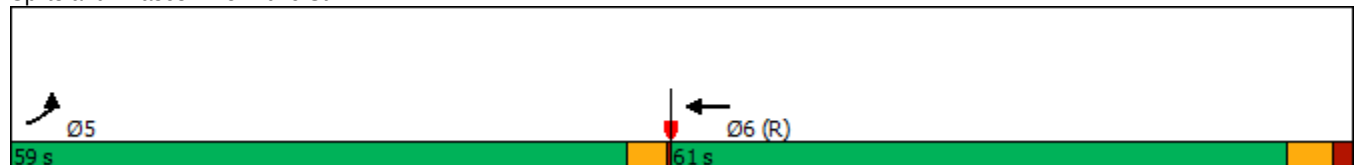


Lane Group	EBL	EBT	WBT
Lane Configurations			
Traffic Volume (vph)	346	758	747
Future Volume (vph)	346	758	747
Turn Type	Prot	NA	NA
Protected Phases	5	Free	6
Permitted Phases			
Detector Phase	5		6
Switch Phase			
Minimum Initial (s)	4.0		4.0
Minimum Split (s)	8.0		22.0
Total Split (s)	59.0		61.0
Total Split (%)	49.2%		50.8%
Yellow Time (s)	3.5		4.0
All-Red Time (s)	0.5		2.0
Lost Time Adjust (s)	-2.0		-2.0
Total Lost Time (s)	2.0		4.0
Lead/Lag	Lead		Lag
Lead-Lag Optimize?			Yes
Recall Mode	None		C-Max
Act Effect Green (s)	33.1	120.0	80.9
Actuated g/C Ratio	0.28	1.00	0.67
v/c Ratio	0.74	0.22	0.33
Control Delay	41.5	0.1	12.8
Queue Delay	0.0	0.0	0.0
Total Delay	41.5	0.1	12.8
LOS	D	A	B
Approach Delay		13.1	12.8
Approach LOS		B	B

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2: and 6:WBT, Start of Green	
Natural Cycle: 40	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.74	
Intersection Signal Delay: 13.0	Intersection LOS: B
Intersection Capacity Utilization 123.6%	ICU Level of Service H
Analysis Period (min) 15	

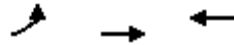
Splits and Phases: 8: Duke St



Queues

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022



Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	363	796	784
v/c Ratio	0.74	0.22	0.33
Control Delay	41.5	0.1	12.8
Queue Delay	0.0	0.0	0.0
Total Delay	41.5	0.1	12.8
Queue Length 50th (ft)	239	0	171
Queue Length 95th (ft)	m173	m0	294
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	840	3539	2384
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.43	0.22	0.33

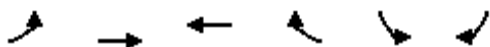
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	346	758	747	0	0	0
Future Volume (vph)	346	758	747	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	363	796	784	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	363	796	784	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	5	Free	6			
Permitted Phases						
Actuated Green, G (s)	31.1	120.0	78.9			
Effective Green, g (s)	33.1	120.0	80.9			
Actuated g/C Ratio	0.28	1.00	0.67			
Clearance Time (s)	4.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	488	3539	2385			
v/s Ratio Prot	c0.21	0.22	c0.22			
v/s Ratio Perm						
v/c Ratio	0.74	0.22	0.33			
Uniform Delay, d1	39.6	0.0	8.2			
Progression Factor	0.88	1.00	1.37			
Incremental Delay, d2	4.5	0.1	0.3			
Delay (s)	39.5	0.1	11.5			
Level of Service	D	A	B			
Approach Delay (s)		12.4	11.5		0.0	
Approach LOS		B	B		A	
Intersection Summary						
HCM 2000 Control Delay		12.1		HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio		0.45				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		6.0
Intersection Capacity Utilization		123.6%		ICU Level of Service		H
Analysis Period (min)		15				
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

11/07/2022



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑↑↑	↑↑↑		↑↓		↑↓
Traffic Volume (vph)	1427	2324	204	31	14	20
Future Volume (vph)	1427	2324	204	31	14	20
Turn Type	NA	NA	Perm	NA	Perm	NA
Protected Phases	2	6		8		4
Permitted Phases			8		4	
Detector Phase	2	6	8	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.0	28.0	40.0	40.0	13.0	13.0
Total Split (s)	75.0	75.0	45.0	45.0	45.0	45.0
Total Split (%)	62.5%	62.5%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.0	4.0		4.0		4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	77.4	77.4		34.6		31.5
Actuated g/C Ratio	0.64	0.64		0.29		0.26
v/c Ratio	0.48	0.78		0.83		0.20
Control Delay	10.3	16.8		57.7		30.5
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	10.3	16.8		57.7		30.5
LOS	B	B		E		C
Approach Delay	10.3	16.8		57.7		30.5
Approach LOS	B	B		E		C

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 3 (3%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 17.7

Intersection LOS: B

Intersection Capacity Utilization 77.7%

ICU Level of Service D

Analysis Period (min) 15

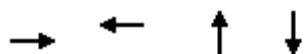
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

11/07/2022



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1577	2516	320	77
v/c Ratio	0.48	0.78	0.83	0.20
Control Delay	10.3	16.8	57.7	30.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	10.3	16.8	57.7	30.5
Queue Length 50th (ft)	179	400	226	42
Queue Length 95th (ft)	226	495	292	77
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3279	3246	454	504
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.48	0.78	0.70	0.15
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

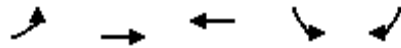
11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1427	0	0	2324	0	204	31	21	14	20	34
Future Volume (vph)	0	1427	0	0	2324	0	204	31	21	14	20	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.99			0.93	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5085			5034			1767			1591	
Flt Permitted		1.00			1.00			0.72			0.92	
Satd. Flow (perm)		5085			5034			1322			1473	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	0	1577	0	0	2516	0	255	39	26	16	23	38
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	1577	0	0	2516	0	0	317	0	0	75	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		75.4			75.4			32.6			32.6	
Effective Green, g (s)		77.4			77.4			34.6			34.6	
Actuated g/C Ratio		0.65			0.65			0.29			0.29	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3279			3246			381			424	
v/s Ratio Prot		0.31			c0.50							
v/s Ratio Perm								c0.24			0.05	
v/c Ratio		0.48			0.78			0.83			0.18	
Uniform Delay, d1		11.0			15.1			40.0			32.0	
Progression Factor		0.83			0.96			1.00			1.00	
Incremental Delay, d2		0.5			1.1			14.4			0.2	
Delay (s)		9.6			15.5			54.3			32.2	
Level of Service		A			B			D			C	
Approach Delay (s)		9.6			15.5			54.3			32.2	
Approach LOS		A			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			16.5				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			77.7%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

11: Duke St & Callahan Dr

11/07/2022

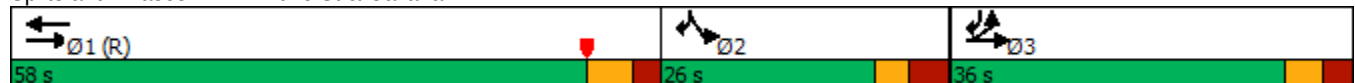


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	305	1157	1586	87	779
Future Volume (vph)	305	1157	1586	87	779
Turn Type	Prot	NA	NA	Prot	pt+ov
Protected Phases	3	1 3	1	2	2 3
Permitted Phases					
Detector Phase	3	1 3	1	2	2 3
Switch Phase					
Minimum Initial (s)	8.0		10.0	8.0	
Minimum Split (s)	14.3		43.5	14.8	
Total Split (s)	36.0		58.0	26.0	
Total Split (%)	30.0%		48.3%	21.7%	
Yellow Time (s)	3.5		4.0	3.0	
All-Red Time (s)	2.8		2.5	3.8	
Lost Time Adjust (s)	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.3		4.5	4.8	
Lead/Lag			Lead	Lag	
Lead-Lag Optimize?					
Recall Mode	None		C-Max	None	
Act Effect Green (s)	31.7	89.5	53.5	21.2	57.2
Actuated g/C Ratio	0.26	0.75	0.45	0.18	0.48
v/c Ratio	0.74	0.34	0.88	0.35	0.70
Control Delay	66.9	5.5	12.7	47.4	28.0
Queue Delay	0.0	0.0	1.3	0.0	0.0
Total Delay	66.9	5.5	14.0	47.4	28.0
LOS	E	A	B	D	C
Approach Delay		18.3	14.0	30.0	
Approach LOS		B	B	C	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 118 (98%), Referenced to phase 1:EBWB, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 19.1
Intersection Capacity Utilization 73.6%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 11: Duke St & Callahan Dr



Queues

11: Duke St & Callahan Dr

11/07/2022



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	337	1279	1933	104	929
v/c Ratio	0.74	0.34	0.88	0.35	0.70
Control Delay	66.9	5.5	12.7	47.4	28.0
Queue Delay	0.0	0.0	1.3	0.0	0.0
Total Delay	66.9	5.5	14.0	47.4	28.0
Queue Length 50th (ft)	277	104	247	71	310
Queue Length 95th (ft)	375	150	m263	124	381
Internal Link Dist (ft)		565	511	483	
Turn Bay Length (ft)	315			175	
Base Capacity (vph)	453	3754	2187	293	1325
Starvation Cap Reductn	0	0	108	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.74	0.34	0.93	0.35	0.70

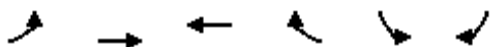
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

11: Duke St & Callahan Dr

11/07/2022

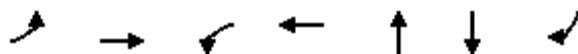


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	305	1157	1586	200	87	779
Future Volume (vph)	305	1157	1586	200	87	779
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		2%	2%		1%	
Total Lost time (s)	4.3	4.5	4.5		4.8	4.8
Lane Util. Factor	1.00	0.91	0.91		1.00	0.88
Flpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1718	5034	4878		1663	2773
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1718	5034	4878		1663	2773
Peak-hour factor, PHF	0.95	0.95	0.97	0.97	0.88	0.88
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	337	1279	1717	216	104	929
RTOR Reduction (vph)	0	0	13	0	0	4
Lane Group Flow (vph)	337	1279	1920	0	104	925
Confl. Peds. (#/hr)	45			45	1	
Heavy Vehicles (%)	4%	2%	2%	6%	8%	2%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	3	1 3	1		2	2 3
Permitted Phases						
Actuated Green, G (s)	29.7	87.5	51.5		19.2	55.7
Effective Green, g (s)	31.7	85.2	53.5		21.2	57.7
Actuated g/C Ratio	0.26	0.71	0.45		0.18	0.48
Clearance Time (s)	6.3		6.5		6.8	
Vehicle Extension (s)	4.0		2.0		2.0	
Lane Grp Cap (vph)	453	3574	2174		293	1333
v/s Ratio Prot	0.20	0.25	c0.39		0.06	c0.33
v/s Ratio Perm						
v/c Ratio	0.74	0.36	0.88		0.35	0.69
Uniform Delay, d1	40.4	6.8	30.4		43.4	24.3
Progression Factor	1.39	1.02	0.33		1.00	1.00
Incremental Delay, d2	6.3	0.1	2.4		0.3	1.3
Delay (s)	62.6	6.9	12.5		43.7	25.6
Level of Service	E	A	B		D	C
Approach Delay (s)		18.6	12.5		27.4	
Approach LOS		B	B		C	
Intersection Summary						
HCM 2000 Control Delay			18.0		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	13.6
Intersection Capacity Utilization			73.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Timings

71: W Taylor Run Pkwy and Service Rd

11/07/2022



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations		↔		↔	↔	↔	↔			
Traffic Volume (vph)	9	6	85	11	26	270	1			
Future Volume (vph)	9	6	85	11	26	270	1			
Turn Type	Perm	NA	Perm	NA	NA	NA	Perm			
Protected Phases		6		6	4 5	4		2	3	5
Permitted Phases	6		6				4			
Detector Phase	6	6	6	6	4 5	4	4			
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0		7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0		13.0	13.0	14.0	33.0	12.5
Total Split (s)	43.0	43.0	43.0	43.0		29.0	29.0	58.0	33.0	15.0
Total Split (%)	35.8%	35.8%	35.8%	35.8%		24.2%	24.2%	48%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0		3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0		-2.0	-2.0			
Total Lost Time (s)		4.0		4.0		4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag		Lag	Lag		Lead	Lead
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max		None	None	C-Max	None	None
Act Effect Green (s)		69.0		69.0	38.9	25.0	25.0			
Actuated g/C Ratio		0.58		0.58	0.32	0.21	0.21			
v/c Ratio		0.11		0.53	0.05	0.77	0.00			
Control Delay		6.6		17.9	3.1	59.1	0.0			
Queue Delay		0.1		5.4	1.7	0.3	0.0			
Total Delay		6.7		23.3	4.8	59.4	0.0			
LOS		A		C	A	E	A			
Approach Delay		6.7		23.3	4.8	59.2				
Approach LOS		A		C	A	E				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 32.7

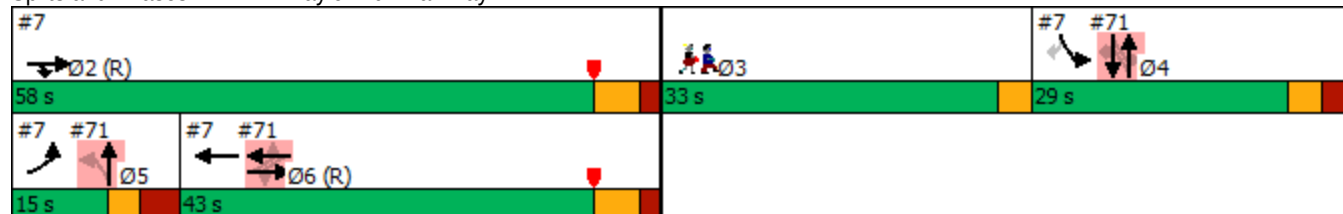
Intersection LOS: C

Intersection Capacity Utilization 51.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Pkwy and Service Rd

11/07/2022



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	106	466	29	298	1
v/c Ratio	0.11	0.53	0.05	0.77	0.00
Control Delay	6.6	17.9	3.1	59.1	0.0
Queue Delay	0.1	5.4	1.7	0.3	0.0
Total Delay	6.7	23.3	4.8	59.4	0.0
Queue Length 50th (ft)	6	141	1	219	0
Queue Length 95th (ft)	41	310	4	#346	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	935	876	621	388	420
Starvation Cap Reductn	0	0	510	0	0
Spillback Cap Reductn	367	340	0	5	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.19	0.87	0.26	0.78	0.00

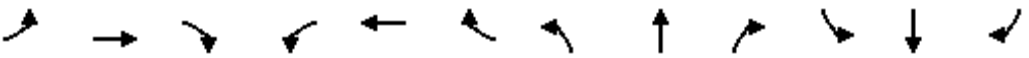
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Pkwy and Service Rd

11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Volume (vph)	9	6	66	85	11	246	0	26	0	0	270	1
Future Volume (vph)	9	6	66	85	11	246	0	26	0	0	270	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.97			1.00			1.00	1.00
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.89			0.90			1.00			1.00	0.85
Flt Protected		0.99			0.99			1.00			1.00	1.00
Satd. Flow (prot)		1648			1614			1863			1863	1583
Flt Permitted		0.94			0.89			1.00			1.00	1.00
Satd. Flow (perm)		1564			1454			1863			1863	1583
Peak-hour factor, PHF	0.81	0.81	0.81	0.77	0.77	0.77	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	12	8	86	116	15	335	0	29	0	0	298	1
RTOR Reduction (vph)	0	39	0	0	52	0	0	0	0	0	0	1
Lane Group Flow (vph)	0	67	0	0	414	0	0	29	0	0	298	0
Confl. Peds. (#/hr)	22					22			7	7		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	2%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA			NA			NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		63.3			63.3			35.2			23.0	23.0
Effective Green, g (s)		65.3			65.3			37.2			25.0	25.0
Actuated g/C Ratio		0.54			0.54			0.31			0.21	0.21
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		851			791			577			388	329
v/s Ratio Prot								c0.02			c0.16	
v/s Ratio Perm		0.04			c0.28							0.00
v/c Ratio		0.08			0.52			0.05			0.77	0.00
Uniform Delay, d1		13.0			17.4			29.0			44.8	37.6
Progression Factor		1.00			1.00			0.11			1.00	1.00
Incremental Delay, d2		0.2			2.5			0.0			8.8	0.0
Delay (s)		13.2			19.9			3.1			53.6	37.6
Level of Service		B			B			A			D	D
Approach Delay (s)		13.2			19.9			3.1			53.6	
Approach LOS		B			B			A			D	
Intersection Summary												
HCM 2000 Control Delay			29.8									
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			120.0									
Intersection Capacity Utilization			51.2%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

130: Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

11/07/2022

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	1815	0	0	346	0
Future Volume (Veh/h)	0	1815	0	0	346	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1906	0	0	363	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				1906	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				1906	0
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	100
cM capacity (veh/h)	1623				75	1085
Direction, Lane #	NB 1	NE 1				
Volume Total	1906	363				
Volume Left	0	363				
Volume Right	0	0				
cSH	1700	75				
Volume to Capacity	1.12	4.82				
Queue Length 95th (ft)	0	Err				
Control Delay (s)	0.0	Err				
Lane LOS		F				
Approach Delay (s)	0.0	Err				
Approach LOS		F				
Intersection Summary						
Average Delay		1599.7				
Intersection Capacity Utilization		127.1%		ICU Level of Service		H
Analysis Period (min)		15				



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix R: Synchro Screening Results (2036 Build Alternative 3)

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

10/31/2022



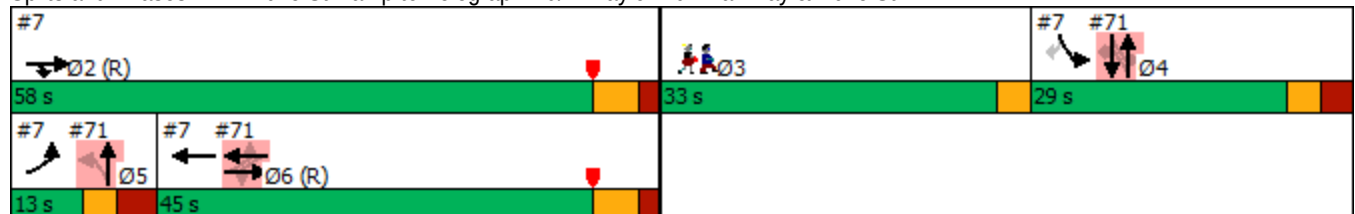
Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	30	928	961	2296	318	36	
Future Volume (vph)	30	928	961	2296	318	36	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	13.0	58.0	58.0	45.0	29.0	29.0	33.0
Total Split (%)	10.8%	48.3%	48.3%	37.5%	24.2%	24.2%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	8.4	80.4	80.4	70.0	25.0	25.0	
Actuated g/C Ratio	0.07	0.67	0.67	0.58	0.21	0.21	
v/c Ratio	0.30	0.52	0.97	0.93	1.04	0.10	
Control Delay	58.9	16.5	40.7	28.4	76.2	0.9	
Queue Delay	0.0	0.0	0.0	1.2	20.6	2.4	
Total Delay	58.9	16.5	40.7	29.6	96.8	3.2	
LOS	E	B	D	C	F	A	
Approach Delay		29.3		29.6			
Approach LOS		C		C			

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 86 (72%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.04
 Intersection Signal Delay: 34.2
 Intersection Capacity Utilization 71.7%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

10/31/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	35	1095	1134	2565	384	43
v/c Ratio	0.30	0.52	0.97	0.93	1.04	0.10
Control Delay	58.9	16.5	40.7	28.4	76.2	0.9
Queue Delay	0.0	0.0	0.0	1.2	20.6	2.4
Total Delay	58.9	16.5	40.7	29.6	96.8	3.2
Queue Length 50th (ft)	27	203	677	635	~97	1
Queue Length 95th (ft)	m47	433	#1422	m#1076	m#412	m0
Internal Link Dist (ft)		321		722		
Turn Bay Length (ft)	180					
Base Capacity (vph)	116	2122	1167	2750	368	413
Starvation Cap Reductn	0	0	0	0	26	293
Spillback Cap Reductn	0	0	0	69	0	7
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.30	0.52	0.97	0.96	1.12	0.36

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

10/31/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	928	961	0	2296	0	0	0	0	318	0	36
Future Volume (vph)	30	928	961	0	2296	0	0	0	0	318	0	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1641	3167	1743		4715					1770		1553
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1641	3167	1743		4715					1770		1553
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	1.00	1.00	1.00	0.87	0.87	0.87
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	35	1095	1134	0	2565	0	0	0	0	384	0	43
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	34
Lane Group Flow (vph)	35	1095	1134	0	2565	0	0	0	0	384	0	9
Confl. Peds. (#/hr)										3		5
Heavy Vehicles (%)	10%	14%	9%	2%	10%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	5.2	76.0	76.0		64.3					23.0		23.0
Effective Green, g (s)	7.2	78.0	78.0		66.3					25.0		25.0
Actuated g/C Ratio	0.06	0.65	0.65		0.55					0.21		0.21
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	98	2058	1132		2605					368		323
v/s Ratio Prot	0.02	0.35	c0.65		0.54					c0.22		
v/s Ratio Perm												0.01
v/c Ratio	0.36	0.53	1.00		0.98					1.04		0.03
Uniform Delay, d1	54.2	11.2	21.0		26.4					47.5		37.8
Progression Factor	0.99	1.24	1.15		1.05					0.44		1.00
Incremental Delay, d2	1.9	0.8	25.0		8.2					51.9		0.0
Delay (s)	55.6	14.7	49.2		35.8					72.6		37.8
Level of Service	E	B	D		D					E		D
Approach Delay (s)		32.6			35.8			0.0			69.1	
Approach LOS		C			D			A			E	
Intersection Summary												
HCM 2000 Control Delay			37.1									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.00									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			71.7%									ICU Level of Service C
Analysis Period (min)			15									
c Critical Lane Group												

Timings

8: Duke Street eastbound and Telegraph Road on-ramp

10/31/2022



Lane Group	EBL	EBT	WBT	SBR	Ø4
Lane Configurations	↰	↑↑	↑↑	↰	
Traffic Volume (vph)	288	958	863	1701	
Future Volume (vph)	288	958	863	1701	
Turn Type	Prot	NA	NA	pt+ov	
Protected Phases	5	2	6	4 5	4
Permitted Phases					
Detector Phase	5	2	6	4 5	
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0		4.0
Minimum Split (s)	8.0	20.0	23.0		8.0
Total Split (s)	24.0	63.0	39.0		57.0
Total Split (%)	20.0%	52.5%	32.5%		48%
Yellow Time (s)	3.5	3.5	4.0		3.5
All-Red Time (s)	0.5	0.5	2.0		0.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0		
Total Lost Time (s)	2.0	2.0	4.0		
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?			Yes		
Recall Mode	None	C-Max	C-Max		None
Act Effect Green (s)	22.0	61.0	35.0	79.0	
Actuated g/C Ratio	0.18	0.51	0.29	0.66	
v/c Ratio	0.93	0.56	0.88	1.01	
Control Delay	78.9	22.5	53.5	44.0	
Queue Delay	0.0	0.0	0.0	0.0	
Total Delay	78.9	22.5	53.5	44.0	
LOS	E	C	D	D	
Approach Delay		35.5	53.5		
Approach LOS		D	D		

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.01

Intersection Signal Delay: 43.4

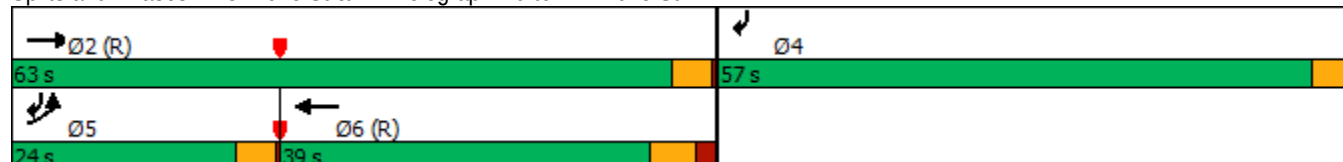
Intersection LOS: D

Intersection Capacity Utilization 94.2%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 8: Duke St & NB Telegraph Rd to WB Duke St



Queues

8: Duke Street eastbound and Telegraph Road on-ramp

10/31/2022



Lane Group	EBL	EBT	WBT	SBR
Lane Group Flow (vph)	302	1006	906	1823
v/c Ratio	0.93	0.56	0.88	1.01
Control Delay	78.9	22.5	53.5	44.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	78.9	22.5	53.5	44.0
Queue Length 50th (ft)	238	224	367	~764
Queue Length 95th (ft)	m#362	m463	m#459	#989
Internal Link Dist (ft)		184	95	
Turn Bay Length (ft)	300			
Base Capacity (vph)	324	1798	1032	1808
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.93	0.56	0.88	1.01

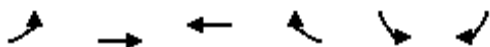
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

8: Duke Street eastbound and Telegraph Road on-ramp

10/31/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	288	958	863	0	0	1701
Future Volume (vph)	288	958	863	0	0	1701
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	2.0	4.0			2.0
Lane Util. Factor	1.00	0.95	0.95			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	3539	3539			2733
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	3539	3539			2733
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.98
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	302	1006	906	0	0	1822
RTOR Reduction (vph)	0	0	0	0	0	10
Lane Group Flow (vph)	302	1006	906	0	0	1813
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	NA	NA			pt+ov
Protected Phases	5	2	6			4 5
Permitted Phases						
Actuated Green, G (s)	20.0	59.0	33.0			77.0
Effective Green, g (s)	22.0	61.0	35.0			79.0
Actuated g/C Ratio	0.18	0.51	0.29			0.66
Clearance Time (s)	4.0	4.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0			
Lane Grp Cap (vph)	324	1798	1032			1799
v/s Ratio Prot	0.17	0.28	c0.26			c0.66
v/s Ratio Perm						
v/c Ratio	0.93	0.56	0.88			1.01
Uniform Delay, d1	48.3	20.3	40.5			20.5
Progression Factor	1.02	1.05	1.08			1.00
Incremental Delay, d2	27.0	1.0	9.3			23.2
Delay (s)	76.1	22.2	53.2			43.7
Level of Service	E	C	D			D
Approach Delay (s)		34.7	53.2		43.7	
Approach LOS		C	D		D	
Intersection Summary						
HCM 2000 Control Delay			42.9		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.98			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			94.2%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

10/31/2022



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑↑↑	↑↑↑		↑↓		↑↓
Traffic Volume (vph)	2150	1066	284	28	16	13
Future Volume (vph)	2150	1066	284	28	16	13
Turn Type	NA	NA	Perm	NA	Perm	NA
Protected Phases	2	6		8		4
Permitted Phases			8		4	
Detector Phase	2	6	8	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.0	28.0	40.0	40.0	13.0	13.0
Total Split (s)	68.0	68.0	52.0	52.0	52.0	52.0
Total Split (%)	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.0	4.0		4.0		4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	66.1	66.1		45.9		45.9
Actuated g/C Ratio	0.55	0.55		0.38		0.38
v/c Ratio	0.90	0.45		0.93		0.16
Control Delay	33.2	17.2		62.4		13.6
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	33.2	17.2		62.4		13.6
LOS	C	B		E		B
Approach Delay	33.2	17.2		62.4		13.6
Approach LOS	C	B		E		B

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 31.3

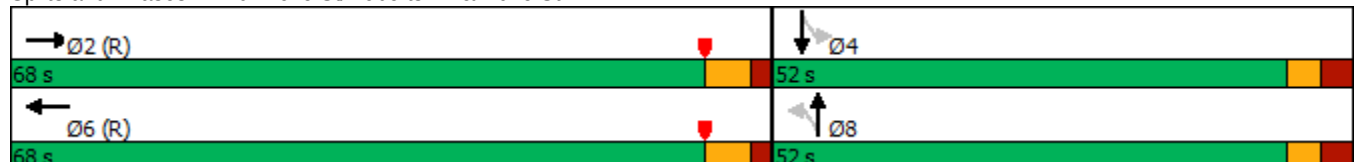
Intersection LOS: C

Intersection Capacity Utilization 76.4%

ICU Level of Service D

Analysis Period (min) 15

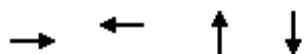
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

10/31/2022



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	2508	1217	446	97
v/c Ratio	0.90	0.45	0.93	0.16
Control Delay	33.2	17.2	62.4	13.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	33.2	17.2	62.4	13.6
Queue Length 50th (ft)	561	205	317	24
Queue Length 95th (ft)	643	244	359	48
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	2772	2692	502	619
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.90	0.45	0.89	0.16
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

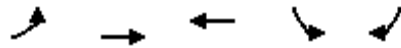
10/31/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2150	0	0	1066	0	284	28	11	16	13	42
Future Volume (vph)	0	2150	0	0	1066	0	284	28	11	16	13	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			1.00			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5036			4891			1756			1666	
Flt Permitted		1.00			1.00			0.68			0.88	
Satd. Flow (perm)		5036			4891			1255			1479	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.76	0.76	0.76	0.77	0.77	0.77
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	0	2508	0	0	1217	0	392	39	15	22	18	57
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	28	0
Lane Group Flow (vph)	0	2508	0	0	1217	0	0	445	0	0	69	0
Confl. Peds. (#/hr)	18		3	3		18			8	8		
Heavy Vehicles (%)	2%	3%	2%	2%	5%	2%	3%	2%	9%	2%	2%	5%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		64.1			64.1			43.9			43.9	
Effective Green, g (s)		66.1			66.1			45.9			45.9	
Actuated g/C Ratio		0.55			0.55			0.38			0.38	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			0.2			3.0			3.0	
Lane Grp Cap (vph)		2773			2694			480			565	
v/s Ratio Prot		c0.50			0.25							
v/s Ratio Perm								c0.35			0.05	
v/c Ratio		0.90			0.45			0.93			0.12	
Uniform Delay, d1		24.1			16.1			35.5			24.0	
Progression Factor		1.11			1.00			1.00			1.00	
Incremental Delay, d2		5.4			0.5			24.1			0.1	
Delay (s)		32.3			16.7			59.6			24.1	
Level of Service		C			B			E			C	
Approach Delay (s)		32.3			16.7			59.6			24.1	
Approach LOS		C			B			E			C	
Intersection Summary												
HCM 2000 Control Delay			30.5				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.91									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			76.4%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

11: Duke St & Callahan Dr

10/31/2022



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations	↰	↑↑↑	↑↑↑	↰	↰↰
Traffic Volume (vph)	429	1748	715	131	383
Future Volume (vph)	429	1748	715	131	383
Turn Type	Prot	NA	NA	Prot	pt+ov
Protected Phases	3	1 3	1	2	2 3
Permitted Phases					
Detector Phase	3	1 3	1	2	2 3
Switch Phase					
Minimum Initial (s)	8.0		10.0	8.0	
Minimum Split (s)	14.3		43.5	14.8	
Total Split (s)	57.0		47.0	26.0	
Total Split (%)	43.8%		36.2%	20.0%	
Yellow Time (s)	3.5		4.0	3.0	
All-Red Time (s)	2.8		2.5	3.8	
Lost Time Adjust (s)	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.3		4.5	4.8	
Lead/Lag			Lead	Lag	
Lead-Lag Optimize?					
Recall Mode	None		C-Max	None	
Act Effect Green (s)	52.7	102.7	45.7	18.0	75.0
Actuated g/C Ratio	0.41	0.79	0.35	0.14	0.58
v/c Ratio	0.70	0.50	0.63	0.66	0.29
Control Delay	38.4	5.5	20.5	66.5	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.4	5.5	20.5	66.5	13.2
LOS	D	A	C	E	B
Approach Delay		12.0	20.5	26.8	
Approach LOS		B	C	C	

Intersection Summary

Cycle Length: 130
Actuated Cycle Length: 130
Offset: 64 (49%), Referenced to phase 1:EBWB, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.70
Intersection Signal Delay: 16.4
Intersection Capacity Utilization 74.7%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

Splits and Phases: 11: Duke St & Callahan Dr



Queues

11: Duke St & Callahan Dr

10/31/2022

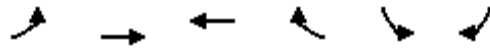


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	484	1974	1042	160	468
v/c Ratio	0.70	0.50	0.63	0.66	0.29
Control Delay	38.4	5.5	20.5	66.5	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	38.4	5.5	20.5	66.5	13.2
Queue Length 50th (ft)	334	179	239	129	100
Queue Length 95th (ft)	465	230	280	190	119
Internal Link Dist (ft)		565	511	483	
Turn Bay Length (ft)	315			175	
Base Capacity (vph)	696	3939	1647	284	1585
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	267	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.70	0.54	0.63	0.56	0.30
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

11: Duke St & Callahan Dr

10/31/2022

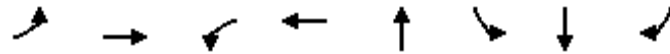


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	429	1748	715	148	131	383
Future Volume (vph)	429	1748	715	148	131	383
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		2%	2%		1%	
Total Lost time (s)	4.3	4.5	4.5		4.8	4.8
Lane Util. Factor	1.00	0.91	0.91		1.00	0.88
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.97		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1718	4986	4620		1744	2773
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1718	4986	4620		1744	2773
Peak-hour factor, PHF	0.93	0.93	0.87	0.87	0.86	0.86
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	484	1974	863	179	160	468
RTOR Reduction (vph)	0	0	23	0	0	13
Lane Group Flow (vph)	484	1974	1019	0	160	455
Confl. Peds. (#/hr)	64			64		
Heavy Vehicles (%)	4%	3%	5%	10%	3%	2%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	3	1 3	1		2	2 3
Permitted Phases						
Actuated Green, G (s)	50.7	100.7	43.7		16.0	73.5
Effective Green, g (s)	52.7	98.4	45.7		18.0	75.5
Actuated g/C Ratio	0.41	0.76	0.35		0.14	0.58
Clearance Time (s)	6.3		6.5		6.8	
Vehicle Extension (s)	4.0		2.0		2.0	
Lane Grp Cap (vph)	696	3774	1624		241	1610
v/s Ratio Prot	c0.28	0.40	c0.22		c0.09	0.16
v/s Ratio Perm						
v/c Ratio	0.70	0.52	0.63		0.66	0.28
Uniform Delay, d1	32.0	6.4	35.1		53.1	13.7
Progression Factor	1.00	1.00	0.55		1.00	1.00
Incremental Delay, d2	3.3	0.2	1.6		5.2	0.0
Delay (s)	35.3	6.5	20.7		58.4	13.7
Level of Service	D	A	C		E	B
Approach Delay (s)		12.2	20.7		25.1	
Approach LOS		B	C		C	
Intersection Summary						
HCM 2000 Control Delay			16.3		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.66			
Actuated Cycle Length (s)			130.0		Sum of lost time (s)	13.6
Intersection Capacity Utilization			74.7%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Timings

71: W Taylor Run Pkwy and Service Rd

10/31/2022



Lane Group	EBL	EBT	WBL	WBT	NBT	SBL	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations											
Traffic Volume (vph)	19	8	56	6	30	1	275	6			
Future Volume (vph)	19	8	56	6	30	1	275	6			
Turn Type	Perm	NA	Perm	NA	NA	Perm	NA	Perm			
Protected Phases		6		6	4 5		4		2	3	5
Permitted Phases	6		6			4		4			
Detector Phase	6	6	6	6	4 5	4	4	4			
Switch Phase											
Minimum Initial (s)	7.0	7.0	7.0	7.0		7.0	7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0		13.0	13.0	13.0	14.0	33.0	12.5
Total Split (s)	45.0	45.0	45.0	45.0		29.0	29.0	29.0	58.0	33.0	13.0
Total Split (%)	37.5%	37.5%	37.5%	37.5%		24.2%	24.2%	24.2%	48%	28%	11%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0		3.0	3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0			-2.0	-2.0			
Total Lost Time (s)		4.0		4.0			4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag		Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max		None	None	None	C-Max	None	None
Act Effect Green (s)		70.0		70.0	37.9		25.0	25.0			
Actuated g/C Ratio		0.58		0.58	0.32		0.21	0.21			
v/c Ratio		0.07		0.10	0.06		0.86	0.02			
Control Delay		10.9		16.4	1.9		67.6	0.0			
Queue Delay		0.1		0.1	2.5		0.6	0.0			
Total Delay		10.9		16.5	4.4		68.1	0.0			
LOS		B		B	A		E	A			
Approach Delay		10.9		16.5	4.4		66.7				
Approach LOS		B		B	A		E				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 86 (72%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.04

Intersection Signal Delay: 47.5

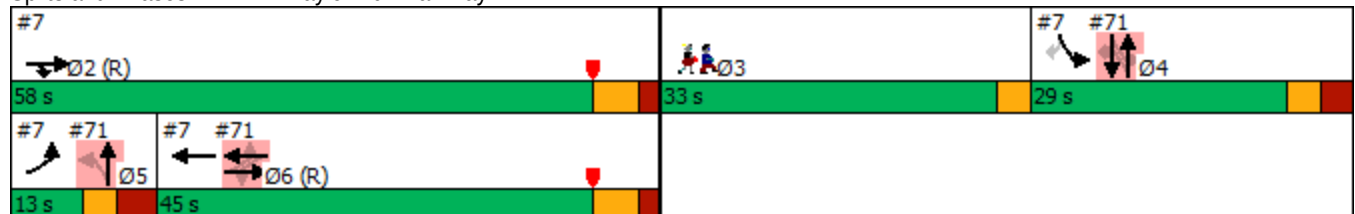
Intersection LOS: D

Intersection Capacity Utilization 30.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Pkwy and Service Rd

10/31/2022



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	68	83	34	333	7
v/c Ratio	0.07	0.10	0.06	0.86	0.02
Control Delay	10.9	16.4	1.9	67.6	0.0
Queue Delay	0.1	0.1	2.5	0.6	0.0
Total Delay	10.9	16.5	4.4	68.1	0.0
Queue Length 50th (ft)	11	25	0	251	0
Queue Length 95th (ft)	43	72	3	#384	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	925	807	589	388	411
Starvation Cap Reductn	0	0	485	0	0
Spillback Cap Reductn	309	272	0	4	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.11	0.16	0.33	0.87	0.02

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Pkwy and Service Rd

10/31/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	8	23	56	6	0	0	30	0	1	275	6
Future Volume (vph)	19	8	23	56	6	0	0	30	0	1	275	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			1.00			1.00			1.00	0.98
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.94			1.00			1.00			1.00	0.85
Flt Protected		0.98			0.96			1.00			1.00	1.00
Satd. Flow (prot)		1710			1782			1863			1862	1544
Flt Permitted		0.90			0.74			1.00			1.00	1.00
Satd. Flow (perm)		1569			1384			1863			1862	1544
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.87
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	26	11	31	75	8	0	0	34	0	1	332	7
RTOR Reduction (vph)	0	14	0	0	0	0	0	0	0	0	0	6
Lane Group Flow (vph)	0	54	0	0	83	0	0	34	0	0	333	1
Confl. Peds. (#/hr)	10					10	2		1	1		2
Turn Type	Perm	NA		Perm	NA			NA		Perm	NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		64.3			64.3			34.2			23.0	23.0
Effective Green, g (s)		66.3			66.3			36.2			25.0	25.0
Actuated g/C Ratio		0.55			0.55			0.30			0.21	0.21
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		866			764			562			387	321
v/s Ratio Prot								c0.02				
v/s Ratio Perm		0.03			c0.06						0.18	0.00
v/c Ratio		0.06			0.11			0.06			0.86	0.00
Uniform Delay, d1		12.4			12.8			29.8			45.8	37.6
Progression Factor		1.00			1.00			0.06			1.00	1.00
Incremental Delay, d2		0.1			0.3			0.0			17.4	0.0
Delay (s)		12.6			13.1			1.8			63.2	37.6
Level of Service		B			B			A			E	D
Approach Delay (s)		12.6			13.1			1.8			62.7	
Approach LOS		B			B			A			E	
Intersection Summary												
HCM 2000 Control Delay		44.4			HCM 2000 Level of Service			D				
HCM 2000 Volume to Capacity ratio		0.28										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			15.5				
Intersection Capacity Utilization		30.2%			ICU Level of Service			A				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

112: Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

10/31/2022

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		 				
Traffic Volume (veh/h)	0	529	0	1701	288	0
Future Volume (Veh/h)	0	529	0	1701	288	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	555	0	1786	302	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1786				278	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1786				278	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				56	100
cM capacity (veh/h)	343				689	1084
Direction, Lane #	NB 1	NB 2	SB 1	NE 1		
Volume Total	278	278	1786	302		
Volume Left	0	0	0	302		
Volume Right	0	0	1786	0		
cSH	1700	1700	1700	689		
Volume to Capacity	0.16	0.16	1.05	0.44		
Queue Length 95th (ft)	0	0	0	56		
Control Delay (s)	0.0	0.0	0.0	14.2		
Lane LOS				B		
Approach Delay (s)	0.0		0.0	14.2		
Approach LOS				B		
Intersection Summary						
Average Delay			1.6			
Intersection Capacity Utilization			113.9%	ICU Level of Service		H
Analysis Period (min)			15			

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/07/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	26	702	1253	1978	402	19	
Future Volume (vph)	26	702	1253	1978	402	19	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	15.0	58.0	58.0	43.0	29.0	29.0	33.0
Total Split (%)	12.5%	48.3%	48.3%	35.8%	24.2%	24.2%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.4	80.4	80.4	69.0	25.0	25.0	
Actuated g/C Ratio	0.08	0.67	0.67	0.58	0.21	0.21	
v/c Ratio	0.23	0.33	1.10	0.80	1.24	0.05	
Control Delay	69.5	4.7	74.3	23.2	152.8	0.2	
Queue Delay	0.0	0.0	0.0	0.0	0.2	1.4	
Total Delay	69.5	4.7	74.3	23.2	153.1	1.6	
LOS	E	A	E	C	F	A	
Approach Delay		49.6		23.2			
Approach LOS		D		C			

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 46.6

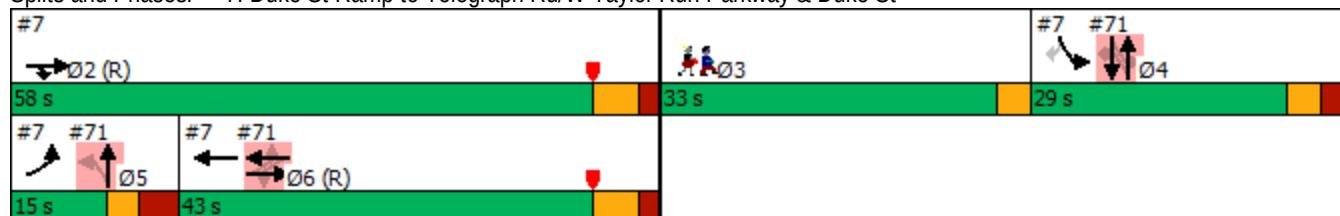
Intersection LOS: D

Intersection Capacity Utilization 84.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/07/2022



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	28	745	1329	2258	444	21
v/c Ratio	0.23	0.33	1.10	0.80	1.24	0.05
Control Delay	69.5	4.7	74.3	23.2	152.8	0.2
Queue Delay	0.0	0.0	0.0	0.0	0.2	1.4
Total Delay	69.5	4.7	74.3	23.2	153.1	1.6
Queue Length 50th (ft)	23	35	~625	383	~429	0
Queue Length 95th (ft)	m35	170	#1784	#966	#607	m0
Internal Link Dist (ft)		321		722		
Turn Bay Length (ft)	180					
Base Capacity (vph)	137	2260	1212	2814	358	420
Starvation Cap Reductn	0	0	0	0	8	322
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.33	1.10	0.80	1.27	0.21

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	702	1253	0	1978	0	0	0	0	402	0	19
Future Volume (vph)	26	702	1253	0	1978	0	0	0	0	402	0	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1570	3374	1810		4893					1719		1583
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1570	3374	1810		4893					1719		1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	28	745	1329	0	2258	0	0	0	0	444	0	21
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	17
Lane Group Flow (vph)	28	745	1329	0	2258	0	0	0	0	444	0	4
Confl. Peds. (#/hr)										7	7	
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	6.2	76.0	76.0		63.3					23.0		23.0
Effective Green, g (s)	8.2	78.0	78.0		65.3					25.0		25.0
Actuated g/C Ratio	0.07	0.65	0.65		0.54					0.21		0.21
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	107	2193	1176		2662					358		329
v/s Ratio Prot	0.02	0.22	c0.73		0.46					c0.26		
v/s Ratio Perm												0.00
v/c Ratio	0.26	0.34	1.13		0.85					1.24		0.01
Uniform Delay, d1	53.0	9.4	21.0		23.2					47.5		37.7
Progression Factor	1.27	0.41	0.88		0.94					0.55		1.00
Incremental Delay, d2	1.1	0.4	68.5		2.3					126.0		0.0
Delay (s)	68.4	4.3	86.9		24.1					151.9		37.7
Level of Service	E	A	F		C					F		D
Approach Delay (s)		57.3			24.1			0.0			146.7	
Approach LOS		E			C			A			F	
Intersection Summary												
HCM 2000 Control Delay			50.4									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			84.8%									ICU Level of Service E
Analysis Period (min)			15									
c Critical Lane Group												

Timings

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022



Lane Group	EBL	EBT	WBT	SBR	Ø4
Lane Configurations					
Traffic Volume (vph)	346	758	747	1465	
Future Volume (vph)	346	758	747	1465	
Turn Type	Prot	NA	NA	pt+ov	
Protected Phases	5	2	6	4 5	4
Permitted Phases					
Detector Phase	5	2	6	4 5	
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0		4.0
Minimum Split (s)	8.0	22.0	22.0		20.0
Total Split (s)	35.0	73.0	38.0		47.0
Total Split (%)	29.2%	60.8%	31.7%		39%
Yellow Time (s)	3.5	4.0	4.0		3.5
All-Red Time (s)	0.5	2.0	2.0		0.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0		
Total Lost Time (s)	2.0	4.0	4.0		
Lead/Lag	Lead		Lag		
Lead-Lag Optimize?			Yes		
Recall Mode	None	C-Max	C-Max		None
Act Effect Green (s)	31.7	69.0	35.3	78.7	
Actuated g/C Ratio	0.26	0.58	0.29	0.66	
v/c Ratio	0.78	0.39	0.75	0.87	
Control Delay	41.5	18.8	39.0	22.4	
Queue Delay	0.0	0.0	0.0	0.0	
Total Delay	41.5	18.8	39.0	22.4	
LOS	D	B	D	C	
Approach Delay		25.9	39.0		
Approach LOS		C	D		

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 27.2

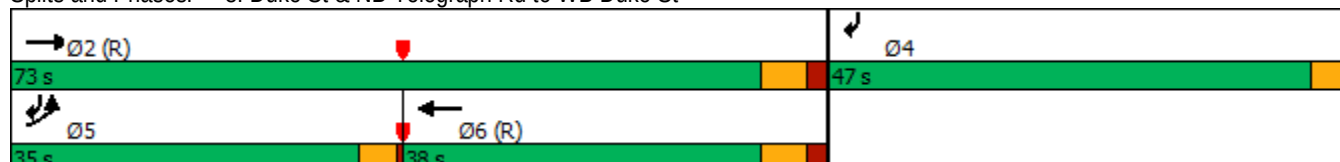
Intersection LOS: C

Intersection Capacity Utilization 82.2%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 8: Duke St & NB Telegraph Rd to WB Duke St



Queues

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022



Lane Group	EBL	EBT	WBT	SBR
Lane Group Flow (vph)	363	796	784	1570
v/c Ratio	0.78	0.39	0.75	0.87
Control Delay	41.5	18.8	39.0	22.4
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	41.5	18.8	39.0	22.4
Queue Length 50th (ft)	259	237	326	478
Queue Length 95th (ft)	m195	m122	395	618
Internal Link Dist (ft)		184	95	
Turn Bay Length (ft)	300			
Base Capacity (vph)	486	2034	1041	1837
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.75	0.39	0.75	0.85

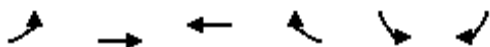
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

8: Duke Street eastbound and Telegraph Road on-ramp

11/07/2022



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	346	758	747	0	0	1465
Future Volume (vph)	346	758	747	0	0	1465
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	2.0	4.0	4.0			2.0
Lane Util. Factor	1.00	0.95	0.95			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	3539	3539			2733
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	3539	3539			2733
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.98
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	363	796	784	0	0	1570
RTOR Reduction (vph)	0	0	0	0	0	15
Lane Group Flow (vph)	363	796	784	0	0	1555
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	NA	NA			pt+ov
Protected Phases	5	2	6			4 5
Permitted Phases						
Actuated Green, G (s)	29.7	67.0	33.3			76.7
Effective Green, g (s)	31.7	69.0	35.3			78.7
Actuated g/C Ratio	0.26	0.58	0.29			0.66
Clearance Time (s)	4.0	6.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0			
Lane Grp Cap (vph)	467	2034	1041			1792
v/s Ratio Prot	0.21	0.22	c0.22			c0.57
v/s Ratio Perm						
v/c Ratio	0.78	0.39	0.75			0.87
Uniform Delay, d1	40.9	14.0	38.4			16.5
Progression Factor	0.79	1.30	0.90			1.00
Incremental Delay, d2	6.0	0.4	3.6			4.7
Delay (s)	38.1	18.6	38.3			21.2
Level of Service	D	B	D			C
Approach Delay (s)		24.7	38.3		21.2	
Approach LOS		C	D		C	
Intersection Summary						
HCM 2000 Control Delay			26.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.84			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	8.0
Intersection Capacity Utilization			82.2%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

11/07/2022



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑↑↑	↑↑↑		↑↓		↑↓
Traffic Volume (vph)	1427	2324	204	31	14	20
Future Volume (vph)	1427	2324	204	31	14	20
Turn Type	NA	NA	Perm	NA	Perm	NA
Protected Phases	2	6		8		4
Permitted Phases			8		4	
Detector Phase	2	6	8	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	10.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.0	28.0	40.0	40.0	13.0	13.0
Total Split (s)	75.0	75.0	45.0	45.0	45.0	45.0
Total Split (%)	62.5%	62.5%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.0	4.0		4.0		4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	77.4	77.4		34.6		31.5
Actuated g/C Ratio	0.64	0.64		0.29		0.26
v/c Ratio	0.48	0.78		0.83		0.20
Control Delay	9.7	16.8		57.7		30.5
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	9.7	16.8		57.7		30.5
LOS	A	B		E		C
Approach Delay	9.7	16.8		57.7		30.5
Approach LOS	A	B		E		C

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 3 (3%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 17.5

Intersection LOS: B

Intersection Capacity Utilization 77.7%

ICU Level of Service D

Analysis Period (min) 15

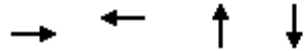
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

11/07/2022



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1577	2516	320	77
v/c Ratio	0.48	0.78	0.83	0.20
Control Delay	9.7	16.8	57.7	30.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.7	16.8	57.7	30.5
Queue Length 50th (ft)	144	400	226	42
Queue Length 95th (ft)	226	495	292	77
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3279	3246	454	504
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.48	0.78	0.70	0.15
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

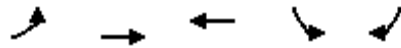
11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1427	0	0	2324	0	204	31	21	14	20	34
Future Volume (vph)	0	1427	0	0	2324	0	204	31	21	14	20	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.99			0.93	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5085			5034			1767			1591	
Flt Permitted		1.00			1.00			0.72			0.92	
Satd. Flow (perm)		5085			5034			1322			1473	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	0	1577	0	0	2516	0	255	39	26	16	23	38
RTOR Reduction (vph)	0	0	0	0	0	0	0	3	0	0	2	0
Lane Group Flow (vph)	0	1577	0	0	2516	0	0	317	0	0	75	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		75.4			75.4			32.6			32.6	
Effective Green, g (s)		77.4			77.4			34.6			34.6	
Actuated g/C Ratio		0.65			0.65			0.29			0.29	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3279			3246			381			424	
v/s Ratio Prot		0.31			c0.50							
v/s Ratio Perm								c0.24			0.05	
v/c Ratio		0.48			0.78			0.83			0.18	
Uniform Delay, d1		11.0			15.1			40.0			32.0	
Progression Factor		0.78			0.96			1.00			1.00	
Incremental Delay, d2		0.5			1.1			14.4			0.2	
Delay (s)		9.0			15.5			54.3			32.2	
Level of Service		A			B			D			C	
Approach Delay (s)		9.0			15.5			54.3			32.2	
Approach LOS		A			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			16.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			77.7%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

11: Duke St & Callahan Dr

11/07/2022

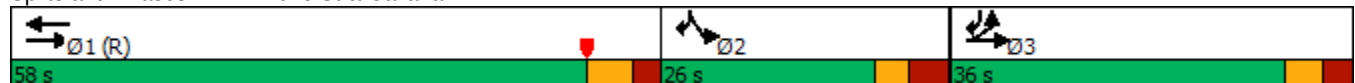


Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Configurations					
Traffic Volume (vph)	305	1157	1586	87	779
Future Volume (vph)	305	1157	1586	87	779
Turn Type	Prot	NA	NA	Prot	pt+ov
Protected Phases	3	1 3	1	2	2 3
Permitted Phases					
Detector Phase	3	1 3	1	2	2 3
Switch Phase					
Minimum Initial (s)	8.0		10.0	8.0	
Minimum Split (s)	14.3		43.5	14.8	
Total Split (s)	36.0		58.0	26.0	
Total Split (%)	30.0%		48.3%	21.7%	
Yellow Time (s)	3.5		4.0	3.0	
All-Red Time (s)	2.8		2.5	3.8	
Lost Time Adjust (s)	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.3		4.5	4.8	
Lead/Lag			Lead	Lag	
Lead-Lag Optimize?					
Recall Mode	None		C-Max	None	
Act Effect Green (s)	31.7	89.5	53.5	21.2	57.2
Actuated g/C Ratio	0.26	0.75	0.45	0.18	0.48
v/c Ratio	0.74	0.34	0.88	0.35	0.70
Control Delay	60.1	10.4	12.7	47.4	28.0
Queue Delay	0.0	0.0	1.3	0.0	0.0
Total Delay	60.1	10.4	14.0	47.4	28.0
LOS	E	B	B	D	C
Approach Delay		20.8	14.0	30.0	
Approach LOS		C	B	C	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 118 (98%), Referenced to phase 1:EBWB, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 20.0
 Intersection LOS: C
 Intersection Capacity Utilization 73.6%
 ICU Level of Service D
 Analysis Period (min) 15

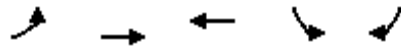
Splits and Phases: 11: Duke St & Callahan Dr



Queues

11: Duke St & Callahan Dr

11/07/2022



Lane Group	EBL	EBT	WBT	SBL	SBR
Lane Group Flow (vph)	337	1279	1933	104	929
v/c Ratio	0.74	0.34	0.88	0.35	0.70
Control Delay	60.1	10.4	12.7	47.4	28.0
Queue Delay	0.0	0.0	1.3	0.0	0.0
Total Delay	60.1	10.4	14.0	47.4	28.0
Queue Length 50th (ft)	277	186	247	71	310
Queue Length 95th (ft)	375	189	m263	124	381
Internal Link Dist (ft)		565	511	483	
Turn Bay Length (ft)	315			175	
Base Capacity (vph)	453	3754	2187	293	1325
Starvation Cap Reductn	0	0	108	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.74	0.34	0.93	0.35	0.70

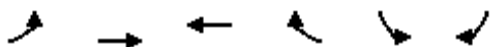
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

11: Duke St & Callahan Dr

11/07/2022

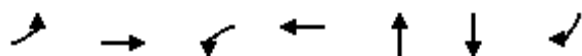


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	305	1157	1586	200	87	779
Future Volume (vph)	305	1157	1586	200	87	779
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		2%	2%		1%	
Total Lost time (s)	4.3	4.5	4.5		4.8	4.8
Lane Util. Factor	1.00	0.91	0.91		1.00	0.88
Flpb, ped/bikes	1.00	1.00	0.99		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1718	5034	4878		1663	2773
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1718	5034	4878		1663	2773
Peak-hour factor, PHF	0.95	0.95	0.97	0.97	0.88	0.88
Growth Factor (vph)	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	337	1279	1717	216	104	929
RTOR Reduction (vph)	0	0	13	0	0	4
Lane Group Flow (vph)	337	1279	1920	0	104	925
Confl. Peds. (#/hr)	45			45	1	
Heavy Vehicles (%)	4%	2%	2%	6%	8%	2%
Turn Type	Prot	NA	NA		Prot	pt+ov
Protected Phases	3	1 3	1		2	2 3
Permitted Phases						
Actuated Green, G (s)	29.7	87.5	51.5		19.2	55.7
Effective Green, g (s)	31.7	85.2	53.5		21.2	57.7
Actuated g/C Ratio	0.26	0.71	0.45		0.18	0.48
Clearance Time (s)	6.3		6.5		6.8	
Vehicle Extension (s)	4.0		2.0		2.0	
Lane Grp Cap (vph)	453	3574	2174		293	1333
v/s Ratio Prot	0.20	0.25	c0.39		0.06	c0.33
v/s Ratio Perm						
v/c Ratio	0.74	0.36	0.88		0.35	0.69
Uniform Delay, d1	40.4	6.8	30.4		43.4	24.3
Progression Factor	1.23	1.95	0.33		1.00	1.00
Incremental Delay, d2	6.3	0.1	2.4		0.3	1.3
Delay (s)	55.8	13.3	12.5		43.7	25.6
Level of Service	E	B	B		D	C
Approach Delay (s)		22.2	12.5		27.4	
Approach LOS		C	B		C	
Intersection Summary						
HCM 2000 Control Delay			19.2		HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	13.6
Intersection Capacity Utilization			73.6%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

Timings

71: W Taylor Run Pkwy and Service Rd

11/07/2022



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations		↔		↔	↔	↔	↔			
Traffic Volume (vph)	9	6	85	11	26	270	1			
Future Volume (vph)	9	6	85	11	26	270	1			
Turn Type	Perm	NA	Perm	NA	NA	NA	Perm			
Protected Phases		6		6	4 5	4		2	3	5
Permitted Phases	6		6				4			
Detector Phase	6	6	6	6	4 5	4	4			
Switch Phase										
Minimum Initial (s)	7.0	7.0	7.0	7.0		7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0		13.0	13.0	14.0	33.0	12.5
Total Split (s)	43.0	43.0	43.0	43.0		29.0	29.0	58.0	33.0	15.0
Total Split (%)	35.8%	35.8%	35.8%	35.8%		24.2%	24.2%	48%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0		3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0		-2.0	-2.0			
Total Lost Time (s)		4.0		4.0		4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag		Lag	Lag		Lead	Lead
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	C-Max	C-Max		None	None	C-Max	None	None
Act Effect Green (s)		69.0		69.0	38.9	25.0	25.0			
Actuated g/C Ratio		0.58		0.58	0.32	0.21	0.21			
v/c Ratio		0.11		0.53	0.05	0.77	0.00			
Control Delay		6.6		17.9	3.1	59.1	0.0			
Queue Delay		0.1		5.4	1.7	0.3	0.0			
Total Delay		6.7		23.3	4.8	59.4	0.0			
LOS		A		C	A	E	A			
Approach Delay		6.7		23.3	4.8	59.2				
Approach LOS		A		C	A	E				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 32.7

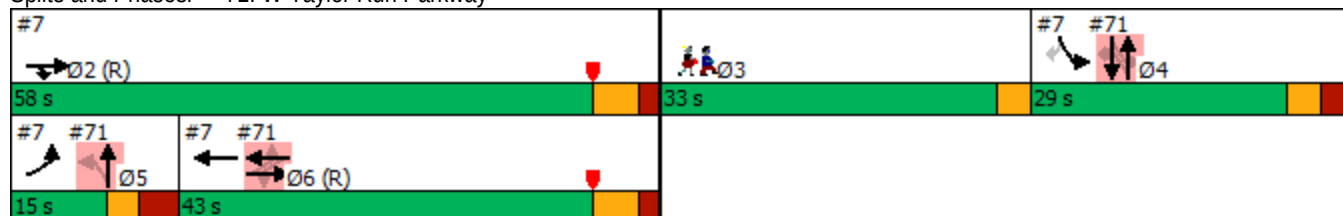
Intersection LOS: C

Intersection Capacity Utilization 51.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Pkwy and Service Rd

11/07/2022



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	106	466	29	298	1
v/c Ratio	0.11	0.53	0.05	0.77	0.00
Control Delay	6.6	17.9	3.1	59.1	0.0
Queue Delay	0.1	5.4	1.7	0.3	0.0
Total Delay	6.7	23.3	4.8	59.4	0.0
Queue Length 50th (ft)	6	141	1	219	0
Queue Length 95th (ft)	41	310	4	#346	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	935	876	621	388	420
Starvation Cap Reductn	0	0	510	0	0
Spillback Cap Reductn	367	340	0	5	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.19	0.87	0.26	0.78	0.00

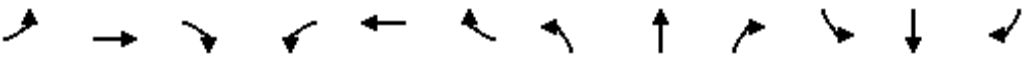
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Pkwy and Service Rd

11/07/2022

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Volume (vph)	9	6	66	85	11	246	0	26	0	0	270	1
Future Volume (vph)	9	6	66	85	11	246	0	26	0	0	270	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.97			1.00			1.00	1.00
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.89			0.90			1.00			1.00	0.85
Flt Protected		0.99			0.99			1.00			1.00	1.00
Satd. Flow (prot)		1648			1614			1863			1863	1583
Flt Permitted		0.94			0.89			1.00			1.00	1.00
Satd. Flow (perm)		1564			1454			1863			1863	1583
Peak-hour factor, PHF	0.81	0.81	0.81	0.77	0.77	0.77	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%	105%
Adj. Flow (vph)	12	8	86	116	15	335	0	29	0	0	298	1
RTOR Reduction (vph)	0	39	0	0	52	0	0	0	0	0	0	1
Lane Group Flow (vph)	0	67	0	0	414	0	0	29	0	0	298	0
Confl. Peds. (#/hr)	22					22			7	7		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	2%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA			NA			NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		63.3			63.3			35.2			23.0	23.0
Effective Green, g (s)		65.3			65.3			37.2			25.0	25.0
Actuated g/C Ratio		0.54			0.54			0.31			0.21	0.21
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		851			791			577			388	329
v/s Ratio Prot								c0.02			c0.16	
v/s Ratio Perm		0.04			c0.28							0.00
v/c Ratio		0.08			0.52			0.05			0.77	0.00
Uniform Delay, d1		13.0			17.4			29.0			44.8	37.6
Progression Factor		1.00			1.00			0.11			1.00	1.00
Incremental Delay, d2		0.2			2.5			0.0			8.8	0.0
Delay (s)		13.2			19.9			3.1			53.6	37.6
Level of Service		B			B			A			D	D
Approach Delay (s)		13.2			19.9			3.1			53.6	
Approach LOS		B			B			A			D	
Intersection Summary												
HCM 2000 Control Delay			29.8									
HCM 2000 Volume to Capacity ratio			0.52									
Actuated Cycle Length (s)			120.0								15.5	
Intersection Capacity Utilization			51.2%								A	
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

Telegraph Road on-ramp at New Ramp (from eastbound Duke Street)

11/07/2022

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		↑↑		↑	↑	
Traffic Volume (veh/h)	0	1815	0	1465	346	0
Future Volume (Veh/h)	0	1815	0	1465	346	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1906	0	1538	363	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1538				953	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1538				953	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				0	100
cM capacity (veh/h)	428				257	1084
Direction, Lane #	NB 1	NB 2	SB 1	NE 1		
Volume Total	953	953	1538	363		
Volume Left	0	0	0	363		
Volume Right	0	0	1538	0		
cSH	1700	1700	1700	257		
Volume to Capacity	0.56	0.56	0.90	1.41		
Queue Length 95th (ft)	0	0	0	501		
Control Delay (s)	0.0	0.0	0.0	243.9		
Lane LOS				F		
Approach Delay (s)	0.0		0.0	243.9		
Approach LOS				F		
Intersection Summary						
Average Delay			23.3			
Intersection Capacity Utilization			98.6%	ICU Level of Service		F
Analysis Period (min)			15			



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

[Appendix S: Signal Justification Report \(SJR\)](#)



VDOT Signal Justification Report (SJR) Northern Virginia District

Date: May 15, 2023

I. Study Intersection

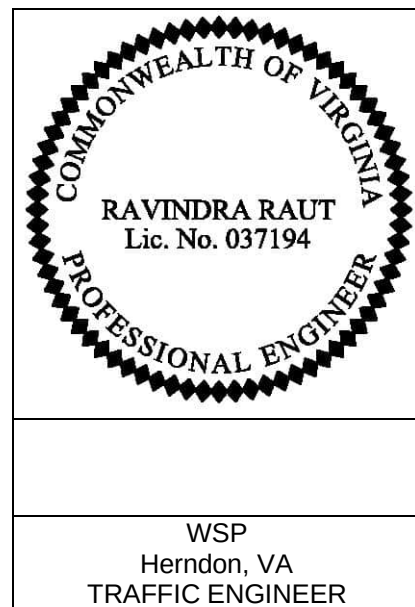
Major Street Route # and Name: Rte. 236 (Duke Street) **Direction:** East/West

Minor Street Route # and Name: New Telegraph Road (Route 611) on-ramp **Direction:** North/South

County or Locality: Fairfax

Is the Intersection on the Arterial Preservation Network (APN)?: No

Sketch/Diagram/Aerial of the Intersection Geometry:



Describe the origin and nature of the request. If this SJR is based on a recommendation from another study (e.g. Traffic Impact Analysis or Safety Study), then note the name/date of the study and attach the study to this SJR.

The request for signalization at Duke Street (Route 236) and New Telegraph Road (Route 611) On-Ramp is a proposed intersection. Duke Street and Taylor Run Parkway Intersection Improvement Project's primary goal is to determine and assess measures to reduce congestion, recommend multimodal improvements and address safety at the intersection of Duke Street and W. Taylor Run Parkway, and provide additional access to the southbound Telegraph Road from the eastbound Duke Street. The proposed intersection provides additional access for the traffic from the eastbound Duke Street to Telegraph Road on-ramp. Traffic study prepared for the intersection improvement project recommends traffic signal at this location. Duke Street between N. Quaker Lane and Dove Lane/Robert's Lane is classified as Other Principal Arterial per *VDOT Functional Classification*. Telegraph Road is a north-south route classified as Minor Arterial per VDOT Functional Classification. Within the study area, Telegraph Road provides grade-separated access (partial cloverleaf interchange) to Duke Street.

Single lane ramp from the northbound Telegraph Road provides access to westbound Duke Street. The posted speed limit on the ramp is 25 miles per hour. Sidewalks are present on the either side of Duke Street. Pedestrian facilities (high visibility laddered crosswalk, ADA ramps, RRFB, advance RRFB, Yield Line markings) are present across the ramp approach.

From January 2015 to December 2022, a total of eighteen (18) rear-end, and three (3) fixed object type crashes were recorded on the Telegraph Road off-ramp to the westbound Duke Street. Rear-end crashes were related to the crosswalk at the end of the ramp. These crashes were recorded when the vehicle in the front stopped for the pedestrian in the crosswalk or the pedestrian waiting at the crosswalk, while the vehicle following the first vehicle did not stop in time, either collided with the vehicle in the front or collided with a fixed object. Due to the curvature of the ramp, it is difficult for the vehicle to notice the pedestrian in the crosswalk or vehicle in front trying to stop for a pedestrian.

Proposed intersection, Duke Street eastbound and Telegraph Road on-ramp new, will provide additional access to the southbound Telegraph Road providing a relief to the existing on-ramp at Duke Street and W. Taylor Run Parkway. Telegraph Road off-ramp will be eliminated, and dual right-turns will be provided at the intersection. Signalized crosswalk on the north leg of this intersection will improve safety for pedestrians and will likely to mitigate crosswalk related crashes on Telegraph Road Off-Ramp to the westbound Duke Street.

If the origin of this SJR comes from another study, what were the key conclusions from that study that are related to this intersection?

NA

II. Signal Warrant Analysis Summary

Intersection Approach Information:

Approach Direction	Road Name/Route Number	Approach Speed	Approach Speed Type	Approach Speed Notes ¹	Number of Through Lanes	Annual Average Daily Traffic (AADT)
Northbound	NA	NA	NA	NA	NA	NA
Southbound	Telegraph Road Off-Ramp	25 MPH	Posted Speed Limit	NA	1	17,350
Eastbound	Duke Street	35 MPH	Posted Speed Limit	N/A	2	10,150
Westbound	Duke Street	35 MPH	Posted Speed Limit	NA	2	8,800

Summary of Traffic Count Source:

The traffic counts from Duke Street and W. Taylor Run Parkway intersection improvement project were utilized for SJR. AM and PM peak period turning movement counts (TMCs) were collected within the study area on June 6, 2018, from 6:30 am – 9:30 am and 4:00 – 7:00 pm. The existing traffic volumes were forecasted to the Future Year 2026 and 2036, which was determined the opening and design years for the project. The annual growth rate for the build condition was determined by evaluating the Metropolitan Washington Council of Governments (MWCOC) model's Household and Employment rates, and future-year travel demand models were then used to develop post-processed traffic volumes. A typical 0.1 K Factor was used to determine the ADT volumes for the future conditions at the proposed intersection.

Summary of MUTCD Signal Warrant Analysis:

The signal warrant is based on traffic volumes for Opening Year 2026 Build conditions.

MUTCD Signal Warrants	Warrant Satisfied?	Notes / Summary
Warrant 1: Eight-Hour Vehicular Volume	☐ Yes ☐ No ☒ N/A	Not evaluated
Warrant 1: VDOT ADT Option	☒ Yes ☐ No ☐ N/A	Total of both major-street approaches was 18,950 and total for minor-street approach was 17,350. The 100% columns in Condition A and B were satisfied.
Warrant 2: Four-Hour Vehicular Volume	☐ Yes ☐ No ☒ N/A	Not evaluated
Warrant 3: Peak Hour	☒ Yes ☐ No ☐ N/A	1. Warrant 3A - peak hour delay: N/A; and 2. Warrant 3B - peak hour volumes: AM and PM peak hours volume meets minimum.
Warrant 4: Pedestrian Volume	☐ Yes ☐ No ☒ N/A	Not evaluated.
Warrant 5: School Crossing	☐ Yes ☐ No ☒ N/A	Not evaluated.
Warrant 6: Coordinated Signal System	☐ Yes ☒ No ☒ N/A	Not evaluated.
Warrant 7: Crash Experience	☐ Yes ☐ No ☒ N/A	Not evaluated.
Warrant 8: Roadway Network	☐ Yes ☐ No ☒ N/A	Not evaluated.
Warrant 9: Intersection Near a Grade Crossing	☐ Yes ☐ No ☒ N/A	No railroad crossing in the vicinity.

Are the signal warrant analyses based on current volumes or anticipated future volumes?

☐ Current volumes ☒ Anticipated future volumes/conditions

If the signal warrant is only met under future conditions, provide a summary of trip generation assumptions and anticipated development thresholds that will trigger the signal being justified:

The signal warrant study is based on the Opening Year 2026 Build traffic conditions, which includes the build-out of the new intersection on Duke Street. The existing traffic volumes were forecasted to the Future Year 2026, which was determined the opening year for the project. MWCOC Travel demand model output for the year 2045 is based on the assumption that the southbound left-turn traffic from W. Taylor Run Parkway to the on-ramp is restricted, and new access

to Telegraph Road on-ramp from the eastbound is present. To determine the growth rate on Duke Street, the growth rates for the eastbound and westbound directions were combined. In addition to that, the weighted average was taken for the links, from N. Quaker Lane to Telegraph Road, and from Telegraph Road to Diagonal Road, to determine the single growth rate for Duke Street between N. Quaker Lane and Diagonal Road. The Future year demand model produced a growth rate of -0.3% per year for the section of Duke Street between N. Quaker Lane and Diagonal Road. Based upon the evaluation, the project team identified and agreed upon an annual growth rate of 0.25% for build conditions. Growth rate of 0.25% per year is the conservative approach to analyze the Build conditions, considering possible high-density development on the Duke Street corridor which is not included in the MWCOG model. Growth rate of 0.25% (compound method) was applied to all movements including Service Road. This growth rate is also consistent with the growth rate used for the East Eisenhower Small Area Plan (EESAP) and Duke Street Transitway Project.

Was the 70% volume reduction factor applied to various signal warrant thresholds?

☐ Yes ☒ No

If yes, please describe the additional justification based on engineering judgment for use of the 70% volume reduction factor:

N/A

Was a right-turn volume adjustment used?

☐ Yes ☒ No

Please describe the rationale for this determination (whether yes or no above) and how the right turn vehicle volumes were considered in the analysis:

No right turn volumes were reduced in the signal warrant analysis. Synchro models for the proposed signal were analyzed using HCM 2000 Signalized Intersection Capacity Analysis to find the RTOR reduction. Both AM and PM Peak hour Synchro models showed a reduction that does not exceed 1%.

III. VJuST Innovative Intersection Consideration

VJuST screening was conducted at the intersection for opening year 2026 conditions with a Conventional Signal control, a Continuous Green-T (CGT) control, and a Roundabout control.

The Weighted Conflict Point Score shown in the VJuST output sheets indicates conflict points for a 4-leg Intersection and 4-leg roundabout, which were recalculated to 3-leg conflict points using the formula given in the VJuST spreadsheet. The maximum v/c ratio and weighted conflict points from the VJuST screening are shown in Table 1 below.

Table 1: VJuST Max v/c Results and Conflict Points

	2026		No. of Weighted Conflict Points
	AM	PM	
Conventional	0.93	0.80	12
Continuous Green-T	0.93	0.80	12
Roundabout	0.44	0.42	8

Summary of Potentially Feasible Innovative Intersections according to VJuST results:

Innovative Intersection Type	Feasibility Decision and Reason
Continuous Green-T (CGT)	Is this Innovative Intersection type feasible? ☐ Yes ☒ No Explanation: For the CGT design using VJuST screening tool, the Maximum v/c ratio operates at an acceptable rate of 0.93 with 12 total conflict points which are similar to a conventional signal. However, with the crosswalk being added to the north leg of the intersection, a CGT would not be safe for pedestrians. Additionally, a CGT design would require additional costs and have more environmental impacts compared to the conventional signal.

Innovative Intersection Type	Feasibility Decision and Reason
Roundabout	Is this Innovative Intersection type feasible? ☐ Yes ☒ No Explanation: For the roundabout design using VJuST screening tool, the Maximum v/c ratio operates at an acceptable rate of 0.44 with 8 total conflict points. This intersection type (roundabout) would also require significant Right-Of-Way (minimum inscribed circle diameter for WB-67 design vehicle is to be 180 feet for two-lane roundabouts). Additionally, a roundabout design would require additional costs and have more environmental impacts compared to the conventional signal.

IV. Intersection Configuration and Control Recommendations and Signal Justification

Intersection configuration and control recommendations:

Innovative intersections were analyzed and determined as not feasible due to right-of-way restrictions and financial constraints, improve pedestrian safety, and unable to accommodate existing traffic patterns. A roundabout control is not cost-effective and would require a larger footprint that may lead to more environmental impacts. Also, the need for pedestrian-friendly facilities is a major consideration since intersection is near King Street Metro Station and on the route for future BRT project on Duke Street, so a CGT design is not suitable at this location. While the v/c ratio for the roundabout design operates at an acceptable, unsaturated rate of 0.44 for AM peak hour, the CGT and the conventional signal designs still scored in the VDOT Junction Screening Tool with acceptable v/c ratios less than 1.00. This indicates that both the CGT and conventional traffic signal control methods would operate under capacity. However, a conventional traffic signal is recommended for this intersection due to its cost, the minimum required right-of-way and more importantly the pedestrian traffic safety and vehicular operational improvements.

Signal Justification:

Signal warrants were analyzed for this intersection and the VDOT ADT Option and Peak Hour (Warrant #3) warrants were satisfied per the MUTCD criteria in Opening Year 2026 Build conditions. Due to the foreseeable traffic projections and growth in the study area, the installation of a traffic signal would improve the overall safety and operation of the intersection and support the proposed roadway network.

Is an Access Management Exception or Access Management Waiver necessitated by the recommended intersection control method?:

☐ Yes ☒ No

If yes, please describe the specific spacing requirement that is not met (e.g., which spacing requirement from the Road Design Manual Appendix F) and brief rationale for recommending this condition:

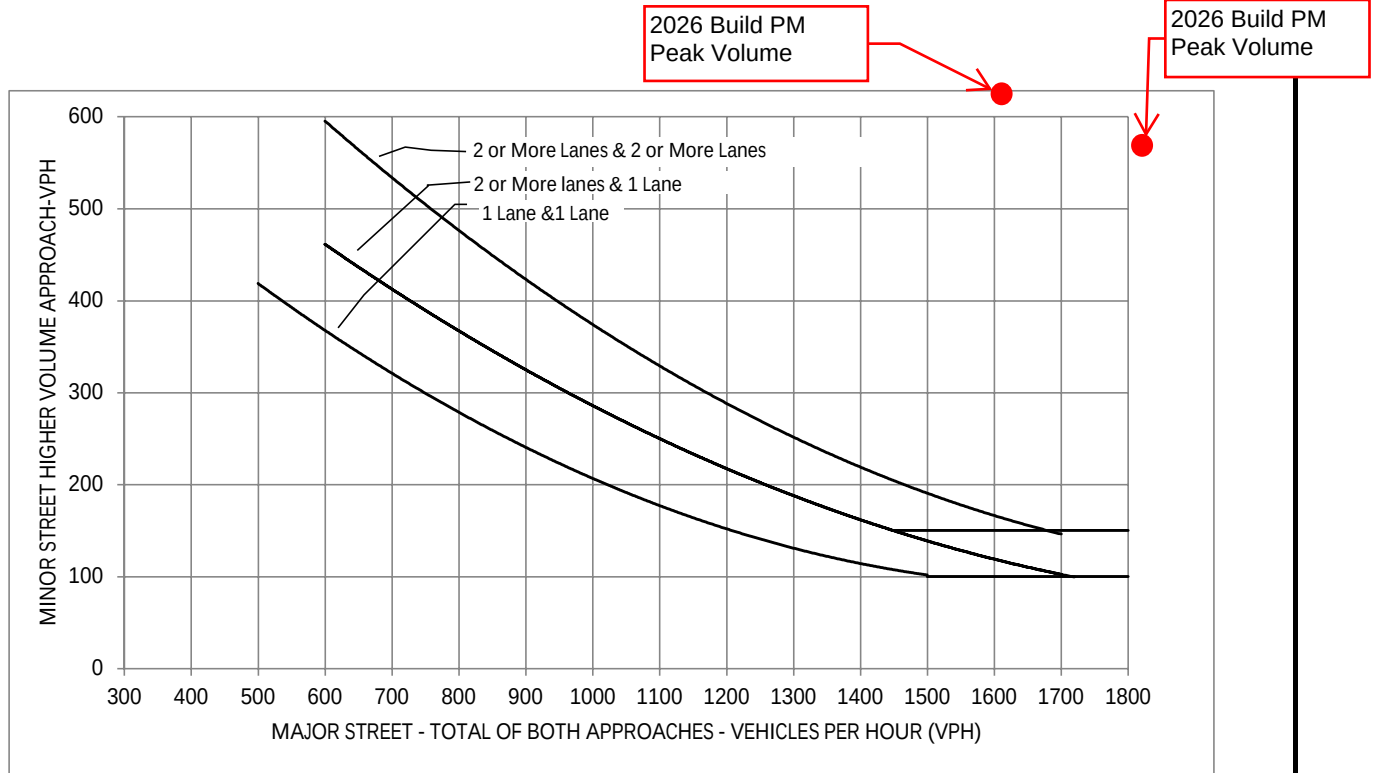
N/A

Appendix: Signal Warrant Analysis

Manual of Uniform Traffic Control Devices
Worksheet for Signal Warrants (Section 4C)
WARRANT 3 B(100%): Peak-Hour Vehicular Volume

Spot Number:	0
Intersection:	Duke Street @ Telegraph Road (Route 611) off-ramp
Date	5/15/2023 by PY

2	: No. of Lanes on Major St.
2	: No. of Lanes on Minor St.
35	: Speed limit or 85th Percentile? (MPH)
NO	: Is the intersection within an Isolated community?
0	: What is the of the population isolated community?



How Many Hours Are Met	2
Is Warrant 3 B (100%) Met?	YES

Croson Lane and Quail Pond Place/Fairlawn Drive



Table 4C-V1. Traffic Signal Warrant Using Average Daily Traffic Estimate

(To be used only when traffic counts are not available, such as at a future intersection)

Condition A—Minimum Vehicular Volume

Number of lanes for moving traffic on each approach		Vehicles per day on major street (total of both approaches)				Vehicles per day on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1	1	8,000	6,400	5,600	4,480	2,400	1,920	1,680	1,344
2 or more	1	9,600	7,680	6,720	5,376	2,400	1,920	1,680	1,344
2 or more	2 or more	9,600	7,680	6,720	5,376	3,200	2,560	2,240	1,792
1	2 or more	8,000	6,400	5,600	4,480	3,200	2,560	2,240	1,792

2026 ADT = 18950

2026 ADT = 17350

Condition B—Interruption of Continuous Traffic

Number of lanes for moving traffic on each approach		Vehicles per day on major street (total of both approaches)				Vehicles per day on higher-volume minor-street approach (one direction only)			
Major Street	Minor Street	100% ^a	80% ^b	70% ^c	56% ^d	100% ^a	80% ^b	70% ^c	56% ^d
1	1	12,000	9,600	8,400	6,720	1,200	960	850	680
2 or more	1	14,400	11,520	10,080	8,064	1,200	960	850	680
2 or more	2 or more	14,400	11,520	10,080	8,064	1,600	1,280	1,120	896
1	2 or more	12,000	9,600	8,400	6,720	1,600	1,280	1,120	896

^a Basic minimum hourly volume for urban areas

^b Used for combination of Conditions A and B after adequate consideration of other remedial measures in urban areas

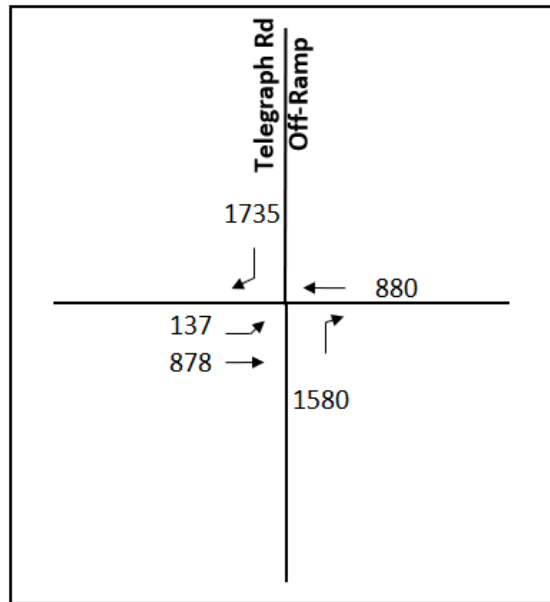
^c May be used when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

^d May be used for combination of Conditions A and B after adequate consideration of other remedial measures when the major-street speed exceeds 40 mph or in an isolated community with a population of less than 10,000

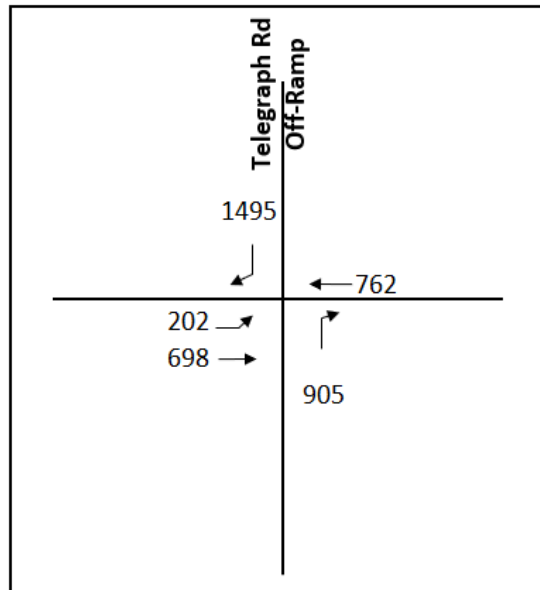
Appendix:
Build Opening Year 2026 Peak Hour Traffic Volumes

Build Opening Year 2026 Peak Hour Traffic Volumes

2026 AM



2026 PM



Appendix:
VJuST Input and Results Worksheets

VDOT Junction Screening Tool

Input Worksheet

Project Title:	Duke West Taylor (2026 AM Peak)			
E-W Facility:	Duke Street			
N-S Facility:	Telegraph Rd			
Date:	May 15, 2023			

Traffic Volume Demand

Direction	Volume (veh/hr)			Truck Percent (%)
	U-Turn / Left	Through	Right	
				
Eastbound	137	878		2.00%
Westbound		880		2.00%
Northbound			1580	2.00%
Southbound			1735	2.00%
Adjustment Factor	0.80	0.95		0.85
Suggested	U - 0.8	L - 0.95		0.85
Truck to PCE Factor	Suggested = 2.00			2.00
Critical Lane Volume				1600

Equivalent Passenger Car Volume

	Volume (pc/hr)			
	U-Turn / Left	Through	Right	Approach
				
Eastbound	140	896	0	1036
Westbound	0	898	0	898
Northbound	0	0	1612	1612
Southbound	0	0	1770	1770

Notes:

Left-turn Adjustment Factor	Conversion of left-turning vehicles to equivalent through vehicles
Right-turn Adjustment Factor	Conversion of right-turning vehicles to equivalent through vehicles
U-turn Adjustment Factor	Conversion of U-turning vehicles to equivalent through vehicles
Truck to PCE Factor	1 truck = X Passenger Car Equivalents
Critical Lane Volume Sum Limit	Saturation value for critical lane volume sum at an intersection

VDOT Junction Screening Tool				
Possible Configurations				
Indicate with a "Y" or "N" if each intersection or interchange configuration should or should not be considered. Use the information links for guidance. Then, click the "Show/Hide Configurations button" to hide the worksheets for the configurations that will not be considered.				
#	Intersections	Information	Consider?	Justification
Signalized Intersections				
1	Conventional	-	Y	
2	Bowtie	Link	N	
3	Center Turn Overpass	Link	N	
4	Continuous Green-T	Link	Y	
5	Echelon	Link	N	
6	Full Displaced Left Turn	Link	N	
7	Median U-Turn	Link	N	
8	Partial Displaced Left Turn	Link	N	
9	Partial Median U-Turn	Link	N	
10	Quadrant Roadway N-E	Link	N	
11	Quadrant Roadway N-W	Link	N	
12	Quadrant Roadway S-E	Link	N	
13	Quadrant Roadway S-W	Link	N	
14	Restricted Crossing U-Turn	Link	N	
15	Single Loop	Link	N	
16	Split Intersection	Link	N	
17	Thru-Cut	Link	N	
Unsignalized Intersections				
18	50 Mini Roundabout	Link	N	
19	75 Mini Roundabout	Link	N	
20	Roundabout	Link	Y	
21	Two-Way Stop Control	-	N	
#	Interchanges	Information	Consider?	Justification
22	Traditional Diamond	Link	N	
23	Contraflow Left	Link	N	
24	Displaced Left Turn	Link	N	
25	Diverging Diamond	Link	N	
26	Double Roundabout	Link	N	
27	Michigan Urban Diamond	Link	N	
28	Partial Cloverleaf	Link	N	
29	Single Point	Link	N	
30	Single Roundabout	Link	N	

VDOT Junction Screening Tool

Directional Questions and Base Lane Configurations

Before entering a base number of through lanes for each direction, answer all applicable directional question for each intersection or interchange configuration selected for consideration. Navigate to the lane configuration worksheet for example diagrams, if provided.

Intersections	Question	Direction
Bowtie	N/A	N/A
Continuous Green-T	Select the direction associated with the "stem" of the T-intersection from the drop-down list. See example diagrams.	SB
Echelon	N/A	N/A
Median U-Turn	N/A	N/A
Partial Displaced Left Turn	N/A	N/A
Partial Median U-Turn	N/A	N/A
Restricted Crossing U-Turn	N/A	N/A
Single Loop	N/A	N/A
Split Intersection	N/A	N/A
Thru-Cut	N/A	N/A
Interchanges	Question	Direction
All	N/A	N/A

Base Number of Through Lanes

Enter a base number of through lanes for each direction. The number of through lanes entered will populate on each non-roundabout lane configuration worksheet. This tool also allows the user to enter the number of through lanes on the lane configuration worksheets directly. This base number may be overwritten on individual lane configuration worksheets. Turn lanes, shared lanes, and channelized lanes must still be entered in each lane configuration worksheet.

Eastbound	2
Westbound	2
Northbound	0
Southbound	0

VDOT Junction Screening Tool

Results Worksheet

VDOT Junction Screening Tool

General Information	
Project Title:	Duke West Taylor (2026 AM Peak)
EW Facility:	Duke Street
NS Facility:	Telegraph Rd
Date:	May 15, 2023

Volumes (veh/hr)	U-Turn / Left	Through	Right
Eastbound	137	878	0
Westbound	0	880	0
Northbound	0	0	1580
Southbound	0	0	1735

General Instructions: All intersection and interchange configurations have a default assumption of one exclusive lane per movement. No results shall be interpreted until the user has verified the lane configurations on each worksheet.

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	
Conventional	-	0.93		48	
Continuous Green-T	-	0.93	-	12*	
Roundabout	-	0.44		8	
*The continuous green-T is the only three-legged innovative intersection in this tool. To compare the continuous green-T to other innovative intersections, conflicts corresponding with the fourth leg must be removed. This has been done for the conventional intersection. Conflict point diagrams for three-legged and four-legged conventional intersections have been provided on the conventional intersection worksheet for reference.					

Interchange Results					
		Congestion	Pedestrian	Safety	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Traditional Diamond	Weighted Total Conflict Points	

Information	
Congestion	The maximum v/c ratio represents the worst v/c of all zones that make up an intersection.
Pedestrian	Compares the potential of each design to accommodate pedestrians based on safety, wayfinding, and delay. Potential is qualitatively defined as better (+), similar (blank cell), or worse (-) than a conventional intersection or traditional diamond interchange.
Safety	Weighted Total = (2 x Crossing Conflicts) + Merging Conflicts + Diverging Conflicts

Conventional

DESIGN AND RESULTS

Project Name:	Duke West Taylor (2026 AM Peak)	Critical Lane Volume Sum			
EW Facility:	Duke Street	< 1200	1200 - 1399	1400 - 1599	≥ 1600
NS Facility:	Telegraph Rd	VOLUME / CAPACITY RATIO:			0.93
Date:	May 15, 2023				

N
W
S
E

Zone 5

1490

0.93

V / C

Note: This diagram does not reflect the actual lane configuration of the intersection

Conventional

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.

SB Critical Vol 0

EW Split? FALSE
NS Split? FALSE

EB Critical Vol 596

WB Critical Vol 448

NB Critical Vol 894

Zone 5

1490

Back to Results

Safety - Conflict Point Diagram

● Diverging
● Merging
○ Crossing

Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	32

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

48

Safety - Conflict Point Diagram (Three Legs)

● Diverging
● Merging
○ Crossing

Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	9

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

12

T

Continuous Green-T Intersection

DESIGN AND RESULTS

Project Name:

Duke West Taylor (2026 AM Peak)

Critical Lane Volume Sum

EW Facility:

Duke Street

< 12001200 - 13991400 - 1599≥ 1600

NS Facility:

Telegraph Rd

VOLUME / CAPACITY RATIO:0.93

Date:

May 15, 2023

S

E

W

N

North arrow directions will appear once the directional question has been answered on the [Input Worksheet](#).

EB

WB

SB

NB

Zone 5

1490

0.93V / C

Continuous Green Movement

448

0.28V / C

Note: This diagram does not reflect the actual lane configuration of the intersection

T

Continuous Green-T Intersection

DATA INPUT AND CONFIGURATION

Step 1: Enter the lane configurations in the yellow cells.

EW Split? FALSE

NS Split? TRUE

Continuous Green Movement V/C

0.28

WB Critical Vol 0

WB

Channelized w/ Rcv Lane?

Shared?

No?

Yes?

0

896

2

1

pcph

pcph

pcph

pcph

Zone 5

1490

EB

EB Critical Vol 596

0

896

2

1

pcph

pcph

pcph

pcph

SB

SB Critical Vol 894

0

0

2

?

No

Shared?

No

Channelized w/ Rcv Lane?

pcph

pcph

1770

pcph

Back to Results

T

Safety - Conflict Point Diagram

● Diverging

◐ Merging

○ Crossing

Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	9

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

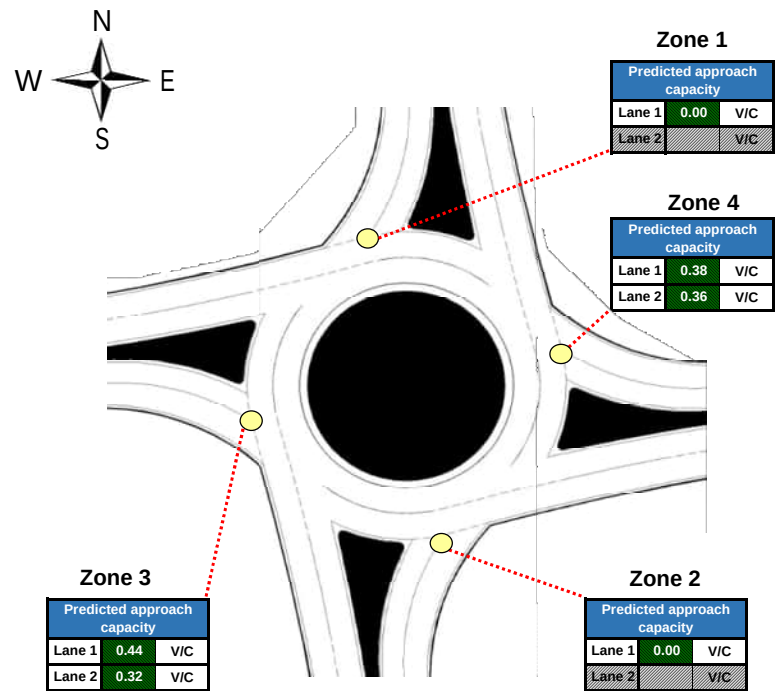
Weighted Total Conflict Points

12

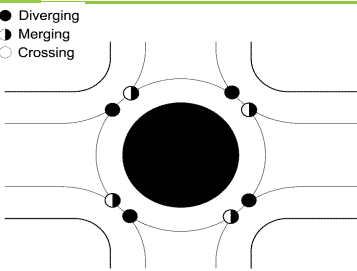
Roundabout

DESIGN AND RESULTS

Project Name:	Duke West Taylor (2026 AM Peak)	Critical Lane Volume Sum			
EW Facility:	Duke Street	< 1200	1200 - 1399	1400 - 1599	≥ 1600
NS Facility:	Telegraph Rd	VOLUME / CAPACITY RATIO:		0.44	
Date:	May 15, 2023				



Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	0
Merging	4
Diverging	4
Total	8

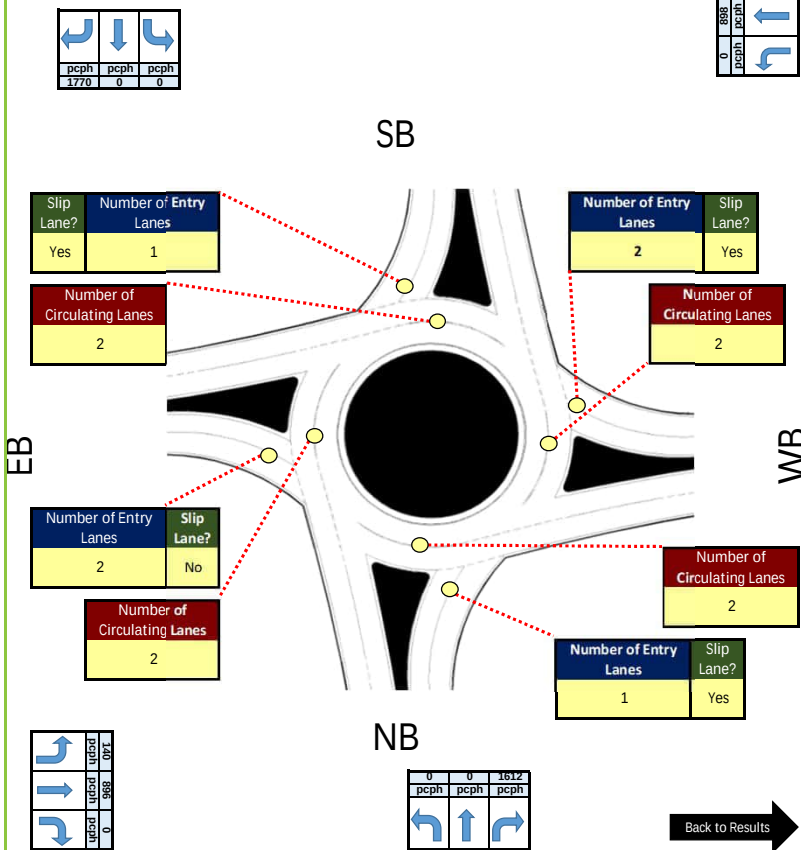
Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points	
8	

Roundabout

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.

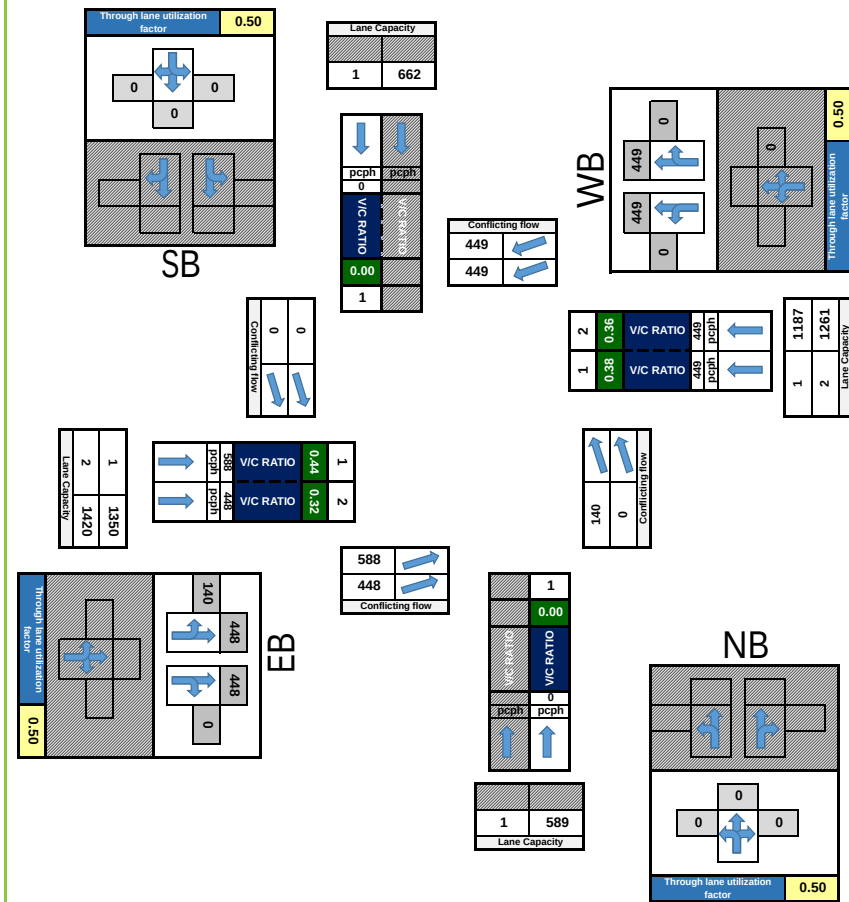


Assumptions

- The number of circulating lanes in one quadrant is assumed to be equal to the number of exiting lanes in the next quadrant.
- The roundabout is limited to a maximum of two entry lanes and two circulating lanes.
- All left-turning vehicles are assumed to stay in the innermost lane until exiting the roundabout.
- This worksheet does not use the CLV methodology. The calculations are based on the *HCM 6th Edition*.

Roundabout

CAPACITY CALCULATIONS



EQUATION: $A \times \exp(-B \times Q)$				
Number of Entry Lanes	Number of Circulating Lanes	Lane	A	B
1	1	-	1380	0.00102
1	2	-	1420	0.00085
2	1	Left	1420	0.00091
2	1	Right	1420	0.00091
2	2	Left	1350	0.00092
2	2	Right	1420	0.00085

VDOT Junction Screening Tool

Input Worksheet

Project Title:	Duke West Taylor (2026 PM Peak)			
E-W Facility:	Duke Street			
N-S Facility:	Telegraph Rd			
Date:	May 15, 2023			

Traffic Volume Demand

Direction	Volume (veh/hr)			Truck Percent (%)
	U-Turn / Left	Through	Right	
				
Eastbound	202	698		2.00%
Westbound		762		2.00%
Northbound			905	2.00%
Southbound			1495	2.00%
Adjustment Factor	0.80	0.95		0.85
Suggested	U - 0.8	L - 0.95		0.85
Truck to PCE Factor	Suggested = 2.00			2.00
Critical Lane Volume				1600

Equivalent Passenger Car Volume

	Volume (pc/hr)			
	U-Turn / Left	Through	Right	Approach
				
Eastbound	206	712	0	918
Westbound	0	777	0	777
Northbound	0	0	923	923
Southbound	0	0	1525	1525

Notes:

Left-turn Adjustment Factor	Conversion of left-turning vehicles to equivalent through vehicles
Right-turn Adjustment Factor	Conversion of right-turning vehicles to equivalent through vehicles
U-turn Adjustment Factor	Conversion of U-turning vehicles to equivalent through vehicles
Truck to PCE Factor	1 truck = X Passenger Car Equivalents
Critical Lane Volume Sum Limit	Saturation value for critical lane volume sum at an intersection

VDOT Junction Screening Tool

Possible Configurations

Indicate with a "Y" or "N" if each intersection or interchange configuration should or should not be considered. Use the information links for guidance. Then, click the "Show/Hide Configurations button" to hide the worksheets for the configurations that will not be considered.

#	Intersections	Information	Consider?	Justification
Signalized Intersections				
1	Conventional	-	Y	
2	Bowtie	Link	N	
3	Center Turn Overpass	Link	N	
4	Continuous Green-T	Link	Y	
5	Echelon	Link	N	
6	Full Displaced Left Turn	Link	N	
7	Median U-Turn	Link	N	
8	Partial Displaced Left Turn	Link	N	
9	Partial Median U-Turn	Link	N	
10	Quadrant Roadway N-E	Link	N	
11	Quadrant Roadway N-W	Link	N	
12	Quadrant Roadway S-E	Link	N	
13	Quadrant Roadway S-W	Link	N	
14	Restricted Crossing U-Turn	Link	N	
15	Single Loop	Link	N	
16	Split Intersection	Link	N	
17	Thru-Cut	Link	N	
Unsignalized Intersections				
18	50 Mini Roundabout	Link	N	
19	75 Mini Roundabout	Link	N	
20	Roundabout	Link	Y	
21	Two-Way Stop Control	-	N	
#	Interchanges	Information	Consider?	Justification
22	Traditional Diamond	Link	N	
23	Contraflow Left	Link	N	
24	Displaced Left Turn	Link	N	
25	Diverging Diamond	Link	N	
26	Double Roundabout	Link	N	
27	Michigan Urban Diamond	Link	N	
28	Partial Cloverleaf	Link	N	
29	Single Point	Link	N	
30	Single Roundabout	Link	N	

VDOT Junction Screening Tool

Directional Questions and Base Lane Configurations

Before entering a base number of through lanes for each direction, answer all applicable directional question for each intersection or interchange configuration selected for consideration. Navigate to the lane configuration worksheet for example diagrams, if provided.

Intersections	Question	Direction
Bowtie	N/A	N/A
Continuous Green-T	Select the direction associated with the "stem" of the T-intersection from the drop-down list. See example diagrams.	SB
Echelon	N/A	N/A
Median U-Turn	N/A	N/A
Partial Displaced Left Turn	N/A	N/A
Partial Median U-Turn	N/A	N/A
Restricted Crossing U-Turn	N/A	N/A
Single Loop	N/A	N/A
Split Intersection	N/A	N/A
Thru-Cut	N/A	N/A
Interchanges	Question	Direction
All	N/A	N/A

Base Number of Through Lanes

Enter a base number of through lanes for each direction. The number of through lanes entered will populate on each non-roundabout lane configuration worksheet. This tool also allows the user to enter the number of through lanes on the lane configuration worksheets directly. This base number may be overwritten on individual lane configuration worksheets. Turn lanes, shared lanes, and channelized lanes must still be entered in each lane configuration worksheet.

Eastbound	2
Westbound	2
Northbound	0
Southbound	0

VDOT Junction Screening Tool

Results Worksheet

VDOT Junction Screening Tool

General Information

Project Title:

Duke West Taylor (2026 PM Peak)

EW Facility:

Duke Street

NS Facility:

Telegraph Rd

Date:

May 15, 2023

Volumes (veh/hr)

U-Turn / Left

Through

Right

Eastbound

202

698

0

Westbound

0

762

0

Northbound

0

0

905

Southbound

0

0

1495

General Instructions: All intersection and interchange configurations have a default assumption of one exclusive lane per movement. No results shall be interpreted until the user has verified the lane configurations on each worksheet.

Intersection Results					
		Congestion	Pedestrian	Safety	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	
Conventional	-	0.80		48	
Continuous Green-T	-	0.80	-	12*	
Roundabout	-	0.42		8	
*The continuous green-T is the only three-legged innovative intersection in this tool. To compare the continuous green-T to other innovative intersections, conflicts corresponding with the fourth leg must be removed. This has been done for the conventional intersection. Conflict point diagrams for three-legged and four-legged conventional intersections have been provided on the conventional intersection worksheet for reference.					

Interchange Results					

Information	
Congestion	The maximum v/c ratio represents the worst v/c of all zones that make up an intersection.
Pedestrian	Compares the potential of each design to accommodate pedestrians based on safety, wayfinding, and delay. Potential is qualitatively defined as better (+), similar (blank cell), or worse (-) than a conventional intersection or traditional diamond interchange.
Safety	Weighted Total = (2 x Crossing Conflicts) + Merging Conflicts + Diverging Conflicts

Conventional

DESIGN AND RESULTS

Project Name:

Duke West Taylor (2026 PM Peak)

EW Facility:

Duke Street

NS Facility:

Telegraph Rd

Date:

May 15, 2023

Critical Lane Volume Sum

< 1200

1200 - 1399

1400 - 1599

≥ 1600

VOLUME / CAPACITY RATIO:

0.80

N

W

E

S

Zone 5

1285

0.80

V / C

Note: This diagram does not reflect the actual lane configuration of the intersection

Conventional

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.

SB Critical Vol

0

EW Split?

FALSE

NS Split?

FALSE

Channelized w/ Rcv Lane?

No

Shared ?

No

Shared ?

No

pcph

1525

2

pcph

0

0

pcph

0

0

EB Critical Vol

605

Channelized w/ Rcv Lane?

No

Shared ?

No

Shared ?

No

pcph

206

1

pcph

712

2

pcph

0

0

Zone 5

1285

Channelized w/ Rcv Lane?

No

Shared ?

No

Shared ?

No

pcph

0

0

pcph

0

0

pcph

1

0

WB Critical Vol

356

Channelized w/ Rcv Lane?

No

Shared ?

Yes

Shared ?

No

pcph

0

0

pcph

0

0

pcph

0

0

NB Critical Vol

680

Channelized w/ Rcv Lane?

No

Shared ?

No

Shared ?

Yes

pcph

0

0

pcph

0

0

pcph

1

0

Back to Results

Safety - Conflict Point Diagram

● Diverging

● Merging

○ Crossing

Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	32

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

48

Safety - Conflict Point Diagram (Three Legs)

● Diverging

● Merging

○ Crossing

Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	9

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

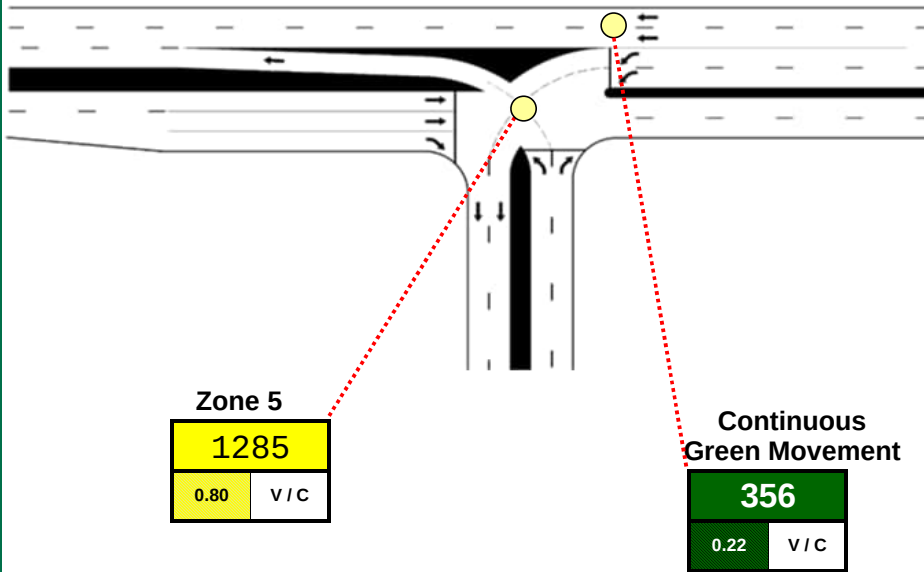
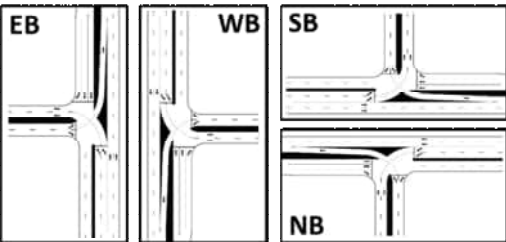
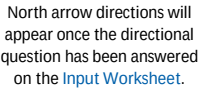
Weighted Total Conflict Points

12

Continuous Green-T Intersection

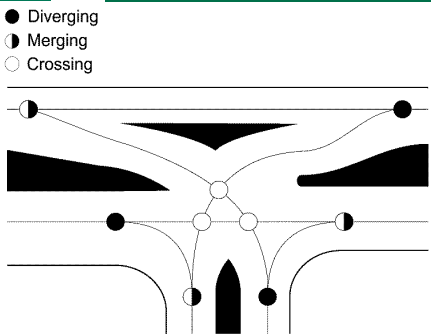
DESIGN AND RESULTS

Project Name:	Duke West Taylor (2026 PM Peak)	Critical Lane Volume Sum			
EW Facility:	Duke Street	< 1200	1200 - 1399	1400 - 1599	≥ 1600
NS Facility:	Telegraph Rd	VOLUME / CAPACITY RATIO:		0.80	
Date:	May 15, 2023				



Note: This diagram does not reflect the actual lane configuration of the intersection

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	9

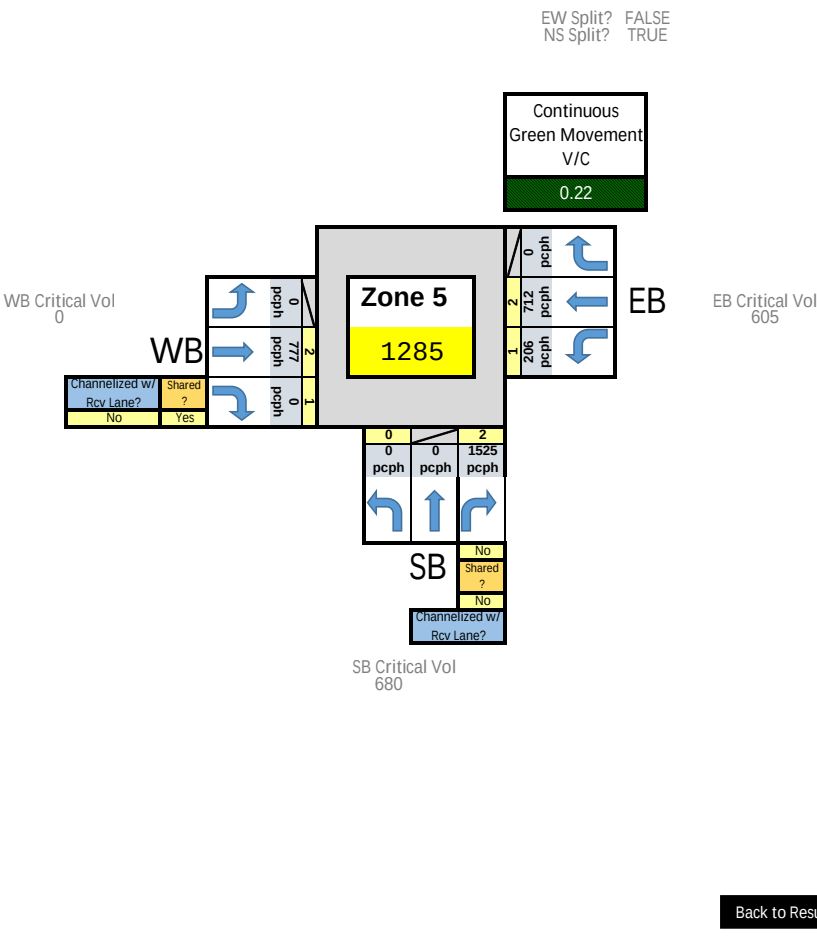
Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points
12

Continuous Green-T Intersection

DATA INPUT AND CONFIGURATION

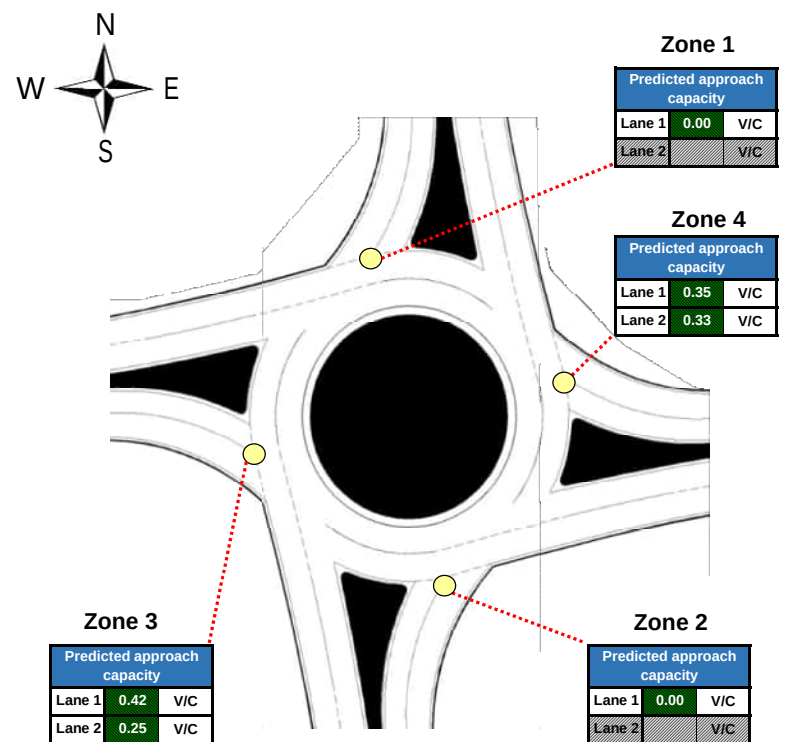
Step 1: Enter the lane configurations in the yellow cells.



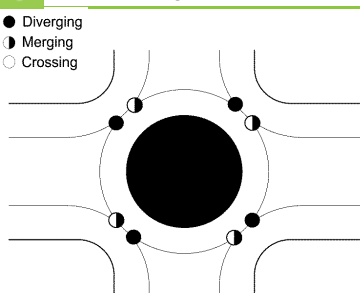
Roundabout

DESIGN AND RESULTS

Project Name:	Duke West Taylor (2026 PM Peak)	Critical Lane Volume Sum			
EW Facility:	Duke Street	< 1200	1200 - 1399	1400 - 1599	≥ 1600
NS Facility:	Telegraph Rd	VOLUME / CAPACITY RATIO:	0.42		
Date:	May 15, 2023				



Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	0
Merging	4
Diverging	4
Total	8

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points
8

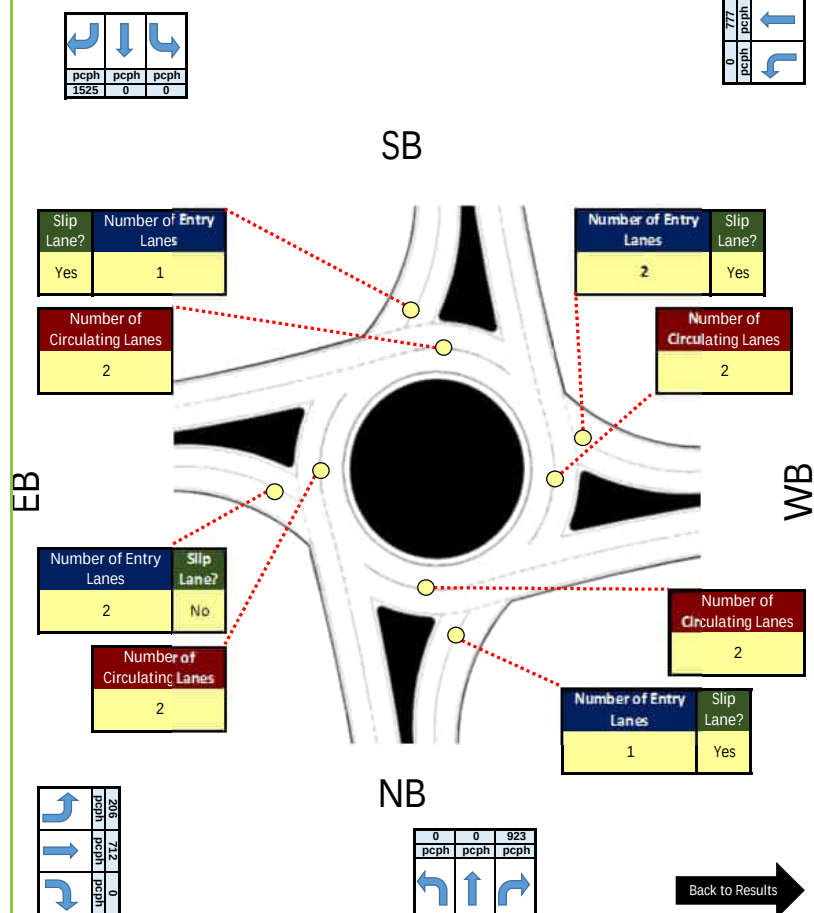
Assumptions

- The number of circulating lanes in one quadrant is assumed to be equal to the number of exiting lanes in the next quadrant.
- The roundabout is limited to a maximum of two entry lanes and two circulating lanes.
- All left-turning vehicles are assumed to stay in the innermost lane until exiting the roundabout.
- This worksheet does not use the CLV methodology. The calculations are based on the *HCM 6th Edition*.

 Roundabout

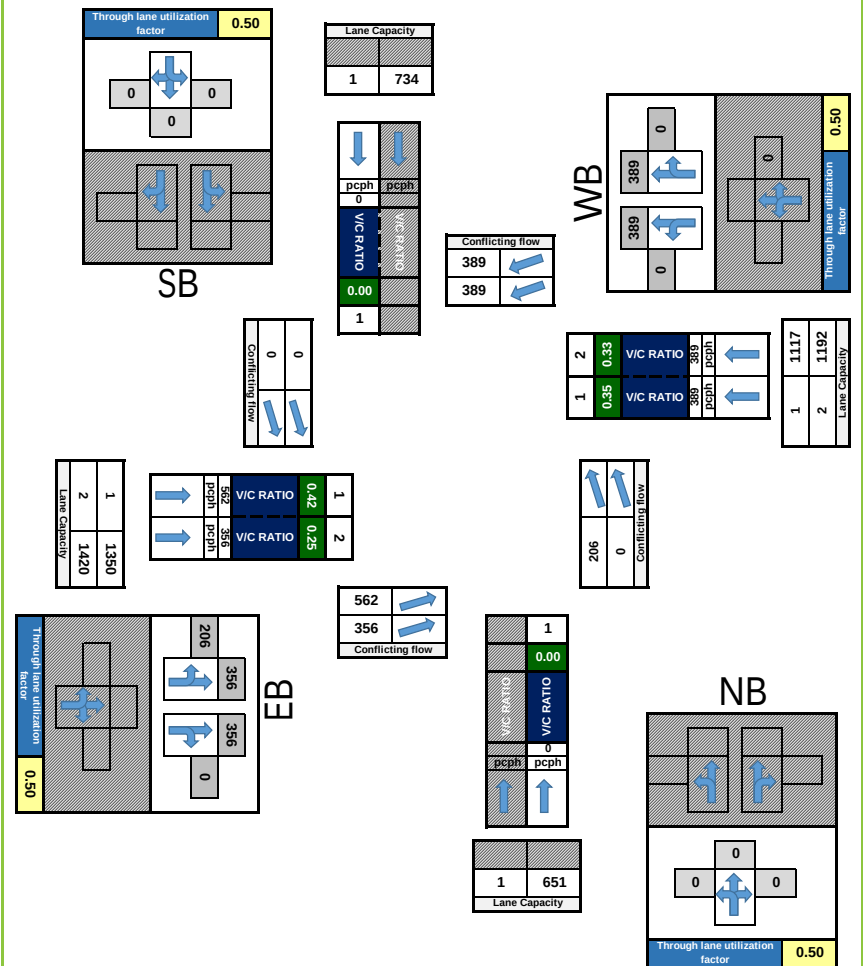
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



 Roundabout

CAPACITY CALCULATIONS



EQUATION: $A \times \exp(-B \times Q)$

Number of Entry Lanes	Number of Circulating Lanes	Lane	A	B
1	1	-	1380	0.00102
1	2	-	1420	0.00085
2	1	Left	1420	0.00091
2	1	Right	1420	0.00091
2	2	Left	1350	0.00092
2	2	Right	1420	0.00085



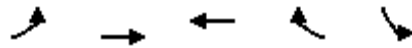
Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix T: Signal Timing 2026 Build Alternative 1

Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	Ø2
Lane Configurations	↰	↑↑↑	↑↑	↰	↰↰	
Traffic Volume (vph)	315	1261	880	1018	548	
Future Volume (vph)	315	1261	880	1018	548	
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	2
Permitted Phases	5 2					
Detector Phase	5	5 2	6	6 4	4	
Switch Phase						
Minimum Initial (s)	5.0		10.0		7.0	10.0
Minimum Split (s)	19.6		22.0		29.5	22.0
Total Split (s)	20.0		61.0		39.0	81.0
Total Split (%)	16.7%		50.8%		32.5%	68%
Yellow Time (s)	3.0		4.0		3.5	4.0
All-Red Time (s)	2.6		2.0		3.0	2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0	
Total Lost Time (s)	3.6		4.0		4.5	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None		C-Max		None	C-Max
Act Effect Green (s)	77.4	77.4	57.0	96.0	34.5	
Actuated g/C Ratio	0.64	0.64	0.48	0.80	0.29	
v/c Ratio	0.84	0.43	0.60	0.87	1.02	
Control Delay	34.0	11.0	17.2	13.7	75.2	
Queue Delay	0.0	0.0	1.7	13.3	1.5	
Total Delay	34.0	11.1	18.9	27.0	76.7	
LOS	C	B	B	C	E	
Approach Delay		15.6	23.2		76.7	
Approach LOS		B	C		E	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 30.5
 Intersection Capacity Utilization 88.8%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service E

Splits and Phases: 1: Duke St & N Quaker Lane



Queues

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	342	1398	945	1093	884
v/c Ratio	0.84	0.43	0.60	0.87	1.02
Control Delay	34.0	11.0	17.2	13.7	75.2
Queue Delay	0.0	0.0	1.7	13.3	1.5
Total Delay	34.0	11.1	18.9	27.0	76.7
Queue Length 50th (ft)	112	180	135	895	~353
Queue Length 95th (ft)	#271	212	211	910	#481
Internal Link Dist (ft)		582	312		324
Turn Bay Length (ft)					
Base Capacity (vph)	405	3217	1587	1254	865
Starvation Cap Reductn	0	0	445	166	0
Spillback Cap Reductn	0	321	0	0	4
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.84	0.48	0.83	1.00	1.03

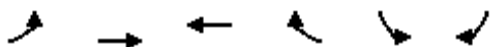
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	315	1261	880	1018	548	272
Future Volume (vph)	315	1261	880	1018	548	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.95	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1719	4988	3343	1568	2830	
Flt Permitted	0.18	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	334	4988	3343	1568	2830	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.94	0.94
Growth Factor (vph)	100%	102%	102%	102%	102%	100%
Adj. Flow (vph)	342	1398	945	1093	595	289
RTOR Reduction (vph)	0	0	0	0	52	0
Lane Group Flow (vph)	342	1398	945	1093	832	0
Confl. Peds. (#/hr)	4			4	4	2
Heavy Vehicles (%)	5%	4%	8%	3%	27%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	75.0	75.0	55.0	93.5	32.5	
Effective Green, g (s)	77.0	77.0	57.0	95.5	34.5	
Actuated g/C Ratio	0.64	0.64	0.48	0.80	0.29	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		0.2		3.0	
Lane Grp Cap (vph)	403	3200	1587	1247	813	
v/s Ratio Prot	c0.12	0.28	0.28	c0.70	c0.29	
v/s Ratio Perm	0.43					
v/c Ratio	0.85	0.44	0.60	0.88	1.02	
Uniform Delay, d1	16.5	10.7	23.1	8.3	42.8	
Progression Factor	1.00	1.00	0.68	0.76	1.00	
Incremental Delay, d2	15.2	0.1	1.2	5.5	37.6	
Delay (s)	31.7	10.8	17.0	11.8	80.4	
Level of Service	C	B	B	B	F	
Approach Delay (s)		14.9	14.2		80.4	
Approach LOS		B	B		F	
Intersection Summary						
HCM 2000 Control Delay			27.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.93			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			88.8%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Timings

2: S Quaker Ln & Duke St

03/14/2024

	→	↘	↙	←	↖	↑	↗	↓		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø6
Lane Configurations	↑↑	↑	↙	↑↑		↕		↕		
Traffic Volume (vph)	1691	118	24	1845	53	0	2	0		
Future Volume (vph)	1691	118	24	1845	53	0	2	0		
Turn Type	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA		
Protected Phases	2		1	1 6		4		3 4	3	6
Permitted Phases		2	1 6		4		3 4			
Detector Phase	2	2	1	1 6	4	4	3 4	3 4		
Switch Phase										
Minimum Initial (s)	10.0	10.0	5.0		7.0	7.0			4.0	4.0
Minimum Split (s)	15.5	15.5	10.5		29.0	29.0			12.0	20.0
Total Split (s)	63.0	63.0	16.0		29.0	29.0			12.0	79.0
Total Split (%)	52.5%	52.5%	13.3%		24.2%	24.2%			10%	66%
Yellow Time (s)	4.0	4.0	4.0		3.0	3.0			3.0	4.0
All-Red Time (s)	1.5	1.5	1.5		1.0	1.0			0.5	1.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0			-2.0				
Total Lost Time (s)	3.5	3.5	3.5			2.0				
Lead/Lag	Lead	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	None		None	None			None	C-Max
Act Effect Green (s)	86.6	86.6	102.6	103.3		12.6		14.6		
Actuated g/C Ratio	0.72	0.72	0.86	0.86		0.10		0.12		
v/c Ratio	0.75	0.12	0.10	0.68		0.34		0.01		
Control Delay	14.3	2.2	2.2	2.8		7.8		38.5		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		
Total Delay	14.3	2.2	2.2	2.8		7.8		38.5		
LOS	B	A	A	A		A		D		
Approach Delay	13.5			2.8		7.8		38.5		
Approach LOS	B			A		A		D		

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 8.2

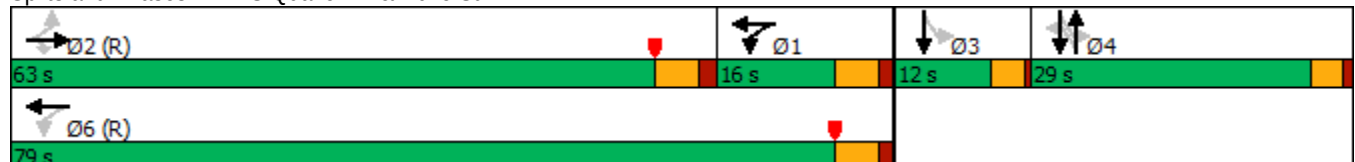
Intersection LOS: A

Intersection Capacity Utilization 66.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: S Quaker Ln & Duke St



Queues

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1875	131	26	2002	81	2
v/c Ratio	0.75	0.12	0.10	0.68	0.34	0.01
Control Delay	14.3	2.2	2.2	2.8	7.8	38.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	2.2	2.2	2.8	7.8	38.5
Queue Length 50th (ft)	569	3	0	6	0	1
Queue Length 95th (ft)	m#903	m19	m3	88	19	8
Internal Link Dist (ft)	312			222	293	73
Turn Bay Length (ft)			75			
Base Capacity (vph)	2504	1088	270	2959	384	345
Starvation Cap Reductn	0	0	0	83	0	0
Spillback Cap Reductn	0	0	0	50	1	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.12	0.10	0.70	0.21	0.01

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 Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1691	118	24	1845	0	53	0	14	2	0	0
Future Volume (vph)	0	1691	118	24	1845	0	53	0	14	2	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor		0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00	0.98	1.00	1.00			1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	1.00			0.97			1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.96			0.95	
Satd. Flow (prot)		3471	1475	1770	3438			1669			1761	
Flt Permitted		1.00	1.00	0.06	1.00			0.78			0.77	
Satd. Flow (perm)		3471	1475	115	3438			1347			1427	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.84	0.84	0.84	1.00	1.00	1.00
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	0	1875	131	26	2002	0	64	0	17	2	0	0
RTOR Reduction (vph)	0	0	28	0	0	0	0	73	0	0	0	0
Lane Group Flow (vph)	0	1875	103	26	2002	0	0	8	0	0	2	0
Confl. Peds. (#/hr)	9		4	4		9			5	5		
Heavy Vehicles (%)	2%	4%	7%	2%	5%	2%	2%	2%	21%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1			4			3	4
Permitted Phases	2		2	1	6		4			3	4	
Actuated Green, G (s)		81.0	81.0	97.0	97.0			9.2			13.5	
Effective Green, g (s)		83.0	83.0	99.0	99.0			11.2			15.5	
Actuated g/C Ratio		0.69	0.69	0.82	0.82			0.09			0.13	
Clearance Time (s)		5.5	5.5	5.5				4.0				
Vehicle Extension (s)		0.2	0.2	3.0				3.0				
Lane Grp Cap (vph)		2400	1020	267	2836			125			184	
v/s Ratio Prot		c0.54		0.01	c0.58							
v/s Ratio Perm			0.07	0.07				c0.01			c0.00	
v/c Ratio		0.78	0.10	0.10	0.71			0.06			0.01	
Uniform Delay, d1		12.4	6.1	18.4	4.4			49.6			45.6	
Progression Factor		0.95	0.61	0.25	0.30			1.00			1.00	
Incremental Delay, d2		2.1	0.2	0.1	0.6			0.2			0.0	
Delay (s)		13.9	3.9	4.6	1.9			49.8			45.6	
Level of Service		B	A	A	A			D			D	
Approach Delay (s)		13.2			1.9			49.8			45.6	
Approach LOS		B			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			8.4			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			66.8%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	40	1661	1822	3	0	17	0
Future Volume (vph)	40	1661	1822	3	0	17	0
Turn Type	pm+pt	NA	NA	Perm	NA	Perm	NA
Protected Phases	5	2	6		8		4
Permitted Phases	2			8		4	
Detector Phase	5	2	6	8	8	4	4
Switch Phase							
Minimum Initial (s)	4.5	10.0	1.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.6	16.3	16.3	29.0	29.0	13.0	13.0
Total Split (s)	18.0	91.0	73.0	29.0	29.0	29.0	29.0
Total Split (%)	15.0%	75.8%	60.8%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.6	2.3	2.3	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	3.6	4.3	4.3		4.0		4.0
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	102.8	103.0	94.3		12.2		12.2
Actuated g/C Ratio	0.86	0.86	0.79		0.10		0.10
v/c Ratio	0.22	0.60	0.74		0.10		0.29
Control Delay	9.7	1.5	2.6		47.0		9.2
Queue Delay	0.0	0.2	0.1		0.0		0.0
Total Delay	9.7	1.7	2.8		47.0		9.2
LOS	A	A	A		D		A
Approach Delay		1.9	2.8		47.0		9.2
Approach LOS		A	A		D		A

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay: 2.6

Intersection LOS: A

Intersection Capacity Utilization 68.7%

ICU Level of Service C

Analysis Period (min) 15

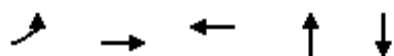
Splits and Phases: 3: Duke St & Alexandria Commons



Queues

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	43	1789	1993	12	65
v/c Ratio	0.22	0.60	0.74	0.10	0.29
Control Delay	9.7	1.5	2.6	47.0	9.2
Queue Delay	0.0	0.2	0.1	0.0	0.0
Total Delay	9.7	1.7	2.8	47.0	9.2
Queue Length 50th (ft)	0	1	9	9	0
Queue Length 95th (ft)	m0	40	#40	7	27
Internal Link Dist (ft)		222	571	88	97
Turn Bay Length (ft)	100				
Base Capacity (vph)	296	2975	2694	256	380
Starvation Cap Reductn	0	389	106	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.15	0.69	0.77	0.05	0.17

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 Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	1661	6	0	1822	34	3	0	0	17	0	44
Future Volume (vph)	40	1661	6	0	1822	34	3	0	0	17	0	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.3			4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			1.00			0.90	
Flt Protected	0.95	1.00			1.00			0.95			0.99	
Satd. Flow (prot)	1770	3469			3429			1770			1652	
Flt Permitted	0.06	1.00			1.00			0.66			0.91	
Satd. Flow (perm)	113	3469			3429			1233			1521	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.25	0.25	0.25	0.95	0.95	0.95
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	43	1783	6	0	1956	37	12	0	0	18	0	47
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	59	0
Lane Group Flow (vph)	43	1789	0	0	1992	0	0	12	0	0	6	0
Confl. Peds. (#/hr)	8		3	3		8			9	9		
Heavy Vehicles (%)	2%	4%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	98.9	98.9			89.1			8.8			8.8	
Effective Green, g (s)	100.9	100.9			91.1			10.8			10.8	
Actuated g/C Ratio	0.84	0.84			0.76			0.09			0.09	
Clearance Time (s)	5.6	6.3			6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0			0.2			2.0			2.0	
Lane Grp Cap (vph)	180	2916			2603			110			136	
v/s Ratio Prot	0.01	c0.52			c0.58							
v/s Ratio Perm	0.19							c0.01			0.00	
v/c Ratio	0.24	0.61			0.77			0.11			0.04	
Uniform Delay, d1	10.0	3.1			8.3			50.2			49.9	
Progression Factor	3.06	0.22			0.07			1.00			1.00	
Incremental Delay, d2	0.2	0.6			1.2			0.2			0.0	
Delay (s)	30.7	1.3			1.7			50.3			49.9	
Level of Service	C	A			A			D			D	
Approach Delay (s)		2.0			1.7			50.3			49.9	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			2.8				HCM 2000 Level of Service			A		
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			11.9		
Intersection Capacity Utilization			68.7%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	52	1624	22	1768	11	5	81	1	77
Future Volume (vph)	52	1624	22	1768	11	5	81	1	77
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	4.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	30.8	10.0	31.0	29.0	29.0	29.0	29.0	29.0
Total Split (s)	16.0	73.0	18.0	75.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	13.3%	60.8%	15.0%	62.5%	24.2%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	1.8	2.6	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	3.8	3.6	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	None	None
Act Effect Green (s)	93.6	89.0	91.9	85.9		16.8		16.8	16.8
Actuated g/C Ratio	0.78	0.74	0.77	0.72		0.14		0.14	0.14
v/c Ratio	0.33	0.69	0.12	0.86		0.22		0.60	0.34
Control Delay	22.3	6.3	1.0	10.5		21.9		61.1	10.8
Queue Delay	0.0	0.1	0.0	14.7		0.0		0.0	0.0
Total Delay	22.3	6.4	1.0	25.2		21.9		61.1	10.8
LOS	C	A	A	C		C		E	B
Approach Delay		6.9		24.9		21.9		36.8	
Approach LOS		A		C		C		D	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 13 (11%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 17.7
Intersection Capacity Utilization 78.7%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

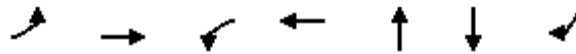
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St

Ø1	Ø2 (R)	Ø4
18 s	73 s	29 s
Ø5	Ø6 (R)	Ø8
16 s	75 s	29 s

Queues

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	56	1764	24	2094	53	110	103
v/c Ratio	0.33	0.69	0.12	0.86	0.22	0.60	0.34
Control Delay	22.3	6.3	1.0	10.5	21.9	61.1	10.8
Queue Delay	0.0	0.1	0.0	14.7	0.0	0.0	0.0
Total Delay	22.3	6.4	1.0	25.2	21.9	61.1	10.8
Queue Length 50th (ft)	5	76	1	8	12	81	0
Queue Length 95th (ft)	m48	277	m0	m#1002	47	109	28
Internal Link Dist (ft)		571		730	190	93	
Turn Bay Length (ft)	195		80				
Base Capacity (vph)	236	2573	300	2438	342	272	406
Starvation Cap Reductn	0	25	0	383	0	0	0
Spillback Cap Reductn	0	158	0	40	1	0	1
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.73	0.08	1.02	0.16	0.40	0.25

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 Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	1624	2	22	1768	121	11	5	31	81	1	77
Future Volume (vph)	52	1624	2	22	1768	121	11	5	31	81	1	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3471		1656	3405			1618			1760	1559
Flt Permitted	0.05	1.00		0.09	1.00			0.92			0.71	1.00
Satd. Flow (perm)	86	3471		150	3405			1511			1311	1559
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.90	0.90	0.90	0.76	0.76	0.76
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	56	1762	2	24	1960	134	12	6	35	109	1	103
RTOR Reduction (vph)	0	0	0	0	3	0	0	30	0	0	0	89
Lane Group Flow (vph)	56	1764	0	24	2091	0	0	23	0	0	110	14
Confl. Peds. (#/hr)	3		3	3		3	2		6	6		2
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	9%	2%	3%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	89.3	84.7		85.7	82.6			14.8			14.8	14.8
Effective Green, g (s)	93.3	86.7		89.7	84.6			16.8			16.8	16.8
Actuated g/C Ratio	0.78	0.72		0.75	0.70			0.14			0.14	0.14
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	159	2507		176	2400			211			183	218
v/s Ratio Prot	c0.02	0.51		0.01	c0.61							
v/s Ratio Perm	0.25			0.10				0.02			c0.08	0.01
v/c Ratio	0.35	0.70		0.14	0.87			0.11			0.60	0.07
Uniform Delay, d1	19.1	9.4		8.0	13.5			45.1			48.5	44.8
Progression Factor	2.21	0.49		0.13	0.52			1.00			1.00	1.00
Incremental Delay, d2	0.4	1.4		0.0	1.9			0.1			3.8	0.0
Delay (s)	42.6	5.9		1.1	8.9			45.1			52.2	44.8
Level of Service	D	A		A	A			D			D	D
Approach Delay (s)		7.1			8.8			45.1			48.7	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			10.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			78.7%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

5: Roth St/Cambridge Rd & Duke St

03/14/2024

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	60	1672	96	1854	302	6	6	189	4	51
Future Volume (vph)	60	1672	96	1854	302	6	6	189	4	51
Turn Type	Prot	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6			8		4	
Permitted Phases			6		6	8		4		4
Detector Phase	5	2	1	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	6.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.5	30.7	11.5	15.7	15.7	13.4	13.4	30.0	30.0	30.0
Total Split (s)	16.0	67.0	18.0	69.0	69.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	13.3%	55.8%	15.0%	57.5%	57.5%	29.2%	29.2%	29.2%	29.2%	29.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	1.7	2.5	1.7	1.7	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	3.5	3.7	3.5	3.7	3.7		4.0		4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?										
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	10.6	72.2	83.3	74.3	74.3		26.2		26.2	26.2
Actuated g/C Ratio	0.09	0.60	0.69	0.62	0.62		0.22		0.22	0.22
v/c Ratio	0.43	0.90	0.52	0.96	0.34		0.20		0.82	0.15
Control Delay	48.1	31.2	32.7	42.3	15.9		13.1		67.9	5.8
Queue Delay	0.0	0.1	0.0	38.8	0.0		0.0		0.0	0.0
Total Delay	48.1	31.2	32.7	81.1	15.9		13.1		67.9	5.8
LOS	D	C	C	F	B		B		E	A
Approach Delay		31.8		70.3			13.1		55.0	
Approach LOS		C		E			B		E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 101 (84%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 52.9
Intersection Capacity Utilization 85.8%
Analysis Period (min) 15
Intersection LOS: D
ICU Level of Service E

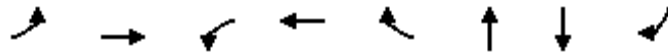
Splits and Phases: 5: Roth St/Cambridge Rd & Duke St

 Ø1	 Ø2 (R)	 Ø4
18 s	67 s	35 s
 Ø5	 Ø6 (R)	 Ø8
16 s	69 s	35 s

Queues

5: Roth St/Cambridge Rd & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	67	1878	105	2033	331	69	224	59
v/c Ratio	0.43	0.90	0.52	0.96	0.34	0.20	0.82	0.15
Control Delay	48.1	31.2	32.7	42.3	15.9	13.1	67.9	5.8
Queue Delay	0.0	0.1	0.0	38.8	0.0	0.0	0.0	0.0
Total Delay	48.1	31.2	32.7	81.1	15.9	13.1	67.9	5.8
Queue Length 50th (ft)	52	442	27	~900	0	7	164	0
Queue Length 95th (ft)	m74	#980	98	#1105	146	44	244	23
Internal Link Dist (ft)		730		743		286	101	
Turn Bay Length (ft)	120		250					
Base Capacity (vph)	184	2087	257	2127	979	407	322	450
Starvation Cap Reductn	0	5	0	227	0	0	0	0
Spillback Cap Reductn	0	0	0	260	0	0	0	5
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.90	0.41	1.09	0.34	0.17	0.70	0.13

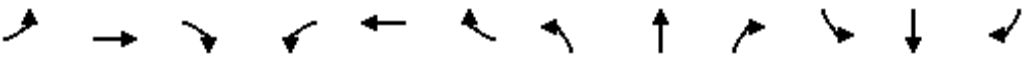
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

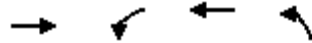
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	1672	4	96	1854	302	6	6	54	189	4	51
Future Volume (vph)	60	1672	4	96	1854	302	6	6	54	189	4	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	3470		1656	3438	1583		1451			1757	1527
Flt Permitted	0.95	1.00		0.05	1.00	1.00		0.97			0.68	1.00
Satd. Flow (perm)	1770	3470		95	3438	1583		1415			1248	1527
Peak-hour factor, PHF	0.91	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.97	0.88	0.88	0.88
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	67	1874	4	105	2033	331	6	6	57	219	5	59
RTOR Reduction (vph)	0	0	0	0	0	0	0	45	0	0	0	46
Lane Group Flow (vph)	67	1878	0	105	2033	331	0	24	0	0	224	13
Confl. Peds. (#/hr)			4	4			16					16
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	17%	2%	17%	2%	50%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	7.4	70.2		79.6	71.2	71.2		24.2			24.2	24.2
Effective Green, g (s)	9.4	72.2		83.6	73.2	73.2		26.2			26.2	26.2
Actuated g/C Ratio	0.08	0.60		0.70	0.61	0.61		0.22			0.22	0.22
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	138	2087		201	2097	965		308			272	333
v/s Ratio Prot	0.04	0.54		c0.05	c0.59							
v/s Ratio Perm				0.32		0.21		0.02			c0.18	0.01
v/c Ratio	0.49	0.90		0.52	0.97	0.34		0.08			0.82	0.04
Uniform Delay, d1	53.0	20.8		25.5	22.3	11.5		37.3			44.7	37.0
Progression Factor	0.81	1.16		1.35	1.43	1.13		1.00			1.00	1.00
Incremental Delay, d2	0.7	5.3		0.9	12.0	0.8		0.0			17.2	0.0
Delay (s)	43.7	29.3		35.3	44.0	13.9		37.3			61.9	37.0
Level of Service	D	C		D	D	B		D			E	D
Approach Delay (s)		29.8			39.6			37.3			56.7	
Approach LOS		C			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			36.6				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			11.2		
Intersection Capacity Utilization			85.8%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↑↑↑	↑
Traffic Volume (vph)	1894	87	2245	7
Future Volume (vph)	1894	87	2245	7
Turn Type	NA	Perm	NA	Prot
Protected Phases	2		6	4
Permitted Phases		6		
Detector Phase	2	6	6	4
Switch Phase				
Minimum Initial (s)	10.0	10.0	10.0	4.0
Minimum Split (s)	27.5	15.5	15.5	13.0
Total Split (s)	79.0	95.0	95.0	25.0
Total Split (%)	65.8%	79.2%	79.2%	20.8%
Yellow Time (s)	3.5	3.5	3.5	3.0
All-Red Time (s)	2.0	2.0	2.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.5	3.5	3.5	4.0
Lead/Lag				
Lead-Lag Optimize?				
Recall Mode	C-Max	C-Max	C-Max	None
Act Effect Green (s)	106.2	106.2	106.2	9.3
Actuated g/C Ratio	0.88	0.88	0.88	0.08
v/c Ratio	0.48	0.79	0.57	0.31
Control Delay	5.1	47.9	3.6	32.5
Queue Delay	0.0	0.0	0.1	0.0
Total Delay	5.2	47.9	3.8	32.5
LOS	A	D	A	C
Approach Delay	5.2		5.4	32.5
Approach LOS	A		A	C

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 69 (58%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.79
Intersection Signal Delay: 5.6
Intersection Capacity Utilization 59.5%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

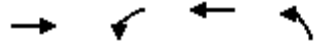
Splits and Phases: 6: Witter Drive & Duke St



Queues

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	2100	98	2516	45
v/c Ratio	0.48	0.79	0.57	0.31
Control Delay	5.1	47.9	3.6	32.5
Queue Delay	0.0	0.0	0.1	0.0
Total Delay	5.2	47.9	3.8	32.5
Queue Length 50th (ft)	167	26	10	13
Queue Length 95th (ft)	459	m#68	748	36
Internal Link Dist (ft)	743		262	663
Turn Bay Length (ft)		200		
Base Capacity (vph)	4404	124	4413	291
Starvation Cap Reductn	0	0	370	0
Spillback Cap Reductn	156	0	719	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.49	0.79	0.68	0.15

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 Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	1894	21	87	2245	7	25
Future Volume (vph)	1894	21	87	2245	7	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		3.5	3.5	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.90	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	4978		1718	4988	1538	
Flt Permitted	1.00		0.08	1.00	0.99	
Satd. Flow (perm)	4978		142	4988	1538	
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.73	0.73
Growth Factor (vph)	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	2077	23	98	2516	10	35
RTOR Reduction (vph)	1	0	0	0	25	0
Lane Group Flow (vph)	2099	0	98	2516	20	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	4%	2%	5%	4%	14%	8%
Turn Type	NA		Perm	NA	Prot	
Protected Phases	2			6	4	
Permitted Phases			6			
Actuated Green, G (s)	102.3		102.3	102.3	6.2	
Effective Green, g (s)	104.3		104.3	104.3	8.2	
Actuated g/C Ratio	0.87		0.87	0.87	0.07	
Clearance Time (s)	5.5		5.5	5.5	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	4326		123	4335	105	
v/s Ratio Prot	0.42			0.50	c0.01	
v/s Ratio Perm			c0.69			
v/c Ratio	0.49		0.80	0.58	0.19	
Uniform Delay, d1	1.8		3.3	2.1	52.8	
Progression Factor	2.58		2.55	1.44	1.00	
Incremental Delay, d2	0.2		28.2	0.4	0.9	
Delay (s)	4.8		36.7	3.3	53.6	
Level of Service	A		D	A	D	
Approach Delay (s)	4.8			4.6	53.6	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay		5.1		HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio		0.75				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)	7.5	
Intersection Capacity Utilization		59.5%		ICU Level of Service	B	
Analysis Period (min)		15				
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



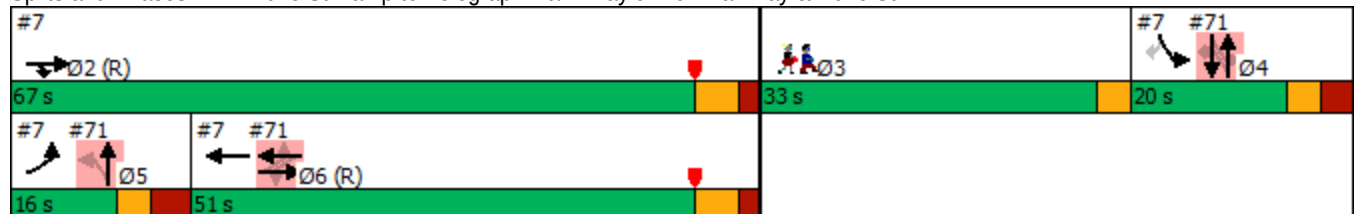
Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	30	928	961	2296	68	36	
Future Volume (vph)	30	928	961	2296	68	36	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	16.0	67.0	67.0	51.0	20.0	20.0	33.0
Total Split (%)	13.3%	55.8%	55.8%	42.5%	16.7%	16.7%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.8	92.8	92.8	81.0	12.6	12.6	
Actuated g/C Ratio	0.08	0.77	0.77	0.68	0.10	0.10	
v/c Ratio	0.25	0.43	0.82	0.78	0.42	0.16	
Control Delay	61.5	5.4	18.8	20.3	29.4	1.6	
Queue Delay	0.0	0.0	0.0	0.1	1.8	0.9	
Total Delay	61.5	5.4	18.8	20.4	31.2	2.5	
LOS	E	A	B	C	C	A	
Approach Delay		13.0		20.4			
Approach LOS		B		C			

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 17.0
 Intersection Capacity Utilization 64.0%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	34	1064	1101	2491	78	42
v/c Ratio	0.25	0.43	0.82	0.78	0.42	0.16
Control Delay	61.5	5.4	18.8	20.3	29.4	1.6
Queue Delay	0.0	0.0	0.0	0.1	1.8	0.9
Total Delay	61.5	5.4	18.8	20.4	31.2	2.5
Queue Length 50th (ft)	23	40	293	500	23	1
Queue Length 95th (ft)	m46	352	#1305	#1034	42	0
Internal Link Dist (ft)		321		577		
Turn Bay Length (ft)	180					
Base Capacity (vph)	157	2449	1348	3181	236	305
Starvation Cap Reductn	0	0	0	0	72	144
Spillback Cap Reductn	0	0	0	66	0	5
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.43	0.82	0.80	0.48	0.26

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	928	961	0	2296	0	0	0	0	68	0	36
Future Volume (vph)	30	928	961	0	2296	0	0	0	0	68	0	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1641	3167	1743		4715					1770		1542
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1641	3167	1743		4715					1770		1542
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	1.00	1.00	1.00	0.87	0.87	0.87
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	102%	102%	102%	100%	102%	102%
Adj. Flow (vph)	34	1064	1101	0	2491	0	0	0	0	78	0	42
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	38
Lane Group Flow (vph)	34	1064	1101	0	2491	0	0	0	0	78	0	4
Confl. Peds. (#/hr)										3		5
Heavy Vehicles (%)	10%	14%	9%	2%	10%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	6.6	88.4	88.4		75.3					10.6		10.6
Effective Green, g (s)	8.6	90.4	90.4		77.3					12.6		12.6
Actuated g/C Ratio	0.07	0.75	0.75		0.64					0.10		0.10
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	117	2385	1313		3037					185		161
v/s Ratio Prot	0.02	0.34	c0.63		0.53					c0.04		
v/s Ratio Perm												0.00
v/c Ratio	0.29	0.45	0.84		0.82					0.42		0.03
Uniform Delay, d1	52.8	5.5	9.9		16.1					50.3		48.2
Progression Factor	1.12	0.66	1.12		1.09					0.46		1.00
Incremental Delay, d2	1.3	0.6	6.0		2.6					1.5		0.1
Delay (s)	60.3	4.2	17.1		20.1					24.4		48.3
Level of Service	E	A	B		C					C		D
Approach Delay (s)		11.5			20.1			0.0			32.8	
Approach LOS		B			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			16.5		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					15.5		
Intersection Capacity Utilization			64.0%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024

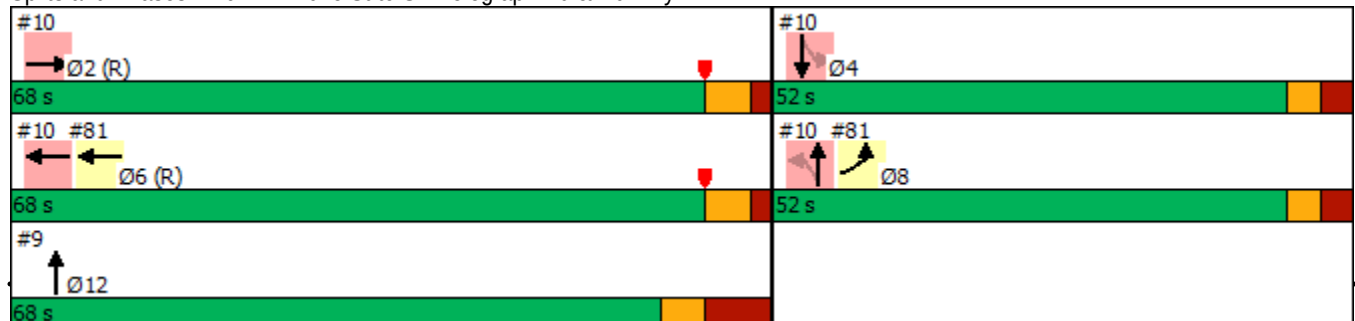


Lane Group	NBT	Ø2	Ø4	Ø6	Ø8
Lane Configurations	↑↑				
Traffic Volume (vph)	432				
Future Volume (vph)	432				
Turn Type	NA				
Protected Phases	12	2	4	6	8
Permitted Phases					
Detector Phase	12				
Switch Phase					
Minimum Initial (s)	4.0	10.0	7.0	4.0	7.0
Minimum Split (s)	26.0	25.0	13.0	25.0	40.0
Total Split (s)	68.0	68.0	52.0	68.0	52.0
Total Split (%)	56.7%	57%	43%	57%	43%
Yellow Time (s)	4.0	4.0	3.0	4.0	3.0
All-Red Time (s)	6.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0				
Total Lost Time (s)	8.0				
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	C-Max	None	C-Max	None
Act Effect Green (s)	72.1				
Actuated g/C Ratio	0.60				
v/c Ratio	0.21				
Control Delay	8.5				
Queue Delay	0.0				
Total Delay	8.5				
LOS	A				
Approach Delay	8.5				
Approach LOS	A				

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 8.5
Intersection LOS: A
Intersection Capacity Utilization 18.8%
ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 9: WB Duke St to SB Telegraph Rd & Dummy



Queues

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Lane Group	NBT
Lane Group Flow (vph)	441
v/c Ratio	0.21
Control Delay	8.5
Queue Delay	0.0
Total Delay	8.5
Queue Length 50th (ft)	56
Queue Length 95th (ft)	75
Internal Link Dist (ft)	94
Turn Bay Length (ft)	
Base Capacity (vph)	2125
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.21
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			
Traffic Volume (vph)	0	0	432	0	0	0
Future Volume (vph)	0	0	432	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			8.0			
Lane Util. Factor			0.95			
Frt			1.00			
Flt Protected			1.00			
Satd. Flow (prot)			3539			
Flt Permitted			1.00			
Satd. Flow (perm)			3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	0	0	441	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	441	0	0	0
Turn Type			NA			
Protected Phases			12			
Permitted Phases						
Actuated Green, G (s)			70.1			
Effective Green, g (s)			72.1			
Actuated g/C Ratio			0.60			
Clearance Time (s)			10.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)			2126			
v/s Ratio Prot			c0.12			
v/s Ratio Perm						
v/c Ratio			0.21			
Uniform Delay, d1			10.9			
Progression Factor			0.68			
Incremental Delay, d2			0.0			
Delay (s)			7.5			
Level of Service			A			
Approach Delay (s)	0.0		7.5		0.0	
Approach LOS	A		A		A	
Intersection Summary						
HCM 2000 Control Delay			7.5	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.14			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		14.0
Intersection Capacity Utilization			18.8%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	Ø12
Lane Configurations	↑↑↑	↑↑↑		↑↓		↑↓	
Traffic Volume (vph)	2151	1066	193	26	16	13	
Future Volume (vph)	2151	1066	193	26	16	13	
Turn Type	NA	NA	Perm	NA	Perm	NA	
Protected Phases	2	6		8		4	12
Permitted Phases			8		4		
Detector Phase	2	6	8	8	4	4	
Switch Phase							
Minimum Initial (s)	10.0	4.0	7.0	7.0	7.0	7.0	4.0
Minimum Split (s)	25.0	25.0	40.0	40.0	13.0	13.0	26.0
Total Split (s)	68.0	68.0	52.0	52.0	52.0	52.0	68.0
Total Split (%)	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%	57%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0	4.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0	6.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0	
Total Lost Time (s)	4.0	4.0		4.0		4.0	
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	76.1	76.1		35.9		35.9	
Actuated g/C Ratio	0.63	0.63		0.30		0.30	
v/c Ratio	0.76	0.38		0.81		0.19	
Control Delay	20.6	12.1		54.0		14.5	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	20.6	12.1		54.0		14.5	
LOS	C	B		D		B	
Approach Delay	20.6	12.1		54.0		14.5	
Approach LOS	C	B		D		B	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 20.5

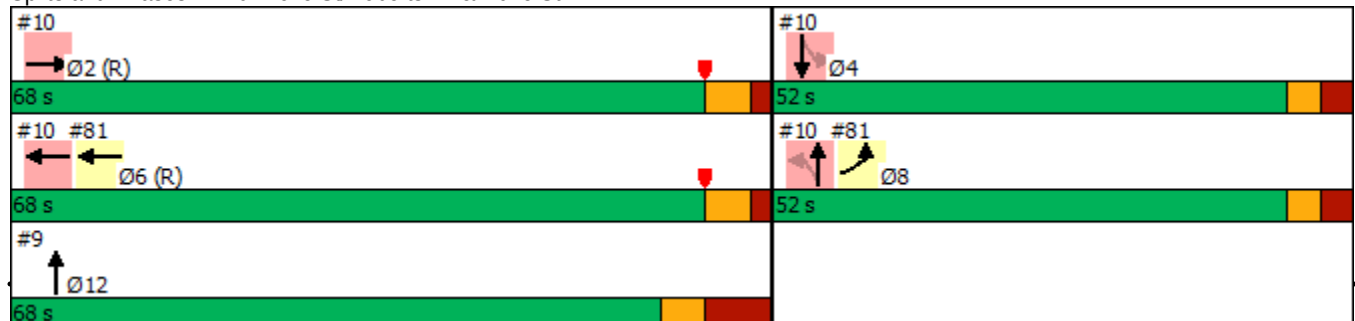
Intersection LOS: C

Intersection Capacity Utilization 70.6%

ICU Level of Service C

Analysis Period (min) 15

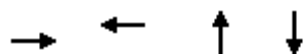
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	2438	1182	302	94
v/c Ratio	0.76	0.38	0.81	0.19
Control Delay	20.6	12.1	54.0	14.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.6	12.1	54.0	14.5
Queue Length 50th (ft)	478	151	214	24
Queue Length 95th (ft)	729	231	224	43
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3192	3100	501	640
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.76	0.38	0.60	0.15
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2151	0	0	1066	0	193	26	10	16	13	42
Future Volume (vph)	0	2151	0	0	1066	0	193	26	10	16	13	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.99			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5036			4891			1756			1663	
Flt Permitted		1.00			1.00			0.68			0.91	
Satd. Flow (perm)		5036			4891			1252			1523	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.76	0.76	0.76	0.77	0.77	0.77
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	100%	102%	102%	102%	102%	102%
Adj. Flow (vph)	0	2438	0	0	1182	0	254	35	13	21	17	56
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	36	0
Lane Group Flow (vph)	0	2438	0	0	1182	0	0	301	0	0	58	0
Confl. Peds. (#/hr)	18		3	3		18			8	8		
Heavy Vehicles (%)	2%	3%	2%	2%	5%	2%	3%	2%	9%	2%	2%	5%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		74.1			74.1			33.9			33.9	
Effective Green, g (s)		76.1			76.1			35.9			35.9	
Actuated g/C Ratio		0.63			0.63			0.30			0.30	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3193			3101			374			455	
v/s Ratio Prot		c0.48			0.24							
v/s Ratio Perm								c0.24			0.04	
v/c Ratio		0.76			0.38			0.80			0.13	
Uniform Delay, d1		15.6			10.6			38.8			30.6	
Progression Factor		1.08			1.00			1.00			1.00	
Incremental Delay, d2		1.8			0.4			11.8			0.1	
Delay (s)		18.7			10.9			50.6			30.8	
Level of Service		B			B			D			C	
Approach Delay (s)		18.7			10.9			50.6			30.8	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			19.1				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)		14.0			
Intersection Capacity Utilization			70.6%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

71: W Taylor Run Parkway

03/14/2024

												
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations												
Traffic Volume (vph)	19	8	13	20	2	23	1	69	6			
Future Volume (vph)	19	8	13	20	2	23	1	69	6			
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm			
Protected Phases		6		6		4 5		4		2	3	5
Permitted Phases	6		6		4 5		4		4			
Detector Phase	6	6	6	6	4 5	4 5	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0			13.0	13.0	13.0	14.0	33.0	12.5
Total Split (s)	51.0	51.0	51.0	51.0			20.0	20.0	20.0	67.0	33.0	16.0
Total Split (%)	42.5%	42.5%	42.5%	42.5%			16.7%	16.7%	16.7%	56%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0			3.0	3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0				-2.0	-2.0			
Total Lost Time (s)		4.0		4.0				4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None	None	C-Max	None	None
Act Effect Green (s)		81.0		81.0		26.9		12.6	12.6			
Actuated g/C Ratio		0.68		0.68		0.22		0.10	0.10			
v/c Ratio		0.06		0.26		0.08		0.41	0.03			
Control Delay		8.7		2.8		1.4		56.0	0.2			
Queue Delay		0.0		0.0		2.7		0.0	0.0			
Total Delay		8.7		2.8		4.1		56.0	0.2			
LOS		A		A		A		E	A			
Approach Delay		8.7		2.8		4.1		51.5				
Approach LOS		A		A		A		D				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.82

Intersection Signal Delay: 12.4

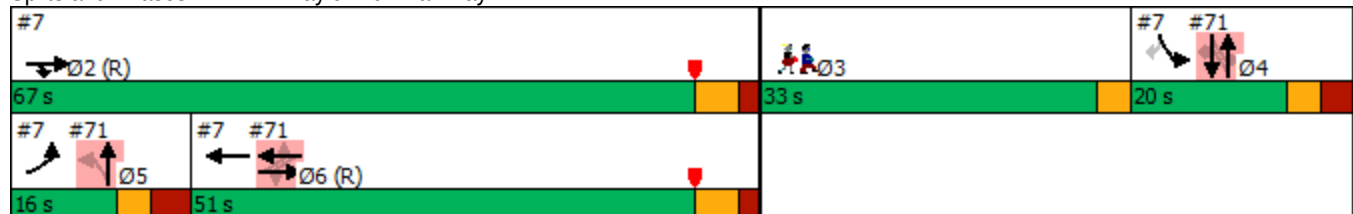
Intersection LOS: B

Intersection Capacity Utilization 36.9%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	63	303	34	80	7
v/c Ratio	0.06	0.26	0.08	0.41	0.03
Control Delay	8.7	2.8	1.4	56.0	0.2
Queue Delay	0.0	0.0	2.7	0.0	0.0
Total Delay	8.7	2.8	4.1	56.0	0.2
Queue Length 50th (ft)	7	0	1	59	0
Queue Length 95th (ft)	37	56	0	103	0
Internal Link Dist (ft)	56	360	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	1010	1151	421	247	304
Starvation Cap Reductn	0	0	322	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.06	0.26	0.34	0.32	0.02
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Parkway

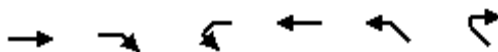
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	8	23	13	20	203	2	23	6	1	69	6
Future Volume (vph)	19	8	23	13	20	203	2	23	6	1	69	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.98			1.00			1.00	0.97
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.94			0.88			0.97			1.00	0.85
Flt Protected		0.98			1.00			1.00			1.00	1.00
Satd. Flow (prot)		1711			1603			1797			1861	1537
Flt Permitted		0.85			0.99			0.99			1.00	1.00
Satd. Flow (perm)		1484			1587			1783			1857	1537
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.87
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	24	10	29	17	26	260	2	25	7	1	79	7
RTOR Reduction (vph)	0	10	0	0	93	0	0	6	0	0	0	6
Lane Group Flow (vph)	0	53	0	0	210	0	0	28	0	0	80	1
Confl. Peds. (#/hr)	10					10	2		1	1		2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		75.3			75.3			23.2			10.6	10.6
Effective Green, g (s)		77.3			77.3			25.2			12.6	12.6
Actuated g/C Ratio		0.64			0.64			0.21			0.10	0.10
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		955			1022			374			194	161
v/s Ratio Prot												
v/s Ratio Perm		0.04			c0.13			c0.02			c0.04	0.00
v/c Ratio		0.06			0.21			0.08			0.41	0.00
Uniform Delay, d1		7.9			8.8			38.1			50.2	48.1
Progression Factor		1.00			0.68			0.03			1.00	1.00
Incremental Delay, d2		0.1			0.5			0.1			1.4	0.0
Delay (s)		8.0			6.4			1.3			51.7	48.1
Level of Service		A			A			A			D	D
Approach Delay (s)		8.0			6.4			1.3			51.4	
Approach LOS		A			A			A			D	
Intersection Summary												
HCM 2000 Control Delay		14.3				HCM 2000 Level of Service		B				
HCM 2000 Volume to Capacity ratio		0.21										
Actuated Cycle Length (s)		120.0				Sum of lost time (s)		15.5				
Intersection Capacity Utilization		36.9%				ICU Level of Service		A				
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

72: Duke St Slip lane & Service Rd

03/14/2024

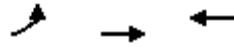


Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations				↑	↑	
Traffic Volume (veh/h)	0	0	0	19	274	0
Future Volume (Veh/h)	0	0	0	19	274	0
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	19	274	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	548	0	548	548	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	548	0	548	548	0	
tC, single (s)	6.5	6.2	7.1	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.0	3.3	3.5	4.0	2.2	
p0 queue free %	100	100	100	95	83	
cM capacity (veh/h)	369	1085	389	369	1623	
Direction, Lane #	WB 1	NW 1				
Volume Total	19	274				
Volume Left	0	274				
Volume Right	0	0				
cSH	369	1623				
Volume to Capacity	0.05	0.17				
Queue Length 95th (ft)	4	15				
Control Delay (s)	15.3	7.7				
Lane LOS	C	A				
Approach Delay (s)	15.3	7.7				
Approach LOS	C					
Intersection Summary						
Average Delay		8.2				
Intersection Capacity Utilization		25.2%		ICU Level of Service		A
Analysis Period (min)		15				

Timings

81: Duke St

03/14/2024



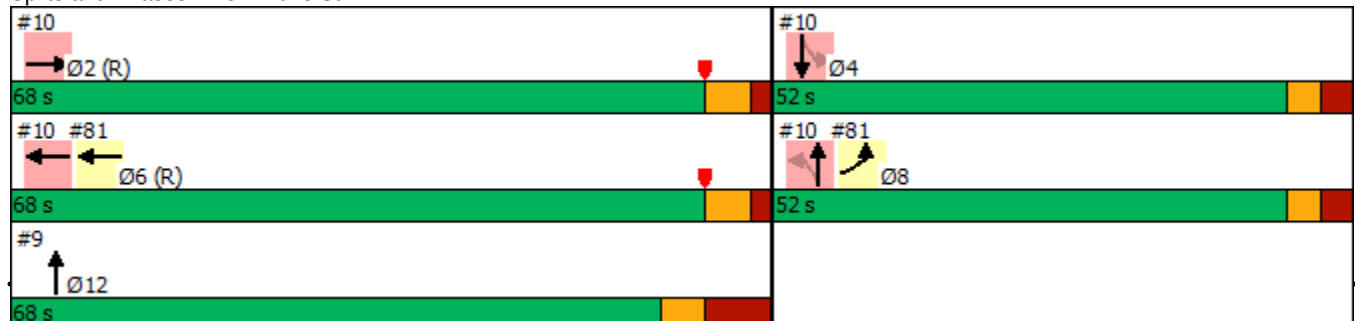
Lane Group	EBL	EBT	WBT	Ø2	Ø4	Ø12
Lane Configurations						
Traffic Volume (vph)	137	861	863			
Future Volume (vph)	137	861	863			
Turn Type	Prot	NA	NA			
Protected Phases	8	Free	6	2	4	12
Permitted Phases						
Detector Phase	8		6			
Switch Phase						
Minimum Initial (s)	7.0		4.0	10.0	7.0	4.0
Minimum Split (s)	40.0		25.0	25.0	13.0	26.0
Total Split (s)	52.0		68.0	68.0	52.0	68.0
Total Split (%)	43.3%		56.7%	57%	43%	57%
Yellow Time (s)	3.0		4.0	4.0	3.0	4.0
All-Red Time (s)	3.0		2.0	2.0	3.0	6.0
Lost Time Adjust (s)	-2.0		-2.0			
Total Lost Time (s)	4.0		4.0			
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		C-Max	C-Max	None	None
Act Effect Green (s)	35.9	120.0	76.1			
Actuated g/C Ratio	0.30	1.00	0.63			
v/c Ratio	0.26	0.25	0.39			
Control Delay	18.8	0.2	8.0			
Queue Delay	0.0	0.0	0.0			
Total Delay	18.8	0.2	8.0			
LOS	B	A	A			
Approach Delay		2.7	8.0			
Approach LOS		A	A			

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 5.1
 Intersection Capacity Utilization 138.4%
 Analysis Period (min) 15

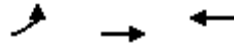
Intersection LOS: A
 ICU Level of Service H

Splits and Phases: 81: Duke St



Queues
81: Duke St

03/14/2024

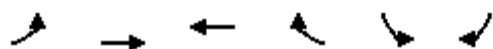


Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	137	878	880
v/c Ratio	0.26	0.25	0.39
Control Delay	18.8	0.2	8.0
Queue Delay	0.0	0.0	0.0
Total Delay	18.8	0.2	8.0
Queue Length 50th (ft)	56	0	107
Queue Length 95th (ft)	44	0	132
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	708	3539	2243
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.19	0.25	0.39
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

81: Duke St

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	137	861	863	0	0	0
Future Volume (vph)	137	861	863	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	100%	102%	102%	102%	102%	102%
Adj. Flow (vph)	137	878	880	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	137	878	880	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	8	Free	6			
Permitted Phases						
Actuated Green, G (s)	33.9	120.0	74.1			
Effective Green, g (s)	35.9	120.0	76.1			
Actuated g/C Ratio	0.30	1.00	0.63			
Clearance Time (s)	6.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	529	3539	2244			
v/s Ratio Prot	0.08	0.25	c0.25			
v/s Ratio Perm						
v/c Ratio	0.26	0.25	0.39			
Uniform Delay, d1	31.9	0.0	10.7			
Progression Factor	0.59	1.00	0.63			
Incremental Delay, d2	0.2	0.2	0.5			
Delay (s)	19.0	0.2	7.2			
Level of Service	B	A	A			
Approach Delay (s)		2.7	7.2		0.0	
Approach LOS		A	A		A	
Intersection Summary						
HCM 2000 Control Delay			4.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.38			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	16.0
Intersection Capacity Utilization			138.4%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

82: WB Duke St to SB Telegraph Rd

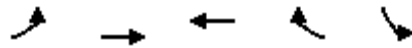
03/14/2024

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		 				
Traffic Volume (veh/h)	0	441	0	0	137	0
Future Volume (Veh/h)	0	441	0	0	137	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	441	0	0	137	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		252				
pX, platoon unblocked					0.95	
vC, conflicting volume	0				220	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				65	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				84	100
cM capacity (veh/h)	1622				884	1084
Direction, Lane #	NB 1	NB 2	NE 1			
Volume Total	220	220	137			
Volume Left	0	0	137			
Volume Right	0	0	0			
cSH	1700	1700	884			
Volume to Capacity	0.13	0.13	0.16			
Queue Length 95th (ft)	0	0	14			
Control Delay (s)	0.0	0.0	9.8			
Lane LOS			A			
Approach Delay (s)	0.0		9.8			
Approach LOS			A			
Intersection Summary						
Average Delay		2.3				
Intersection Capacity Utilization		26.4%		ICU Level of Service		A
Analysis Period (min)		15				

Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	Ø2
Lane Configurations	↰	↑↑↑	↑↑	↱	↰↰↰	
Traffic Volume (vph)	306	994	1195	703	843	
Future Volume (vph)	306	994	1195	703	843	
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	2
Permitted Phases	5 2					
Detector Phase	5	5 2	6	6 4	4	
Switch Phase						
Minimum Initial (s)	5.0		10.0		7.0	10.0
Minimum Split (s)	19.6		22.0		29.5	22.0
Total Split (s)	22.0		53.0		45.0	75.0
Total Split (%)	18.3%		44.2%		37.5%	63%
Yellow Time (s)	3.0		4.0		3.5	4.0
All-Red Time (s)	2.6		2.0		3.0	2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0	
Total Lost Time (s)	3.6		4.0		4.5	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None		C-Max		None	C-Max
Act Effect Green (s)	71.4	71.4	49.0	94.0	40.5	
Actuated g/C Ratio	0.60	0.60	0.41	0.78	0.34	
v/c Ratio	1.06	0.38	0.87	0.60	0.97	
Control Delay	101.8	13.2	39.3	5.5	59.1	
Queue Delay	0.0	0.3	47.4	0.4	0.5	
Total Delay	101.8	13.5	86.7	6.0	59.6	
LOS	F	B	F	A	E	
Approach Delay		34.0	56.8		59.6	
Approach LOS		C	E		E	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 50.1

Intersection LOS: D

Intersection Capacity Utilization 90.2%

ICU Level of Service E

Analysis Period (min) 15

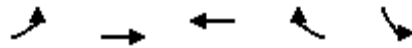
Splits and Phases: 1: Duke St & N Quaker Lane



Queues

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	344	1139	1257	739	1118
v/c Ratio	1.06	0.38	0.87	0.60	0.97
Control Delay	101.8	13.2	39.3	5.5	59.1
Queue Delay	0.0	0.3	47.4	0.4	0.5
Total Delay	101.8	13.5	86.7	6.0	59.6
Queue Length 50th (ft)	~243	159	395	93	430
Queue Length 95th (ft)	#425	187	497	146	#577
Internal Link Dist (ft)		582	312		324
Turn Bay Length (ft)					
Base Capacity (vph)	324	2996	1445	1240	1152
Starvation Cap Reductn	0	0	316	161	0
Spillback Cap Reductn	0	1115	0	0	4
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.06	0.61	1.11	0.68	0.97

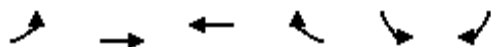
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	306	994	1195	703	843	163
Future Volume (vph)	306	994	1195	703	843	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1719	5036	3539	1583	3372	
Flt Permitted	0.08	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	138	5036	3539	1583	3372	
Peak-hour factor, PHF	0.89	0.89	0.97	0.97	0.90	0.90
Growth Factor (vph)	100%	102%	102%	102%	100%	100%
Adj. Flow (vph)	344	1139	1257	739	937	181
RTOR Reduction (vph)	0	0	0	0	14	0
Lane Group Flow (vph)	344	1139	1257	739	1104	0
Confl. Peds. (#/hr)	2			2		1
Heavy Vehicles (%)	5%	3%	2%	2%	2%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	69.0	69.0	47.0	91.5	38.5	
Effective Green, g (s)	71.0	71.0	49.0	93.5	40.5	
Actuated g/C Ratio	0.59	0.59	0.41	0.78	0.34	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	324	2979	1445	1233	1138	
v/s Ratio Prot	c0.16	0.23	0.36	0.47	c0.33	
v/s Ratio Perm	c0.47					
v/c Ratio	1.06	0.38	0.87	0.60	0.97	
Uniform Delay, d1	38.9	12.9	32.6	5.5	39.2	
Progression Factor	1.00	1.00	1.03	0.74	1.00	
Incremental Delay, d2	67.2	0.1	5.2	0.5	19.8	
Delay (s)	106.1	13.0	38.8	4.6	59.0	
Level of Service	F	B	D	A	E	
Approach Delay (s)		34.6	26.2		59.0	
Approach LOS		C	C		E	
Intersection Summary						
HCM 2000 Control Delay			36.9		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			1.05			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			90.2%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Timings

2: S Quaker Ln & Duke St

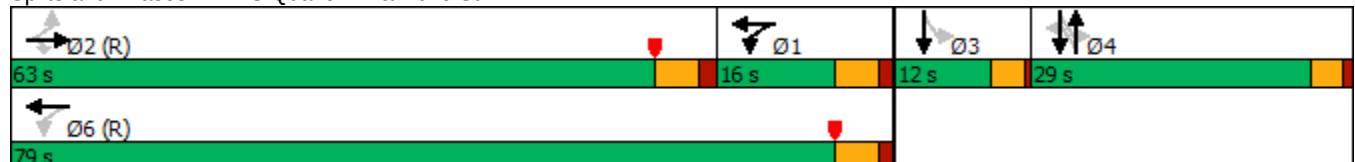
03/14/2024

											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø6
Lane Configurations											
Traffic Volume (vph)	7	1480	362	26	1794	103	0	1	0		
Future Volume (vph)	7	1480	362	26	1794	103	0	1	0		
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA		
Protected Phases		2		1	1 6		4		3 4	3	6
Permitted Phases	2		2	1 6		4		3 4			
Detector Phase	2	2	2	1	1 6	4	4	3 4	3 4		
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	5.0		7.0	7.0			4.0	4.0
Minimum Split (s)	15.5	15.5	15.5	10.5		29.0	29.0			12.0	20.0
Total Split (s)	63.0	63.0	63.0	16.0		29.0	29.0			12.0	79.0
Total Split (%)	52.5%	52.5%	52.5%	13.3%		24.2%	24.2%			10%	66%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0			3.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5		1.0	1.0			0.5	1.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0			-2.0				
Total Lost Time (s)	3.5	3.5	3.5	3.5			2.0				
Lead/Lag	Lead	Lead	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	None		None	None			Max	C-Max
Act Effect Green (s)	72.0	72.0	72.0	88.0	88.0		14.5		27.0		
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73		0.12		0.22		
v/c Ratio	0.13	0.73	0.37	0.11	0.75		0.60		0.02		
Control Delay	25.6	24.8	8.2	2.6	5.4		26.8		0.0		
Queue Delay	0.0	4.8	0.7	0.0	1.3		5.1		0.0		
Total Delay	25.6	29.6	8.8	2.6	6.8		32.0		0.0		
LOS	C	C	A	A	A		C		A		
Approach Delay		25.4			6.7		32.0				
Approach LOS		C			A		C				

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 62 (52%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 16.6
Intersection Capacity Utilization 70.8%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service C

Splits and Phases: 2: S Quaker Ln & Duke St



Queues

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	8	1558	389	28	1934	155	8
v/c Ratio	0.13	0.73	0.37	0.11	0.75	0.60	0.02
Control Delay	25.6	24.8	8.2	2.6	5.4	26.8	0.0
Queue Delay	0.0	4.8	0.7	0.0	1.3	5.1	0.0
Total Delay	25.6	29.6	8.8	2.6	6.8	32.0	0.0
Queue Length 50th (ft)	3	434	75	0	45	37	0
Queue Length 95th (ft)	m8	m544	m110	m0	57	73	0
Internal Link Dist (ft)		312			222	293	73
Turn Bay Length (ft)	175			75			
Base Capacity (vph)	62	2123	1044	250	2592	389	598
Starvation Cap Reductn	0	491	346	0	191	0	0
Spillback Cap Reductn	0	0	0	0	420	173	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.95	0.56	0.11	0.89	0.72	0.01

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

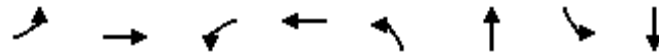
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1480	362	26	1794	7	103	0	19	1	0	1
Future Volume (vph)	7	1480	362	26	1794	7	103	0	19	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.98			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1769	3539	1537	1570	3537			1744			1695	
Flt Permitted	0.06	1.00	1.00	0.08	1.00			0.75			0.96	
Satd. Flow (perm)	103	3539	1537	139	3537			1370			1675	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.80	0.80	0.80	0.25	0.25	0.25
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	8	1558	389	28	1926	8	131	0	24	4	0	4
RTOR Reduction (vph)	0	0	124	0	0	0	0	92	0	0	6	0
Lane Group Flow (vph)	8	1558	265	28	1934	0	0	63	0	0	2	0
Confl. Peds. (#/hr)	9		11	11		9			7	7		
Heavy Vehicles (%)	2%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1			4			3	4
Permitted Phases	2		2	1	6		4			3	4	
Actuated Green, G (s)	70.0	70.0	70.0	86.0	86.0			12.5			24.5	
Effective Green, g (s)	72.0	72.0	72.0	88.0	88.0			14.5			26.5	
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73			0.12			0.22	
Clearance Time (s)	5.5	5.5	5.5	5.5				4.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0				3.0				
Lane Grp Cap (vph)	61	2123	922	250	2593			165			369	
v/s Ratio Prot		0.44		0.01	c0.55							
v/s Ratio Perm	0.08		0.17	0.07				c0.05			c0.00	
v/c Ratio	0.13	0.73	0.29	0.11	0.75			0.38			0.00	
Uniform Delay, d1	10.4	17.2	11.6	21.9	9.4			48.6			36.5	
Progression Factor	1.37	1.23	2.25	0.21	0.36			1.00			1.00	
Incremental Delay, d2	3.4	1.7	0.6	0.1	0.8			1.5			0.0	
Delay (s)	17.6	22.8	26.7	4.6	4.2			50.1			36.5	
Level of Service	B	C	C	A	A			D			D	
Approach Delay (s)		23.6			4.2			50.1			36.5	
Approach LOS		C			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			15.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			70.8%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	62	1427	7	1718	16	2	49	2
Future Volume (vph)	62	1427	7	1718	16	2	49	2
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	5.0	10.0	1.0	1.0	7.0	7.0	6.7	6.7
Minimum Split (s)	11.1	17.0	16.3	16.3	29.0	29.0	13.0	13.0
Total Split (s)	16.0	91.0	75.0	75.0	29.0	29.0	29.0	29.0
Total Split (%)	13.3%	75.8%	62.5%	62.5%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	4.0	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.6	2.3	2.3	2.3	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.1	4.3	4.3	4.3		4.0		4.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	95.5	95.3	85.5	85.5		16.4		16.4
Actuated g/C Ratio	0.80	0.79	0.71	0.71		0.14		0.14
v/c Ratio	0.34	0.54	0.04	0.75		0.21		0.69
Control Delay	22.8	0.7	7.1	9.3		40.1		43.5
Queue Delay	0.0	0.1	0.0	0.1		0.0		0.0
Total Delay	22.8	0.8	7.1	9.4		40.1		43.5
LOS	C	A	A	A		D		D
Approach Delay		1.8		9.4		40.1		43.5
Approach LOS		A		A		D		D

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 68 (57%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 8.1
 Intersection Capacity Utilization 68.8%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service C

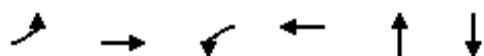
Splits and Phases: 3: Duke St & Alexandria Commons



Queues

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	67	1529	8	1882	33	184
v/c Ratio	0.34	0.54	0.04	0.75	0.21	0.69
Control Delay	22.8	0.7	7.1	9.3	40.1	43.5
Queue Delay	0.0	0.1	0.0	0.1	0.0	0.0
Total Delay	22.8	0.8	7.1	9.4	40.1	43.5
Queue Length 50th (ft)	8	2	1	161	19	86
Queue Length 95th (ft)	m28	2	m2	172	34	127
Internal Link Dist (ft)		222		571	88	97
Turn Bay Length (ft)	100		375			
Base Capacity (vph)	253	2807	210	2513	231	367
Starvation Cap Reductn	0	265	0	56	0	0
Spillback Cap Reductn	0	0	0	54	0	1
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.60	0.04	0.77	0.14	0.50

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	1427	10	7	1718	34	16	2	4	49	2	93
Future Volume (vph)	62	1427	10	7	1718	34	16	2	4	49	2	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.3		4.3	4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.98			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1770	3535		1767	3527			1745			1664	
Flt Permitted	0.06	1.00		0.16	1.00			0.60			0.89	
Satd. Flow (perm)	111	3535		296	3527			1087			1502	
Peak-hour factor, PHF	0.94	0.94	0.94	0.95	0.95	0.95	0.69	0.69	0.69	0.80	0.80	0.80
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	67	1518	11	8	1845	37	24	3	6	62	3	119
RTOR Reduction (vph)	0	0	0	0	1	0	0	5	0	0	60	0
Lane Group Flow (vph)	67	1529	0	8	1881	0	0	28	0	0	124	0
Confl. Peds. (#/hr)	2		15	15		2			9	9		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	93.3	93.3		82.3	82.3			14.4			14.4	
Effective Green, g (s)	95.3	95.3		84.3	84.3			16.4			16.4	
Actuated g/C Ratio	0.79	0.79		0.70	0.70			0.14			0.14	
Clearance Time (s)	6.1	6.3		6.3	6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0		0.2	0.2			2.0			2.0	
Lane Grp Cap (vph)	183	2807		207	2477			148			205	
v/s Ratio Prot	0.02	c0.43			c0.53							
v/s Ratio Perm	0.27			0.03				0.03			c0.08	
v/c Ratio	0.37	0.54		0.04	0.76			0.19			0.61	
Uniform Delay, d1	14.0	4.5		5.5	11.4			45.9			48.8	
Progression Factor	3.80	0.04		0.81	0.59			1.00			1.00	
Incremental Delay, d2	0.3	0.5		0.2	1.5			0.2			3.5	
Delay (s)	53.6	0.7		4.7	8.2			46.1			52.2	
Level of Service	D	A		A	A			D			D	
Approach Delay (s)		2.9			8.1			46.1			52.2	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			8.4			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.4			
Intersection Capacity Utilization			68.8%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	29	1449	27	1665	19	6	98	8	75
Future Volume (vph)	29	1449	27	1665	19	6	98	8	75
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	4.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	30.8	10.0	31.0	29.0	29.0	29.0	29.0	29.0
Total Split (s)	17.0	74.0	17.0	74.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	14.2%	61.7%	14.2%	61.7%	24.2%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	1.8	2.6	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	3.8	3.6	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	None	None
Act Effect Green (s)	88.7	84.4	88.7	83.9		21.2		21.2	21.2
Actuated g/C Ratio	0.74	0.70	0.74	0.70		0.18		0.18	0.18
v/c Ratio	0.19	0.63	0.12	0.77		0.44		0.86	0.26
Control Delay	11.4	7.8	8.7	25.6		15.8		90.8	9.8
Queue Delay	0.0	0.0	0.0	0.1		0.0		0.0	0.0
Total Delay	11.4	7.8	8.7	25.7		15.8		90.8	9.8
LOS	B	A	A	C		B		F	A
Approach Delay		7.8		25.4		15.8		57.3	
Approach LOS		A		C		B		E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 67 (56%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 19.6
Intersection Capacity Utilization 76.0%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

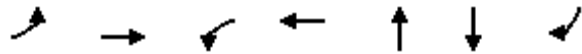
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St

Ø1	Ø2 (R)	Ø4
17 s	74 s	29 s
Ø5	Ø6 (R)	Ø8
17 s	74 s	29 s

Queues

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	32	1578	29	1884	163	129	91
v/c Ratio	0.19	0.63	0.12	0.77	0.44	0.86	0.26
Control Delay	11.4	7.8	8.7	25.6	15.8	90.8	9.8
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	11.4	7.8	8.7	25.7	15.8	90.8	9.8
Queue Length 50th (ft)	5	126	7	494	25	96	0
Queue Length 95th (ft)	m14	206	m13	m708	41	#169	37
Internal Link Dist (ft)		571		730	190	93	
Turn Bay Length (ft)	195		80				
Base Capacity (vph)	255	2489	324	2452	415	177	401
Starvation Cap Reductn	0	13	0	22	0	0	0
Spillback Cap Reductn	0	0	0	36	1	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.64	0.09	0.78	0.39	0.73	0.23

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 Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	1449	3	27	1665	108	19	6	83	98	8	75
Future Volume (vph)	29	1449	3	27	1665	108	19	6	83	98	8	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1752	3538		1770	3502			1626			1770	1583
Flt Permitted	0.05	1.00		0.10	1.00			0.93			0.46	1.00
Satd. Flow (perm)	101	3538		196	3502			1519			854	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.68	0.68	0.68	0.84	0.84	0.84
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	32	1575	3	29	1769	115	28	9	124	119	10	91
RTOR Reduction (vph)	0	0	0	0	3	0	0	103	0	0	0	75
Lane Group Flow (vph)	32	1578	0	29	1881	0	0	60	0	0	129	16
Confl. Peds. (#/hr)	1		10	10		1			7	7		
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	83.5	80.2		82.7	79.5			19.2			19.2	19.2
Effective Green, g (s)	87.5	82.2		86.7	81.5			21.2			21.2	21.2
Actuated g/C Ratio	0.73	0.69		0.72	0.68			0.18			0.18	0.18
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	146	2423		209	2378			268			150	279
v/s Ratio Prot	c0.01	0.45		0.01	c0.54							
v/s Ratio Perm	0.15			0.09				0.04			c0.15	0.01
v/c Ratio	0.22	0.65		0.14	0.79			0.22			0.86	0.06
Uniform Delay, d1	13.8	10.7		8.3	13.3			42.4			48.0	41.1
Progression Factor	2.05	0.59		1.86	1.74			1.00			1.00	1.00
Incremental Delay, d2	0.2	1.2		0.0	1.1			0.2			34.7	0.0
Delay (s)	28.6	7.5		15.6	24.3			42.5			82.7	41.1
Level of Service	C	A		B	C			D			F	D
Approach Delay (s)		7.9			24.2			42.5			65.5	
Approach LOS		A			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			20.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			76.0%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

5: Roth St/Cambridge Rd & Duke St

03/14/2024

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	9	1619	61	1756	175	3	11	276	5	41
Future Volume (vph)	9	1619	61	1756	175	3	11	276	5	41
Turn Type	Prot	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6			8		4	
Permitted Phases			6		6	8		4		4
Detector Phase	5	2	1	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	6.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.5	30.7	11.5	15.7	15.7	13.4	13.4	30.4	30.4	30.4
Total Split (s)	13.0	60.0	13.0	60.0	60.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	10.8%	50.0%	10.8%	50.0%	50.0%	39.2%	39.2%	39.2%	39.2%	39.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	1.7	2.5	1.7	1.7	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	3.5	3.7	3.5	3.7	3.7		4.4		4.4	4.4
Lead/Lag	Lead	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?										
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	8.2	59.5	68.9	66.8	66.8		42.6		42.6	42.6
Actuated g/C Ratio	0.07	0.50	0.57	0.56	0.56		0.36		0.36	0.36
v/c Ratio	0.09	1.00	0.35	0.94	0.21		0.57		1.47	0.08
Control Delay	65.0	44.7	25.9	41.2	20.5		23.3		263.6	2.6
Queue Delay	0.0	0.0	0.0	0.1	0.0		0.0		0.0	0.1
Total Delay	65.0	44.7	25.9	41.3	20.5		23.3		263.6	2.7
LOS	E	D	C	D	C		C		F	A
Approach Delay		44.8		39.0			23.3		230.2	
Approach LOS		D		D			C		F	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 95 (79%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.47

Intersection Signal Delay: 55.7

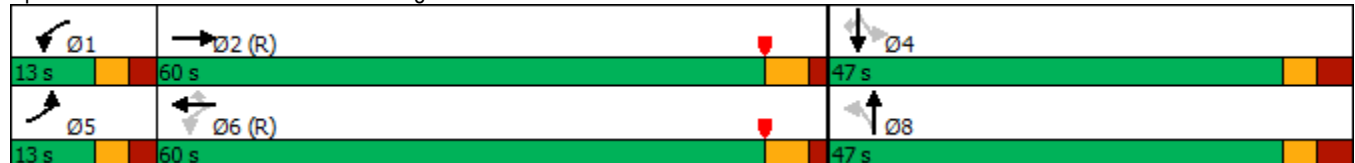
Intersection LOS: E

Intersection Capacity Utilization 101.5%

ICU Level of Service G

Analysis Period (min) 15

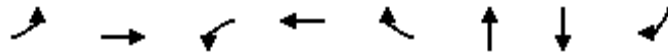
Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



Queues

5: Roth St/Cambridge Rd & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	10	1746	64	1847	184	381	333	49
v/c Ratio	0.09	1.00	0.35	0.94	0.21	0.57	1.47	0.08
Control Delay	65.0	44.7	25.9	41.2	20.5	23.3	263.6	2.6
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1
Total Delay	65.0	44.7	25.9	41.3	20.5	23.3	263.6	2.7
Queue Length 50th (ft)	7	~778	31	517	80	150	~353	0
Queue Length 95th (ft)	m14	#929	59	#1026	138	252	#505	11
Internal Link Dist (ft)		730		743		286	101	
Turn Bay Length (ft)	120		250					
Base Capacity (vph)	128	1754	197	1971	863	663	227	598
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	4	0	0	0	187
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	1.00	0.32	0.94	0.21	0.57	1.47	0.12

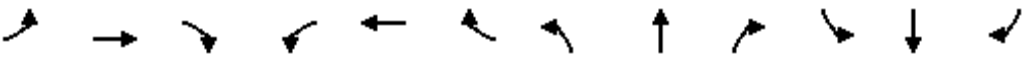
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1619	5	61	1756	175	3	11	344	276	5	41
Future Volume (vph)	9	1619	5	61	1756	175	3	11	344	276	5	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.87			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1626	3537		1752	3539	1550		1620			1770	1550
Flt Permitted	0.95	1.00		0.06	1.00	1.00		1.00			0.34	1.00
Satd. Flow (perm)	1626	3537		119	3539	1550		1617			640	1550
Peak-hour factor, PHF	0.93	0.93	0.93	0.97	0.97	0.97	0.96	0.96	0.96	0.86	0.86	0.86
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	10	1741	5	64	1847	184	3	12	366	327	6	49
RTOR Reduction (vph)	0	0	0	0	0	0	0	89	0	0	0	32
Lane Group Flow (vph)	10	1746	0	64	1847	184	0	292	0	0	333	17
Confl. Peds. (#/hr)	1		2	2		1	6					6
Heavy Vehicles (%)	11%	2%	2%	3%	2%	2%	2%	2%	2%	2%	20%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	1.4	56.4		65.8	60.4	60.4		40.6			40.6	40.6
Effective Green, g (s)	3.4	58.4		69.3	62.4	62.4		42.6			42.6	42.6
Actuated g/C Ratio	0.03	0.49		0.58	0.52	0.52		0.36			0.36	0.36
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	46	1721		169	1840	806		574			227	550
v/s Ratio Prot	0.01	0.49		c0.02	c0.52							
v/s Ratio Perm				0.19		0.12		0.18			c0.52	0.01
v/c Ratio	0.22	1.01		0.38	1.00	0.23		0.51			1.47	0.03
Uniform Delay, d1	57.0	30.8		25.6	28.8	15.7		30.5			38.7	25.2
Progression Factor	1.21	0.84		1.76	1.29	1.38		1.00			1.00	1.00
Incremental Delay, d2	0.7	22.9		0.5	20.7	0.6		0.3			232.6	0.0
Delay (s)	69.7	48.6		45.4	58.0	22.2		30.7			271.3	25.3
Level of Service	E	D		D	E	C		C			F	C
Approach Delay (s)		48.8			54.4			30.7			239.8	
Approach LOS		D			D			C			F	
Intersection Summary												
HCM 2000 Control Delay			65.7									HCM 2000 Level of Service E
HCM 2000 Volume to Capacity ratio			1.17									
Actuated Cycle Length (s)			120.0									Sum of lost time (s) 11.6
Intersection Capacity Utilization			101.5%									ICU Level of Service G
Analysis Period (min)			15									
c Critical Lane Group												

Timings

6: Witter Drive & Duke St

03/14/2024

	→	↖	←	↙
Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑↑	↖	↑↑↑	↙
Traffic Volume (vph)	2243	29	1968	24
Future Volume (vph)	2243	29	1968	24
Turn Type	NA	pm+pt	NA	Prot
Protected Phases	2	1	6	4
Permitted Phases		6		
Detector Phase	2	1	6	4
Switch Phase				
Minimum Initial (s)	10.0	6.0	10.0	4.0
Minimum Split (s)	27.5	12.0	15.5	20.0
Total Split (s)	81.0	14.0	95.0	25.0
Total Split (%)	67.5%	11.7%	79.2%	20.8%
Yellow Time (s)	3.5	3.0	3.5	3.5
All-Red Time (s)	2.0	3.0	2.0	0.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.5	4.0	3.5	2.0
Lead/Lag	Lag	Lead		
Lead-Lag Optimize?				
Recall Mode	C-Max	None	C-Max	None
Act Effect Green (s)	95.1	101.9	102.4	12.1
Actuated g/C Ratio	0.79	0.85	0.85	0.10
v/c Ratio	0.57	0.16	0.49	0.62
Control Delay	3.1	11.1	4.7	28.4
Queue Delay	0.1	0.0	0.0	0.0
Total Delay	3.3	11.1	4.7	28.5
LOS	A	B	A	C
Approach Delay	3.3		4.8	28.5
Approach LOS	A		A	C

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 4 (3%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 4.9
Intersection Capacity Utilization 56.0%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Witter Drive & Duke St

↖ Ø1	→ Ø2 (R)	↙ Ø4
14 s	81 s	25 s
↖ Ø6 (R)		
95 s		

Queues

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	2297	31	2113	164
v/c Ratio	0.57	0.16	0.49	0.62
Control Delay	3.1	11.1	4.7	28.4
Queue Delay	0.1	0.0	0.0	0.0
Total Delay	3.3	11.1	4.7	28.5
Queue Length 50th (ft)	116	2	39	39
Queue Length 95th (ft)	m133	m15	258	37
Internal Link Dist (ft)	743		262	663
Turn Bay Length (ft)		200		
Base Capacity (vph)	4025	220	4339	404
Starvation Cap Reductn	584	0	244	0
Spillback Cap Reductn	312	0	0	6
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.67	0.14	0.52	0.41

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	2243	8	29	1968	24	71
Future Volume (vph)	2243	8	29	1968	24	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	2.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.90	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	5082		1770	5085	1641	
Flt Permitted	1.00		0.05	1.00	0.99	
Satd. Flow (perm)	5082		95	5085	1641	
Peak-hour factor, PHF	0.98	0.98	0.95	0.95	0.59	0.59
Growth Factor (vph)	100%	102%	102%	102%	102%	102%
Adj. Flow (vph)	2289	8	31	2113	41	123
RTOR Reduction (vph)	0	0	0	0	100	0
Lane Group Flow (vph)	2297	0	31	2113	64	0
Confl. Peds. (#/hr)		9	9			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	90.7		100.4	100.4	10.1	
Effective Green, g (s)	92.7		102.4	102.4	12.1	
Actuated g/C Ratio	0.77		0.85	0.85	0.10	
Clearance Time (s)	5.5		6.0	5.5	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3925		160	4339	165	
v/s Ratio Prot	c0.45		0.01	c0.42	c0.04	
v/s Ratio Perm			0.15			
v/c Ratio	0.59		0.19	0.49	0.39	
Uniform Delay, d1	5.7		4.6	2.2	50.5	
Progression Factor	0.49		5.05	1.74	1.00	
Incremental Delay, d2	0.2		0.4	0.3	1.5	
Delay (s)	2.9		23.7	4.1	52.0	
Level of Service	A		C	A	D	
Approach Delay (s)	2.9			4.4	52.0	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay		5.4		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.56				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		9.5
Intersection Capacity Utilization		56.0%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	26	702	1573	1978	184	19	
Future Volume (vph)	26	702	1573	1978	184	19	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	15.0	63.0	63.0	48.0	24.0	24.0	33.0
Total Split (%)	12.5%	52.5%	52.5%	40.0%	20.0%	20.0%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.4	87.0	87.0	75.6	18.4	18.4	
Actuated g/C Ratio	0.08	0.72	0.72	0.63	0.15	0.15	
v/c Ratio	0.22	0.30	1.21	0.71	0.73	0.06	
Control Delay	62.9	4.9	119.4	21.8	41.0	0.4	
Queue Delay	0.0	0.0	0.0	0.0	5.6	1.2	
Total Delay	62.9	4.9	119.4	21.8	46.5	1.6	
LOS	E	A	F	C	D	A	
Approach Delay		83.4		21.8			
Approach LOS		F		C			

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.21

Intersection Signal Delay: 53.1

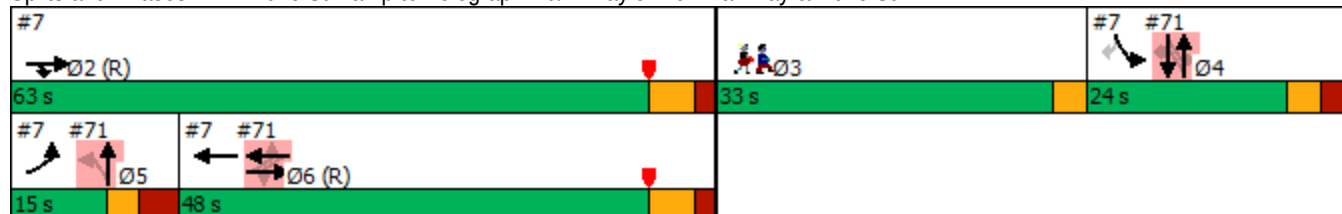
Intersection LOS: D

Intersection Capacity Utilization 100.7%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	27	723	1589	2193	194	20
v/c Ratio	0.22	0.30	1.21	0.71	0.73	0.06
Control Delay	62.9	4.9	119.4	21.8	41.0	0.4
Queue Delay	0.0	0.0	0.0	0.0	5.6	1.2
Total Delay	62.9	4.9	119.4	21.8	46.5	1.6
Queue Length 50th (ft)	22	53	~1428	447	61	0
Queue Length 95th (ft)	m33	125	#2108	#873	#98	m0
Internal Link Dist (ft)		321		574		
Turn Bay Length (ft)	180					
Base Capacity (vph)	137	2444	1311	3082	286	358
Starvation Cap Reductn	0	0	0	0	50	255
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.30	1.21	0.71	0.82	0.19

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  							
Traffic Volume (vph)	26	702	1573	0	1978	0	0	0	0	184	0	19
Future Volume (vph)	26	702	1573	0	1978	0	0	0	0	184	0	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1570	3374	1810		4893					1719		1583
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1570	3374	1810		4893					1719		1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Growth Factor (vph)	102%	102%	100%	102%	102%	102%	102%	102%	102%	100%	102%	102%
Adj. Flow (vph)	27	723	1589	0	2193	0	0	0	0	194	0	20
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	17
Lane Group Flow (vph)	27	723	1589	0	2193	0	0	0	0	194	0	3
Confl. Peds. (#/hr)										7	7	
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	6.2	82.6	82.6		69.9					16.4		16.4
Effective Green, g (s)	8.2	84.6	84.6		71.9					18.4		18.4
Actuated g/C Ratio	0.07	0.70	0.70		0.60					0.15		0.15
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	107	2378	1276		2931					263		242
v/s Ratio Prot	0.02	0.21	c0.88		0.45					c0.11		
v/s Ratio Perm												0.00
v/c Ratio	0.25	0.30	1.25		0.75					0.74		0.01
Uniform Delay, d1	53.0	6.6	17.7		17.5					48.5		43.1
Progression Factor	1.15	0.58	0.83		1.12					0.50		1.00
Incremental Delay, d2	1.0	0.3	116.1		1.8					10.0		0.0
Delay (s)	61.8	4.1	130.8		21.4					34.5		43.1
Level of Service	E	A	F		C					C		D
Approach Delay (s)		90.8			21.4			0.0			35.3	
Approach LOS		F			C			A			D	
Intersection Summary												
HCM 2000 Control Delay			56.3									HCM 2000 Level of Service E
HCM 2000 Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			100.7%									ICU Level of Service G
Analysis Period (min)			15									
c Critical Lane Group												

Timings

9: WB Duke St to SB Telegraph Rd

03/14/2024

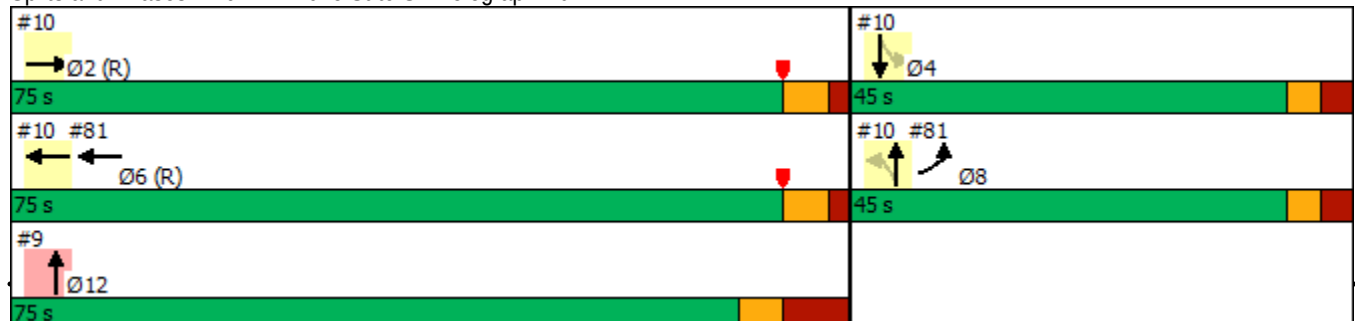


Lane Group	NBT	Ø2	Ø4	Ø6	Ø8
Lane Configurations	↑↑				
Traffic Volume (vph)	1776				
Future Volume (vph)	1776				
Turn Type	NA				
Protected Phases	12	2	4	6	8
Permitted Phases					
Detector Phase	12				
Switch Phase					
Minimum Initial (s)	4.0	10.0	7.0	4.0	7.0
Minimum Split (s)	26.0	25.0	13.0	22.0	40.0
Total Split (s)	75.0	75.0	45.0	75.0	45.0
Total Split (%)	62.5%	63%	38%	63%	38%
Yellow Time (s)	4.0	4.0	3.0	4.0	3.0
All-Red Time (s)	6.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0				
Total Lost Time (s)	8.0				
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	C-Max	None	C-Max	None
Act Effect Green (s)	80.3				
Actuated g/C Ratio	0.67				
v/c Ratio	0.75				
Control Delay	7.2				
Queue Delay	0.0				
Total Delay	7.2				
LOS	A				
Approach Delay	7.2				
Approach LOS	A				

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 7.2
Intersection Capacity Utilization 55.8%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 9: WB Duke St to SB Telegraph Rd



Queues

9: WB Duke St to SB Telegraph Rd

03/14/2024



Lane Group	NBT
Lane Group Flow (vph)	1776
v/c Ratio	0.75
Control Delay	7.2
Queue Delay	0.0
Total Delay	7.2
Queue Length 50th (ft)	141
Queue Length 95th (ft)	170
Internal Link Dist (ft)	96
Turn Bay Length (ft)	
Base Capacity (vph)	2369
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.75
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

9: WB Duke St to SB Telegraph Rd

03/14/2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			
Traffic Volume (vph)	0	0	1776	0	0	0
Future Volume (vph)	0	0	1776	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			8.0			
Lane Util. Factor			0.95			
Frt			1.00			
Flt Protected			1.00			
Satd. Flow (prot)			3539			
Flt Permitted			1.00			
Satd. Flow (perm)			3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	102%	102%	100%	102%	102%	102%
Adj. Flow (vph)	0	0	1776	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1776	0	0	0
Turn Type			NA			
Protected Phases			12			
Permitted Phases						
Actuated Green, G (s)			78.3			
Effective Green, g (s)			80.3			
Actuated g/C Ratio			0.67			
Clearance Time (s)			10.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)			2368			
v/s Ratio Prot			c0.50			
v/s Ratio Perm						
v/c Ratio			0.75			
Uniform Delay, d1			13.2			
Progression Factor			0.37			
Incremental Delay, d2			1.7			
Delay (s)			6.6			
Level of Service			A			
Approach Delay (s)	0.0		6.6		0.0	
Approach LOS	A		A		A	
Intersection Summary						
HCM 2000 Control Delay			6.6	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		14.0
Intersection Capacity Utilization			55.8%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	Ø12
Lane Configurations	↑↑↑	↑↑↑		↕		↕	
Traffic Volume (vph)	1427	2324	133	31	14	20	
Future Volume (vph)	1427	2324	133	31	14	20	
Turn Type	NA	NA	Perm	NA	Perm	NA	
Protected Phases	2	6		8		4	12
Permitted Phases			8		4		
Detector Phase	2	6	8	8	4	4	
Switch Phase							
Minimum Initial (s)	10.0	4.0	7.0	7.0	7.0	7.0	4.0
Minimum Split (s)	25.0	22.0	40.0	40.0	13.0	13.0	26.0
Total Split (s)	75.0	75.0	45.0	45.0	45.0	45.0	75.0
Total Split (%)	62.5%	62.5%	37.5%	37.5%	37.5%	37.5%	63%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0	4.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0	6.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0	
Total Lost Time (s)	4.0	4.0		4.0		4.0	
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	None	None	None	None	Max
Act Effect Green (s)	84.3	84.3		27.7		26.0	
Actuated g/C Ratio	0.70	0.70		0.23		0.22	
v/c Ratio	0.43	0.69		0.71		0.23	
Control Delay	8.6	10.5		52.5		35.1	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	8.6	10.5		52.5		35.1	
LOS	A	B		D		D	
Approach Delay	8.6	10.5		52.5		35.1	
Approach LOS	A	B		D		D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 12.4

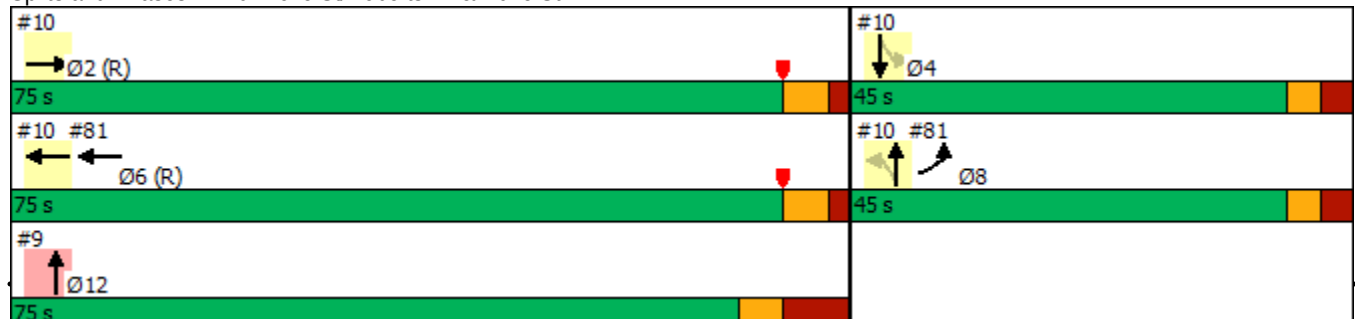
Intersection LOS: B

Intersection Capacity Utilization 73.3%

ICU Level of Service D

Analysis Period (min) 15

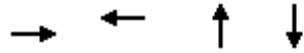
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1532	2444	222	74
v/c Ratio	0.43	0.69	0.71	0.23
Control Delay	8.6	10.5	52.5	35.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.6	10.5	52.5	35.1
Queue Length 50th (ft)	142	378	157	45
Queue Length 95th (ft)	296	578	204	80
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3574	3538	463	512
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.43	0.69	0.48	0.14
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

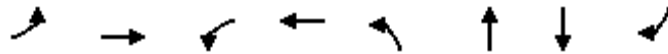
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1427	0	0	2324	0	133	31	21	14	20	34
Future Volume (vph)	0	1427	0	0	2324	0	133	31	21	14	20	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.98			0.93	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		5085			5034			1764			1590	
Flt Permitted		1.00			1.00			0.74			0.93	
Satd. Flow (perm)		5085			5034			1347			1494	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	100%	102%	102%	102%	102%	102%
Adj. Flow (vph)	0	1532	0	0	2444	0	158	38	26	15	22	37
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	2	0
Lane Group Flow (vph)	0	1532	0	0	2444	0	0	217	0	0	72	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		82.3			82.3			25.7			25.7	
Effective Green, g (s)		84.3			84.3			27.7			27.7	
Actuated g/C Ratio		0.70			0.70			0.23			0.23	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3572			3536			310			344	
v/s Ratio Prot		0.30			c0.49							
v/s Ratio Perm								c0.16			0.05	
v/c Ratio		0.43			0.69			0.70			0.21	
Uniform Delay, d1		7.6			10.3			42.4			37.3	
Progression Factor		0.97			0.84			1.00			1.00	
Incremental Delay, d2		0.4			0.7			7.0			0.3	
Delay (s)		7.7			9.4			49.3			37.6	
Level of Service		A			A			D			D	
Approach Delay (s)		7.7			9.4			49.3			37.6	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			11.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			14.0			
Intersection Capacity Utilization			73.3%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations		↔		↔		↔	↔	↔			
Traffic Volume (vph)	8	5	10	43	4	21	125	1			
Future Volume (vph)	8	5	10	43	4	21	125	1			
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA	Perm			
Protected Phases		6		6		4 5	4		2	3	5
Permitted Phases	6		6		4 5			4			
Detector Phase	6	6	6	6	4 5	4 5	4	4			
Switch Phase											
Minimum Initial (s)	7.0	7.0	7.0	7.0			7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0			13.0	13.0	14.0	33.0	12.5
Total Split (s)	48.0	48.0	48.0	48.0			24.0	24.0	63.0	33.0	15.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%			20.0%	20.0%	53%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0			3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0			-2.0	-2.0			
Total Lost Time (s)		4.0		4.0			4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag		Lead	Lead
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None	C-Max	None	None
Act Effect Green (s)		75.6		75.6		32.3	18.4	18.4			
Actuated g/C Ratio		0.63		0.63		0.27	0.15	0.15			
v/c Ratio		0.10		0.30		0.06	0.46	0.00			
Control Delay		5.6		7.6		1.3	51.4	0.0			
Queue Delay		0.0		0.1		3.5	0.1	0.0			
Total Delay		5.6		7.7		4.9	51.5	0.0			
LOS		A		A		A	D	A			
Approach Delay		5.6		7.7		4.9	51.1				
Approach LOS		A		A		A	D				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.21

Intersection Signal Delay: 17.2

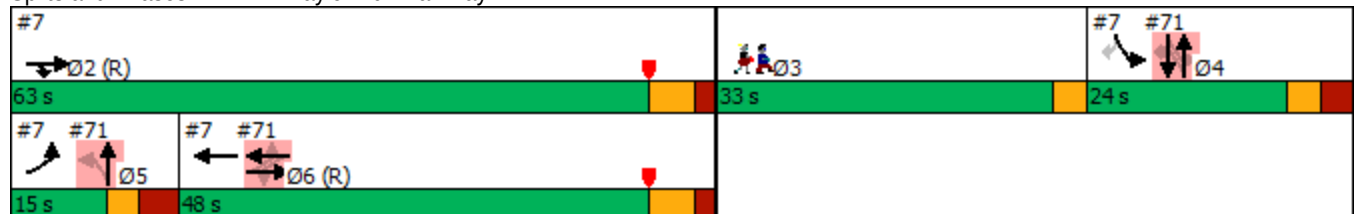
Intersection LOS: B

Intersection Capacity Utilization 38.1%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	99	321	28	132	1
v/c Ratio	0.10	0.30	0.06	0.46	0.00
Control Delay	5.6	7.6	1.3	51.4	0.0
Queue Delay	0.0	0.1	3.5	0.1	0.0
Total Delay	5.6	7.7	4.9	51.5	0.0
Queue Length 50th (ft)	4	42	0	93	0
Queue Length 95th (ft)	36	126	2	156	0
Internal Link Dist (ft)	56	362	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	1032	1062	488	310	358
Starvation Cap Reductn	0	0	408	0	0
Spillback Cap Reductn	178	183	0	5	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.37	0.35	0.43	0.00
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Parkway

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	5	67	10	43	194	4	21	2	0	125	1
Future Volume (vph)	8	5	67	10	43	194	4	21	2	0	125	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.97			1.00			1.00	1.00
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.89			0.89			0.99			1.00	0.85
Flt Protected		0.99			1.00			0.99			1.00	1.00
Satd. Flow (prot)		1642			1612			1813			1863	1583
Flt Permitted		0.96			0.99			0.97			1.00	1.00
Satd. Flow (perm)		1590			1600			1771			1863	1583
Peak-hour factor, PHF	0.81	0.81	0.81	0.77	0.77	0.77	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	10	6	83	13	56	252	4	22	2	0	132	1
RTOR Reduction (vph)	0	33	0	0	69	0	0	1	0	0	0	1
Lane Group Flow (vph)	0	66	0	0	252	0	0	27	0	0	132	0
Confl. Peds. (#/hr)	22					22			7	7		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	2%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		69.9			69.9			28.6			16.4	16.4
Effective Green, g (s)		71.9			71.9			30.6			18.4	18.4
Actuated g/C Ratio		0.60			0.60			0.26			0.15	0.15
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		952			958			451			285	242
v/s Ratio Prot											c0.07	
v/s Ratio Perm		0.04			c0.16			c0.01				0.00
v/c Ratio		0.07			0.26			0.06			0.46	0.00
Uniform Delay, d1		10.1			11.4			33.8			46.3	43.0
Progression Factor		1.00			0.93			0.04			1.00	1.00
Incremental Delay, d2		0.1			0.7			0.1			1.2	0.0
Delay (s)		10.2			11.3			1.3			47.5	43.0
Level of Service		B			B			A			D	D
Approach Delay (s)		10.2			11.3			1.3			47.5	
Approach LOS		B			B			A			D	
Intersection Summary												
HCM 2000 Control Delay			18.9				HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio			0.27									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			15.5		
Intersection Capacity Utilization			38.1%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

72: Duke St Slip lane & Service Rd

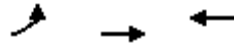
03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑	↖	
Traffic Volume (veh/h)	0	0	0	23	239	0
Future Volume (Veh/h)	0	0	0	23	239	0
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	23	239	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	478	0	478	478	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	478	0	478	478	0	
tC, single (s)	6.5	6.2	7.1	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.0	3.3	3.5	4.0	2.2	
p0 queue free %	100	100	100	94	85	
cM capacity (veh/h)	415	1085	441	415	1623	
Direction, Lane #	WB 1	NB 1				
Volume Total	23	239				
Volume Left	0	239				
Volume Right	0	0				
cSH	415	1623				
Volume to Capacity	0.06	0.15				
Queue Length 95th (ft)	4	13				
Control Delay (s)	14.2	7.6				
Lane LOS	B	A				
Approach Delay (s)	14.2	7.6				
Approach LOS	B					
Intersection Summary						
Average Delay		8.2				
Intersection Capacity Utilization		23.2%		ICU Level of Service		A
Analysis Period (min)		15				

Timings

81: Duke St

03/14/2024

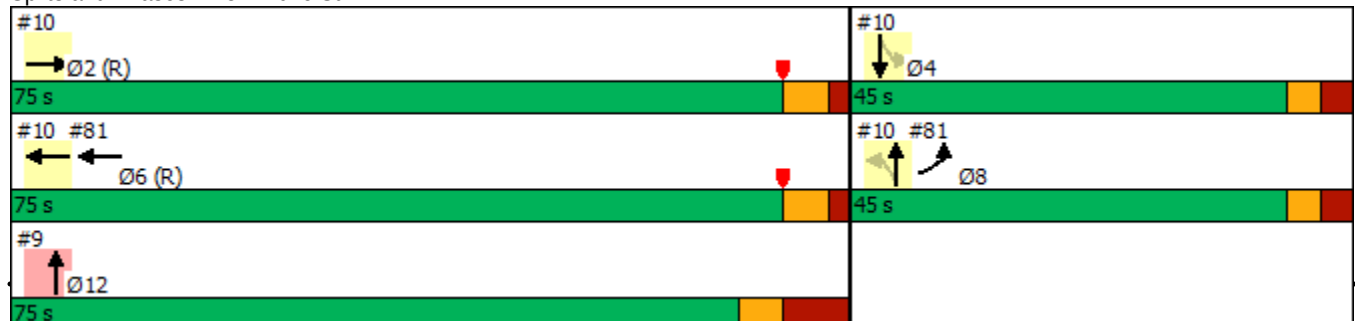


Lane Group	EBL	EBT	WBT	Ø2	Ø4	Ø12
Lane Configurations						
Traffic Volume (vph)	202	698	747			
Future Volume (vph)	202	698	747			
Turn Type	Prot	NA	NA			
Protected Phases	8	Free	6	2	4	12
Permitted Phases						
Detector Phase	8		6			
Switch Phase						
Minimum Initial (s)	7.0		4.0	10.0	7.0	4.0
Minimum Split (s)	40.0		22.0	25.0	13.0	26.0
Total Split (s)	45.0		75.0	75.0	45.0	75.0
Total Split (%)	37.5%		62.5%	63%	38%	63%
Yellow Time (s)	3.0		4.0	4.0	3.0	4.0
All-Red Time (s)	3.0		2.0	2.0	3.0	6.0
Lost Time Adjust (s)	-2.0		-2.0			
Total Lost Time (s)	4.0		4.0			
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		C-Max	C-Max	None	Max
Act Effect Green (s)	27.7	120.0	84.3			
Actuated g/C Ratio	0.23	1.00	0.70			
v/c Ratio	0.50	0.20	0.31			
Control Delay	45.6	0.1	4.0			
Queue Delay	0.0	0.0	0.0			
Total Delay	45.6	0.1	4.0			
LOS	D	A	A			
Approach Delay		10.3	4.0			
Approach LOS		B	A			

Intersection Summary

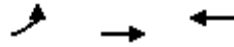
Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 7.4
 Intersection LOS: A
 Intersection Capacity Utilization 120.3%
 ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 81: Duke St



Queues
81: Duke St

03/14/2024

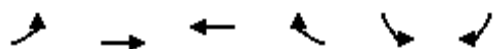


Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	202	698	762
v/c Ratio	0.50	0.20	0.31
Control Delay	45.6	0.1	4.0
Queue Delay	0.0	0.0	0.0
Total Delay	45.6	0.1	4.0
Queue Length 50th (ft)	146	0	48
Queue Length 95th (ft)	128	0	69
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	604	3539	2487
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.33	0.20	0.31
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

81: Duke St

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	202	698	747	0	0	0
Future Volume (vph)	202	698	747	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	100%	100%	102%	102%	102%	102%
Adj. Flow (vph)	202	698	762	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	202	698	762	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	8	Free	6			
Permitted Phases						
Actuated Green, G (s)	25.7	120.0	82.3			
Effective Green, g (s)	27.7	120.0	84.3			
Actuated g/C Ratio	0.23	1.00	0.70			
Clearance Time (s)	6.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	408	3539	2486			
v/s Ratio Prot	c0.11	0.20	c0.22			
v/s Ratio Perm						
v/c Ratio	0.50	0.20	0.31			
Uniform Delay, d1	40.1	0.0	6.8			
Progression Factor	1.08	1.00	0.49			
Incremental Delay, d2	0.9	0.1	0.2			
Delay (s)	44.0	0.1	3.6			
Level of Service	D	A	A			
Approach Delay (s)		10.0	3.6		0.0	
Approach LOS		A	A		A	
Intersection Summary						
HCM 2000 Control Delay			7.0		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.38			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	16.0
Intersection Capacity Utilization			120.3%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

82: WB Duke St to SB Telegraph Rd

03/14/2024

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		 				
Traffic Volume (veh/h)	0	1776	0	0	201	0
Future Volume (Veh/h)	0	1776	0	0	201	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1776	0	0	201	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		251				
pX, platoon unblocked					0.64	
vC, conflicting volume	0				888	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				0	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				69	100
cM capacity (veh/h)	1622				659	1084
Direction, Lane #	NB 1	NB 2	NE 1			
Volume Total	888	888	201			
Volume Left	0	0	201			
Volume Right	0	0	0			
cSH	1700	1700	659			
Volume to Capacity	0.52	0.52	0.31			
Queue Length 95th (ft)	0	0	32			
Control Delay (s)	0.0	0.0	12.8			
Lane LOS			B			
Approach Delay (s)	0.0		12.8			
Approach LOS			B			
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			66.9%	ICU Level of Service		C
Analysis Period (min)			15			



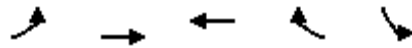
Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix U: Signal Timing 2026 Build Alternative 3A

Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	Ø2
Lane Configurations	↰	↑↑↑	↑↑	↰	↰↰	
Traffic Volume (vph)	315	1261	880	1018	548	
Future Volume (vph)	315	1261	880	1018	548	
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	2
Permitted Phases	5 2					
Detector Phase	5	5 2	6	6 4	4	
Switch Phase						
Minimum Initial (s)	5.0		10.0		7.0	10.0
Minimum Split (s)	19.6		22.0		29.5	22.0
Total Split (s)	20.0		61.0		39.0	81.0
Total Split (%)	16.7%		50.8%		32.5%	68%
Yellow Time (s)	3.0		4.0		3.5	4.0
All-Red Time (s)	2.6		2.0		3.0	2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0	
Total Lost Time (s)	3.6		4.0		4.5	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None		C-Max		None	C-Max
Act Effect Green (s)	77.4	77.4	57.0	96.0	34.5	
Actuated g/C Ratio	0.64	0.64	0.48	0.80	0.29	
v/c Ratio	0.84	0.43	0.60	0.87	1.02	
Control Delay	34.0	11.0	17.2	13.7	75.2	
Queue Delay	0.0	0.0	1.7	13.3	1.5	
Total Delay	34.0	11.1	18.9	27.0	76.7	
LOS	C	B	B	C	E	
Approach Delay		15.6	23.2		76.7	
Approach LOS		B	C		E	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.02
 Intersection Signal Delay: 30.5
 Intersection Capacity Utilization 88.8%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service E

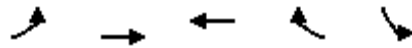
Splits and Phases: 1: Duke St & N Quaker Lane



Queues

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	342	1398	945	1093	884
v/c Ratio	0.84	0.43	0.60	0.87	1.02
Control Delay	34.0	11.0	17.2	13.7	75.2
Queue Delay	0.0	0.0	1.7	13.3	1.5
Total Delay	34.0	11.1	18.9	27.0	76.7
Queue Length 50th (ft)	112	180	135	895	~353
Queue Length 95th (ft)	#271	212	211	910	#481
Internal Link Dist (ft)		582	312		324
Turn Bay Length (ft)					
Base Capacity (vph)	405	3217	1587	1254	865
Starvation Cap Reductn	0	0	445	166	0
Spillback Cap Reductn	0	321	0	0	4
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.84	0.48	0.83	1.00	1.03

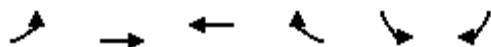
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	315	1261	880	1018	548	272
Future Volume (vph)	315	1261	880	1018	548	272
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.95	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1719	4988	3343	1568	2830	
Flt Permitted	0.18	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	334	4988	3343	1568	2830	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.94	0.94
Growth Factor (vph)	100%	102%	102%	102%	102%	100%
Adj. Flow (vph)	342	1398	945	1093	595	289
RTOR Reduction (vph)	0	0	0	0	52	0
Lane Group Flow (vph)	342	1398	945	1093	832	0
Confl. Peds. (#/hr)	4			4	4	2
Heavy Vehicles (%)	5%	4%	8%	3%	27%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	75.0	75.0	55.0	93.5	32.5	
Effective Green, g (s)	77.0	77.0	57.0	95.5	34.5	
Actuated g/C Ratio	0.64	0.64	0.48	0.80	0.29	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		0.2		3.0	
Lane Grp Cap (vph)	403	3200	1587	1247	813	
v/s Ratio Prot	c0.12	0.28	0.28	c0.70	c0.29	
v/s Ratio Perm	0.43					
v/c Ratio	0.85	0.44	0.60	0.88	1.02	
Uniform Delay, d1	16.5	10.7	23.1	8.3	42.8	
Progression Factor	1.00	1.00	0.68	0.76	1.00	
Incremental Delay, d2	15.2	0.1	1.2	5.5	37.6	
Delay (s)	31.7	10.8	17.0	11.8	80.4	
Level of Service	C	B	B	B	F	
Approach Delay (s)		14.9	14.2		80.4	
Approach LOS		B	B		F	
Intersection Summary						
HCM 2000 Control Delay			27.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.93			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			88.8%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Timings

2: S Quaker Ln & Duke St

03/14/2024

	→	↘	↙	←	↖	↑	↗	↓		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø6
Lane Configurations	↑↑	↑	↘	↑↑		↕		↕		
Traffic Volume (vph)	1691	118	24	1845	53	0	2	0		
Future Volume (vph)	1691	118	24	1845	53	0	2	0		
Turn Type	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA		
Protected Phases	2		1	1 6		4		3 4	3	6
Permitted Phases		2	1 6		4		3 4			
Detector Phase	2	2	1	1 6	4	4	3 4	3 4		
Switch Phase										
Minimum Initial (s)	10.0	10.0	5.0		7.0	7.0			4.0	4.0
Minimum Split (s)	15.5	15.5	10.5		29.0	29.0			12.0	20.0
Total Split (s)	63.0	63.0	16.0		29.0	29.0			12.0	79.0
Total Split (%)	52.5%	52.5%	13.3%		24.2%	24.2%			10%	66%
Yellow Time (s)	4.0	4.0	4.0		3.0	3.0			3.0	4.0
All-Red Time (s)	1.5	1.5	1.5		1.0	1.0			0.5	1.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0			-2.0				
Total Lost Time (s)	3.5	3.5	3.5			2.0				
Lead/Lag	Lead	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	None		None	None			None	C-Max
Act Effect Green (s)	86.6	86.6	102.6	103.3		12.6		14.6		
Actuated g/C Ratio	0.72	0.72	0.86	0.86		0.10		0.12		
v/c Ratio	0.75	0.12	0.10	0.68		0.34		0.01		
Control Delay	14.3	2.2	2.2	2.8		7.8		38.5		
Queue Delay	0.0	0.0	0.0	0.0		0.0		0.0		
Total Delay	14.3	2.2	2.2	2.8		7.8		38.5		
LOS	B	A	A	A		A		D		
Approach Delay	13.5			2.8		7.8		38.5		
Approach LOS	B			A		A		D		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.75
Intersection Signal Delay: 8.2
Intersection Capacity Utilization 66.8%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service C

Splits and Phases: 2: S Quaker Ln & Duke St

Ø2 (R)	Ø1	Ø3	Ø4
63 s	16 s	12 s	29 s
Ø6 (R)			
79 s			

Queues

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1875	131	26	2002	81	2
v/c Ratio	0.75	0.12	0.10	0.68	0.34	0.01
Control Delay	14.3	2.2	2.2	2.8	7.8	38.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	14.3	2.2	2.2	2.8	7.8	38.5
Queue Length 50th (ft)	569	3	0	6	0	1
Queue Length 95th (ft)	m#903	m19	m3	87	19	8
Internal Link Dist (ft)	312			222	293	73
Turn Bay Length (ft)			75			
Base Capacity (vph)	2504	1088	270	2959	384	345
Starvation Cap Reductn	0	0	0	83	0	0
Spillback Cap Reductn	0	0	0	50	1	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.75	0.12	0.10	0.70	0.21	0.01

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 Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1691	118	24	1845	0	53	0	14	2	0	0
Future Volume (vph)	0	1691	118	24	1845	0	53	0	14	2	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor		0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00	0.98	1.00	1.00			1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	1.00			0.97			1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.96			0.95	
Satd. Flow (prot)		3471	1475	1770	3438			1669			1761	
Flt Permitted		1.00	1.00	0.06	1.00			0.78			0.77	
Satd. Flow (perm)		3471	1475	115	3438			1347			1427	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.84	0.84	0.84	1.00	1.00	1.00
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	0	1875	131	26	2002	0	64	0	17	2	0	0
RTOR Reduction (vph)	0	0	28	0	0	0	0	73	0	0	0	0
Lane Group Flow (vph)	0	1875	103	26	2002	0	0	8	0	0	2	0
Confl. Peds. (#/hr)	9		4	4		9			5	5		
Heavy Vehicles (%)	2%	4%	7%	2%	5%	2%	2%	2%	21%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1			4			3	4
Permitted Phases	2		2	1	6		4			3	4	
Actuated Green, G (s)		81.0	81.0	97.0	97.0			9.2			13.5	
Effective Green, g (s)		83.0	83.0	99.0	99.0			11.2			15.5	
Actuated g/C Ratio		0.69	0.69	0.82	0.82			0.09			0.13	
Clearance Time (s)		5.5	5.5	5.5				4.0				
Vehicle Extension (s)		0.2	0.2	3.0				3.0				
Lane Grp Cap (vph)		2400	1020	267	2836			125			184	
v/s Ratio Prot		c0.54		0.01	c0.58							
v/s Ratio Perm			0.07	0.07				c0.01			c0.00	
v/c Ratio		0.78	0.10	0.10	0.71			0.06			0.01	
Uniform Delay, d1		12.4	6.1	18.4	4.4			49.6			45.6	
Progression Factor		0.95	0.61	0.24	0.30			1.00			1.00	
Incremental Delay, d2		2.1	0.2	0.1	0.6			0.2			0.0	
Delay (s)		13.9	3.9	4.6	1.9			49.8			45.6	
Level of Service		B	A	A	A			D			D	
Approach Delay (s)		13.2			1.9			49.8			45.6	
Approach LOS		B			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			8.4			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			66.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	40	1661	1822	3	0	17	0
Future Volume (vph)	40	1661	1822	3	0	17	0
Turn Type	pm+pt	NA	NA	Perm	NA	Perm	NA
Protected Phases	5	2	6		8		4
Permitted Phases	2			8		4	
Detector Phase	5	2	6	8	8	4	4
Switch Phase							
Minimum Initial (s)	4.5	10.0	1.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.6	16.3	16.3	29.0	29.0	13.0	13.0
Total Split (s)	18.0	91.0	73.0	29.0	29.0	29.0	29.0
Total Split (%)	15.0%	75.8%	60.8%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.6	2.3	2.3	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	3.6	4.3	4.3		4.0		4.0
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	102.8	103.0	94.3		12.2		12.2
Actuated g/C Ratio	0.86	0.86	0.79		0.10		0.10
v/c Ratio	0.22	0.60	0.74		0.10		0.29
Control Delay	9.7	1.5	2.6		47.0		9.2
Queue Delay	0.0	0.2	0.1		0.0		0.0
Total Delay	9.7	1.7	2.8		47.0		9.2
LOS	A	A	A		D		A
Approach Delay		1.9	2.8		47.0		9.2
Approach LOS		A	A		D		A

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.74
 Intersection Signal Delay: 2.6
 Intersection Capacity Utilization 68.7%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service C

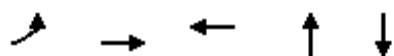
Splits and Phases: 3: Duke St & Alexandria Commons



Queues

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	43	1789	1993	12	65
v/c Ratio	0.22	0.60	0.74	0.10	0.29
Control Delay	9.7	1.5	2.6	47.0	9.2
Queue Delay	0.0	0.2	0.1	0.0	0.0
Total Delay	9.7	1.7	2.8	47.0	9.2
Queue Length 50th (ft)	0	1	9	9	0
Queue Length 95th (ft)	m0	40	#39	7	27
Internal Link Dist (ft)		222	571	88	97
Turn Bay Length (ft)	100				
Base Capacity (vph)	296	2975	2694	256	380
Starvation Cap Reductn	0	389	106	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.15	0.69	0.77	0.05	0.17

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 Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	1661	6	0	1822	34	3	0	0	17	0	44
Future Volume (vph)	40	1661	6	0	1822	34	3	0	0	17	0	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.3			4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			1.00			0.90	
Flt Protected	0.95	1.00			1.00			0.95			0.99	
Satd. Flow (prot)	1770	3469			3429			1770			1652	
Flt Permitted	0.06	1.00			1.00			0.66			0.91	
Satd. Flow (perm)	113	3469			3429			1233			1521	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.25	0.25	0.25	0.95	0.95	0.95
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	43	1783	6	0	1956	37	12	0	0	18	0	47
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	59	0
Lane Group Flow (vph)	43	1789	0	0	1992	0	0	12	0	0	6	0
Confl. Peds. (#/hr)	8		3	3		8			9	9		
Heavy Vehicles (%)	2%	4%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	98.9	98.9			89.1			8.8			8.8	
Effective Green, g (s)	100.9	100.9			91.1			10.8			10.8	
Actuated g/C Ratio	0.84	0.84			0.76			0.09			0.09	
Clearance Time (s)	5.6	6.3			6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0			0.2			2.0			2.0	
Lane Grp Cap (vph)	180	2916			2603			110			136	
v/s Ratio Prot	0.01	c0.52			c0.58							
v/s Ratio Perm	0.19							c0.01			0.00	
v/c Ratio	0.24	0.61			0.77			0.11			0.04	
Uniform Delay, d1	10.0	3.1			8.3			50.2			49.9	
Progression Factor	3.06	0.22			0.07			1.00			1.00	
Incremental Delay, d2	0.2	0.6			1.2			0.2			0.0	
Delay (s)	30.7	1.3			1.8			50.3			49.9	
Level of Service	C	A			A			D			D	
Approach Delay (s)		2.0			1.8			50.3			49.9	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			2.8									
HCM 2000 Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			120.0								11.9	
Intersection Capacity Utilization			68.7%								C	
ICU Level of Service												
Analysis Period (min)			15									
c Critical Lane Group												

Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	52	1624	22	1768	11	5	81	1	77
Future Volume (vph)	52	1624	22	1768	11	5	81	1	77
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	4.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	30.8	10.0	31.0	29.0	29.0	29.0	29.0	29.0
Total Split (s)	16.0	73.0	18.0	75.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	13.3%	60.8%	15.0%	62.5%	24.2%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	1.8	2.6	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	3.8	3.6	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	None	None
Act Effect Green (s)	93.6	89.0	91.9	85.9		16.8		16.8	16.8
Actuated g/C Ratio	0.78	0.74	0.77	0.72		0.14		0.14	0.14
v/c Ratio	0.33	0.69	0.12	0.86		0.22		0.60	0.34
Control Delay	22.3	6.3	1.0	10.5		21.9		61.1	10.8
Queue Delay	0.0	0.1	0.0	14.7		0.0		0.0	0.0
Total Delay	22.3	6.4	1.0	25.2		21.9		61.1	10.8
LOS	C	A	A	C		C		E	B
Approach Delay		6.9		24.9		21.9		36.8	
Approach LOS		A		C		C		D	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 13 (11%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 17.7
Intersection Capacity Utilization 78.7%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

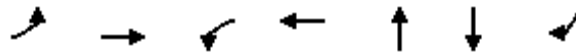
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St

 Ø1	 Ø2 (R)	 Ø4
18 s	73 s	29 s
 Ø5	 Ø6 (R)	 Ø8
16 s	75 s	29 s

Queues

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	56	1764	24	2094	53	110	103
v/c Ratio	0.33	0.69	0.12	0.86	0.22	0.60	0.34
Control Delay	22.3	6.3	1.0	10.5	21.9	61.1	10.8
Queue Delay	0.0	0.1	0.0	14.7	0.0	0.0	0.0
Total Delay	22.3	6.4	1.0	25.2	21.9	61.1	10.8
Queue Length 50th (ft)	5	76	1	8	12	81	0
Queue Length 95th (ft)	m48	277	m0	m#998	47	109	28
Internal Link Dist (ft)		571		730	190	93	
Turn Bay Length (ft)	195		80				
Base Capacity (vph)	236	2573	300	2438	342	272	406
Starvation Cap Reductn	0	25	0	383	0	0	0
Spillback Cap Reductn	0	158	0	41	1	0	1
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.73	0.08	1.02	0.16	0.40	0.25

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 Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	52	1624	2	22	1768	121	11	5	31	81	1	77
Future Volume (vph)	52	1624	2	22	1768	121	11	5	31	81	1	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3471		1656	3405			1618			1760	1559
Flt Permitted	0.05	1.00		0.09	1.00			0.92			0.71	1.00
Satd. Flow (perm)	86	3471		150	3405			1511			1311	1559
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.90	0.90	0.90	0.76	0.76	0.76
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	56	1762	2	24	1960	134	12	6	35	109	1	103
RTOR Reduction (vph)	0	0	0	0	3	0	0	30	0	0	0	89
Lane Group Flow (vph)	56	1764	0	24	2091	0	0	23	0	0	110	14
Confl. Peds. (#/hr)	3		3	3		3	2		6	6		2
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	9%	2%	3%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	89.3	84.7		85.7	82.6			14.8			14.8	14.8
Effective Green, g (s)	93.3	86.7		89.7	84.6			16.8			16.8	16.8
Actuated g/C Ratio	0.78	0.72		0.75	0.70			0.14			0.14	0.14
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	159	2507		176	2400			211			183	218
v/s Ratio Prot	c0.02	0.51		0.01	c0.61							
v/s Ratio Perm	0.25			0.10				0.02			c0.08	0.01
v/c Ratio	0.35	0.70		0.14	0.87			0.11			0.60	0.07
Uniform Delay, d1	19.1	9.4		8.0	13.5			45.1			48.5	44.8
Progression Factor	2.21	0.49		0.13	0.52			1.00			1.00	1.00
Incremental Delay, d2	0.4	1.4		0.0	1.8			0.1			3.8	0.0
Delay (s)	42.6	5.9		1.1	8.9			45.1			52.2	44.8
Level of Service	D	A		A	A			D			D	D
Approach Delay (s)		7.1			8.8			45.1			48.7	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			10.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			78.7%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

5: Roth St/Cambridge Rd & Duke St

03/14/2024

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	60	1672	96	1854	302	6	6	189	4	51
Future Volume (vph)	60	1672	96	1854	302	6	6	189	4	51
Turn Type	Prot	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6			8		4	
Permitted Phases			6		6	8		4		4
Detector Phase	5	2	1	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	6.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.5	30.7	11.5	15.7	15.7	13.4	13.4	30.4	30.4	30.4
Total Split (s)	16.0	67.0	18.0	69.0	69.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	13.3%	55.8%	15.0%	57.5%	57.5%	29.2%	29.2%	29.2%	29.2%	29.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	1.7	2.5	1.7	1.7	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	3.5	3.7	3.5	3.7	3.7		4.4		4.4	4.4
Lead/Lag	Lead	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?										
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	10.6	72.0	83.1	74.1	74.1		26.0		26.0	26.0
Actuated g/C Ratio	0.09	0.60	0.69	0.62	0.62		0.22		0.22	0.22
v/c Ratio	0.43	0.90	0.52	0.96	0.34		0.20		0.82	0.15
Control Delay	48.1	31.3	34.5	35.2	9.9		13.2		67.8	5.9
Queue Delay	0.0	0.1	0.0	39.6	0.0		0.0		0.0	0.0
Total Delay	48.1	31.4	34.5	74.8	9.9		13.2		67.8	5.9
LOS	D	C	C	E	A		B		E	A
Approach Delay		32.0		64.4			13.2		54.9	
Approach LOS		C		E			B		D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 101 (84%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.96

Intersection Signal Delay: 49.8

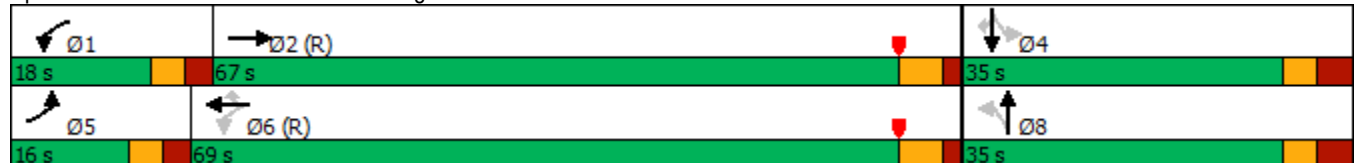
Intersection LOS: D

Intersection Capacity Utilization 86.2%

ICU Level of Service E

Analysis Period (min) 15

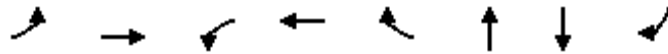
Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



Queues

5: Roth St/Cambridge Rd & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	67	1878	105	2033	331	69	224	59
v/c Ratio	0.43	0.90	0.52	0.96	0.34	0.20	0.82	0.15
Control Delay	48.1	31.3	34.5	35.2	9.9	13.2	67.8	5.9
Queue Delay	0.0	0.1	0.0	39.6	0.0	0.0	0.0	0.0
Total Delay	48.1	31.4	34.5	74.8	9.9	13.2	67.8	5.9
Queue Length 50th (ft)	52	442	22	~901	184	7	164	0
Queue Length 95th (ft)	m74	#980	98	#1080	9	45	244	23
Internal Link Dist (ft)		730		743		286	101	
Turn Bay Length (ft)	120		250					
Base Capacity (vph)	184	2083	257	2122	977	402	322	445
Starvation Cap Reductn	0	5	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	259	0	0	0	5
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.36	0.90	0.41	1.09	0.34	0.17	0.70	0.13

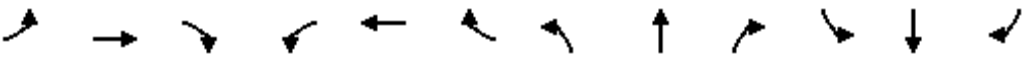
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	1672	4	96	1854	302	6	6	54	189	4	51
Future Volume (vph)	60	1672	4	96	1854	302	6	6	54	189	4	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	3470		1656	3438	1583		1451			1757	1527
Flt Permitted	0.95	1.00		0.05	1.00	1.00		0.97			0.69	1.00
Satd. Flow (perm)	1770	3470		96	3438	1583		1414			1265	1527
Peak-hour factor, PHF	0.91	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.97	0.88	0.88	0.88
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	67	1874	4	105	2033	331	6	6	57	219	5	59
RTOR Reduction (vph)	0	0	0	0	0	0	0	45	0	0	0	46
Lane Group Flow (vph)	67	1878	0	105	2033	331	0	24	0	0	224	13
Confl. Peds. (#/hr)			4	4			16					16
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	17%	2%	17%	2%	50%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	7.4	70.0		79.4	71.0	71.0		24.0			24.0	24.0
Effective Green, g (s)	9.4	72.0		83.4	73.0	73.0		26.0			26.0	26.0
Actuated g/C Ratio	0.08	0.60		0.70	0.61	0.61		0.22			0.22	0.22
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	138	2082		201	2091	962		306			274	330
v/s Ratio Prot	0.04	0.54		c0.05	c0.59							
v/s Ratio Perm				0.32		0.21		0.02			c0.18	0.01
v/c Ratio	0.49	0.90		0.52	0.97	0.34		0.08			0.82	0.04
Uniform Delay, d1	53.0	20.9		25.6	22.5	11.6		37.5			44.7	37.1
Progression Factor	0.81	1.15		1.44	1.04	0.68		1.00			1.00	1.00
Incremental Delay, d2	0.7	5.4		0.9	12.5	0.8		0.0			16.2	0.0
Delay (s)	43.7	29.6		37.7	35.9	8.7		37.5			60.9	37.1
Level of Service	D	C		D	D	A		D			E	D
Approach Delay (s)		30.0			32.3			37.5			56.0	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			32.9				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			11.6		
Intersection Capacity Utilization			86.2%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

6: Witter Drive & Duke St

03/14/2024

	→	↖	←	↙
Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↑↑↑	↘
Traffic Volume (vph)	1894	87	2245	7
Future Volume (vph)	1894	87	2245	7
Turn Type	NA	pm+pt	NA	Prot
Protected Phases	2	1	6	4
Permitted Phases		6		
Detector Phase	2	1	6	4
Switch Phase				
Minimum Initial (s)	10.0	6.0	10.0	4.0
Minimum Split (s)	27.5	12.0	15.5	13.0
Total Split (s)	79.0	16.0	95.0	25.0
Total Split (%)	65.8%	13.3%	79.2%	20.8%
Yellow Time (s)	3.5	3.0	3.5	3.0
All-Red Time (s)	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.5	4.0	3.5	4.0
Lead/Lag	Lead	Lag		
Lead-Lag Optimize?				
Recall Mode	C-Max	None	C-Max	None
Act Effect Green (s)	89.8	105.3	106.5	9.0
Actuated g/C Ratio	0.75	0.88	0.89	0.08
v/c Ratio	0.56	0.37	0.57	0.31
Control Delay	13.3	19.6	2.6	26.9
Queue Delay	0.0	0.0	0.2	0.0
Total Delay	13.3	19.6	2.8	26.9
LOS	B	B	A	C
Approach Delay	13.3		3.4	26.9
Approach LOS	B		A	C

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 69 (58%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.57
Intersection Signal Delay: 8.0
Intersection Capacity Utilization 56.1%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Witter Drive & Duke St

→ Ø2 (R)	↖ Ø1	↙ Ø4
79 s	16 s	25 s
↖ Ø6 (R)		
95 s		

Queues

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	2100	98	2516	45
v/c Ratio	0.56	0.37	0.57	0.31
Control Delay	13.3	19.6	2.6	26.9
Queue Delay	0.0	0.0	0.2	0.0
Total Delay	13.3	19.6	2.8	26.9
Queue Length 50th (ft)	380	19	2	7
Queue Length 95th (ft)	511	m54	749	31
Internal Link Dist (ft)	743		262	663
Turn Bay Length (ft)		200		
Base Capacity (vph)	3726	265	4428	298
Starvation Cap Reductn	0	0	951	0
Spillback Cap Reductn	87	0	665	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.58	0.37	0.72	0.15

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

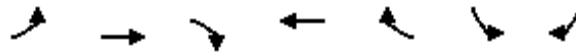
03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	1894	21	87	2245	7	25
Future Volume (vph)	1894	21	87	2245	7	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.90	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	4978		1719	4988	1538	
Flt Permitted	1.00		0.07	1.00	0.99	
Satd. Flow (perm)	4978		121	4988	1538	
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.73	0.73
Growth Factor (vph)	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	2077	23	98	2516	10	35
RTOR Reduction (vph)	1	0	0	0	33	0
Lane Group Flow (vph)	2099	0	98	2516	12	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	4%	2%	5%	4%	14%	8%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	86.6		102.6	102.6	5.9	
Effective Green, g (s)	88.6		104.6	104.6	7.9	
Actuated g/C Ratio	0.74		0.87	0.87	0.07	
Clearance Time (s)	5.5		6.0	5.5	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3675		265	4347	101	
v/s Ratio Prot	0.42		0.04	c0.50	c0.01	
v/s Ratio Perm			0.29			
v/c Ratio	0.57		0.37	0.58	0.12	
Uniform Delay, d1	7.1		14.3	2.0	52.8	
Progression Factor	1.80		1.19	1.06	1.00	
Incremental Delay, d2	0.3		0.5	0.3	0.5	
Delay (s)	13.1		17.6	2.4	53.3	
Level of Service	B		B	A	D	
Approach Delay (s)	13.1			3.0	53.3	
Approach LOS	B			A	D	
Intersection Summary						
HCM 2000 Control Delay		7.9		HCM 2000 Level of Service	A	
HCM 2000 Volume to Capacity ratio		0.57				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)	11.5	
Intersection Capacity Utilization		56.1%		ICU Level of Service	B	
Analysis Period (min)		15				
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



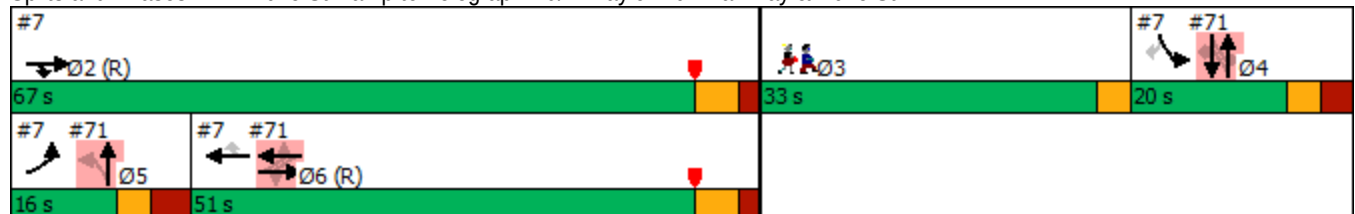
Lane Group	EBL	EBT	EBR	WBT	WBR	SBL	SBR	Ø3
Lane Configurations								
Traffic Volume (vph)	30	928	961	2296	273	68	36	
Future Volume (vph)	30	928	961	2296	273	68	36	
Turn Type	Prot	NA	Prot	NA	Perm	Prot	Perm	
Protected Phases	5	2	2	6		4		3
Permitted Phases					6		4	
Detector Phase	5	2	2	6	6	4	4	
Switch Phase								
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	13.0	33.0
Total Split (s)	16.0	67.0	67.0	51.0	51.0	20.0	20.0	33.0
Total Split (%)	13.3%	55.8%	55.8%	42.5%	42.5%	16.7%	16.7%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	10.2	89.4	89.4	74.7	74.7	16.0	16.0	
Actuated g/C Ratio	0.08	0.74	0.74	0.62	0.62	0.13	0.13	
v/c Ratio	0.24	0.45	0.85	0.85	0.29	0.33	0.14	
Control Delay	60.0	5.0	20.8	21.8	14.6	26.4	1.8	
Queue Delay	0.0	0.0	0.0	0.2	65.2	4.1	1.5	
Total Delay	60.0	5.0	20.8	22.0	79.8	30.5	3.3	
LOS	E	A	C	C	E	C	A	
Approach Delay		13.7		28.0				
Approach LOS		B		C				

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 140
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.85
 Intersection Signal Delay: 21.7
 Intersection Capacity Utilization 64.0%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service C

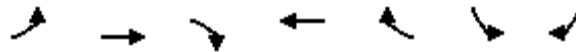
Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	34	1064	1101	2491	290	78	42
v/c Ratio	0.24	0.45	0.85	0.85	0.29	0.33	0.14
Control Delay	60.0	5.0	20.8	21.8	14.6	26.4	1.8
Queue Delay	0.0	0.0	0.0	0.2	65.2	4.1	1.5
Total Delay	60.0	5.0	20.8	22.0	79.8	30.5	3.3
Queue Length 50th (ft)	22	83	293	398	87	23	0
Queue Length 95th (ft)	m49	124	#1301	m#998	m178	42	0
Internal Link Dist (ft)		321		722			
Turn Bay Length (ft)	180				120		
Base Capacity (vph)	157	2359	1298	2933	985	236	305
Starvation Cap Reductn	0	0	0	0	0	100	171
Spillback Cap Reductn	0	0	0	66	785	0	5
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.45	0.85	0.87	1.45	0.57	0.31

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	928	961	0	2296	273	0	0	0	68	0	36
Future Volume (vph)	30	928	961	0	2296	273	0	0	0	68	0	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00				1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		1.00
Frt	1.00	1.00	1.00		1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (prot)	1641	3167	1743		4715	1583				1770		1547
Flt Permitted	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (perm)	1641	3167	1743		4715	1583				1770		1547
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	1.00	1.00	1.00	0.87	0.87	0.87
Growth Factor (vph)	102%	102%	102%	102%	102%	100%	102%	102%	102%	100%	102%	102%
Adj. Flow (vph)	34	1064	1101	0	2491	290	0	0	0	78	0	42
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	36
Lane Group Flow (vph)	34	1064	1101	0	2491	290	0	0	0	78	0	6
Confl. Peds. (#/hr)										3		5
Heavy Vehicles (%)	10%	14%	9%	2%	10%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Prot		NA	Perm				Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases						6						4
Actuated Green, G (s)	8.2	85.0	85.0		70.3	70.3				14.0		14.0
Effective Green, g (s)	10.2	87.0	87.0		72.3	72.3				16.0		16.0
Actuated g/C Ratio	0.08	0.72	0.72		0.60	0.60				0.13		0.13
Clearance Time (s)	6.5	6.0	6.0		6.0	6.0				6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2	0.2				3.0		3.0
Lane Grp Cap (vph)	139	2296	1263		2840	953				236		206
v/s Ratio Prot	0.02	0.34	c0.63		0.53					c0.04		
v/s Ratio Perm						0.18						0.00
v/c Ratio	0.24	0.46	0.87		0.88	0.30				0.33		0.03
Uniform Delay, d1	51.3	6.8	12.3		20.1	11.6				47.1		45.2
Progression Factor	1.11	0.54	1.07		1.02	1.02				0.48		1.00
Incremental Delay, d2	0.8	0.6	7.3		1.7	0.3				0.8		0.1
Delay (s)	57.6	4.3	20.5		22.2	12.2				23.3		45.3
Level of Service	E	A	C		C	B				C		D
Approach Delay (s)		13.2			21.2			0.0			31.0	
Approach LOS		B			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			18.0		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					15.5		
Intersection Capacity Utilization			64.0%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Lane Group	NBT	Ø2	Ø4	Ø5	Ø6	Ø8
Lane Configurations	↑↑					
Traffic Volume (vph)	443					
Future Volume (vph)	443					
Turn Type	NA					
Protected Phases	12	2	4	5	6	8
Permitted Phases						
Detector Phase	12					
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	7.0
Minimum Split (s)	26.0	22.0	10.0	10.0	23.0	40.0
Total Split (s)	86.0	86.0	34.0	50.0	36.0	34.0
Total Split (%)	71.7%	72%	28%	42%	30%	28%
Yellow Time (s)	4.0	4.0	3.0	3.0	4.0	3.0
All-Red Time (s)	6.0	2.0	3.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0					
Total Lost Time (s)	8.0					
Lead/Lag				Lead	Lag	
Lead-Lag Optimize?					Yes	
Recall Mode	Max	C-Max	None	None	C-Max	None
Act Effect Green (s)	78.0					
Actuated g/C Ratio	0.65					
v/c Ratio	0.19					
Control Delay	15.4					
Queue Delay	0.0					
Total Delay	15.4					
LOS	B					
Approach Delay	15.4					
Approach LOS	B					

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 15.4
Intersection LOS: B
Intersection Capacity Utilization 18.9%
ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 9: WB Duke St to SB Telegraph Rd & Dummy

#10 → Ø2 (R) 86 s	#10 #81 ↓ Ø4 34 s
#81 ↙ Ø5 50 s	#10 #81 ← Ø6 (R) 36 s
#9 ↑ Ø12 86 s	#10 #81 ↑ Ø8 34 s

Queues

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Lane Group	NBT
Lane Group Flow (vph)	443
v/c Ratio	0.19
Control Delay	15.4
Queue Delay	0.0
Total Delay	15.4
Queue Length 50th (ft)	93
Queue Length 95th (ft)	m114
Internal Link Dist (ft)	60
Turn Bay Length (ft)	
Base Capacity (vph)	2300
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.19

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			
Traffic Volume (vph)	0	0	443	0	0	0
Future Volume (vph)	0	0	443	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			8.0			
Lane Util. Factor			0.95			
Frt			1.00			
Flt Protected			1.00			
Satd. Flow (prot)			3539			
Flt Permitted			1.00			
Satd. Flow (perm)			3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	102%	102%	100%	102%	102%	102%
Adj. Flow (vph)	0	0	443	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	443	0	0	0
Turn Type			NA			
Protected Phases			12			
Permitted Phases						
Actuated Green, G (s)			76.0			
Effective Green, g (s)			78.0			
Actuated g/C Ratio			0.65			
Clearance Time (s)			10.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)			2300			
v/s Ratio Prot			c0.13			
v/s Ratio Perm						
v/c Ratio			0.19			
Uniform Delay, d1			8.4			
Progression Factor			1.80			
Incremental Delay, d2			0.1			
Delay (s)			15.3			
Level of Service			B			
Approach Delay (s)	0.0		15.3		0.0	
Approach LOS	A		B		A	
Intersection Summary						
HCM 2000 Control Delay			15.3	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.15			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		18.0
Intersection Capacity Utilization			18.9%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

10: Dove St/Roberts Ln & Duke St

→ ← ↶ ↑ ↷ ↓

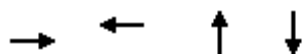
Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	
Natural Cycle: 80	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.99	
Intersection Signal Delay: 31.8	Intersection LOS: C
Intersection Capacity Utilization 70.7%	ICU Level of Service C
Analysis Period (min) 15	

#10 → Ø2 (R) 86 s	#10 #81 Ø4 34 s
#81 ↙ Ø5 50 s	#10 #81 Ø6 (R) 36 s
#9 ↑ Ø12 86 s	#10 #81 Ø8 34 s

Queues

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	2437	1182	307	94
v/c Ratio	0.71	0.91	0.99	0.22
Control Delay	13.9	53.5	94.9	17.8
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	13.9	53.5	94.9	17.8
Queue Length 50th (ft)	449	325	237	23
Queue Length 95th (ft)	543	#408	#319	51
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3441	1304	309	428
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.71	0.91	0.99	0.22

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2150	0	0	1066	0	193	28	11	16	13	42
Future Volume (vph)	0	2150	0	0	1066	0	193	28	11	16	13	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.99			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5036			4891			1755			1663	
Flt Permitted		1.00			1.00			0.68			0.92	
Satd. Flow (perm)		5036			4891			1234			1546	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.76	0.76	0.76	0.77	0.77	0.77
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	100%	102%	102%	102%	102%	102%
Adj. Flow (vph)	0	2437	0	0	1182	0	254	38	15	21	17	56
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	42	0
Lane Group Flow (vph)	0	2437	0	0	1182	0	0	306	0	0	52	0
Confl. Peds. (#/hr)	18		3	3		18			8	8		
Heavy Vehicles (%)	2%	3%	2%	2%	5%	2%	3%	2%	9%	2%	2%	5%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		80.0			30.0			28.0			28.0	
Effective Green, g (s)		82.0			32.0			30.0			30.0	
Actuated g/C Ratio		0.68			0.27			0.25			0.25	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3441			1304			308			386	
v/s Ratio Prot		c0.48			c0.24							
v/s Ratio Perm								c0.25			0.03	
v/c Ratio		0.71			0.91			0.99			0.13	
Uniform Delay, d1		11.7			42.6			44.9			34.9	
Progression Factor		1.07			1.00			1.00			1.00	
Incremental Delay, d2		1.3			10.7			48.9			0.2	
Delay (s)		13.7			53.2			93.7			35.1	
Level of Service		B			D			F			D	
Approach Delay (s)		13.7			53.2			93.7			35.1	
Approach LOS		B			D			F			D	
Intersection Summary												
HCM 2000 Control Delay			31.9				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)		14.0			
Intersection Capacity Utilization			70.7%				ICU Level of Service		C			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

71: W Taylor Run Parkway

03/14/2024

										Ø2	Ø3	Ø5
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR			
Lane Configurations												
Traffic Volume (vph)	19	8	12	6	15	225	1	69	6			
Future Volume (vph)	19	8	12	6	15	225	1	69	6			
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm			
Protected Phases		6		6		4 5		4		2	3	5
Permitted Phases	6		6		4 5		4		4			
Detector Phase	6	6	6	6	4 5	4 5	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0			13.0	13.0	13.0	14.0	33.0	12.5
Total Split (s)	51.0	51.0	51.0	51.0			20.0	20.0	20.0	67.0	33.0	16.0
Total Split (%)	42.5%	42.5%	42.5%	42.5%			16.7%	16.7%	16.7%	56%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0			3.0	3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0				-2.0	-2.0			
Total Lost Time (s)		4.0		4.0				4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None	None	C-Max	None	None
Act Effect Green (s)		74.7		74.7		30.7		16.0	16.0			
Actuated g/C Ratio		0.62		0.62		0.26		0.13	0.13			
v/c Ratio		0.06		0.02		0.71		0.33	0.02			
Control Delay		9.0		14.1		67.1		51.3	0.2			
Queue Delay		0.0		0.0		73.7		0.0	0.0			
Total Delay		9.0		14.1		140.8		51.3	0.2			
LOS		A		B		F		D	A			
Approach Delay		9.0		14.1		140.8		47.2				
Approach LOS		A		B		F		D				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 102.2

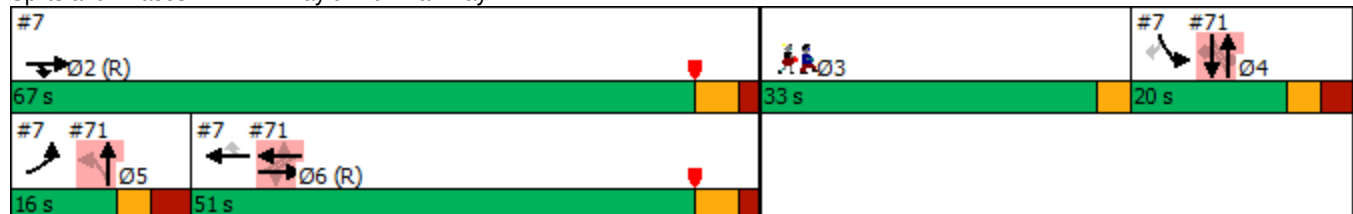
Intersection LOS: F

Intersection Capacity Utilization 38.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	63	23	329	80	7
v/c Ratio	0.06	0.02	0.71	0.33	0.02
Control Delay	9.0	14.1	67.1	51.3	0.2
Queue Delay	0.0	0.0	73.7	0.0	0.0
Total Delay	9.0	14.1	140.8	51.3	0.2
Queue Length 50th (ft)	8	6	240	57	0
Queue Length 95th (ft)	37	25	326	103	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	1006	1023	481	244	304
Starvation Cap Reductn	0	0	368	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.06	0.02	2.91	0.33	0.02
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Parkway

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	19	8	23	12	6	0	15	225	63	1	69	6
Future Volume (vph)	19	8	23	12	6	0	15	225	63	1	69	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			1.00			1.00			1.00	0.97
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.94			1.00			0.97			1.00	0.85
Flt Protected		0.98			0.97			1.00			1.00	1.00
Satd. Flow (prot)		1709			1804			1798			1862	1540
Flt Permitted		0.92			0.88			0.99			0.99	1.00
Satd. Flow (perm)		1602			1645			1776			1837	1540
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.87
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	24	10	29	15	8	0	16	245	68	1	79	7
RTOR Reduction (vph)	0	12	0	0	0	0	0	8	0	0	0	6
Lane Group Flow (vph)	0	51	0	0	23	0	0	321	0	0	80	1
Confl. Peds. (#/hr)	10					10	2		1	1		2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		70.3			70.3			28.2			14.0	14.0
Effective Green, g (s)		72.3			72.3			30.2			16.0	16.0
Actuated g/C Ratio		0.60			0.60			0.25			0.13	0.13
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		965			991			446			244	205
v/s Ratio Prot												
v/s Ratio Perm		c0.03			0.01			c0.18			0.04	0.00
v/c Ratio		0.05			0.02			0.72			0.33	0.00
Uniform Delay, d1		9.8			9.6			41.0			47.1	45.1
Progression Factor		1.00			1.00			1.48			1.00	1.00
Incremental Delay, d2		0.1			0.0			5.4			0.8	0.0
Delay (s)		9.9			9.7			65.9			47.9	45.1
Level of Service		A			A			E			D	D
Approach Delay (s)		9.9			9.7			65.9			47.7	
Approach LOS		A			A			E			D	
Intersection Summary												
HCM 2000 Control Delay		53.1										
HCM 2000 Volume to Capacity ratio		0.24										
Actuated Cycle Length (s)		120.0										
Intersection Capacity Utilization		38.2%										
Analysis Period (min)		15										
c Critical Lane Group												

Timings

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024



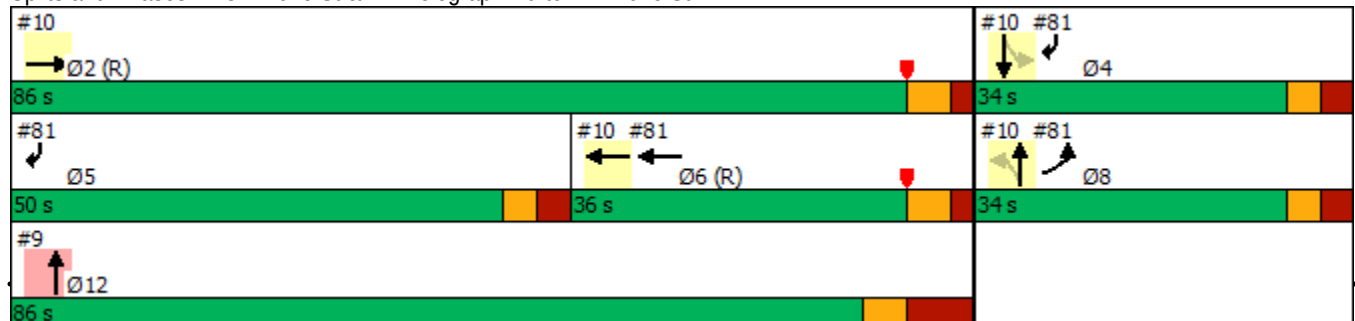
Lane Group	EBL	EBT	WBT	SBR	Ø2	Ø4	Ø5	Ø12
Lane Configurations	↰	↗↗	↰↰	↰↰				
Traffic Volume (vph)	137	878	863	1701				
Future Volume (vph)	137	878	863	1701				
Turn Type	Prot	NA	NA	custom				
Protected Phases	8	Free	6	4 5	2	4	5	12
Permitted Phases								
Detector Phase	8		6	4 5				
Switch Phase								
Minimum Initial (s)	7.0		4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	40.0		23.0		22.0	10.0	10.0	26.0
Total Split (s)	34.0		36.0		86.0	34.0	50.0	86.0
Total Split (%)	28.3%		30.0%		72%	28%	42%	72%
Yellow Time (s)	3.0		4.0		4.0	3.0	3.0	4.0
All-Red Time (s)	3.0		2.0		2.0	3.0	3.0	6.0
Lost Time Adjust (s)	-2.0		-2.0					
Total Lost Time (s)	4.0		4.0					
Lead/Lag			Lag				Lead	
Lead-Lag Optimize?			Yes					
Recall Mode	None		C-Max		C-Max	None	None	Max
Act Effect Green (s)	30.0	120.0	32.0	80.0				
Actuated g/C Ratio	0.25	1.00	0.27	0.67				
v/c Ratio	0.31	0.25	0.93	0.97				
Control Delay	44.4	0.2	49.5	34.0				
Queue Delay	0.0	0.0	0.0	0.0				
Total Delay	44.4	0.2	49.5	34.0				
LOS	D	A	D	C				
Approach Delay		6.1	49.5					
Approach LOS		A	D					

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 80
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.99
 Intersection Signal Delay: 30.0
 Intersection Capacity Utilization 91.7%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service F

Splits and Phases: 81: Duke St & NB Telegraph Rd to WB Duke St



Queues

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024



Lane Group	EBL	EBT	WBT	SBR
Lane Group Flow (vph)	137	878	880	1770
v/c Ratio	0.31	0.25	0.93	0.97
Control Delay	44.4	0.2	49.5	34.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	44.4	0.2	49.5	34.0
Queue Length 50th (ft)	89	0	198	664
Queue Length 95th (ft)	119	0	m#245	#931
Internal Link Dist (ft)		184	95	
Turn Bay Length (ft)	300			
Base Capacity (vph)	442	3539	943	1829
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.31	0.25	0.93	0.97

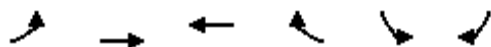
Intersection Summary

- # 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 Signalized Intersection Capacity Analysis

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	137	878	863	0	0	1701
Future Volume (vph)	137	878	863	0	0	1701
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			4.0
Lane Util. Factor	1.00	0.95	0.95			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	3539	3539			2733
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	3539	3539			2733
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.98
Growth Factor (vph)	100%	100%	102%	102%	102%	102%
Adj. Flow (vph)	137	878	880	0	0	1770
RTOR Reduction (vph)	0	0	0	0	0	7
Lane Group Flow (vph)	137	878	880	0	0	1763
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	NA	NA			custom
Protected Phases	8	Free	6			4 5
Permitted Phases						
Actuated Green, G (s)	28.0	120.0	30.0			78.0
Effective Green, g (s)	30.0	120.0	32.0			80.0
Actuated g/C Ratio	0.25	1.00	0.27			0.67
Clearance Time (s)	6.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	442	3539	943			1822
v/s Ratio Prot	0.08	0.25	c0.25			c0.65
v/s Ratio Perm						
v/c Ratio	0.31	0.25	0.93			0.97
Uniform Delay, d1	36.6	0.0	43.0			18.8
Progression Factor	1.15	1.00	0.91			1.00
Incremental Delay, d2	0.4	0.2	9.9			14.1
Delay (s)	42.5	0.2	49.0			32.8
Level of Service	D	A	D			C
Approach Delay (s)		5.9	49.0		32.8	
Approach LOS		A	D		C	
Intersection Summary						
HCM 2000 Control Delay			29.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			1.01			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			91.7%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

82: NB Telegraph Rd to WB Duke St & WB Duke St to SB Telegraph Rd

03/14/2024

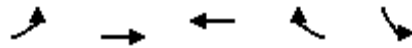


Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		↑↑		↑	↑	
Traffic Volume (veh/h)	0	443	0	1701	137	0
Future Volume (Veh/h)	0	443	0	1701	137	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	443	0	1735	137	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		373				
pX, platoon unblocked					0.96	
vC, conflicting volume	1735				222	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1735				101	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				84	100
cM capacity (veh/h)	359				850	1084
Direction, Lane #	NB 1	NB 2	SB 1	NE 1		
Volume Total	222	222	1735	137		
Volume Left	0	0	0	137		
Volume Right	0	0	1735	0		
cSH	1700	1700	1700	850		
Volume to Capacity	0.13	0.13	1.02	0.16		
Queue Length 95th (ft)	0	0	0	14		
Control Delay (s)	0.0	0.0	0.0	10.0		
Lane LOS				B		
Approach Delay (s)	0.0		0.0	10.0		
Approach LOS				B		
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			110.8%		ICU Level of Service	H
Analysis Period (min)			15			

Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	Ø2
Lane Configurations	↰	↑↑↑	↑↑	↰	↰↰	
Traffic Volume (vph)	306	994	1195	703	843	
Future Volume (vph)	306	994	1195	703	843	
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	2
Permitted Phases	5 2					
Detector Phase	5	5 2	6	6 4	4	
Switch Phase						
Minimum Initial (s)	5.0		10.0		7.0	10.0
Minimum Split (s)	19.6		22.0		29.5	22.0
Total Split (s)	25.0		50.0		45.0	75.0
Total Split (%)	20.8%		41.7%		37.5%	63%
Yellow Time (s)	3.0		4.0		3.5	4.0
All-Red Time (s)	2.6		2.0		3.0	2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0	
Total Lost Time (s)	3.6		4.0		4.5	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None		C-Max		None	C-Max
Act Effect Green (s)	71.4	71.4	46.0	91.0	40.5	
Actuated g/C Ratio	0.60	0.60	0.38	0.76	0.34	
v/c Ratio	0.94	0.38	0.93	0.62	0.97	
Control Delay	67.8	13.2	44.2	6.0	59.1	
Queue Delay	0.0	0.3	45.4	0.4	0.4	
Total Delay	67.8	13.5	89.6	6.4	59.4	
LOS	E	B	F	A	E	
Approach Delay		26.1	58.8		59.4	
Approach LOS		C	E		E	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 20 (17%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.97

Intersection Signal Delay: 48.4

Intersection LOS: D

Intersection Capacity Utilization 90.2%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 1: Duke St & N Quaker Lane



Queues

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	344	1139	1257	739	1118
v/c Ratio	0.94	0.38	0.93	0.62	0.97
Control Delay	67.8	13.2	44.2	6.0	59.1
Queue Delay	0.0	0.3	45.4	0.4	0.4
Total Delay	67.8	13.5	89.6	6.4	59.4
Queue Length 50th (ft)	213	159	474	106	430
Queue Length 95th (ft)	#388	187	#618	119	#577
Internal Link Dist (ft)		582	312		324
Turn Bay Length (ft)					
Base Capacity (vph)	367	2996	1356	1200	1152
Starvation Cap Reductn	0	0	248	135	0
Spillback Cap Reductn	0	1086	0	0	3
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.94	0.60	1.13	0.69	0.97

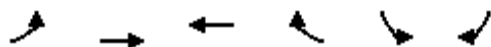
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	306	994	1195	703	843	163
Future Volume (vph)	306	994	1195	703	843	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1719	5036	3539	1583	3372	
Flt Permitted	0.08	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	146	5036	3539	1583	3372	
Peak-hour factor, PHF	0.89	0.89	0.97	0.97	0.90	0.90
Growth Factor (vph)	100%	102%	102%	102%	100%	100%
Adj. Flow (vph)	344	1139	1257	739	937	181
RTOR Reduction (vph)	0	0	0	0	14	0
Lane Group Flow (vph)	344	1139	1257	739	1104	0
Confl. Peds. (#/hr)	2			2		1
Heavy Vehicles (%)	5%	3%	2%	2%	2%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	69.0	69.0	44.0	88.5	38.5	
Effective Green, g (s)	71.0	71.0	46.0	90.5	40.5	
Actuated g/C Ratio	0.59	0.59	0.38	0.75	0.34	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	366	2979	1356	1193	1138	
v/s Ratio Prot	c0.17	0.23	0.36	0.47	c0.33	
v/s Ratio Perm	c0.39					
v/c Ratio	0.94	0.38	0.93	0.62	0.97	
Uniform Delay, d1	37.6	12.9	35.4	6.8	39.2	
Progression Factor	1.00	1.00	0.98	0.63	1.00	
Incremental Delay, d2	31.5	0.1	8.9	0.7	19.8	
Delay (s)	69.1	13.0	43.7	5.0	59.0	
Level of Service	E	B	D	A	E	
Approach Delay (s)		26.0	29.4		59.0	
Approach LOS		C	C		E	
Intersection Summary						
HCM 2000 Control Delay			35.5		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.97			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			90.2%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Timings

2: S Quaker Ln & Duke St

03/14/2024

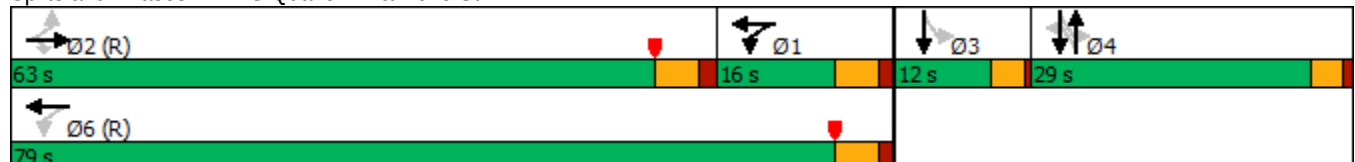
											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø6
Lane Configurations											
Traffic Volume (vph)	7	1480	362	26	1794	103	0	1	0		
Future Volume (vph)	7	1480	362	26	1794	103	0	1	0		
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA		
Protected Phases		2		1	1 6		4		3 4	3	6
Permitted Phases	2		2	1 6		4		3 4			
Detector Phase	2	2	2	1	1 6	4	4	3 4	3 4		
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	5.0		7.0	7.0			4.0	4.0
Minimum Split (s)	15.5	15.5	15.5	10.5		29.0	29.0			12.0	20.0
Total Split (s)	63.0	63.0	63.0	16.0		29.0	29.0			12.0	79.0
Total Split (%)	52.5%	52.5%	52.5%	13.3%		24.2%	24.2%			10%	66%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0			3.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5		1.0	1.0			0.5	1.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0			-2.0				
Total Lost Time (s)	3.5	3.5	3.5	3.5			2.0				
Lead/Lag	Lead	Lead	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	None		None	None			Max	C-Max
Act Effect Green (s)	72.0	72.0	72.0	88.0	88.0		14.5		27.0		
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73		0.12		0.22		
v/c Ratio	0.13	0.73	0.37	0.11	0.75		0.60		0.02		
Control Delay	26.1	26.0	8.4	4.9	6.2		26.8		0.0		
Queue Delay	0.0	3.7	0.6	0.0	1.8		23.1		0.0		
Total Delay	26.1	29.7	9.0	4.9	8.0		49.9		0.0		
LOS	C	C	A	A	A		D		A		
Approach Delay		25.6			7.9		49.9				
Approach LOS		C			A		D				

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 52 (43%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 18.0
 Intersection Capacity Utilization 70.8%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 2: S Quaker Ln & Duke St



Queues

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	8	1558	389	28	1934	155	8
v/c Ratio	0.13	0.73	0.37	0.11	0.75	0.60	0.02
Control Delay	26.1	26.0	8.4	4.9	6.2	26.8	0.0
Queue Delay	0.0	3.7	0.6	0.0	1.8	23.1	0.0
Total Delay	26.1	29.7	9.0	4.9	8.0	49.9	0.0
Queue Length 50th (ft)	3	458	82	3	115	37	0
Queue Length 95th (ft)	m8	m568	m120	m4	127	73	0
Internal Link Dist (ft)		312			222	293	73
Turn Bay Length (ft)	175			75			
Base Capacity (vph)	62	2123	1044	250	2592	389	598
Starvation Cap Reductn	0	466	339	0	76	0	0
Spillback Cap Reductn	0	0	0	0	465	222	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.94	0.55	0.11	0.91	0.93	0.01

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

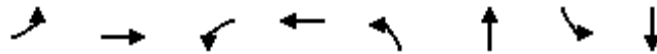
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1480	362	26	1794	7	103	0	19	1	0	1
Future Volume (vph)	7	1480	362	26	1794	7	103	0	19	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.98			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1769	3539	1537	1570	3537			1744			1695	
Flt Permitted	0.06	1.00	1.00	0.08	1.00			0.75			0.96	
Satd. Flow (perm)	103	3539	1537	139	3537			1370			1675	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.80	0.80	0.80	0.25	0.25	0.25
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	8	1558	389	28	1926	8	131	0	24	4	0	4
RTOR Reduction (vph)	0	0	124	0	0	0	0	92	0	0	6	0
Lane Group Flow (vph)	8	1558	265	28	1934	0	0	63	0	0	2	0
Confl. Peds. (#/hr)	9		11	11		9			7	7		
Heavy Vehicles (%)	2%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1			4			3	4
Permitted Phases	2		2	1	6		4			3	4	
Actuated Green, G (s)	70.0	70.0	70.0	86.0	86.0			12.5			24.5	
Effective Green, g (s)	72.0	72.0	72.0	88.0	88.0			14.5			26.5	
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73			0.12			0.22	
Clearance Time (s)	5.5	5.5	5.5	5.5				4.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0				3.0				
Lane Grp Cap (vph)	61	2123	922	250	2593			165			369	
v/s Ratio Prot		0.44		0.01	c0.55							
v/s Ratio Perm	0.08		0.17	0.07				c0.05			c0.00	
v/c Ratio	0.13	0.73	0.29	0.11	0.75			0.38			0.00	
Uniform Delay, d1	10.4	17.2	11.6	21.9	9.4			48.6			36.5	
Progression Factor	1.41	1.30	2.31	0.43	0.43			1.00			1.00	
Incremental Delay, d2	3.4	1.7	0.6	0.1	0.8			1.5			0.0	
Delay (s)	18.0	24.0	27.4	9.6	4.8			50.1			36.5	
Level of Service	B	C	C	A	A			D			D	
Approach Delay (s)		24.6			4.9			50.1			36.5	
Approach LOS		C			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			16.1			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			70.8%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	62	1427	7	1718	16	2	49	2
Future Volume (vph)	62	1427	7	1718	16	2	49	2
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	5.0	10.0	1.0	1.0	7.0	7.0	6.7	6.7
Minimum Split (s)	11.1	17.0	16.3	16.3	29.0	29.0	13.0	13.0
Total Split (s)	16.0	91.0	75.0	75.0	29.0	29.0	29.0	29.0
Total Split (%)	13.3%	75.8%	62.5%	62.5%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	4.0	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.6	2.3	2.3	2.3	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.1	4.3	4.3	4.3		4.0		4.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	95.5	95.3	85.5	85.5		16.4		16.4
Actuated g/C Ratio	0.80	0.79	0.71	0.71		0.14		0.14
v/c Ratio	0.34	0.54	0.04	0.75		0.21		0.69
Control Delay	23.6	0.7	7.1	9.2		40.1		43.5
Queue Delay	0.0	0.1	0.0	0.1		0.0		0.0
Total Delay	23.6	0.8	7.1	9.3		40.1		43.5
LOS	C	A	A	A		D		D
Approach Delay		1.8		9.3		40.1		43.5
Approach LOS		A		A		D		D

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 68 (57%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 8.0
 Intersection Capacity Utilization 68.8%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service C

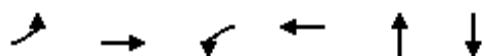
Splits and Phases: 3: Duke St & Alexandria Commons



Queues

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	67	1529	8	1882	33	184
v/c Ratio	0.34	0.54	0.04	0.75	0.21	0.69
Control Delay	23.6	0.7	7.1	9.2	40.1	43.5
Queue Delay	0.0	0.1	0.0	0.1	0.0	0.0
Total Delay	23.6	0.8	7.1	9.3	40.1	43.5
Queue Length 50th (ft)	9	2	1	161	19	86
Queue Length 95th (ft)	m27	5	m2	172	34	127
Internal Link Dist (ft)		222		571	88	97
Turn Bay Length (ft)	100		375			
Base Capacity (vph)	253	2807	210	2513	231	367
Starvation Cap Reductn	0	366	0	56	0	0
Spillback Cap Reductn	0	0	0	14	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.63	0.04	0.77	0.14	0.50

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	1427	10	7	1718	34	16	2	4	49	2	93
Future Volume (vph)	62	1427	10	7	1718	34	16	2	4	49	2	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.3		4.3	4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.98			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1770	3535		1767	3527			1745			1664	
Flt Permitted	0.06	1.00		0.16	1.00			0.60			0.89	
Satd. Flow (perm)	111	3535		296	3527			1087			1502	
Peak-hour factor, PHF	0.94	0.94	0.94	0.95	0.95	0.95	0.69	0.69	0.69	0.80	0.80	0.80
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	67	1518	11	8	1845	37	24	3	6	62	3	119
RTOR Reduction (vph)	0	0	0	0	1	0	0	5	0	0	60	0
Lane Group Flow (vph)	67	1529	0	8	1881	0	0	28	0	0	124	0
Confl. Peds. (#/hr)	2		15	15		2			9	9		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	93.3	93.3		82.3	82.3			14.4			14.4	
Effective Green, g (s)	95.3	95.3		84.3	84.3			16.4			16.4	
Actuated g/C Ratio	0.79	0.79		0.70	0.70			0.14			0.14	
Clearance Time (s)	6.1	6.3		6.3	6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0		0.2	0.2			2.0			2.0	
Lane Grp Cap (vph)	183	2807		207	2477			148			205	
v/s Ratio Prot	0.02	c0.43			c0.53							
v/s Ratio Perm	0.27			0.03				0.03			c0.08	
v/c Ratio	0.37	0.54		0.04	0.76			0.19			0.61	
Uniform Delay, d1	14.0	4.5		5.5	11.4			45.9			48.8	
Progression Factor	3.95	0.03		0.81	0.58			1.00			1.00	
Incremental Delay, d2	0.3	0.5		0.2	1.5			0.2			3.5	
Delay (s)	55.7	0.6		4.7	8.1			46.1			52.2	
Level of Service	E	A		A	A			D			D	
Approach Delay (s)		3.0			8.0			46.1			52.2	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			8.4			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)				12.4		
Intersection Capacity Utilization			68.8%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	29	1449	27	1665	19	6	98	8	75
Future Volume (vph)	29	1449	27	1665	19	6	98	8	75
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	4.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	30.8	10.0	31.0	29.0	29.0	29.0	29.0	29.0
Total Split (s)	17.0	74.0	17.0	74.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	14.2%	61.7%	14.2%	61.7%	24.2%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	1.8	2.6	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	3.8	3.6	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	None	None
Act Effect Green (s)	88.7	84.4	88.7	83.9		21.2		21.2	21.2
Actuated g/C Ratio	0.74	0.70	0.74	0.70		0.18		0.18	0.18
v/c Ratio	0.19	0.63	0.12	0.77		0.44		0.86	0.26
Control Delay	9.9	3.4	8.5	20.0		15.8		90.8	9.8
Queue Delay	0.0	0.0	0.0	0.1		0.0		0.0	0.0
Total Delay	9.9	3.4	8.5	20.1		15.8		90.8	9.8
LOS	A	A	A	C		B		F	A
Approach Delay		3.6		19.9		15.8		57.3	
Approach LOS		A		B		B		E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 67 (56%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 15.1
Intersection Capacity Utilization 76.0%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

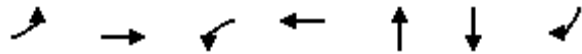
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St

Ø1	Ø2 (R)	Ø4
17 s	74 s	29 s
Ø5	Ø6 (R)	Ø8
17 s	74 s	29 s

Queues

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	32	1578	29	1884	163	129	91
v/c Ratio	0.19	0.63	0.12	0.77	0.44	0.86	0.26
Control Delay	9.9	3.4	8.5	20.0	15.8	90.8	9.8
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	9.9	3.4	8.5	20.1	15.8	90.8	9.8
Queue Length 50th (ft)	2	55	7	365	25	96	0
Queue Length 95th (ft)	m8	79	m13	m581	41	#169	37
Internal Link Dist (ft)		571		730	190	93	
Turn Bay Length (ft)	195		80				
Base Capacity (vph)	255	2489	324	2452	415	177	401
Starvation Cap Reductn	0	13	0	0	0	0	0
Spillback Cap Reductn	0	0	0	36	1	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.64	0.09	0.78	0.39	0.73	0.23

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 Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	1449	3	27	1665	108	19	6	83	98	8	75
Future Volume (vph)	29	1449	3	27	1665	108	19	6	83	98	8	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1752	3538		1770	3502			1626			1770	1583
Flt Permitted	0.05	1.00		0.10	1.00			0.93			0.46	1.00
Satd. Flow (perm)	101	3538		196	3502			1519			854	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.68	0.68	0.68	0.84	0.84	0.84
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	32	1575	3	29	1769	115	28	9	124	119	10	91
RTOR Reduction (vph)	0	0	0	0	3	0	0	103	0	0	0	75
Lane Group Flow (vph)	32	1578	0	29	1881	0	0	60	0	0	129	16
Confl. Peds. (#/hr)	1		10	10		1			7	7		
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	83.5	80.2		82.7	79.5			19.2			19.2	19.2
Effective Green, g (s)	87.5	82.2		86.7	81.5			21.2			21.2	21.2
Actuated g/C Ratio	0.73	0.69		0.72	0.68			0.18			0.18	0.18
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	146	2423		209	2378			268			150	279
v/s Ratio Prot	c0.01	0.45		0.01	c0.54							
v/s Ratio Perm	0.15			0.09				0.04			c0.15	0.01
v/c Ratio	0.22	0.65		0.14	0.79			0.22			0.86	0.06
Uniform Delay, d1	13.8	10.7		8.3	13.3			42.4			48.0	41.1
Progression Factor	1.72	0.21		1.83	1.34			1.00			1.00	1.00
Incremental Delay, d2	0.2	1.2		0.0	1.1			0.2			34.7	0.0
Delay (s)	24.0	3.4		15.3	19.0			42.5			82.7	41.1
Level of Service	C	A		B	B			D			F	D
Approach Delay (s)		3.8			19.0			42.5			65.5	
Approach LOS		A			B			D			E	
Intersection Summary												
HCM 2000 Control Delay			16.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			76.0%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

5: Roth St/Cambridge Rd & Duke St

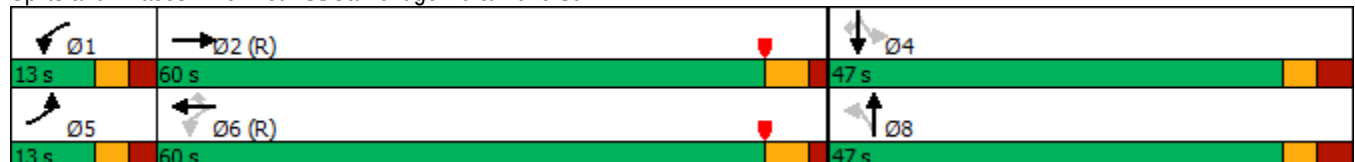
03/14/2024

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	9	1619	61	1756	175	3	11	276	5	41
Future Volume (vph)	9	1619	61	1756	175	3	11	276	5	41
Turn Type	Prot	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6			8		4	
Permitted Phases			6		6	8		4		4
Detector Phase	5	2	1	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	6.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.5	30.7	11.5	15.7	15.7	13.4	13.4	30.4	30.4	30.4
Total Split (s)	13.0	60.0	13.0	60.0	60.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	10.8%	50.0%	10.8%	50.0%	50.0%	39.2%	39.2%	39.2%	39.2%	39.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	1.7	2.5	1.7	1.7	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	3.5	3.7	3.5	3.7	3.7		4.4		4.4	4.4
Lead/Lag	Lead	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?										
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	8.2	59.5	68.9	66.8	66.8		42.6		42.6	42.6
Actuated g/C Ratio	0.07	0.50	0.57	0.56	0.56		0.36		0.36	0.36
v/c Ratio	0.09	1.00	0.35	0.94	0.21		0.57		1.47	0.08
Control Delay	69.1	40.9	24.1	43.7	19.8		23.3		263.6	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	69.1	40.9	24.1	43.7	19.8		23.3		263.6	2.6
LOS	E	D	C	D	B		C		F	A
Approach Delay		41.1		41.0			23.3		230.2	
Approach LOS		D		D			C		F	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 85 (71%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.47
Intersection Signal Delay: 55.2
Intersection Capacity Utilization 101.5%
Analysis Period (min) 15
Intersection LOS: E
ICU Level of Service G

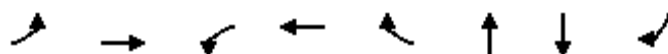
Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



Queues

5: Roth St/Cambridge Rd & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	10	1746	64	1847	184	381	333	49
v/c Ratio	0.09	1.00	0.35	0.94	0.21	0.57	1.47	0.08
Control Delay	69.1	40.9	24.1	43.7	19.8	23.3	263.6	2.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.1	40.9	24.1	43.7	19.8	23.3	263.6	2.6
Queue Length 50th (ft)	7	~776	31	645	94	150	~353	0
Queue Length 95th (ft)	m14	#927	56	#1026	135	252	#505	11
Internal Link Dist (ft)		730		743		286	101	
Turn Bay Length (ft)	120		250					
Base Capacity (vph)	128	1754	197	1971	863	663	227	598
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	0.08	1.00	0.32	0.94	0.21	0.57	1.47	0.08

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 Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1619	5	61	1756	175	3	11	344	276	5	41
Future Volume (vph)	9	1619	5	61	1756	175	3	11	344	276	5	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.87			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1626	3537		1752	3539	1550		1620			1770	1550
Flt Permitted	0.95	1.00		0.06	1.00	1.00		1.00			0.34	1.00
Satd. Flow (perm)	1626	3537		119	3539	1550		1617			640	1550
Peak-hour factor, PHF	0.93	0.93	0.93	0.97	0.97	0.97	0.96	0.96	0.96	0.86	0.86	0.86
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	10	1741	5	64	1847	184	3	12	366	327	6	49
RTOR Reduction (vph)	0	0	0	0	0	0	0	89	0	0	0	32
Lane Group Flow (vph)	10	1746	0	64	1847	184	0	292	0	0	333	17
Confl. Peds. (#/hr)	1		2	2		1	6					6
Heavy Vehicles (%)	11%	2%	2%	3%	2%	2%	2%	2%	2%	2%	20%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	1.4	56.4		65.8	60.4	60.4		40.6			40.6	40.6
Effective Green, g (s)	3.4	58.4		69.3	62.4	62.4		42.6			42.6	42.6
Actuated g/C Ratio	0.03	0.49		0.58	0.52	0.52		0.36			0.36	0.36
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	46	1721		169	1840	806		574			227	550
v/s Ratio Prot	0.01	0.49		c0.02	c0.52							
v/s Ratio Perm				0.19		0.12		0.18			c0.52	0.01
v/c Ratio	0.22	1.01		0.38	1.00	0.23		0.51			1.47	0.03
Uniform Delay, d1	57.0	30.8		25.6	28.8	15.7		30.5			38.7	25.2
Progression Factor	1.29	0.70		1.61	1.40	1.33		1.00			1.00	1.00
Incremental Delay, d2	0.7	22.9		0.5	20.7	0.6		0.3			232.6	0.0
Delay (s)	74.1	44.4		41.7	61.1	21.4		30.7			271.3	25.3
Level of Service	E	D		D	E	C		C			F	C
Approach Delay (s)		44.5			57.0			30.7			239.8	
Approach LOS		D			E			C			F	
Intersection Summary												
HCM 2000 Control Delay			65.2	HCM 2000 Level of Service				E				
HCM 2000 Volume to Capacity ratio			1.17									
Actuated Cycle Length (s)			120.0	Sum of lost time (s)				11.6				
Intersection Capacity Utilization			101.5%	ICU Level of Service				G				
Analysis Period (min)			15									
c Critical Lane Group												

Timings

6: Witter Drive & Duke St

03/14/2024

	→	↖	←	↙
Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↑↑↑	↙
Traffic Volume (vph)	2243	29	1968	24
Future Volume (vph)	2243	29	1968	24
Turn Type	NA	pm+pt	NA	Prot
Protected Phases	2	1	6	4
Permitted Phases		6		
Detector Phase	2	1	6	4
Switch Phase				
Minimum Initial (s)	10.0	6.0	10.0	4.0
Minimum Split (s)	27.5	12.0	15.5	20.0
Total Split (s)	81.0	14.0	95.0	25.0
Total Split (%)	67.5%	11.7%	79.2%	20.8%
Yellow Time (s)	3.5	3.0	3.5	3.5
All-Red Time (s)	2.0	3.0	2.0	0.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.5	4.0	3.5	2.0
Lead/Lag	Lag	Lead		
Lead-Lag Optimize?				
Recall Mode	C-Max	None	C-Max	None
Act Effect Green (s)	95.1	101.9	102.4	12.1
Actuated g/C Ratio	0.79	0.85	0.85	0.10
v/c Ratio	0.57	0.16	0.49	0.62
Control Delay	2.2	11.4	5.4	28.4
Queue Delay	0.2	0.0	0.0	0.0
Total Delay	2.4	11.4	5.4	28.5
LOS	A	B	A	C
Approach Delay	2.4		5.5	28.5
Approach LOS	A		A	C

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 4 (3%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 4.8
Intersection Capacity Utilization 56.0%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Witter Drive & Duke St



Queues

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	2297	31	2113	164
v/c Ratio	0.57	0.16	0.49	0.62
Control Delay	2.2	11.4	5.4	28.4
Queue Delay	0.2	0.0	0.0	0.0
Total Delay	2.4	11.4	5.4	28.5
Queue Length 50th (ft)	73	3	80	39
Queue Length 95th (ft)	m86	m13	258	37
Internal Link Dist (ft)	743		262	663
Turn Bay Length (ft)		200		
Base Capacity (vph)	4025	220	4339	404
Starvation Cap Reductn	698	0	244	0
Spillback Cap Reductn	305	0	0	6
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.69	0.14	0.52	0.41

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

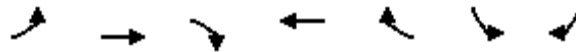
03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	2243	8	29	1968	24	71
Future Volume (vph)	2243	8	29	1968	24	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	2.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.90	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	5082		1770	5085	1641	
Flt Permitted	1.00		0.05	1.00	0.99	
Satd. Flow (perm)	5082		95	5085	1641	
Peak-hour factor, PHF	0.98	0.98	0.95	0.95	0.59	0.59
Growth Factor (vph)	100%	102%	102%	102%	102%	102%
Adj. Flow (vph)	2289	8	31	2113	41	123
RTOR Reduction (vph)	0	0	0	0	100	0
Lane Group Flow (vph)	2297	0	31	2113	64	0
Confl. Peds. (#/hr)		9	9			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	90.7		100.4	100.4	10.1	
Effective Green, g (s)	92.7		102.4	102.4	12.1	
Actuated g/C Ratio	0.77		0.85	0.85	0.10	
Clearance Time (s)	5.5		6.0	5.5	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3925		160	4339	165	
v/s Ratio Prot	c0.45		0.01	c0.42	c0.04	
v/s Ratio Perm			0.15			
v/c Ratio	0.59		0.19	0.49	0.39	
Uniform Delay, d1	5.7		4.6	2.2	50.5	
Progression Factor	0.34		5.24	2.03	1.00	
Incremental Delay, d2	0.2		0.4	0.3	1.5	
Delay (s)	2.1		24.5	4.7	52.0	
Level of Service	A		C	A	D	
Approach Delay (s)	2.1			5.0	52.0	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			5.2		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.56			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.5
Intersection Capacity Utilization			56.0%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	WBR	SBL	SBR	Ø3
Lane Configurations	↰	↱↱	↰	↱↱↱	↰	↰	↰	
Traffic Volume (vph)	26	702	1573	1978	239	184	19	
Future Volume (vph)	26	702	1573	1978	239	184	19	
Turn Type	Prot	NA	Prot	NA	Perm	Prot	Perm	
Protected Phases	5	2	2	6		4		3
Permitted Phases					6		4	
Detector Phase	5	2	2	6	6	4	4	
Switch Phase								
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	13.0	33.0
Total Split (s)	15.0	63.0	63.0	48.0	48.0	24.0	24.0	33.0
Total Split (%)	12.5%	52.5%	52.5%	40.0%	40.0%	20.0%	20.0%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.3	86.1	86.1	72.2	72.2	19.3	19.3	
Actuated g/C Ratio	0.08	0.72	0.72	0.60	0.60	0.16	0.16	
v/c Ratio	0.22	0.30	1.23	0.74	0.28	0.70	0.06	
Control Delay	63.4	5.0	124.4	22.6	17.8	38.3	0.5	
Queue Delay	0.0	0.0	0.0	0.0	71.0	5.8	1.2	
Total Delay	63.4	5.0	124.4	22.6	88.8	44.1	1.7	
LOS	E	A	F	C	F	D	A	
Approach Delay		86.8		29.6				
Approach LOS		F		C				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.23

Intersection Signal Delay: 56.8

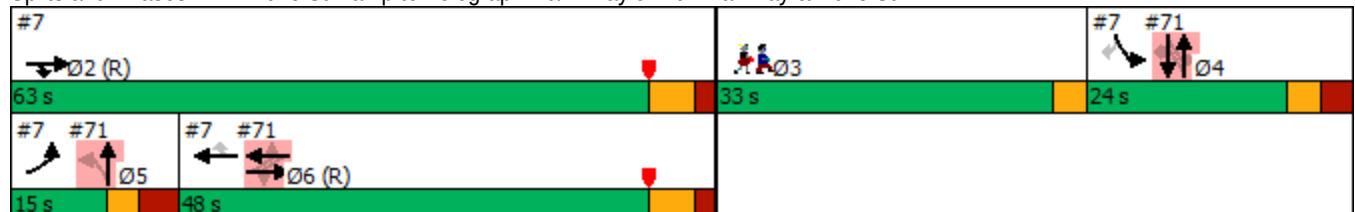
Intersection LOS: E

Intersection Capacity Utilization 100.7%

ICU Level of Service G

Analysis Period (min) 15

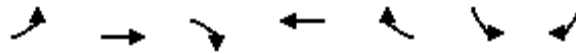
Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	27	723	1589	2193	260	194	20
v/c Ratio	0.22	0.30	1.23	0.74	0.28	0.70	0.06
Control Delay	63.4	5.0	124.4	22.6	17.8	38.3	0.5
Queue Delay	0.0	0.0	0.0	0.0	71.0	5.8	1.2
Total Delay	63.4	5.0	124.4	22.6	88.8	44.1	1.7
Queue Length 50th (ft)	22	49	~1482	356	86	62	0
Queue Length 95th (ft)	m31	120	#2170	m#652	m150	#99	m0
Internal Link Dist (ft)		321		722			
Turn Bay Length (ft)	180				120		
Base Capacity (vph)	137	2419	1297	2944	934	286	358
Starvation Cap Reductn	0	0	0	0	0	51	256
Spillback Cap Reductn	0	0	0	0	791	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.30	1.23	0.74	1.82	0.83	0.20

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	702	1573	0	1978	239	0	0	0	184	0	19
Future Volume (vph)	26	702	1573	0	1978	239	0	0	0	184	0	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00				1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		1.00
Frt	1.00	1.00	1.00		1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (prot)	1570	3374	1810		4893	1553				1719		1583
Flt Permitted	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (perm)	1570	3374	1810		4893	1553				1719		1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Growth Factor (vph)	102%	102%	100%	102%	102%	100%	102%	102%	102%	100%	102%	102%
Adj. Flow (vph)	27	723	1589	0	2193	260	0	0	0	194	0	20
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	17
Lane Group Flow (vph)	27	723	1589	0	2193	260	0	0	0	194	0	3
Confl. Peds. (#/hr)										7	7	
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA	Perm				Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases						6						4
Actuated Green, G (s)	7.3	81.7	81.7		67.9	67.9				17.3		17.3
Effective Green, g (s)	9.3	83.7	83.7		69.9	69.9				19.3		19.3
Actuated g/C Ratio	0.08	0.70	0.70		0.58	0.58				0.16		0.16
Clearance Time (s)	6.5	6.0	6.0		6.0	6.0				6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2	0.2				3.0		3.0
Lane Grp Cap (vph)	121	2353	1262		2850	904				276		254
v/s Ratio Prot	0.02	0.21	c0.88		0.45					c0.11		
v/s Ratio Perm						0.17						0.00
v/c Ratio	0.22	0.31	1.26		0.77	0.29				0.70		0.01
Uniform Delay, d1	52.0	7.0	18.1		19.0	12.6				47.6		42.3
Progression Factor	1.16	0.57	0.75		1.13	1.16				0.51		1.00
Incremental Delay, d2	0.8	0.3	122.1		0.9	0.4				7.7		0.0
Delay (s)	60.9	4.3	135.7		22.3	14.9				32.0		42.4
Level of Service	E	A	F		C	B				C		D
Approach Delay (s)		94.2			21.5			0.0			33.0	
Approach LOS		F			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			56.0									HCM 2000 Level of Service E
HCM 2000 Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			100.7%									ICU Level of Service G
Analysis Period (min)			15									
c Critical Lane Group												

Timings

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Lane Group	NBT	Ø2	Ø4	Ø6	Ø8
Lane Configurations	↑↑				
Traffic Volume (vph)	1776				
Future Volume (vph)	1776				
Turn Type	NA				
Protected Phases	12	2	4	6	8
Permitted Phases					
Detector Phase	12				
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	7.0
Minimum Split (s)	26.0	22.0	22.0	22.0	40.0
Total Split (s)	69.0	69.0	51.0	69.0	51.0
Total Split (%)	57.5%	58%	43%	58%	43%
Yellow Time (s)	4.0	4.0	3.0	4.0	3.0
All-Red Time (s)	6.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0				
Total Lost Time (s)	8.0				
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	C-Max	None	C-Max	None
Act Effect Green (s)	61.0				
Actuated g/C Ratio	0.51				
v/c Ratio	0.99				
Control Delay	28.4				
Queue Delay	0.0				
Total Delay	28.4				
LOS	C				
Approach Delay	28.4				
Approach LOS	C				

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.22
Intersection Signal Delay: 28.4
Intersection LOS: C
Intersection Capacity Utilization 55.8%
ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 9: WB Duke St to SB Telegraph Rd & Dummy

#10 → Ø2 (R) 69 s	#10 #81 ↓ Ø4 51 s
#10 #81 ← Ø6 (R) 69 s	#10 #81 ↑ Ø8 51 s
#9 ↑ Ø12 69 s	

Queues

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Lane Group	NBT
Lane Group Flow (vph)	1776
v/c Ratio	0.99
Control Delay	28.4
Queue Delay	0.0
Total Delay	28.4
Queue Length 50th (ft)	190
Queue Length 95th (ft)	#865
Internal Link Dist (ft)	104
Turn Bay Length (ft)	
Base Capacity (vph)	1798
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.99

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			
Traffic Volume (vph)	0	0	1776	0	0	0
Future Volume (vph)	0	0	1776	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			8.0			
Lane Util. Factor			0.95			
Frt			1.00			
Flt Protected			1.00			
Satd. Flow (prot)			3539			
Flt Permitted			1.00			
Satd. Flow (perm)			3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	102%	102%	100%	102%	102%	102%
Adj. Flow (vph)	0	0	1776	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1776	0	0	0
Turn Type			NA			
Protected Phases			12			
Permitted Phases						
Actuated Green, G (s)			59.0			
Effective Green, g (s)			61.0			
Actuated g/C Ratio			0.51			
Clearance Time (s)			10.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)			1798			
v/s Ratio Prot			c0.50			
v/s Ratio Perm						
v/c Ratio			0.99			
Uniform Delay, d1			29.1			
Progression Factor			0.46			
Incremental Delay, d2			13.5			
Delay (s)			26.8			
Level of Service			C			
Approach Delay (s)	0.0		26.8		0.0	
Approach LOS	A		C		A	
Intersection Summary						
HCM 2000 Control Delay			26.8	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio			0.57			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		14.0
Intersection Capacity Utilization			55.8%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	Ø12
Lane Configurations	↑↑↑	↑↑↑		↕		↕	
Traffic Volume (vph)	1427	2324	133	31	14	20	
Future Volume (vph)	1427	2324	133	31	14	20	
Turn Type	NA	NA	Perm	NA	Perm	NA	
Protected Phases	2	6		8		4	12
Permitted Phases			8		4		
Detector Phase	2	6	8	8	4	4	
Switch Phase							
Minimum Initial (s)	4.0	4.0	7.0	7.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	40.0	40.0	22.0	22.0	26.0
Total Split (s)	69.0	69.0	51.0	51.0	51.0	51.0	69.0
Total Split (%)	57.5%	57.5%	42.5%	42.5%	42.5%	42.5%	58%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0	4.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0	6.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0	
Total Lost Time (s)	4.0	4.0		4.0		4.0	
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	None	None	None	None	Max
Act Effect Green (s)	65.0	65.0		47.0		47.0	
Actuated g/C Ratio	0.54	0.54		0.39		0.39	
v/c Ratio	0.56	0.90		0.41		0.13	
Control Delay	19.5	27.6		28.4		23.5	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	19.5	27.6		28.4		23.5	
LOS	B	C		C		C	
Approach Delay	19.5	27.6		28.4		23.5	
Approach LOS	B	C		C		C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.22

Intersection Signal Delay: 24.7

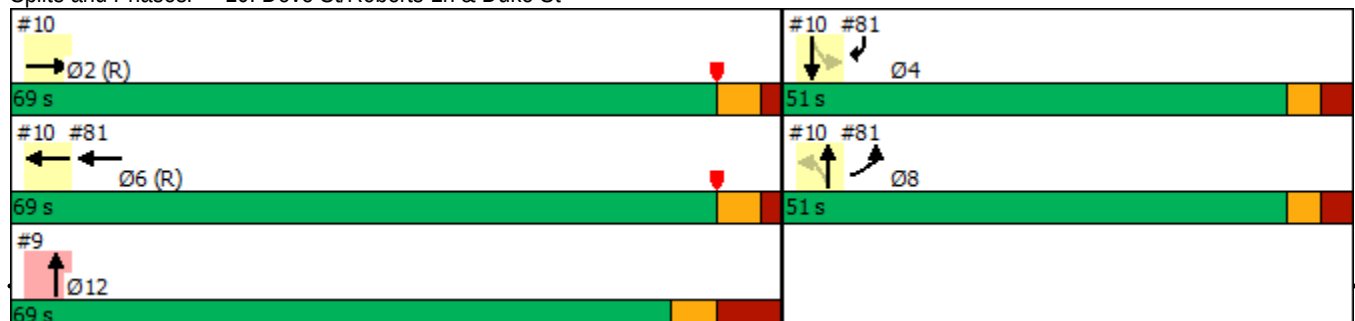
Intersection LOS: C

Intersection Capacity Utilization 73.3%

ICU Level of Service D

Analysis Period (min) 15

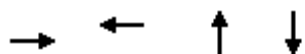
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1532	2444	222	74
v/c Ratio	0.56	0.90	0.41	0.13
Control Delay	19.5	27.6	28.4	23.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.5	27.6	28.4	23.5
Queue Length 50th (ft)	272	625	119	35
Queue Length 95th (ft)	389	697	173	69
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	2754	2726	543	585
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.56	0.90	0.41	0.13
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

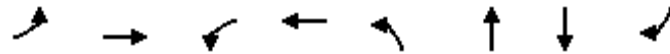
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1427	0	0	2324	0	133	31	21	14	20	34
Future Volume (vph)	0	1427	0	0	2324	0	133	31	21	14	20	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.98			0.93	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		5085			5034			1763			1589	
Flt Permitted		1.00			1.00			0.75			0.93	
Satd. Flow (perm)		5085			5034			1377			1493	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	100%	102%	102%	102%	102%	102%
Adj. Flow (vph)	0	1532	0	0	2444	0	158	38	26	15	22	37
RTOR Reduction (vph)	0	0	0	0	0	0	0	4	0	0	1	0
Lane Group Flow (vph)	0	1532	0	0	2444	0	0	218	0	0	73	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		63.0			63.0			45.0			45.0	
Effective Green, g (s)		65.0			65.0			47.0			47.0	
Actuated g/C Ratio		0.54			0.54			0.39			0.39	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		2754			2726			539			584	
v/s Ratio Prot		0.30			c0.49							
v/s Ratio Perm								c0.16			0.05	
v/c Ratio		0.56			0.90			0.40			0.12	
Uniform Delay, d1		18.0			24.5			26.4			23.3	
Progression Factor		1.03			0.97			1.00			1.00	
Incremental Delay, d2		0.8			3.3			0.5			0.1	
Delay (s)		19.4			27.2			26.9			23.4	
Level of Service		B			C			C			C	
Approach Delay (s)		19.4			27.2			26.9			23.4	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			24.3				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			14.0		
Intersection Capacity Utilization			73.3%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations		↔		↔		↔	↔	↔			
Traffic Volume (vph)	8	5	10	11	36	213	125	1			
Future Volume (vph)	8	5	10	11	36	213	125	1			
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA	Perm			
Protected Phases		6		6		4 5	4		2	3	5
Permitted Phases	6		6		4 5			4			
Detector Phase	6	6	6	6	4 5	4 5	4	4			
Switch Phase											
Minimum Initial (s)	7.0	7.0	7.0	7.0			7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0			13.0	13.0	14.0	33.0	12.5
Total Split (s)	48.0	48.0	48.0	48.0			24.0	24.0	63.0	33.0	15.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%			20.0%	20.0%	53%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0			3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0			-2.0	-2.0			
Total Lost Time (s)		4.0		4.0			4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag		Lead	Lead
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None	C-Max	None	None
Act Effect Green (s)		72.2		72.2		33.2	19.3	19.3			
Actuated g/C Ratio		0.60		0.60		0.28	0.16	0.16			
v/c Ratio		0.10		0.03		0.58	0.44	0.00			
Control Delay		5.6		14.3		62.0	50.3	0.0			
Queue Delay		0.0		0.0		79.2	0.1	0.0			
Total Delay		5.6		14.3		141.3	50.4	0.0			
LOS		A		B		F	D	A			
Approach Delay		5.6		14.3		141.3	50.0				
Approach LOS		A		B		F	D				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.23

Intersection Signal Delay: 87.0

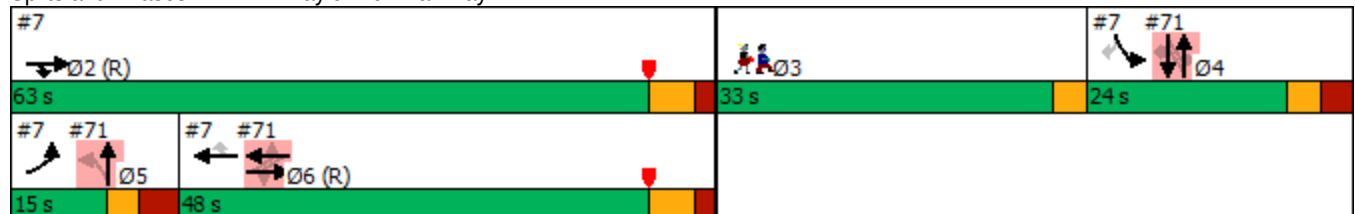
Intersection LOS: F

Intersection Capacity Utilization 36.6%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	99	30	279	132	1
v/c Ratio	0.10	0.03	0.58	0.44	0.00
Control Delay	5.6	14.3	62.0	50.3	0.0
Queue Delay	0.0	0.0	79.2	0.1	0.0
Total Delay	5.6	14.3	141.3	50.4	0.0
Queue Length 50th (ft)	4	7	209	93	0
Queue Length 95th (ft)	36	29	292	156	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	1007	1004	494	310	358
Starvation Cap Reductn	0	0	401	0	0
Spillback Cap Reductn	193	193	0	5	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.04	3.00	0.43	0.00
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Parkway

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	5	67	10	11	2	36	213	16	0	125	1
Future Volume (vph)	8	5	67	10	11	2	36	213	16	0	125	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.89			0.99			0.99			1.00	0.85
Flt Protected		0.99			0.98			0.99			1.00	1.00
Satd. Flow (prot)		1641			1792			1818			1863	1583
Flt Permitted		0.98			0.91			0.94			1.00	1.00
Satd. Flow (perm)		1620			1669			1726			1863	1583
Peak-hour factor, PHF	0.81	0.81	0.81	0.77	0.77	0.77	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	10	6	83	13	14	3	38	224	17	0	132	1
RTOR Reduction (vph)	0	35	0	0	1	0	0	2	0	0	0	1
Lane Group Flow (vph)	0	64	0	0	29	0	0	277	0	0	132	0
Confl. Peds. (#/hr)	22					22			7	7		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	2%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		67.9			67.9			30.6			17.3	17.3
Effective Green, g (s)		69.9			69.9			32.6			19.3	19.3
Actuated g/C Ratio		0.58			0.58			0.27			0.16	0.16
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		943			972			468			299	254
v/s Ratio Prot											0.07	
v/s Ratio Perm		c0.04			0.02			c0.16				0.00
v/c Ratio		0.07			0.03			0.59			0.44	0.00
Uniform Delay, d1		10.9			10.6			37.9			45.5	42.3
Progression Factor		1.00			1.00			1.54			1.00	1.00
Incremental Delay, d2		0.1			0.1			2.0			1.0	0.0
Delay (s)		11.0			10.7			60.2			46.5	42.3
Level of Service		B			B			E			D	D
Approach Delay (s)		11.0			10.7			60.2			46.5	
Approach LOS		B			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			45.1				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.23									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			15.5		
Intersection Capacity Utilization			36.6%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024

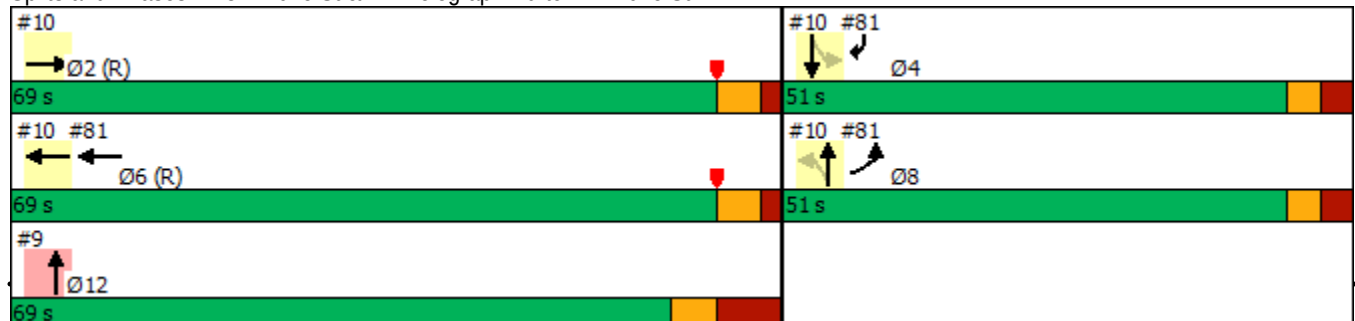


Lane Group	EBL	EBT	WBT	SBR	Ø2	Ø12
Lane Configurations	↰	↱↱	↰↰	↰↰		
Traffic Volume (vph)	202	698	747	1495		
Future Volume (vph)	202	698	747	1495		
Turn Type	Prot	NA	NA	Prot		
Protected Phases	8	Free	6	4	2	12
Permitted Phases						
Detector Phase	8		6	4		
Switch Phase						
Minimum Initial (s)	7.0		4.0	4.0	4.0	4.0
Minimum Split (s)	40.0		22.0	22.0	22.0	26.0
Total Split (s)	51.0		69.0	51.0	69.0	69.0
Total Split (%)	42.5%		57.5%	42.5%	58%	58%
Yellow Time (s)	3.0		4.0	3.0	4.0	4.0
All-Red Time (s)	3.0		2.0	3.0	2.0	6.0
Lost Time Adjust (s)	-2.0		-2.0	-2.0		
Total Lost Time (s)	4.0		4.0	4.0		
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		C-Max	None	C-Max	Max
Act Effect Green (s)	47.0	120.0	65.0	47.0		
Actuated g/C Ratio	0.39	1.00	0.54	0.39		
v/c Ratio	0.29	0.20	0.40	1.22		
Control Delay	24.0	0.1	9.2	132.6		
Queue Delay	0.0	0.0	0.0	0.0		
Total Delay	24.0	0.1	9.2	132.6		
LOS	C	A	A	F		
Approach Delay		5.5	9.2			
Approach LOS		A	A			

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 120
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.22
Intersection Signal Delay: 67.2
Intersection LOS: E
Intersection Capacity Utilization 80.0%
ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 81: Duke St & NB Telegraph Rd to WB Duke St



Queues

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024



Lane Group	EBL	EBT	WBT	SBR
Lane Group Flow (vph)	202	698	762	1526
v/c Ratio	0.29	0.20	0.40	1.22
Control Delay	24.0	0.1	9.2	132.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	24.0	0.1	9.2	132.6
Queue Length 50th (ft)	101	0	65	~739
Queue Length 95th (ft)	82	0	m105	#892
Internal Link Dist (ft)		184	95	
Turn Bay Length (ft)	300			
Base Capacity (vph)	693	3539	1916	1254
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.29	0.20	0.40	1.22

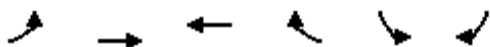
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	202	698	747	0	0	1495
Future Volume (vph)	202	698	747	0	0	1495
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			4.0
Lane Util. Factor	1.00	0.95	0.95			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	3539	3539			2733
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	3539	3539			2733
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.98
Growth Factor (vph)	100%	100%	102%	102%	102%	100%
Adj. Flow (vph)	202	698	762	0	0	1526
RTOR Reduction (vph)	0	0	0	0	0	184
Lane Group Flow (vph)	202	698	762	0	0	1342
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	NA	NA			Prot
Protected Phases	8	Free	6			4
Permitted Phases						
Actuated Green, G (s)	45.0	120.0	63.0			45.0
Effective Green, g (s)	47.0	120.0	65.0			47.0
Actuated g/C Ratio	0.39	1.00	0.54			0.39
Clearance Time (s)	6.0		6.0			6.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	693	3539	1916			1070
v/s Ratio Prot	0.11	0.20	c0.22			c0.49
v/s Ratio Perm						
v/c Ratio	0.29	0.20	0.40			1.25
Uniform Delay, d1	25.1	0.0	16.1			36.5
Progression Factor	0.90	1.00	0.55			1.00
Incremental Delay, d2	0.2	0.1	0.4			122.0
Delay (s)	22.9	0.1	9.1			158.5
Level of Service	C	A	A			F
Approach Delay (s)		5.2	9.1		158.5	
Approach LOS		A	A		F	
Intersection Summary						
HCM 2000 Control Delay			79.5		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.80			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			80.0%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

82: NB Telegraph Rd to WB Duke St & WB Duke St to SB Telegraph Rd

03/14/2024



Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		↑↑		↑	↑	
Traffic Volume (veh/h)	0	1776	0	1465	202	0
Future Volume (Veh/h)	0	1776	0	1465	202	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1776	0	1494	202	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		329				
pX, platoon unblocked					0.50	
vC, conflicting volume	1494				888	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1494				0	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				61	100
cM capacity (veh/h)	445				515	1084
Direction, Lane #	NB 1	NB 2	SB 1	NE 1		
Volume Total	888	888	1494	202		
Volume Left	0	0	0	202		
Volume Right	0	0	1494	0		
cSH	1700	1700	1700	515		
Volume to Capacity	0.52	0.52	0.88	0.39		
Queue Length 95th (ft)	0	0	0	46		
Control Delay (s)	0.0	0.0	0.0	16.4		
Lane LOS				C		
Approach Delay (s)	0.0		0.0	16.4		
Approach LOS				C		
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			95.9%	ICU Level of Service		F
Analysis Period (min)			15			



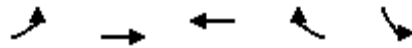
Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix V: Signal Timing 2026 Build Alternative 3C

Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	Ø2
Lane Configurations	↰	↑↑↑	↑↑	↱	↰↰	
Traffic Volume (vph)	306	994	1195	703	843	
Future Volume (vph)	306	994	1195	703	843	
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	2
Permitted Phases	5 2					
Detector Phase	5	5 2	6	6 4	4	
Switch Phase						
Minimum Initial (s)	5.0		10.0		7.0	10.0
Minimum Split (s)	19.6		22.0		29.5	22.0
Total Split (s)	23.0		56.0		41.0	79.0
Total Split (%)	19.2%		46.7%		34.2%	66%
Yellow Time (s)	3.0		4.0		3.5	4.0
All-Red Time (s)	2.6		2.0		3.0	2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0	
Total Lost Time (s)	3.6		4.0		4.5	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None		C-Max		None	C-Max
Act Effect Green (s)	75.4	75.4	52.0	93.0	36.5	
Actuated g/C Ratio	0.63	0.63	0.43	0.78	0.30	
v/c Ratio	1.02	0.36	0.82	0.60	1.07	
Control Delay	89.2	11.1	29.1	2.4	89.8	
Queue Delay	0.0	0.2	18.4	0.4	1.2	
Total Delay	89.2	11.3	47.5	2.8	91.0	
LOS	F	B	D	A	F	
Approach Delay		29.4	30.9		91.0	
Approach LOS		C	C		F	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 33 (28%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.07
Intersection Signal Delay: 45.0
Intersection Capacity Utilization 90.2%
Analysis Period (min) 15
Intersection LOS: D
ICU Level of Service E

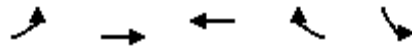
Splits and Phases: 1: Duke St & N Quaker Lane



Queues

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	344	1139	1257	739	1118
v/c Ratio	1.02	0.36	0.82	0.60	1.07
Control Delay	89.2	11.1	29.1	2.4	89.8
Queue Delay	0.0	0.2	18.4	0.4	1.2
Total Delay	89.2	11.3	47.5	2.8	91.0
Queue Length 50th (ft)	~225	144	398	31	~491
Queue Length 95th (ft)	#413	169	425	33	#626
Internal Link Dist (ft)		582	312		324
Turn Bay Length (ft)					
Base Capacity (vph)	338	3164	1533	1226	1040
Starvation Cap Reductn	0	0	303	139	0
Spillback Cap Reductn	0	1037	0	0	3
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.02	0.54	1.02	0.68	1.08

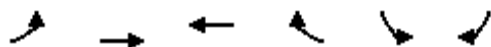
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024

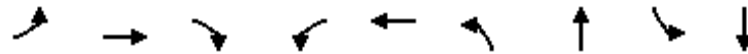


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	306	994	1195	703	843	163
Future Volume (vph)	306	994	1195	703	843	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1719	5036	3539	1583	3372	
Flt Permitted	0.07	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	130	5036	3539	1583	3372	
Peak-hour factor, PHF	0.89	0.89	0.97	0.97	0.90	0.90
Growth Factor (vph)	100%	102%	102%	102%	100%	100%
Adj. Flow (vph)	344	1139	1257	739	937	181
RTOR Reduction (vph)	0	0	0	0	14	0
Lane Group Flow (vph)	344	1139	1257	739	1104	0
Confl. Peds. (#/hr)	2			2		1
Heavy Vehicles (%)	5%	3%	2%	2%	2%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	73.0	73.0	50.0	90.5	34.5	
Effective Green, g (s)	75.0	75.0	52.0	92.5	36.5	
Actuated g/C Ratio	0.62	0.62	0.43	0.77	0.30	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	338	3147	1533	1220	1025	
v/s Ratio Prot	c0.16	0.23	0.36	0.47	c0.33	
v/s Ratio Perm	c0.47					
v/c Ratio	1.02	0.36	0.82	0.61	1.08	
Uniform Delay, d1	39.1	10.9	29.9	5.9	41.8	
Progression Factor	1.00	1.00	0.84	0.15	1.00	
Incremental Delay, d2	53.5	0.1	3.5	0.6	51.3	
Delay (s)	92.6	11.0	28.7	1.5	93.1	
Level of Service	F	B	C	A	F	
Approach Delay (s)		29.9	18.6		93.1	
Approach LOS		C	B		F	
Intersection Summary						
HCM 2000 Control Delay			40.4		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			1.06			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			90.2%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Timings

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø6
Lane Configurations	↰	↗↗	↰	↰	↗↗		↗↗		↗↗		
Traffic Volume (vph)	7	1480	362	26	1794	103	0	1	0		
Future Volume (vph)	7	1480	362	26	1794	103	0	1	0		
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA		
Protected Phases		2		1	1 6		4		3 4	3	6
Permitted Phases	2		2	1 6		4		3 4			
Detector Phase	2	2	2	1	1 6	4	4	3 4	3 4		
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	5.0		7.0	7.0			4.0	4.0
Minimum Split (s)	15.5	15.5	15.5	10.5		29.0	29.0			12.0	20.0
Total Split (s)	63.0	63.0	63.0	16.0		29.0	29.0			12.0	79.0
Total Split (%)	52.5%	52.5%	52.5%	13.3%		24.2%	24.2%			10%	66%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0			3.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5		1.0	1.0			0.5	1.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0			-2.0				
Total Lost Time (s)	3.5	3.5	3.5	3.5			2.0				
Lead/Lag	Lead	Lead	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	None		None	None			Max	C-Max
Act Effect Green (s)	72.0	72.0	72.0	88.0	88.0		14.5		27.0		
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73		0.12		0.22		
v/c Ratio	0.13	0.73	0.37	0.11	0.75		0.60		0.02		
Control Delay	28.8	30.5	10.1	4.9	6.2		26.8		0.0		
Queue Delay	0.0	2.6	0.6	0.0	0.7		2.3		0.0		
Total Delay	28.8	33.1	10.7	4.9	6.9		29.1		0.0		
LOS	C	C	B	A	A		C		A		
Approach Delay		28.6			6.9		29.1				
Approach LOS		C			A		C				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 52 (43%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay: 18.1

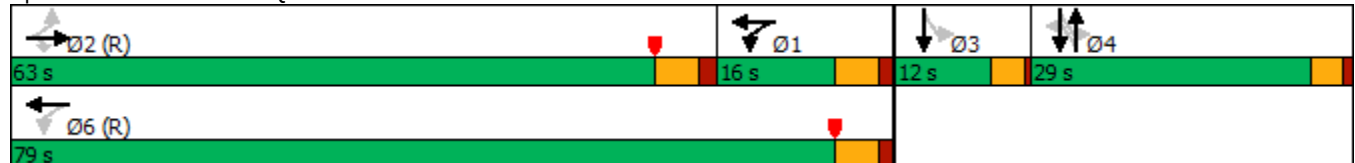
Intersection LOS: B

Intersection Capacity Utilization 70.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: S Quaker Ln & Duke St



Queues

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	8	1558	389	28	1934	155	8
v/c Ratio	0.13	0.73	0.37	0.11	0.75	0.60	0.02
Control Delay	28.8	30.5	10.1	4.9	6.2	26.8	0.0
Queue Delay	0.0	2.6	0.6	0.0	0.7	2.3	0.0
Total Delay	28.8	33.1	10.7	4.9	6.9	29.1	0.0
Queue Length 50th (ft)	4	532	107	3	115	37	0
Queue Length 95th (ft)	m9	m615	m139	m4	127	73	0
Internal Link Dist (ft)		312			222	293	73
Turn Bay Length (ft)	175			75			
Base Capacity (vph)	62	2123	1044	250	2592	389	598
Starvation Cap Reductn	0	427	327	0	76	0	0
Spillback Cap Reductn	0	0	0	0	311	134	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.92	0.54	0.11	0.85	0.61	0.01

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

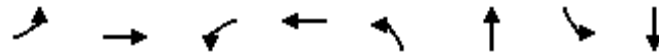
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1480	362	26	1794	7	103	0	19	1	0	1
Future Volume (vph)	7	1480	362	26	1794	7	103	0	19	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.98			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1769	3539	1537	1570	3537			1744			1695	
Flt Permitted	0.06	1.00	1.00	0.08	1.00			0.75			0.96	
Satd. Flow (perm)	103	3539	1537	139	3537			1370			1675	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.80	0.80	0.80	0.25	0.25	0.25
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	8	1558	389	28	1926	8	131	0	24	4	0	4
RTOR Reduction (vph)	0	0	124	0	0	0	0	92	0	0	6	0
Lane Group Flow (vph)	8	1558	265	28	1934	0	0	63	0	0	2	0
Confl. Peds. (#/hr)	9		11	11		9			7	7		
Heavy Vehicles (%)	2%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1			4			3	4
Permitted Phases	2		2	1	6		4			3	4	
Actuated Green, G (s)	70.0	70.0	70.0	86.0	86.0			12.5			24.5	
Effective Green, g (s)	72.0	72.0	72.0	88.0	88.0			14.5			26.5	
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73			0.12			0.22	
Clearance Time (s)	5.5	5.5	5.5	5.5				4.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0				3.0				
Lane Grp Cap (vph)	61	2123	922	250	2593			165			369	
v/s Ratio Prot		0.44		0.01	c0.55							
v/s Ratio Perm	0.08		0.17	0.07				c0.05			c0.00	
v/c Ratio	0.13	0.73	0.29	0.11	0.75			0.38			0.00	
Uniform Delay, d1	10.4	17.2	11.6	21.9	9.4			48.6			36.5	
Progression Factor	1.57	1.55	2.85	0.43	0.43			1.00			1.00	
Incremental Delay, d2	3.2	1.7	0.6	0.1	0.8			1.5			0.0	
Delay (s)	19.6	28.2	33.6	9.6	4.8			50.1			36.5	
Level of Service	B	C	C	A	A			D			D	
Approach Delay (s)		29.2			4.9			50.1			36.5	
Approach LOS		C			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			18.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			70.8%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	62	1427	7	1718	16	2	49	2
Future Volume (vph)	62	1427	7	1718	16	2	49	2
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	5.0	10.0	1.0	1.0	7.0	7.0	6.7	6.7
Minimum Split (s)	11.1	17.0	16.3	16.3	29.0	29.0	13.0	13.0
Total Split (s)	16.0	91.0	75.0	75.0	29.0	29.0	29.0	29.0
Total Split (%)	13.3%	75.8%	62.5%	62.5%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	4.0	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.6	2.3	2.3	2.3	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.1	4.3	4.3	4.3		4.0		4.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	95.5	95.3	85.5	85.5		16.4		16.4
Actuated g/C Ratio	0.80	0.79	0.71	0.71		0.14		0.14
v/c Ratio	0.34	0.54	0.04	0.75		0.21		0.69
Control Delay	24.3	0.7	13.6	18.7		40.1		43.5
Queue Delay	0.0	0.1	0.0	0.1		0.0		0.0
Total Delay	24.3	0.8	13.6	18.8		40.1		43.5
LOS	C	A	B	B		D		D
Approach Delay		1.8		18.7		40.1		43.5
Approach LOS		A		B		D		D

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 68 (57%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 12.9
 Intersection Capacity Utilization 68.8%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

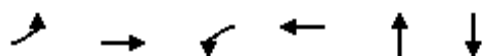
Splits and Phases: 3: Duke St & Alexandria Commons



Queues

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	67	1529	8	1882	33	184
v/c Ratio	0.34	0.54	0.04	0.75	0.21	0.69
Control Delay	24.3	0.7	13.6	18.7	40.1	43.5
Queue Delay	0.0	0.1	0.0	0.1	0.0	0.0
Total Delay	24.3	0.8	13.6	18.8	40.1	43.5
Queue Length 50th (ft)	10	2	3	434	19	86
Queue Length 95th (ft)	m27	5	m4	424	34	127
Internal Link Dist (ft)		222		571	88	97
Turn Bay Length (ft)	100		375			
Base Capacity (vph)	253	2807	210	2513	231	367
Starvation Cap Reductn	0	366	0	56	0	0
Spillback Cap Reductn	0	209	0	14	0	3
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.63	0.04	0.77	0.14	0.51

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	62	1427	10	7	1718	34	16	2	4	49	2	93
Future Volume (vph)	62	1427	10	7	1718	34	16	2	4	49	2	93
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.3		4.3	4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.98			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1770	3535		1767	3527			1745			1664	
Flt Permitted	0.06	1.00		0.16	1.00			0.60			0.89	
Satd. Flow (perm)	111	3535		296	3527			1087			1502	
Peak-hour factor, PHF	0.94	0.94	0.94	0.95	0.95	0.95	0.69	0.69	0.69	0.80	0.80	0.80
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	67	1518	11	8	1845	37	24	3	6	62	3	119
RTOR Reduction (vph)	0	0	0	0	1	0	0	5	0	0	60	0
Lane Group Flow (vph)	67	1529	0	8	1881	0	0	28	0	0	124	0
Confl. Peds. (#/hr)	2		15	15		2			9	9		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	93.3	93.3		82.3	82.3			14.4			14.4	
Effective Green, g (s)	95.3	95.3		84.3	84.3			16.4			16.4	
Actuated g/C Ratio	0.79	0.79		0.70	0.70			0.14			0.14	
Clearance Time (s)	6.1	6.3		6.3	6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0		0.2	0.2			2.0			2.0	
Lane Grp Cap (vph)	183	2807		207	2477			148			205	
v/s Ratio Prot	0.02	c0.43			c0.53							
v/s Ratio Perm	0.27			0.03				0.03			c0.08	
v/c Ratio	0.37	0.54		0.04	0.76			0.19			0.61	
Uniform Delay, d1	14.0	4.5		5.5	11.4			45.9			48.8	
Progression Factor	4.09	0.03		1.57	1.31			1.00			1.00	
Incremental Delay, d2	0.3	0.5		0.2	1.5			0.2			3.5	
Delay (s)	57.5	0.6		8.8	16.5			46.1			52.2	
Level of Service	E	A		A	B			D			D	
Approach Delay (s)		3.0			16.4			46.1			52.2	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			12.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.4			
Intersection Capacity Utilization			68.8%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	29	1449	27	1665	19	6	98	8	75
Future Volume (vph)	29	1449	27	1665	19	6	98	8	75
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	4.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	30.8	10.0	31.0	29.0	29.0	29.0	29.0	29.0
Total Split (s)	17.0	74.0	17.0	74.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	14.2%	61.7%	14.2%	61.7%	24.2%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	1.8	2.6	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	3.8	3.6	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	None	None
Act Effect Green (s)	88.7	84.4	88.7	83.9		21.2		21.2	21.2
Actuated g/C Ratio	0.74	0.70	0.74	0.70		0.18		0.18	0.18
v/c Ratio	0.19	0.63	0.12	0.77		0.44		0.86	0.26
Control Delay	9.4	8.6	5.2	8.8		15.8		90.8	9.8
Queue Delay	0.0	0.2	0.0	0.1		0.0		0.0	0.0
Total Delay	9.4	8.7	5.2	8.8		15.8		90.8	9.8
LOS	A	A	A	A		B		F	A
Approach Delay		8.8		8.8		15.8		57.3	
Approach LOS		A		A		B		E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 89 (74%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 11.8
Intersection Capacity Utilization 76.0%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

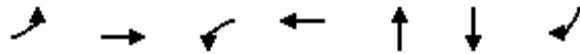
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St

Ø1	Ø2 (R)	Ø4
17 s	74 s	29 s
Ø5	Ø6 (R)	Ø8
17 s	74 s	29 s

Queues

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	32	1578	29	1884	163	129	91
v/c Ratio	0.19	0.63	0.12	0.77	0.44	0.86	0.26
Control Delay	9.4	8.6	5.2	8.8	15.8	90.8	9.8
Queue Delay	0.0	0.2	0.0	0.1	0.0	0.0	0.0
Total Delay	9.4	8.7	5.2	8.8	15.8	90.8	9.8
Queue Length 50th (ft)	1	590	2	71	25	96	0
Queue Length 95th (ft)	m5	34	m10	302	41	#169	37
Internal Link Dist (ft)		571		730	190	93	
Turn Bay Length (ft)	195		80				
Base Capacity (vph)	255	2489	324	2452	415	177	401
Starvation Cap Reductn	0	242	0	0	0	0	0
Spillback Cap Reductn	0	56	0	36	1	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.70	0.09	0.78	0.39	0.73	0.23

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 Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	1449	3	27	1665	108	19	6	83	98	8	75
Future Volume (vph)	29	1449	3	27	1665	108	19	6	83	98	8	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1752	3538		1770	3502			1626			1770	1583
Flt Permitted	0.05	1.00		0.10	1.00			0.93			0.46	1.00
Satd. Flow (perm)	101	3538		196	3502			1519			854	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.68	0.68	0.68	0.84	0.84	0.84
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	32	1575	3	29	1769	115	28	9	124	119	10	91
RTOR Reduction (vph)	0	0	0	0	3	0	0	103	0	0	0	75
Lane Group Flow (vph)	32	1578	0	29	1881	0	0	60	0	0	129	16
Confl. Peds. (#/hr)	1		10	10		1			7	7		
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	83.5	80.2		82.7	79.5			19.2			19.2	19.2
Effective Green, g (s)	87.5	82.2		86.7	81.5			21.2			21.2	21.2
Actuated g/C Ratio	0.73	0.69		0.72	0.68			0.18			0.18	0.18
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	146	2423		209	2378			268			150	279
v/s Ratio Prot	c0.01	0.45		0.01	c0.54							
v/s Ratio Perm	0.15			0.09				0.04			c0.15	0.01
v/c Ratio	0.22	0.65		0.14	0.79			0.22			0.86	0.06
Uniform Delay, d1	13.8	10.7		8.3	13.3			42.4			48.0	41.1
Progression Factor	1.61	0.66		1.02	0.52			1.00			1.00	1.00
Incremental Delay, d2	0.2	1.2		0.1	1.7			0.2			34.7	0.0
Delay (s)	22.5	8.3		8.6	8.6			42.5			82.7	41.1
Level of Service	C	A		A	A			D			F	D
Approach Delay (s)		8.5			8.6			42.5			65.5	
Approach LOS		A			A			D			E	
Intersection Summary												
HCM 2000 Control Delay			13.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.78									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			76.0%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

5: Roth St/Cambridge Rd & Duke St

03/14/2024

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	9	1619	61	1756	175	3	11	276	5	41
Future Volume (vph)	9	1619	61	1756	175	3	11	276	5	41
Turn Type	Prot	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6			8		4	
Permitted Phases			6		6	8		4		4
Detector Phase	5	2	1	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	6.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.5	30.7	11.5	15.7	15.7	13.4	13.4	30.4	30.4	30.4
Total Split (s)	13.0	71.0	13.0	71.0	71.0	36.0	36.0	36.0	36.0	36.0
Total Split (%)	10.8%	59.2%	10.8%	59.2%	59.2%	30.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	1.7	2.5	1.7	1.7	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	3.5	3.7	3.5	3.7	3.7		4.4		4.4	4.4
Lead/Lag	Lead	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?										
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	8.2	70.7	79.9	77.8	77.8		31.6		31.6	31.6
Actuated g/C Ratio	0.07	0.59	0.67	0.65	0.65		0.26		0.26	0.26
v/c Ratio	0.09	0.84	0.35	0.80	0.18		0.74		2.82	0.11
Control Delay	73.7	14.2	22.9	15.7	3.7		36.2		862.2	3.6
Queue Delay	0.0	0.0	0.0	0.9	0.0		0.0		0.0	0.0
Total Delay	73.7	14.2	22.9	16.6	3.7		36.2		862.2	3.6
LOS	E	B	C	B	A		D		F	A
Approach Delay		14.6		15.6			36.2		752.0	
Approach LOS		B		B			D		F	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 95 (79%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 2.82
Intersection Signal Delay: 77.9
Intersection Capacity Utilization 101.5%
Analysis Period (min) 15
Intersection LOS: E
ICU Level of Service G

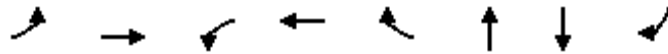
Splits and Phases: 5: Roth St/Cambridge Rd & Duke St

 Ø1	 Ø2 (R)	 Ø4
13 s	71 s	36 s
 Ø5	 Ø6 (R)	 Ø8
13 s	71 s	36 s

Queues

5: Roth St/Cambridge Rd & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	10	1746	64	1847	184	381	333	49
v/c Ratio	0.09	0.84	0.35	0.80	0.18	0.74	2.82	0.11
Control Delay	73.7	14.2	22.9	15.7	3.7	36.2	862.2	3.6
Queue Delay	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0
Total Delay	73.7	14.2	22.9	16.6	3.7	36.2	862.2	3.6
Queue Length 50th (ft)	8	340	11	570	39	184	~441	0
Queue Length 95th (ft)	m14	197	57	#124	10	303	#593	12
Internal Link Dist (ft)		730		743		286	101	
Turn Bay Length (ft)	120		250					
Base Capacity (vph)	128	2085	198	2295	1005	518	118	463
Starvation Cap Reductn	0	6	0	197	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	0.08	0.84	0.32	0.88	0.18	0.74	2.82	0.11

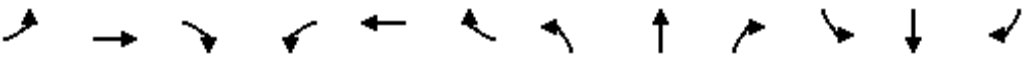
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

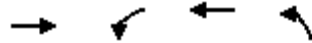
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1619	5	61	1756	175	3	11	344	276	5	41
Future Volume (vph)	9	1619	5	61	1756	175	3	11	344	276	5	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.87			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1626	3537		1752	3539	1550		1620			1770	1550
Flt Permitted	0.95	1.00		0.05	1.00	1.00		1.00			0.24	1.00
Satd. Flow (perm)	1626	3537		101	3539	1550		1617			449	1550
Peak-hour factor, PHF	0.93	0.93	0.93	0.97	0.97	0.97	0.96	0.96	0.96	0.86	0.86	0.86
Growth Factor (vph)	102%	100%	102%	102%	102%	102%	102%	102%	102%	102%	102%	102%
Adj. Flow (vph)	10	1741	5	64	1847	184	3	12	366	327	6	49
RTOR Reduction (vph)	0	0	0	0	0	0	0	93	0	0	0	36
Lane Group Flow (vph)	10	1746	0	64	1847	184	0	288	0	0	333	13
Confl. Peds. (#/hr)	1		2	2		1	6					6
Heavy Vehicles (%)	11%	2%	2%	3%	2%	2%	2%	2%	2%	2%	20%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	1.4	67.6		76.6	71.4	71.4		29.6			29.6	29.6
Effective Green, g (s)	3.4	69.6		80.3	73.4	73.4		31.6			31.6	31.6
Actuated g/C Ratio	0.03	0.58		0.67	0.61	0.61		0.26			0.26	0.26
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	46	2051		166	2164	948		425			118	408
v/s Ratio Prot	0.01	0.49		c0.02	c0.52							
v/s Ratio Perm				0.23		0.12		0.18			c0.74	0.01
v/c Ratio	0.22	0.85		0.39	0.85	0.19		0.68			2.82	0.03
Uniform Delay, d1	57.0	20.9		20.7	18.9	10.3		39.6			44.2	32.8
Progression Factor	1.38	0.50		1.75	0.75	0.36		1.00			1.00	1.00
Incremental Delay, d2	0.7	3.7		0.5	4.1	0.4		3.4			842.9	0.0
Delay (s)	79.1	14.2		36.7	18.3	4.1		43.0			887.1	32.8
Level of Service	E	B		D	B	A		D			F	C
Approach Delay (s)		14.6			17.7			43.0			777.5	
Approach LOS		B			B			D			F	
Intersection Summary												
HCM 2000 Control Delay			81.5				HCM 2000 Level of Service				F	
HCM 2000 Volume to Capacity ratio			1.41									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			11.6		
Intersection Capacity Utilization			101.5%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↑↑↑	↑
Traffic Volume (vph)	2243	29	1968	24
Future Volume (vph)	2243	29	1968	24
Turn Type	NA	pm+pt	NA	Prot
Protected Phases	2	1	6	4
Permitted Phases		6		
Detector Phase	2	1	6	4
Switch Phase				
Minimum Initial (s)	10.0	6.0	10.0	4.0
Minimum Split (s)	27.5	12.0	15.5	20.0
Total Split (s)	81.0	14.0	95.0	25.0
Total Split (%)	67.5%	11.7%	79.2%	20.8%
Yellow Time (s)	3.5	3.0	3.5	3.5
All-Red Time (s)	2.0	3.0	2.0	0.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.5	4.0	3.5	2.0
Lead/Lag	Lag	Lead		
Lead-Lag Optimize?				
Recall Mode	C-Max	None	C-Max	None
Act Effect Green (s)	95.1	101.9	102.4	12.1
Actuated g/C Ratio	0.79	0.85	0.85	0.10
v/c Ratio	0.57	0.16	0.49	0.62
Control Delay	8.9	11.7	1.5	28.4
Queue Delay	0.1	0.0	0.0	0.0
Total Delay	9.0	11.7	1.6	28.5
LOS	A	B	A	C
Approach Delay	9.0		1.7	28.5
Approach LOS	A		A	C

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 72 (60%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 6.3

Intersection LOS: A

Intersection Capacity Utilization 56.0%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 6: Witter Drive & Duke St



Queues

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	2297	31	2113	164
v/c Ratio	0.57	0.16	0.49	0.62
Control Delay	8.9	11.7	1.5	28.4
Queue Delay	0.1	0.0	0.0	0.0
Total Delay	9.0	11.7	1.6	28.5
Queue Length 50th (ft)	270	0	0	39
Queue Length 95th (ft)	m393	m6	68	37
Internal Link Dist (ft)	743		262	663
Turn Bay Length (ft)		200		
Base Capacity (vph)	4025	220	4339	404
Starvation Cap Reductn	370	0	440	0
Spillback Cap Reductn	206	0	0	4
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.63	0.14	0.54	0.41

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↙	↑↑↑	↘	
Traffic Volume (vph)	2243	8	29	1968	24	71
Future Volume (vph)	2243	8	29	1968	24	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	2.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.90	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	5082		1770	5085	1641	
Flt Permitted	1.00		0.05	1.00	0.99	
Satd. Flow (perm)	5082		95	5085	1641	
Peak-hour factor, PHF	0.98	0.98	0.95	0.95	0.59	0.59
Growth Factor (vph)	100%	102%	102%	102%	102%	102%
Adj. Flow (vph)	2289	8	31	2113	41	123
RTOR Reduction (vph)	0	0	0	0	100	0
Lane Group Flow (vph)	2297	0	31	2113	64	0
Confl. Peds. (#/hr)		9	9			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	90.7		100.4	100.4	10.1	
Effective Green, g (s)	92.7		102.4	102.4	12.1	
Actuated g/C Ratio	0.77		0.85	0.85	0.10	
Clearance Time (s)	5.5		6.0	5.5	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3925		160	4339	165	
v/s Ratio Prot	c0.45		0.01	c0.42	c0.04	
v/s Ratio Perm			0.15			
v/c Ratio	0.59		0.19	0.49	0.39	
Uniform Delay, d1	5.7		4.6	2.2	50.5	
Progression Factor	1.45		5.31	0.49	1.00	
Incremental Delay, d2	0.1		0.4	0.3	1.5	
Delay (s)	8.3		24.9	1.4	52.0	
Level of Service	A		C	A	D	
Approach Delay (s)	8.3			1.7	52.0	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay		6.8		HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio		0.56				
Actuated Cycle Length (s)		120.0		Sum of lost time (s)		9.5
Intersection Capacity Utilization		56.0%		ICU Level of Service		B
Analysis Period (min)		15				
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	26	702	1573	1978	184	19	
Future Volume (vph)	26	702	1573	1978	184	19	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	15.0	67.0	67.0	52.0	20.0	20.0	33.0
Total Split (%)	12.5%	55.8%	55.8%	43.3%	16.7%	16.7%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.4	89.5	89.5	78.1	15.9	15.9	
Actuated g/C Ratio	0.08	0.75	0.75	0.65	0.13	0.13	
v/c Ratio	0.22	0.29	1.18	0.69	0.85	0.06	
Control Delay	59.7	5.9	108.1	18.3	58.0	0.5	
Queue Delay	0.0	0.0	0.0	0.0	6.1	1.2	
Total Delay	59.7	5.9	108.1	18.3	64.0	1.7	
LOS	E	A	F	B	E	A	
Approach Delay		76.0		18.3			
Approach LOS		E		B			

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 50 (42%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.18

Intersection Signal Delay: 48.5

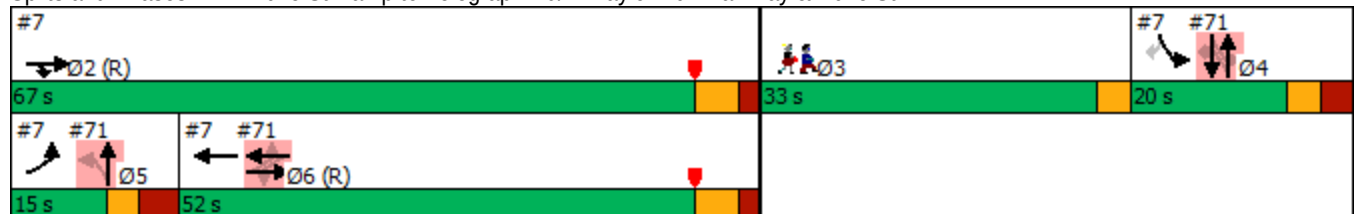
Intersection LOS: D

Intersection Capacity Utilization 100.7%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	27	723	1589	2193	194	20
v/c Ratio	0.22	0.29	1.18	0.69	0.85	0.06
Control Delay	59.7	5.9	108.1	18.3	58.0	0.5
Queue Delay	0.0	0.0	0.0	0.0	6.1	1.2
Total Delay	59.7	5.9	108.1	18.3	64.0	1.7
Queue Length 50th (ft)	19	65	~1440	295	63	0
Queue Length 95th (ft)	m40	127	#2128	#811	#245	m1
Internal Link Dist (ft)		321		722		
Turn Bay Length (ft)	180					
Base Capacity (vph)	137	2516	1350	3185	229	309
Starvation Cap Reductn	0	0	0	0	15	208
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.29	1.18	0.69	0.91	0.20

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  							
Traffic Volume (vph)	26	702	1573	0	1978	0	0	0	0	184	0	19
Future Volume (vph)	26	702	1573	0	1978	0	0	0	0	184	0	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1570	3374	1810		4893					1719		1583
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1570	3374	1810		4893					1719		1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Growth Factor (vph)	102%	102%	100%	102%	102%	102%	102%	102%	102%	100%	102%	102%
Adj. Flow (vph)	27	723	1589	0	2193	0	0	0	0	194	0	20
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	17
Lane Group Flow (vph)	27	723	1589	0	2193	0	0	0	0	194	0	3
Confl. Peds. (#/hr)										7	7	
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	6.2	85.1	85.1		72.4					13.9		13.9
Effective Green, g (s)	8.2	87.1	87.1		74.4					15.9		15.9
Actuated g/C Ratio	0.07	0.73	0.73		0.62					0.13		0.13
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	107	2448	1313		3033					227		209
v/s Ratio Prot	0.02	0.21	c0.88		0.45					c0.11		
v/s Ratio Perm												0.00
v/c Ratio	0.25	0.30	1.21		0.72					0.85		0.01
Uniform Delay, d1	53.0	5.7	16.5		15.7					50.9		45.2
Progression Factor	1.09	0.82	1.34		1.03					0.50		1.00
Incremental Delay, d2	1.0	0.3	100.8		1.5					24.5		0.0
Delay (s)	58.6	5.0	122.8		17.6					50.2		45.3
Level of Service	E	A	F		B					D		D
Approach Delay (s)		85.6			17.6			0.0			49.7	
Approach LOS		F			B			A			D	
Intersection Summary												
HCM 2000 Control Delay			52.6									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			1.14									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			100.7%									ICU Level of Service G
Analysis Period (min)			15									
c Critical Lane Group												

Timings

10: Dove St/Roberts Ln & Duke St

03/14/2024

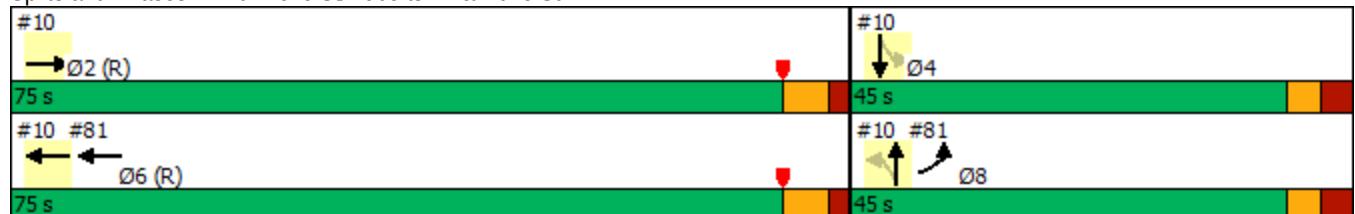


Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑↑↑	↑↑↑		↑↓		↑↓
Traffic Volume (vph)	1427	2324	133	31	14	20
Future Volume (vph)	1427	2324	133	31	14	20
Turn Type	NA	NA	Perm	NA	Perm	NA
Protected Phases	2	6		8		4
Permitted Phases			8		4	
Detector Phase	2	6	8	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	4.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.0	22.0	40.0	40.0	13.0	13.0
Total Split (s)	75.0	75.0	45.0	45.0	45.0	45.0
Total Split (%)	62.5%	62.5%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.0	4.0		4.0		4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	84.3	84.3		27.7		26.0
Actuated g/C Ratio	0.70	0.70		0.23		0.22
v/c Ratio	0.43	0.69		0.71		0.23
Control Delay	7.8	10.5		52.5		35.1
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	7.8	10.5		52.5		35.1
LOS	A	B		D		D
Approach Delay	7.8	10.5		52.5		35.1
Approach LOS	A	B		D		D

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 12.2
Intersection Capacity Utilization 73.3%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

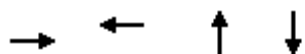
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1532	2444	222	74
v/c Ratio	0.43	0.69	0.71	0.23
Control Delay	7.8	10.5	52.5	35.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	7.8	10.5	52.5	35.1
Queue Length 50th (ft)	135	378	157	45
Queue Length 95th (ft)	186	578	204	80
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3574	3538	463	512
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.43	0.69	0.48	0.14
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

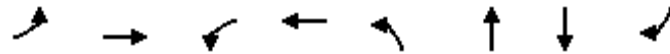
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1427	0	0	2324	0	133	31	21	14	20	34
Future Volume (vph)	0	1427	0	0	2324	0	133	31	21	14	20	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.98			0.93	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		5085			5034			1764			1590	
Flt Permitted		1.00			1.00			0.74			0.93	
Satd. Flow (perm)		5085			5034			1347			1494	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Growth Factor (vph)	102%	102%	102%	102%	102%	102%	100%	102%	102%	102%	102%	102%
Adj. Flow (vph)	0	1532	0	0	2444	0	158	38	26	15	22	37
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	2	0
Lane Group Flow (vph)	0	1532	0	0	2444	0	0	217	0	0	72	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		82.3			82.3			25.7			25.7	
Effective Green, g (s)		84.3			84.3			27.7			27.7	
Actuated g/C Ratio		0.70			0.70			0.23			0.23	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3572			3536			310			344	
v/s Ratio Prot		0.30			c0.49							
v/s Ratio Perm								c0.16			0.05	
v/c Ratio		0.43			0.69			0.70			0.21	
Uniform Delay, d1		7.6			10.3			42.4			37.3	
Progression Factor		0.88			0.84			1.00			1.00	
Incremental Delay, d2		0.4			0.7			7.0			0.3	
Delay (s)		7.1			9.4			49.3			37.6	
Level of Service		A			A			D			D	
Approach Delay (s)		7.1			9.4			49.3			37.6	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay		11.1			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.69										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			8.0				
Intersection Capacity Utilization		73.3%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Timings

71: W Taylor Run Parkway & Service Rd

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations		↔		↔		↔	↔	↔			
Traffic Volume (vph)	8	5	10	43	4	21	125	1			
Future Volume (vph)	8	5	10	43	4	21	125	1			
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA	Perm			
Protected Phases		6		6		4 5	4		2	3	5
Permitted Phases	6		6		4 5			4			
Detector Phase	6	6	6	6	4 5	4 5	4	4			
Switch Phase											
Minimum Initial (s)	7.0	7.0	7.0	7.0			7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0			13.0	13.0	14.0	33.0	12.5
Total Split (s)	52.0	52.0	52.0	52.0			20.0	20.0	67.0	33.0	15.0
Total Split (%)	43.3%	43.3%	43.3%	43.3%			16.7%	16.7%	56%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0			3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0			-2.0	-2.0			
Total Lost Time (s)		4.0		4.0			4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag		Lead	Lead
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None	C-Max	None	None
Act Effect Green (s)		78.1		78.1		29.8	15.9	15.9			
Actuated g/C Ratio		0.65		0.65		0.25	0.13	0.13			
v/c Ratio		0.09		0.29		0.06	0.53	0.00			
Control Delay		4.9		8.0		1.6	57.3	0.0			
Queue Delay		0.0		0.1		2.1	0.2	0.0			
Total Delay		5.0		8.2		3.7	57.5	0.0			
LOS		A		A		A	E	A			
Approach Delay		5.0		8.2		3.7	57.0				
Approach LOS		A		A		A	E				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 50 (42%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.18

Intersection Signal Delay: 18.6

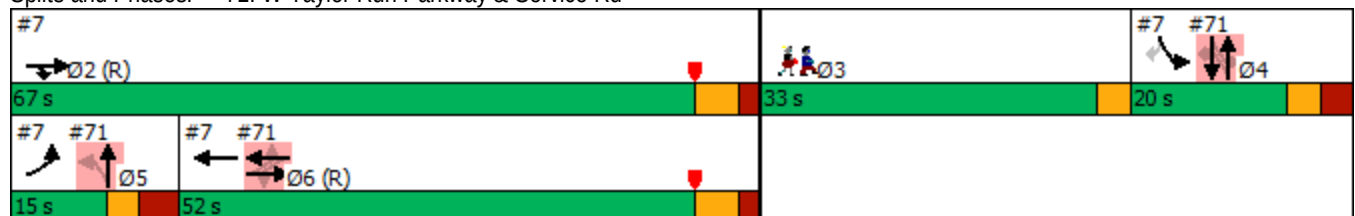
Intersection LOS: B

Intersection Capacity Utilization 38.1%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway & Service Rd



Queues

71: W Taylor Run Parkway & Service Rd

03/14/2024



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	99	321	28	132	1
v/c Ratio	0.09	0.29	0.06	0.53	0.00
Control Delay	4.9	8.0	1.6	57.3	0.0
Queue Delay	0.0	0.1	2.1	0.2	0.0
Total Delay	5.0	8.2	3.7	57.5	0.0
Queue Length 50th (ft)	4	40	1	97	0
Queue Length 95th (ft)	34	106	0	163	0
Internal Link Dist (ft)	56	593	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	1063	1097	445	248	309
Starvation Cap Reductn	0	0	348	0	0
Spillback Cap Reductn	205	211	0	5	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.36	0.29	0.54	0.00
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Parkway & Service Rd

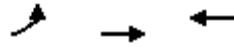
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Volume (vph)	8	5	67	10	43	194	4	21	2	0	125	1
Future Volume (vph)	8	5	67	10	43	194	4	21	2	0	125	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.97			1.00			1.00	1.00
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.89			0.89			0.99			1.00	0.85
Flt Protected		0.99			1.00			0.99			1.00	1.00
Satd. Flow (prot)		1642			1613			1813			1863	1583
Flt Permitted		0.96			0.99			0.97			1.00	1.00
Satd. Flow (perm)		1591			1601			1768			1863	1583
Peak-hour factor, PHF	0.81	0.81	0.81	0.77	0.77	0.77	0.95	0.95	0.95	0.95	0.95	0.95
Growth Factor (vph)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Adj. Flow (vph)	10	6	83	13	56	252	4	22	2	0	132	1
RTOR Reduction (vph)	0	32	0	0	70	0	0	2	0	0	0	1
Lane Group Flow (vph)	0	67	0	0	251	0	0	26	0	0	132	0
Confl. Peds. (#/hr)	22					22			7	7		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	2%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		72.4			72.4			26.1			13.9	13.9
Effective Green, g (s)		74.4			74.4			28.1			15.9	15.9
Actuated g/C Ratio		0.62			0.62			0.23			0.13	0.13
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		986			992			414			246	209
v/s Ratio Prot											c0.07	
v/s Ratio Perm		0.04			c0.16			c0.01				0.00
v/c Ratio		0.07			0.25			0.06			0.54	0.00
Uniform Delay, d1		9.0			10.3			35.7			48.6	45.2
Progression Factor		1.00			1.20			0.04			1.00	1.00
Incremental Delay, d2		0.1			0.6			0.1			2.2	0.0
Delay (s)		9.2			12.9			1.5			50.9	45.2
Level of Service		A			B			A			D	D
Approach Delay (s)		9.2			12.9			1.5			50.8	
Approach LOS		A			B			A			D	
Intersection Summary												
HCM 2000 Control Delay			20.4				HCM 2000 Level of Service				C	
HCM 2000 Volume to Capacity ratio			0.27									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			15.5		
Intersection Capacity Utilization			38.1%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

81: Duke St

03/14/2024



Lane Group	EBL	EBT	WBT	Ø2	Ø4
Lane Configurations					
Traffic Volume (vph)	202	698	747		
Future Volume (vph)	202	698	747		
Turn Type	Prot	NA	NA		
Protected Phases	8	Free	6	2	4
Permitted Phases					
Detector Phase	8		6		
Switch Phase					
Minimum Initial (s)	7.0		4.0	10.0	7.0
Minimum Split (s)	40.0		22.0	25.0	13.0
Total Split (s)	45.0		75.0	75.0	45.0
Total Split (%)	37.5%		62.5%	63%	38%
Yellow Time (s)	3.0		4.0	4.0	3.0
All-Red Time (s)	3.0		2.0	2.0	3.0
Lost Time Adjust (s)	-2.0		-2.0		
Total Lost Time (s)	4.0		4.0		
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None		C-Max	C-Max	None
Act Effect Green (s)	27.7	120.0	84.3		
Actuated g/C Ratio	0.23	1.00	0.70		
v/c Ratio	0.50	0.20	0.31		
Control Delay	46.8	0.1	4.0		
Queue Delay	0.0	0.0	0.0		
Total Delay	46.8	0.1	4.0		
LOS	D	A	A		
Approach Delay		10.6	4.0		
Approach LOS		B	A		

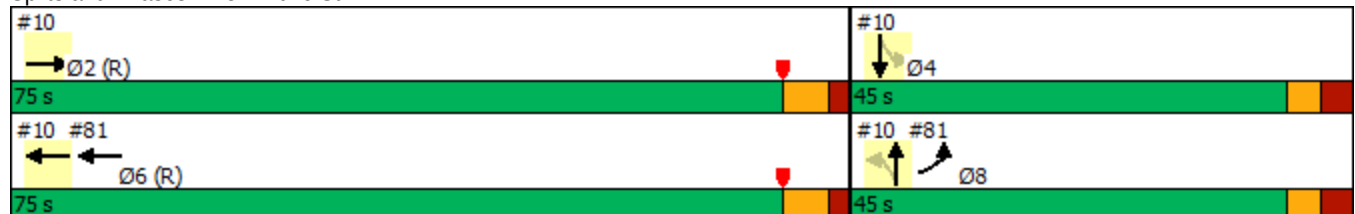
Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.71
 Intersection Signal Delay: 7.6
 Intersection Capacity Utilization 38.9%
 Analysis Period (min) 15

Intersection LOS: A

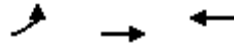
ICU Level of Service A

Splits and Phases: 81: Duke St



Queues
81: Duke St

03/14/2024



Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	202	698	762
v/c Ratio	0.50	0.20	0.31
Control Delay	46.8	0.1	4.0
Queue Delay	0.0	0.0	0.0
Total Delay	46.8	0.1	4.0
Queue Length 50th (ft)	133	0	48
Queue Length 95th (ft)	m237	m0	69
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	604	3539	2487
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.33	0.20	0.31

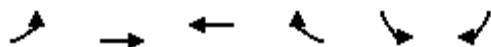
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

81: Duke St

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	202	698	747	0	0	0
Future Volume (vph)	202	698	747	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Growth Factor (vph)	100%	100%	102%	102%	102%	102%
Adj. Flow (vph)	202	698	762	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	202	698	762	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	8	Free	6			
Permitted Phases						
Actuated Green, G (s)	25.7	120.0	82.3			
Effective Green, g (s)	27.7	120.0	84.3			
Actuated g/C Ratio	0.23	1.00	0.70			
Clearance Time (s)	6.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	408	3539	2486			
v/s Ratio Prot	c0.11	0.20	c0.22			
v/s Ratio Perm						
v/c Ratio	0.50	0.20	0.31			
Uniform Delay, d1	40.1	0.0	6.8			
Progression Factor	1.11	1.00	0.49			
Incremental Delay, d2	0.9	0.1	0.2			
Delay (s)	45.3	0.1	3.6			
Level of Service	D	A	A			
Approach Delay (s)		10.3	3.6		0.0	
Approach LOS		B	A		A	
Intersection Summary						
HCM 2000 Control Delay			7.2	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.37			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		12.0
Intersection Capacity Utilization			38.9%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

82: WB Duke St to SB Telegraph Rd

03/14/2024

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	1776	0	0	201	0
Future Volume (Veh/h)	0	1776	0	0	201	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1776	0	0	201	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				888	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				888	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				29	100
cM capacity (veh/h)	1622				283	1084
Direction, Lane #	NB 1	NB 2	NE 1			
Volume Total	888	888	201			
Volume Left	0	0	201			
Volume Right	0	0	0			
cSH	1700	1700	283			
Volume to Capacity	0.52	0.52	0.71			
Queue Length 95th (ft)	0	0	124			
Control Delay (s)	0.0	0.0	43.7			
Lane LOS			E			
Approach Delay (s)	0.0		43.7			
Approach LOS			E			
Intersection Summary						
Average Delay		4.4				
Intersection Capacity Utilization		66.9%		ICU Level of Service		C
Analysis Period (min)		15				



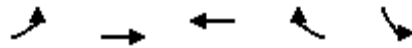
Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix W: Signal Timing 2036 Build Alternative 1

Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	Ø2
Lane Configurations	↖	↑↑↑	↑↑	↗	↖↖	
Traffic Volume (vph)	323	1319	920	1065	573	
Future Volume (vph)	323	1319	920	1065	573	
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	2
Permitted Phases	5 2					
Detector Phase	5	5 2	6	6 4	4	
Switch Phase						
Minimum Initial (s)	5.0		10.0		7.0	10.0
Minimum Split (s)	19.6		22.0		29.5	22.0
Total Split (s)	20.0		61.0		39.0	81.0
Total Split (%)	16.7%		50.8%		32.5%	68%
Yellow Time (s)	3.0		4.0		3.5	4.0
All-Red Time (s)	2.6		2.0		3.0	2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0	
Total Lost Time (s)	3.6		4.0		4.5	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None		C-Max		None	C-Max
Act Effect Green (s)	77.4	77.4	57.0	96.0	34.5	
Actuated g/C Ratio	0.64	0.64	0.48	0.80	0.29	
v/c Ratio	0.89	0.45	0.61	0.89	1.05	
Control Delay	41.1	11.2	16.4	18.7	82.5	
Queue Delay	0.0	0.0	2.0	20.1	4.5	
Total Delay	41.1	11.2	18.4	38.7	87.0	
LOS	D	B	B	D	F	
Approach Delay		17.1	29.3		87.0	
Approach LOS		B	C		F	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.05
 Intersection Signal Delay: 35.7
 Intersection Capacity Utilization 90.9%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service E

Splits and Phases: 1: Duke St & N Quaker Lane



Queues

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	351	1434	968	1121	907
v/c Ratio	0.89	0.45	0.61	0.89	1.05
Control Delay	41.1	11.2	16.4	18.7	82.5
Queue Delay	0.0	0.0	2.0	20.1	4.5
Total Delay	41.1	11.2	18.4	38.7	87.0
Queue Length 50th (ft)	130	187	153	922	~372
Queue Length 95th (ft)	#302	219	220	#1083	#501
Internal Link Dist (ft)		582	312		324
Turn Bay Length (ft)					
Base Capacity (vph)	396	3217	1587	1254	865
Starvation Cap Reductn	0	0	446	166	0
Spillback Cap Reductn	0	329	0	0	10
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.89	0.50	0.85	1.03	1.06

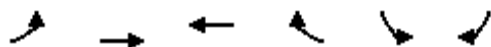
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	323	1319	920	1065	573	279
Future Volume (vph)	323	1319	920	1065	573	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.95	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1719	4988	3343	1568	2831	
Flt Permitted	0.18	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	319	4988	3343	1568	2831	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.94	0.94
Adj. Flow (vph)	351	1434	968	1121	610	297
RTOR Reduction (vph)	0	0	0	0	52	0
Lane Group Flow (vph)	351	1434	968	1121	855	0
Confl. Peds. (#/hr)	4			4	4	2
Heavy Vehicles (%)	5%	4%	8%	3%	27%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	75.0	75.0	55.0	93.5	32.5	
Effective Green, g (s)	77.0	77.0	57.0	95.5	34.5	
Actuated g/C Ratio	0.64	0.64	0.48	0.80	0.29	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		0.2		3.0	
Lane Grp Cap (vph)	396	3200	1587	1247	813	
v/s Ratio Prot	c0.12	0.29	0.29	0.71	c0.30	
v/s Ratio Perm	c0.45					
v/c Ratio	0.89	0.45	0.61	0.90	1.05	
Uniform Delay, d1	19.2	10.8	23.3	8.8	42.8	
Progression Factor	1.00	1.00	0.64	1.13	1.00	
Incremental Delay, d2	20.5	0.1	1.3	6.7	46.0	
Delay (s)	39.7	10.9	16.2	16.6	88.8	
Level of Service	D	B	B	B	F	
Approach Delay (s)		16.6	16.4		88.8	
Approach LOS		B	B		F	
Intersection Summary						
HCM 2000 Control Delay			30.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.96			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			90.9%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Timings

2: S Quaker Ln & Duke St

03/14/2024

	→	↘	↙	←	↖	↑	↗	↓		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø6
Lane Configurations	↑↑	↑	↙	↑↑		↕		↕		
Traffic Volume (vph)	1769	123	25	1930	55	0	2	0		
Future Volume (vph)	1769	123	25	1930	55	0	2	0		
Turn Type	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA		
Protected Phases	2		1	1 6		4		3 4	3	6
Permitted Phases		2	1 6		4		3 4			
Detector Phase	2	2	1	1 6	4	4	3 4	3 4		
Switch Phase										
Minimum Initial (s)	10.0	10.0	5.0		7.0	7.0			4.0	4.0
Minimum Split (s)	15.5	15.5	10.5		29.0	29.0			12.0	20.0
Total Split (s)	63.0	63.0	16.0		29.0	29.0			12.0	79.0
Total Split (%)	52.5%	52.5%	13.3%		24.2%	24.2%			10%	66%
Yellow Time (s)	4.0	4.0	4.0		3.0	3.0			3.0	4.0
All-Red Time (s)	1.5	1.5	1.5		1.0	1.0			0.5	1.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0			-2.0				
Total Lost Time (s)	3.5	3.5	3.5			2.0				
Lead/Lag	Lead	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	None		None	None			None	C-Max
Act Effect Green (s)	86.6	86.6	102.6	103.3		12.6		14.6		
Actuated g/C Ratio	0.72	0.72	0.86	0.86		0.10		0.12		
v/c Ratio	0.77	0.12	0.10	0.69		0.35		0.01		
Control Delay	14.8	2.3	2.2	3.0		8.4		38.5		
Queue Delay	0.0	0.0	0.0	0.1		0.0		0.0		
Total Delay	14.8	2.3	2.2	3.0		8.4		38.5		
LOS	B	A	A	A		A		D		
Approach Delay	14.0			3.0		8.4		38.5		
Approach LOS	B			A		A		D		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 8.5
Intersection Capacity Utilization 68.2%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service C

Splits and Phases: 2: S Quaker Ln & Duke St

Ø2 (R)	Ø1	Ø3	Ø4
63 s	16 s	12 s	29 s
Ø6 (R)			
79 s			

Queues

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1923	134	27	2053	83	2
v/c Ratio	0.77	0.12	0.10	0.69	0.35	0.01
Control Delay	14.8	2.3	2.2	3.0	8.4	38.5
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	14.8	2.3	2.2	3.0	8.4	38.5
Queue Length 50th (ft)	594	4	0	5	0	1
Queue Length 95th (ft)	m#932	m20	m3	103	21	8
Internal Link Dist (ft)	312			222	293	73
Turn Bay Length (ft)			75			
Base Capacity (vph)	2504	1088	260	2959	384	343
Starvation Cap Reductn	0	0	0	82	0	0
Spillback Cap Reductn	0	0	0	84	2	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.12	0.10	0.71	0.22	0.01

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 Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1769	123	25	1930	0	55	0	15	2	0	0
Future Volume (vph)	0	1769	123	25	1930	0	55	0	15	2	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor		0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00	0.98	1.00	1.00			1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	1.00			0.97			1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.96			0.95	
Satd. Flow (prot)		3471	1475	1770	3438			1666			1761	
Flt Permitted		1.00	1.00	0.06	1.00			0.78			0.76	
Satd. Flow (perm)		3471	1475	103	3438			1345			1418	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.84	0.84	0.84	1.00	1.00	1.00
Adj. Flow (vph)	0	1923	134	27	2053	0	65	0	18	2	0	0
RTOR Reduction (vph)	0	0	28	0	0	0	0	75	0	0	0	0
Lane Group Flow (vph)	0	1923	106	27	2053	0	0	8	0	0	2	0
Confl. Peds. (#/hr)	9		4	4		9			5	5		
Heavy Vehicles (%)	2%	4%	7%	2%	5%	2%	2%	2%	21%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 6			4			3 4	
Permitted Phases	2		2	1 6			4			3 4		
Actuated Green, G (s)		81.0	81.0	97.0	97.0			9.2			13.5	
Effective Green, g (s)		83.0	83.0	99.0	99.0			11.2			15.5	
Actuated g/C Ratio		0.69	0.69	0.82	0.82			0.09			0.13	
Clearance Time (s)		5.5	5.5	5.5				4.0				
Vehicle Extension (s)		0.2	0.2	3.0				3.0				
Lane Grp Cap (vph)		2400	1020	258	2836			125			183	
v/s Ratio Prot		c0.55		0.01	c0.60							
v/s Ratio Perm			0.07	0.08				c0.01			c0.00	
v/c Ratio		0.80	0.10	0.10	0.72			0.06			0.01	
Uniform Delay, d1		12.8	6.1	20.2	4.6			49.6			45.6	
Progression Factor		0.95	0.61	0.19	0.28			1.00			1.00	
Incremental Delay, d2		2.3	0.2	0.1	0.6			0.2			0.0	
Delay (s)		14.5	3.9	4.0	1.9			49.8			45.6	
Level of Service		B	A	A	A			D			D	
Approach Delay (s)		13.8			1.9			49.8			45.6	
Approach LOS		B			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			8.7			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			68.2%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	42	1737	1906	3	0	18	0
Future Volume (vph)	42	1737	1906	3	0	18	0
Turn Type	pm+pt	NA	NA	Perm	NA	Perm	NA
Protected Phases	5	2	6		8		4
Permitted Phases	2			8		4	
Detector Phase	5	2	6	8	8	4	4
Switch Phase							
Minimum Initial (s)	4.5	10.0	1.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.6	16.3	16.3	29.0	29.0	13.0	13.0
Total Split (s)	18.0	91.0	73.0	29.0	29.0	29.0	29.0
Total Split (%)	15.0%	75.8%	60.8%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.6	2.3	2.3	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	3.6	4.3	4.3		4.0		4.0
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	102.8	103.0	94.3		12.2		12.2
Actuated g/C Ratio	0.86	0.86	0.79		0.10		0.10
v/c Ratio	0.24	0.62	0.76		0.10		0.30
Control Delay	13.1	1.7	5.3		47.0		9.8
Queue Delay	0.0	0.2	1.0		0.0		0.0
Total Delay	13.1	1.9	6.3		47.0		9.8
LOS	B	A	A		D		A
Approach Delay		2.2	6.3		47.0		9.8
Approach LOS		A	A		D		A

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 4.6
 Intersection Capacity Utilization 70.1%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service C

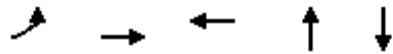
Splits and Phases: 3: Duke St & Alexandria Commons



Queues

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	44	1834	2044	12	67
v/c Ratio	0.24	0.62	0.76	0.10	0.30
Control Delay	13.1	1.7	5.3	47.0	9.8
Queue Delay	0.0	0.2	1.0	0.0	0.0
Total Delay	13.1	1.9	6.3	47.0	9.8
Queue Length 50th (ft)	0	1	10	9	0
Queue Length 95th (ft)	m3	60	#993	7	29
Internal Link Dist (ft)		222	571	88	97
Turn Bay Length (ft)	100				
Base Capacity (vph)	287	2978	2694	253	379
Starvation Cap Reductn	0	391	373	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.15	0.71	0.88	0.05	0.18

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 Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	1737	6	0	1906	36	3	0	0	18	0	46
Future Volume (vph)	42	1737	6	0	1906	36	3	0	0	18	0	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.3			4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			1.00			0.90	
Flt Protected	0.95	1.00			1.00			0.95			0.99	
Satd. Flow (prot)	1770	3469			3429			1770			1653	
Flt Permitted	0.05	1.00			1.00			0.65			0.91	
Satd. Flow (perm)	102	3469			3429			1215			1518	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.25	0.25	0.25	0.95	0.95	0.95
Adj. Flow (vph)	44	1828	6	0	2006	38	12	0	0	19	0	48
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	61	0
Lane Group Flow (vph)	44	1834	0	0	2043	0	0	12	0	0	6	0
Confl. Peds. (#/hr)	8		3	3		8			9	9		
Heavy Vehicles (%)	2%	4%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	98.9	98.9			89.1			8.8			8.8	
Effective Green, g (s)	100.9	100.9			91.1			10.8			10.8	
Actuated g/C Ratio	0.84	0.84			0.76			0.09			0.09	
Clearance Time (s)	5.6	6.3			6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0			0.2			2.0			2.0	
Lane Grp Cap (vph)	171	2916			2603			109			136	
v/s Ratio Prot	0.01	c0.53			c0.60							
v/s Ratio Perm	0.20							c0.01			0.00	
v/c Ratio	0.26	0.63			0.78			0.11			0.04	
Uniform Delay, d1	11.3	3.2			8.6			50.2			49.9	
Progression Factor	4.31	0.26			0.31			1.00			1.00	
Incremental Delay, d2	0.2	0.7			1.3			0.2			0.0	
Delay (s)	49.0	1.5			3.9			50.3			49.9	
Level of Service	D	A			A			D			D	
Approach Delay (s)		2.6			3.9			50.3			49.9	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			4.2									
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			120.0									
Intersection Capacity Utilization			70.1%									
Analysis Period (min)			15									
c Critical Lane Group												

Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	54	1699	23	1849	12	5	85	1	81
Future Volume (vph)	54	1699	23	1849	12	5	85	1	81
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	4.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	30.8	10.0	31.0	29.0	29.0	29.0	29.0	29.0
Total Split (s)	16.0	73.0	18.0	75.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	13.3%	60.8%	15.0%	62.5%	24.2%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	1.8	2.6	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	3.8	3.6	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	None	None
Act Effect Green (s)	93.4	88.7	91.6	85.6		17.0		17.0	17.0
Actuated g/C Ratio	0.78	0.74	0.76	0.71		0.14		0.14	0.14
v/c Ratio	0.33	0.70	0.13	0.88		0.23		0.61	0.34
Control Delay	19.6	9.3	0.7	8.7		21.7		61.7	10.8
Queue Delay	0.0	0.2	0.0	1.9		0.0		0.0	0.0
Total Delay	19.6	9.4	0.7	10.6		21.7		61.7	10.8
LOS	B	A	A	B		C		E	B
Approach Delay		9.7		10.5		21.7		36.9	
Approach LOS		A		B		C		D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 11.7

Intersection LOS: B

Intersection Capacity Utilization 80.1%

ICU Level of Service D

Analysis Period (min) 15

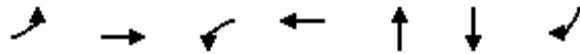
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St



Queues

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	57	1809	25	2148	55	113	107
v/c Ratio	0.33	0.70	0.13	0.88	0.23	0.61	0.34
Control Delay	19.6	9.3	0.7	8.7	21.7	61.7	10.8
Queue Delay	0.0	0.2	0.0	1.9	0.0	0.0	0.0
Total Delay	19.6	9.4	0.7	10.6	21.7	61.7	10.8
Queue Length 50th (ft)	8	141	0	64	13	84	0
Queue Length 95th (ft)	m48	450	m0	m#168	48	112	29
Internal Link Dist (ft)		571		730	190	93	
Turn Bay Length (ft)	195		80				
Base Capacity (vph)	236	2566	291	2430	342	270	409
Starvation Cap Reductn	0	25	0	89	0	0	0
Spillback Cap Reductn	0	160	0	156	1	0	4
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.75	0.09	0.94	0.16	0.42	0.26

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 Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	1699	2	23	1849	127	12	5	32	85	1	81
Future Volume (vph)	54	1699	2	23	1849	127	12	5	32	85	1	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3471		1656	3405			1617			1760	1559
Flt Permitted	0.05	1.00		0.08	1.00			0.92			0.70	1.00
Satd. Flow (perm)	86	3471		137	3405			1504			1298	1559
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.90	0.90	0.90	0.76	0.76	0.76
Adj. Flow (vph)	57	1807	2	25	2010	138	13	6	36	112	1	107
RTOR Reduction (vph)	0	0	0	0	3	0	0	31	0	0	0	92
Lane Group Flow (vph)	57	1809	0	25	2145	0	0	24	0	0	113	15
Confl. Peds. (#/hr)	3		3	3		3	2		6	6		2
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	9%	2%	3%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	89.1	84.5		85.5	82.4			15.0			15.0	15.0
Effective Green, g (s)	93.1	86.5		89.5	84.4			17.0			17.0	17.0
Actuated g/C Ratio	0.78	0.72		0.75	0.70			0.14			0.14	0.14
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	159	2502		166	2394			213			183	220
v/s Ratio Prot	c0.02	0.52		0.01	c0.63							
v/s Ratio Perm	0.26			0.11				0.02			c0.09	0.01
v/c Ratio	0.36	0.72		0.15	0.90			0.11			0.62	0.07
Uniform Delay, d1	21.0	9.8		8.7	14.3			44.9			48.4	44.6
Progression Factor	1.86	0.73		0.07	0.35			1.00			1.00	1.00
Incremental Delay, d2	0.4	1.5		0.0	2.0			0.1			4.3	0.0
Delay (s)	39.5	8.6		0.7	7.0			45.0			52.7	44.7
Level of Service	D	A		A	A			D			D	D
Approach Delay (s)		9.5			6.9			45.0			48.8	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay	10.7			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.82											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			12.0					
Intersection Capacity Utilization	80.1%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												

Timings

5: Roth St/Cambridge Rd & Duke St

03/14/2024

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	63	1749	100	1939	316	6	6	198	4	53
Future Volume (vph)	63	1749	100	1939	316	6	6	198	4	53
Turn Type	Prot	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6			8		4	
Permitted Phases			6		6	8		4		4
Detector Phase	5	2	1	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	6.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.5	30.7	11.5	15.7	15.7	13.0	13.0	30.0	30.0	30.0
Total Split (s)	16.0	67.0	18.0	69.0	69.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	13.3%	55.8%	15.0%	57.5%	57.5%	29.2%	29.2%	29.2%	29.2%	29.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	1.7	2.5	1.7	1.7	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	3.5	3.7	3.5	3.7	3.7		4.0		4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?										
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	10.7	71.6	82.8	73.7	73.7		26.7		26.7	26.7
Actuated g/C Ratio	0.09	0.60	0.69	0.61	0.61		0.22		0.22	0.22
v/c Ratio	0.44	0.93	0.53	0.99	0.35		0.19		0.83	0.15
Control Delay	51.3	32.3	34.8	42.9	11.6		13.0		68.8	6.0
Queue Delay	0.0	0.1	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	51.3	32.4	34.8	42.9	11.6		13.0		68.8	6.0
LOS	D	C	C	D	B		B		E	A
Approach Delay		33.0		38.3			13.0		55.8	
Approach LOS		C		D			B		E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 101 (84%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 36.8
Intersection Capacity Utilization 87.3%
Analysis Period (min) 15
Intersection LOS: D
ICU Level of Service E

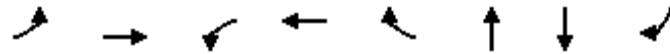
Splits and Phases: 5: Roth St/Cambridge Rd & Duke St

 Ø1	 Ø2 (R)	 Ø4
18 s	67 s	35 s
 Ø5	 Ø6 (R)	 Ø8
16 s	69 s	35 s

Queues

5: Roth St/Cambridge Rd & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	69	1926	108	2085	340	70	230	60
v/c Ratio	0.44	0.93	0.53	0.99	0.35	0.19	0.83	0.15
Control Delay	51.3	32.3	34.8	42.9	11.6	13.0	68.8	6.0
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	32.4	34.8	42.9	11.6	13.0	68.8	6.0
Queue Length 50th (ft)	54	538	24	~956	218	7	168	0
Queue Length 95th (ft)	m80	#1010	102	#1103	10	44	#253	23
Internal Link Dist (ft)		730		743		286	101	
Turn Bay Length (ft)	120		250					
Base Capacity (vph)	184	2071	256	2111	972	408	321	450
Starvation Cap Reductn	0	5	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	0.38	0.93	0.42	0.99	0.35	0.17	0.72	0.13

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 Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	1749	4	100	1939	316	6	6	56	198	4	53
Future Volume (vph)	63	1749	4	100	1939	316	6	6	56	198	4	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	3470		1656	3438	1583		1450			1758	1527
Flt Permitted	0.95	1.00		0.06	1.00	1.00		0.97			0.68	1.00
Satd. Flow (perm)	1770	3470		96	3438	1583		1415			1245	1527
Peak-hour factor, PHF	0.91	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.97	0.88	0.88	0.88
Adj. Flow (vph)	69	1922	4	108	2085	340	6	6	58	225	5	60
RTOR Reduction (vph)	0	0	0	0	0	0	0	45	0	0	0	47
Lane Group Flow (vph)	69	1926	0	108	2085	340	0	25	0	0	230	13
Confl. Peds. (#/hr)			4	4			16					16
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	17%	2%	17%	2%	50%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	7.5	69.6		79.1	70.6	70.6		24.7			24.7	24.7
Effective Green, g (s)	9.5	71.6		83.1	72.6	72.6		26.7			26.7	26.7
Actuated g/C Ratio	0.08	0.60		0.69	0.60	0.60		0.22			0.22	0.22
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	140	2070		202	2079	957		314			277	339
v/s Ratio Prot	0.04	0.56		c0.05	c0.61							
v/s Ratio Perm				0.32		0.21		0.02			c0.18	0.01
v/c Ratio	0.49	0.93		0.53	1.00	0.36		0.08			0.83	0.04
Uniform Delay, d1	52.9	21.9		27.2	23.7	11.9		36.9			44.5	36.6
Progression Factor	0.87	1.08		1.40	1.15	0.79		1.00			1.00	1.00
Incremental Delay, d2	0.7	7.0		1.1	18.6	0.8		0.0			17.9	0.0
Delay (s)	46.8	30.6		39.2	45.8	10.3		37.0			62.4	36.6
Level of Service	D	C		D	D	B		D			E	D
Approach Delay (s)		31.2			40.7			37.0			57.0	
Approach LOS		C			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			37.7									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			120.0									Sum of lost time (s) 11.2
Intersection Capacity Utilization			87.3%									ICU Level of Service E
Analysis Period (min)			15									
c Critical Lane Group												

Timings

6: Witter Drive & Duke St

03/14/2024

	→	↖	←	↙
Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↑↑↑	↘
Traffic Volume (vph)	1981	91	2348	7
Future Volume (vph)	1981	91	2348	7
Turn Type	NA	pm+pt	NA	Prot
Protected Phases	2	1	6	4
Permitted Phases		6		
Detector Phase	2	1	6	4
Switch Phase				
Minimum Initial (s)	10.0	6.0	10.0	4.0
Minimum Split (s)	27.5	12.0	15.5	13.0
Total Split (s)	79.0	16.0	95.0	25.0
Total Split (%)	65.8%	13.3%	79.2%	20.8%
Yellow Time (s)	3.5	3.0	3.5	3.0
All-Red Time (s)	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.5	4.0	3.5	4.0
Lead/Lag	Lead	Lag		
Lead-Lag Optimize?				
Recall Mode	C-Max	None	C-Max	None
Act Effect Green (s)	89.8	105.3	106.5	9.0
Actuated g/C Ratio	0.75	0.88	0.89	0.08
v/c Ratio	0.58	0.39	0.58	0.31
Control Delay	13.9	24.0	3.6	26.9
Queue Delay	0.0	0.0	0.3	0.0
Total Delay	14.0	24.0	3.9	26.9
LOS	B	C	A	C
Approach Delay	14.0		4.6	26.9
Approach LOS	B		A	C

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 69 (58%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 9.0
Intersection Capacity Utilization 57.1%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Witter Drive & Duke St

→ Ø2 (R)	↖ Ø1	↙ Ø4
79 s	16 s	25 s
↖ Ø6 (R)		
95 s		

Queues

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	2154	100	2580	46
v/c Ratio	0.58	0.39	0.58	0.31
Control Delay	13.9	24.0	3.6	26.9
Queue Delay	0.0	0.0	0.3	0.0
Total Delay	14.0	24.0	3.9	26.9
Queue Length 50th (ft)	408	25	2	7
Queue Length 95th (ft)	526	m66	768	31
Internal Link Dist (ft)	743		262	663
Turn Bay Length (ft)		200		
Base Capacity (vph)	3725	259	4426	298
Starvation Cap Reductn	0	0	950	0
Spillback Cap Reductn	88	0	849	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.59	0.39	0.74	0.15

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	1981	22	91	2348	7	26
Future Volume (vph)	1981	22	91	2348	7	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.89	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	4978		1719	4988	1538	
Flt Permitted	1.00		0.06	1.00	0.99	
Satd. Flow (perm)	4978		112	4988	1538	
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.73	0.73
Adj. Flow (vph)	2130	24	100	2580	10	36
RTOR Reduction (vph)	1	0	0	0	34	0
Lane Group Flow (vph)	2153	0	100	2580	12	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	4%	2%	5%	4%	14%	8%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	86.6		102.6	102.6	5.9	
Effective Green, g (s)	88.6		104.6	104.6	7.9	
Actuated g/C Ratio	0.74		0.87	0.87	0.07	
Clearance Time (s)	5.5		6.0	5.5	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3675		258	4347	101	
v/s Ratio Prot	0.43		0.04	c0.52	c0.01	
v/s Ratio Perm			0.30			
v/c Ratio	0.59		0.39	0.59	0.12	
Uniform Delay, d1	7.2		16.7	2.0	52.8	
Progression Factor	1.85		1.26	1.47	1.00	
Incremental Delay, d2	0.3		0.6	0.4	0.5	
Delay (s)	13.7		21.6	3.4	53.3	
Level of Service	B		C	A	D	
Approach Delay (s)	13.7			4.1	53.3	
Approach LOS	B			A	D	
Intersection Summary						
HCM 2000 Control Delay			8.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	11.5
Intersection Capacity Utilization			57.1%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



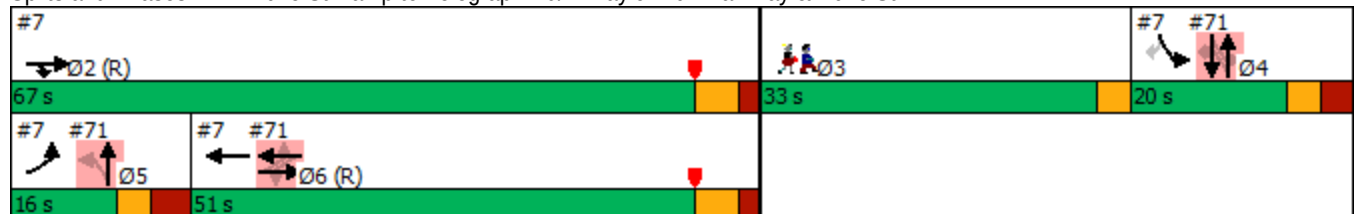
Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	31	971	1005	2402	70	38	
Future Volume (vph)	31	971	1005	2402	70	38	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	16.0	67.0	67.0	51.0	20.0	20.0	33.0
Total Split (%)	13.3%	55.8%	55.8%	42.5%	16.7%	16.7%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.9	92.8	92.8	80.9	12.6	12.6	
Actuated g/C Ratio	0.08	0.77	0.77	0.67	0.10	0.10	
v/c Ratio	0.26	0.45	0.84	0.80	0.43	0.17	
Control Delay	61.9	3.8	19.4	20.8	29.7	1.7	
Queue Delay	0.0	0.0	0.0	0.1	1.9	0.9	
Total Delay	61.9	3.8	19.4	20.9	31.5	2.7	
LOS	E	A	B	C	C	A	
Approach Delay		12.5		20.9			
Approach LOS		B		C			

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 17.1
 Intersection Capacity Utilization 65.6%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	35	1091	1129	2555	80	44
v/c Ratio	0.26	0.45	0.84	0.80	0.43	0.17
Control Delay	61.9	3.8	19.4	20.8	29.7	1.7
Queue Delay	0.0	0.0	0.0	0.1	1.9	0.9
Total Delay	61.9	3.8	19.4	20.9	31.5	2.7
Queue Length 50th (ft)	23	29	287	527	24	1
Queue Length 95th (ft)	m50	127	#1326	#1071	42	0
Internal Link Dist (ft)		321		590		
Turn Bay Length (ft)	180					
Base Capacity (vph)	157	2448	1347	3178	236	305
Starvation Cap Reductn	0	0	0	0	71	142
Spillback Cap Reductn	0	0	0	79	0	5
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.45	0.84	0.82	0.48	0.27

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  							
Traffic Volume (vph)	31	971	1005	0	2402	0	0	0	0	70	0	38
Future Volume (vph)	31	971	1005	0	2402	0	0	0	0	70	0	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1641	3167	1743		4715					1770		1542
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1641	3167	1743		4715					1770		1542
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	1.00	1.00	1.00	0.87	0.87	0.87
Adj. Flow (vph)	35	1091	1129	0	2555	0	0	0	0	80	0	44
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	39
Lane Group Flow (vph)	35	1091	1129	0	2555	0	0	0	0	80	0	5
Confl. Peds. (#/hr)										3		5
Heavy Vehicles (%)	10%	14%	9%	2%	10%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	6.7	88.4	88.4		75.2					10.6		10.6
Effective Green, g (s)	8.7	90.4	90.4		77.2					12.6		12.6
Actuated g/C Ratio	0.07	0.75	0.75		0.64					0.10		0.10
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	118	2385	1313		3033					185		161
v/s Ratio Prot	0.02	0.34	c0.65		0.54					c0.05		
v/s Ratio Perm												0.00
v/c Ratio	0.30	0.46	0.86		0.84					0.43		0.03
Uniform Delay, d1	52.7	5.6	10.4		16.7					50.3		48.2
Progression Factor	1.13	0.43	1.11		1.08					0.46		1.00
Incremental Delay, d2	1.2	0.5	6.4		3.0					1.6		0.1
Delay (s)	60.7	2.9	17.9		21.0					24.6		48.3
Level of Service	E	A	B		C					C		D
Approach Delay (s)		11.3			21.0			0.0			33.0	
Approach LOS		B			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			16.9									HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			65.6%									ICU Level of Service C
Analysis Period (min)			15									
c Critical Lane Group												

Intersection Sign configuration not allowed in HCM analysis.

Timings

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024

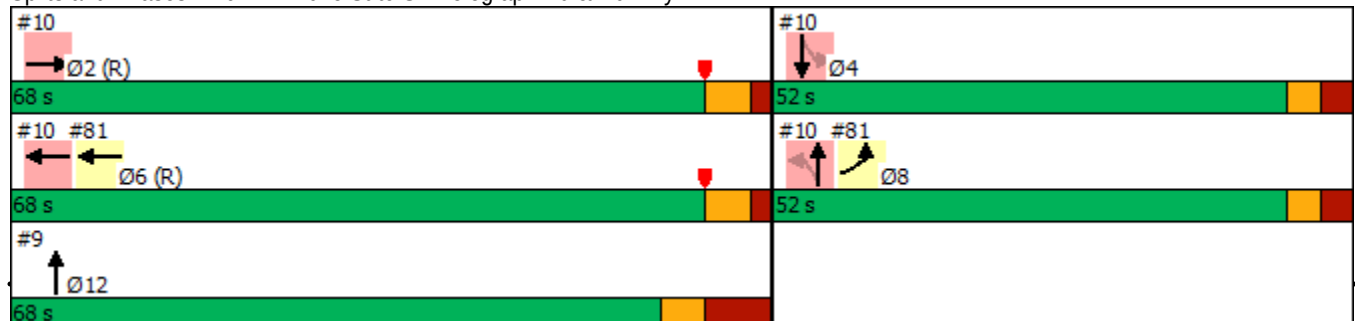


Lane Group	NBT	Ø2	Ø4	Ø6	Ø8
Lane Configurations	↑↑				
Traffic Volume (vph)	453				
Future Volume (vph)	453				
Turn Type	NA				
Protected Phases	12	2	4	6	8
Permitted Phases					
Detector Phase	12				
Switch Phase					
Minimum Initial (s)	4.0	10.0	7.0	4.0	7.0
Minimum Split (s)	26.0	25.0	13.0	25.0	40.0
Total Split (s)	68.0	68.0	52.0	68.0	52.0
Total Split (%)	56.7%	57%	43%	57%	43%
Yellow Time (s)	4.0	4.0	3.0	4.0	3.0
All-Red Time (s)	6.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0				
Total Lost Time (s)	8.0				
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	C-Max	None	C-Max	None
Act Effect Green (s)	71.1				
Actuated g/C Ratio	0.59				
v/c Ratio	0.22				
Control Delay	8.8				
Queue Delay	0.0				
Total Delay	8.8				
LOS	A				
Approach Delay	8.8				
Approach LOS	A				

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.81
Intersection Signal Delay: 8.8
Intersection LOS: A
Intersection Capacity Utilization 19.2%
ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 9: WB Duke St to SB Telegraph Rd & Dummy



Queues

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Lane Group	NBT
Lane Group Flow (vph)	453
v/c Ratio	0.22
Control Delay	8.8
Queue Delay	0.0
Total Delay	8.8
Queue Length 50th (ft)	57
Queue Length 95th (ft)	77
Internal Link Dist (ft)	94
Turn Bay Length (ft)	
Base Capacity (vph)	2097
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.22
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			
Traffic Volume (vph)	0	0	453	0	0	0
Future Volume (vph)	0	0	453	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			8.0			
Lane Util. Factor			0.95			
Frt			1.00			
Flt Protected			1.00			
Satd. Flow (prot)			3539			
Flt Permitted			1.00			
Satd. Flow (perm)			3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	453	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	453	0	0	0
Turn Type			NA			
Protected Phases			12			
Permitted Phases						
Actuated Green, G (s)			69.1			
Effective Green, g (s)			71.1			
Actuated g/C Ratio			0.59			
Clearance Time (s)			10.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)			2096			
v/s Ratio Prot			c0.13			
v/s Ratio Perm						
v/c Ratio			0.22			
Uniform Delay, d1			11.4			
Progression Factor			0.67			
Incremental Delay, d2			0.2			
Delay (s)			7.9			
Level of Service			A			
Approach Delay (s)	0.0		7.9		0.0	
Approach LOS	A		A		A	
Intersection Summary						
HCM 2000 Control Delay			7.9	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.14			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		14.0
Intersection Capacity Utilization			19.2%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	Ø12
Lane Configurations	↑↑↑	↑↑↑		↑		↑	
Traffic Volume (vph)	2249	1115	198	27	17	14	
Future Volume (vph)	2249	1115	198	27	17	14	
Turn Type	NA	NA	Perm	NA	Perm	NA	
Protected Phases	2	6		8		4	12
Permitted Phases			8		4		
Detector Phase	2	6	8	8	4	4	
Switch Phase							
Minimum Initial (s)	10.0	4.0	7.0	7.0	7.0	7.0	4.0
Minimum Split (s)	25.0	25.0	40.0	40.0	13.0	13.0	26.0
Total Split (s)	68.0	68.0	52.0	52.0	52.0	52.0	68.0
Total Split (%)	56.7%	56.7%	43.3%	43.3%	43.3%	43.3%	57%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0	4.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0	6.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0	
Total Lost Time (s)	4.0	4.0		4.0		4.0	
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	None	None	None	None	Max
Act Effect Green (s)	75.1	75.1		36.9		36.9	
Actuated g/C Ratio	0.63	0.63		0.31		0.31	
v/c Ratio	0.79	0.40		0.81		0.19	
Control Delay	20.1	12.7		53.8		15.5	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	20.1	12.7		53.8		15.5	
LOS	C	B		D		B	
Approach Delay	20.1	12.7		53.8		15.5	
Approach LOS	C	B		D		B	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 20.3

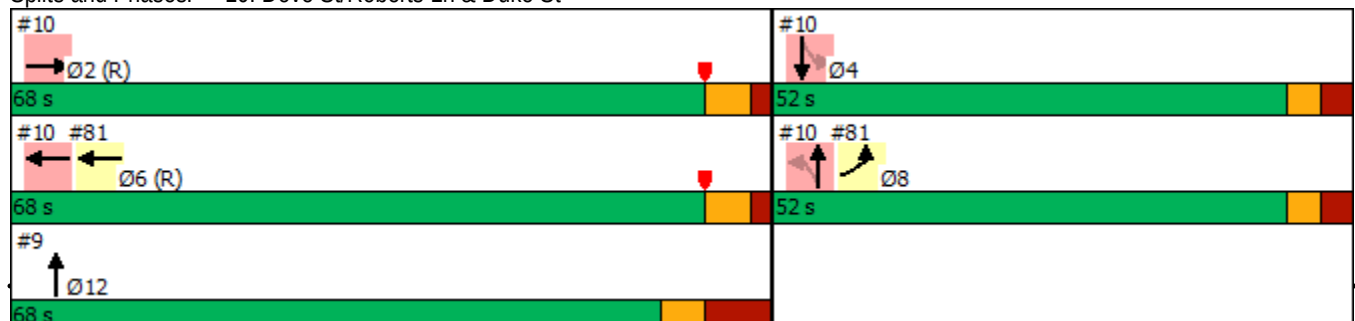
Intersection LOS: C

Intersection Capacity Utilization 71.8%

ICU Level of Service C

Analysis Period (min) 15

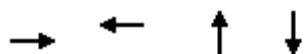
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	2499	1212	310	97
v/c Ratio	0.79	0.40	0.81	0.19
Control Delay	20.1	12.7	53.8	15.5
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.1	12.7	53.8	15.5
Queue Length 50th (ft)	511	160	220	28
Queue Length 95th (ft)	762	242	228	47
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3152	3061	499	636
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.79	0.40	0.62	0.15
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2249	0	0	1115	0	198	27	10	17	14	44
Future Volume (vph)	0	2249	0	0	1115	0	198	27	10	17	14	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.99			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5036			4891			1756			1665	
Flt Permitted		1.00			1.00			0.68			0.90	
Satd. Flow (perm)		5036			4891			1247			1519	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.76	0.76	0.76	0.77	0.77	0.77
Adj. Flow (vph)	0	2499	0	0	1212	0	261	36	13	22	18	57
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	33	0
Lane Group Flow (vph)	0	2499	0	0	1212	0	0	309	0	0	64	0
Confl. Peds. (#/hr)	18		3	3		18			8	8		
Heavy Vehicles (%)	2%	3%	2%	2%	5%	2%	3%	2%	9%	2%	2%	5%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		73.1			73.1			34.9			34.9	
Effective Green, g (s)		75.1			75.1			36.9			36.9	
Actuated g/C Ratio		0.63			0.63			0.31			0.31	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3151			3060			383			467	
v/s Ratio Prot		c0.50			0.25							
v/s Ratio Perm								c0.25			0.04	
v/c Ratio		0.79			0.40			0.81			0.14	
Uniform Delay, d1		16.7			11.2			38.3			30.0	
Progression Factor		0.97			1.00			1.00			1.00	
Incremental Delay, d2		2.1			0.4			11.8			0.1	
Delay (s)		18.2			11.6			50.1			30.2	
Level of Service		B			B			D			C	
Approach Delay (s)		18.2			11.6			50.1			30.2	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM 2000 Control Delay		18.9					HCM 2000 Level of Service				B	
HCM 2000 Volume to Capacity ratio		0.84										
Actuated Cycle Length (s)		120.0					Sum of lost time (s)			14.0		
Intersection Capacity Utilization		71.8%					ICU Level of Service			C		
Analysis Period (min)		15										
c Critical Lane Group												

Timings

71: W Taylor Run Parkway

03/14/2024

												
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations												
Traffic Volume (vph)	20	8	13	20	2	23	1	71	6			
Future Volume (vph)	20	8	13	20	2	23	1	71	6			
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm			
Protected Phases		6		6		4 5		4		2	3	5
Permitted Phases	6		6		4 5		4		4			
Detector Phase	6	6	6	6	4 5	4 5	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0			13.0	13.0	13.0	14.0	33.0	12.5
Total Split (s)	51.0	51.0	51.0	51.0			20.0	20.0	20.0	67.0	33.0	16.0
Total Split (%)	42.5%	42.5%	42.5%	42.5%			16.7%	16.7%	16.7%	56%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0			3.0	3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0				-2.0	-2.0			
Total Lost Time (s)		4.0		4.0				4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None	None	C-Max	None	None
Act Effect Green (s)		80.9		80.9		27.0		12.6	12.6			
Actuated g/C Ratio		0.67		0.67		0.22		0.10	0.10			
v/c Ratio		0.07		0.27		0.09		0.43	0.03			
Control Delay		8.6		2.7		0.7		56.3	0.2			
Queue Delay		0.0		0.0		2.8		0.0	0.0			
Total Delay		8.6		2.7		3.5		56.3	0.2			
LOS		A		A		A		E	A			
Approach Delay		8.6		2.7		3.5		52.0				
Approach LOS		A		A		A		D				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 12.4

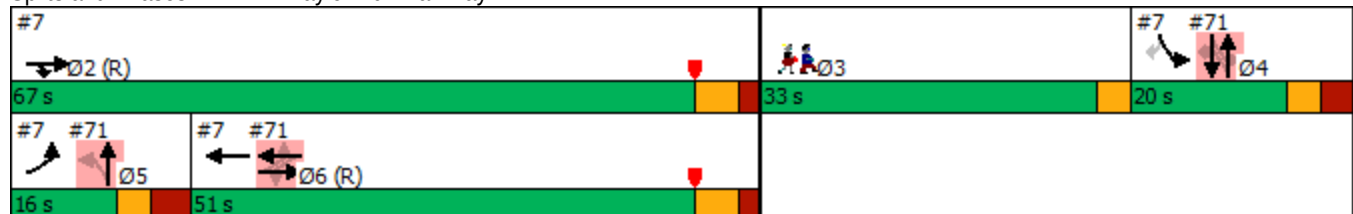
Intersection LOS: B

Intersection Capacity Utilization 37.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	67	310	35	83	7
v/c Ratio	0.07	0.27	0.09	0.43	0.03
Control Delay	8.6	2.7	0.7	56.3	0.2
Queue Delay	0.0	0.0	2.8	0.0	0.0
Total Delay	8.6	2.7	3.5	56.3	0.2
Queue Length 50th (ft)	8	0	1	61	0
Queue Length 95th (ft)	39	54	0	106	0
Internal Link Dist (ft)	56	365	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	1000	1152	421	247	304
Starvation Cap Reductn	0	0	322	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.07	0.27	0.35	0.34	0.02
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Parkway

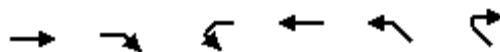
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	8	24	13	20	208	2	23	7	1	71	6
Future Volume (vph)	20	8	24	13	20	208	2	23	7	1	71	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.98			0.99			1.00	0.97
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.94			0.88			0.97			1.00	0.85
Flt Protected		0.98			1.00			1.00			1.00	1.00
Satd. Flow (prot)		1710			1603			1791			1862	1537
Flt Permitted		0.84			0.99			0.99			1.00	1.00
Satd. Flow (perm)		1469			1586			1777			1857	1537
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.87
Adj. Flow (vph)	26	10	31	17	26	267	2	25	8	1	82	7
RTOR Reduction (vph)	0	11	0	0	95	0	0	6	0	0	0	6
Lane Group Flow (vph)	0	56	0	0	215	0	0	29	0	0	83	1
Confl. Peds. (#/hr)	10					10	2		1	1		2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		75.2			75.2			23.3			10.6	10.6
Effective Green, g (s)		77.2			77.2			25.3			12.6	12.6
Actuated g/C Ratio		0.64			0.64			0.21			0.10	0.10
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		945			1020			374			194	161
v/s Ratio Prot												
v/s Ratio Perm		0.04			c0.14			c0.02			c0.04	0.00
v/c Ratio		0.06			0.21			0.08			0.43	0.00
Uniform Delay, d1		7.9			8.8			38.0			50.3	48.1
Progression Factor		1.00			0.66			0.01			1.00	1.00
Incremental Delay, d2		0.1			0.5			0.1			1.5	0.0
Delay (s)		8.1			6.3			0.4			51.8	48.1
Level of Service		A			A			A			D	D
Approach Delay (s)		8.1			6.3			0.4			51.5	
Approach LOS		A			A			A			D	
Intersection Summary												
HCM 2000 Control Delay		14.2										
HCM 2000 Volume to Capacity ratio		0.22										
Actuated Cycle Length (s)		120.0										
Intersection Capacity Utilization		37.2%										
Analysis Period (min)		15										
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

72: Duke St Slip Lane & Service Rd

03/14/2024

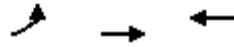


Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations				↑	↑	
Traffic Volume (veh/h)	0	0	0	19	280	0
Future Volume (Veh/h)	0	0	0	19	280	0
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	19	280	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	560	0	560	560	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	560	0	560	560	0	
tC, single (s)	6.5	6.2	7.1	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.0	3.3	3.5	4.0	2.2	
p0 queue free %	100	100	100	95	83	
cM capacity (veh/h)	362	1085	381	362	1623	
Direction, Lane #	WB 1	NW 1				
Volume Total	19	280				
Volume Left	0	280				
Volume Right	0	0				
cSH	362	1623				
Volume to Capacity	0.05	0.17				
Queue Length 95th (ft)	4	16				
Control Delay (s)	15.5	7.7				
Lane LOS	C	A				
Approach Delay (s)	15.5	7.7				
Approach LOS	C					
Intersection Summary						
Average Delay		8.2				
Intersection Capacity Utilization		25.5%		ICU Level of Service		A
Analysis Period (min)		15				

Timings

81: Duke St

03/14/2024



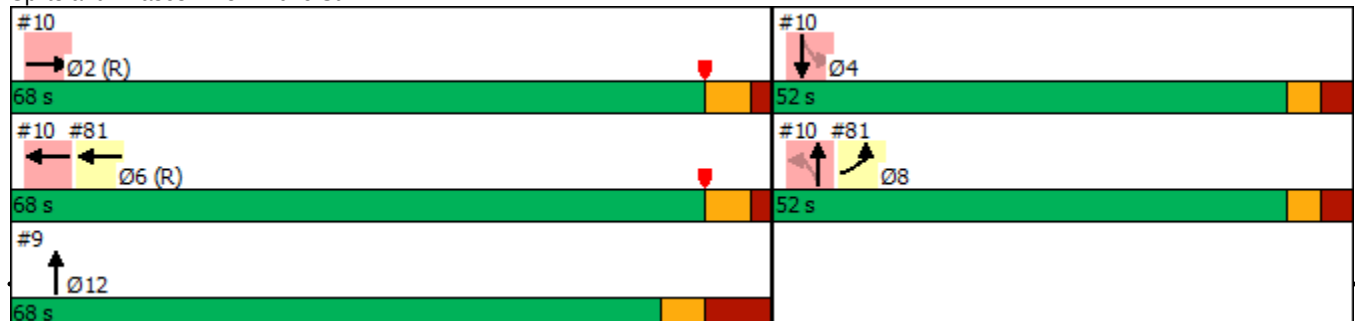
Lane Group	EBL	EBT	WBT	Ø2	Ø4	Ø12
Lane Configurations	↰	↱↱	↱↱			
Traffic Volume (vph)	140	901	903			
Future Volume (vph)	140	901	903			
Turn Type	Prot	NA	NA			
Protected Phases	8	Free	6	2	4	12
Permitted Phases						
Detector Phase	8		6			
Switch Phase						
Minimum Initial (s)	7.0		4.0	10.0	7.0	4.0
Minimum Split (s)	40.0		25.0	25.0	13.0	26.0
Total Split (s)	52.0		68.0	68.0	52.0	68.0
Total Split (%)	43.3%		56.7%	57%	43%	57%
Yellow Time (s)	3.0		4.0	4.0	3.0	4.0
All-Red Time (s)	3.0		2.0	2.0	3.0	6.0
Lost Time Adjust (s)	-2.0		-2.0			
Total Lost Time (s)	4.0		4.0			
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		C-Max	C-Max	None	Max
Act Effect Green (s)	36.9	120.0	75.1			
Actuated g/C Ratio	0.31	1.00	0.63			
v/c Ratio	0.26	0.25	0.41			
Control Delay	30.3	0.2	8.3			
Queue Delay	0.0	0.0	0.0			
Total Delay	30.3	0.2	8.3			
LOS	C	A	A			
Approach Delay		4.2	8.3			
Approach LOS		A	A			

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 6.1
 Intersection Capacity Utilization 141.8%
 Analysis Period (min) 15

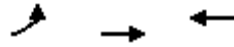
Intersection LOS: A
 ICU Level of Service H

Splits and Phases: 81: Duke St



Queues
81: Duke St

03/14/2024

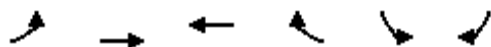


Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	140	901	903
v/c Ratio	0.26	0.25	0.41
Control Delay	30.3	0.2	8.3
Queue Delay	0.0	0.0	0.0
Total Delay	30.3	0.2	8.3
Queue Length 50th (ft)	78	0	112
Queue Length 95th (ft)	71	0	137
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	708	3539	2215
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.20	0.25	0.41
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

81: Duke St

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	140	901	903	0	0	0
Future Volume (vph)	140	901	903	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	140	901	903	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	140	901	903	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	8	Free	6			
Permitted Phases						
Actuated Green, G (s)	34.9	120.0	73.1			
Effective Green, g (s)	36.9	120.0	75.1			
Actuated g/C Ratio	0.31	1.00	0.63			
Clearance Time (s)	6.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	544	3539	2214			
v/s Ratio Prot	0.08	0.25	c0.26			
v/s Ratio Perm						
v/c Ratio	0.26	0.25	0.41			
Uniform Delay, d1	31.2	0.0	11.3			
Progression Factor	0.99	1.00	0.62			
Incremental Delay, d2	0.2	0.2	0.5			
Delay (s)	31.3	0.2	7.5			
Level of Service	C	A	A			
Approach Delay (s)		4.3	7.5		0.0	
Approach LOS		A	A		A	
Intersection Summary						
HCM 2000 Control Delay			5.8		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.39			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	16.0
Intersection Capacity Utilization			141.8%		ICU Level of Service	H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

82: WB Duke St to SB Telegraph Rd

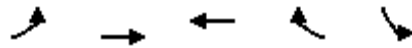
03/14/2024

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		↑↑			↱	
Traffic Volume (veh/h)	0	453	0	0	140	0
Future Volume (Veh/h)	0	453	0	0	140	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	453	0	0	140	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		252				
pX, platoon unblocked					0.94	
vC, conflicting volume	0				226	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				61	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				84	100
cM capacity (veh/h)	1622				885	1084
Direction, Lane #	NB 1	NB 2	NE 1			
Volume Total	226	226	140			
Volume Left	0	0	140			
Volume Right	0	0	0			
cSH	1700	1700	885			
Volume to Capacity	0.13	0.13	0.16			
Queue Length 95th (ft)	0	0	14			
Control Delay (s)	0.0	0.0	9.8			
Lane LOS			A			
Approach Delay (s)	0.0		9.8			
Approach LOS			A			
Intersection Summary						
Average Delay			2.3			
Intersection Capacity Utilization			26.9%	ICU Level of Service		A
Analysis Period (min)			15			

Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	Ø2
Lane Configurations	↰	↑↑↑	↑↑	↱	↰↰↰	
Traffic Volume (vph)	314	1040	1250	735	864	
Future Volume (vph)	314	1040	1250	735	864	
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	2
Permitted Phases	5 2					
Detector Phase	5	5 2	6	6 4	4	
Switch Phase						
Minimum Initial (s)	5.0		10.0		7.0	10.0
Minimum Split (s)	19.6		22.0		29.5	22.0
Total Split (s)	22.0		53.0		45.0	75.0
Total Split (%)	18.3%		44.2%		37.5%	63%
Yellow Time (s)	3.0		4.0		3.5	4.0
All-Red Time (s)	2.6		2.0		3.0	2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0	
Total Lost Time (s)	3.6		4.0		4.5	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None		C-Max		None	C-Max
Act Effect Green (s)	71.4	71.4	49.0	94.0	40.5	
Actuated g/C Ratio	0.60	0.60	0.41	0.78	0.34	
v/c Ratio	1.09	0.39	0.89	0.61	0.99	
Control Delay	110.3	13.3	39.8	5.5	64.5	
Queue Delay	0.0	0.4	46.8	0.5	0.8	
Total Delay	110.3	13.7	86.7	6.0	65.3	
LOS	F	B	F	A	E	
Approach Delay		36.1	56.8		65.3	
Approach LOS		D	E		E	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.09

Intersection Signal Delay: 52.2

Intersection LOS: D

Intersection Capacity Utilization 92.3%

ICU Level of Service F

Analysis Period (min) 15

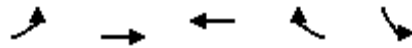
Splits and Phases: 1: Duke St & N Quaker Lane



Queues

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	353	1169	1289	758	1146
v/c Ratio	1.09	0.39	0.89	0.61	0.99
Control Delay	110.3	13.3	39.8	5.5	64.5
Queue Delay	0.0	0.4	46.8	0.5	0.8
Total Delay	110.3	13.7	86.7	6.0	65.3
Queue Length 50th (ft)	~257	164	442	93	447
Queue Length 95th (ft)	#441	192	#525	149	#602
Internal Link Dist (ft)		582	312		324
Turn Bay Length (ft)					
Base Capacity (vph)	324	2996	1445	1240	1152
Starvation Cap Reductn	0	0	316	160	0
Spillback Cap Reductn	0	1152	0	0	4
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.09	0.63	1.14	0.70	1.00

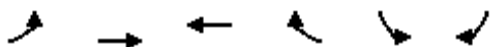
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑↑	↑↑	↰	↰↰	
Traffic Volume (vph)	314	1040	1250	735	864	167
Future Volume (vph)	314	1040	1250	735	864	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1719	5036	3539	1583	3372	
Flt Permitted	0.08	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	138	5036	3539	1583	3372	
Peak-hour factor, PHF	0.89	0.89	0.97	0.97	0.90	0.90
Adj. Flow (vph)	353	1169	1289	758	960	186
RTOR Reduction (vph)	0	0	0	0	14	0
Lane Group Flow (vph)	353	1169	1289	758	1132	0
Confl. Peds. (#/hr)	2			2		1
Heavy Vehicles (%)	5%	3%	2%	2%	2%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	69.0	69.0	47.0	91.5	38.5	
Effective Green, g (s)	71.0	71.0	49.0	93.5	40.5	
Actuated g/C Ratio	0.59	0.59	0.41	0.78	0.34	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	324	2979	1445	1233	1138	
v/s Ratio Prot	c0.17	0.23	0.36	0.48	c0.34	
v/s Ratio Perm	c0.48					
v/c Ratio	1.09	0.39	0.89	0.61	0.99	
Uniform Delay, d1	39.0	13.0	33.0	5.6	39.6	
Progression Factor	1.00	1.00	1.01	0.71	1.00	
Incremental Delay, d2	76.1	0.1	6.0	0.6	25.3	
Delay (s)	115.1	13.1	39.4	4.6	64.9	
Level of Service	F	B	D	A	E	
Approach Delay (s)		36.8	26.5		64.9	
Approach LOS		D	C		E	
Intersection Summary						
HCM 2000 Control Delay			39.1		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			1.08			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			92.3%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

Timings

2: S Quaker Ln & Duke St

03/14/2024

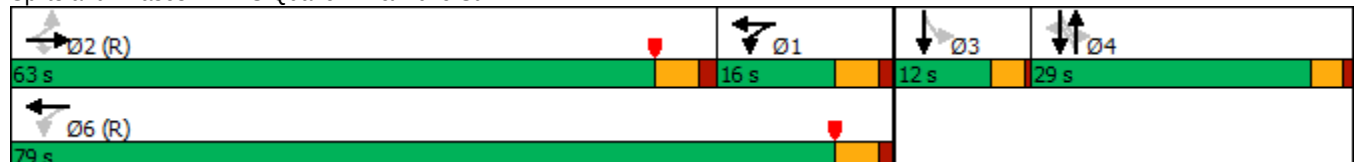
											
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø6
Lane Configurations											
Traffic Volume (vph)	7	1518	379	27	1876	108	0	1	0		
Future Volume (vph)	7	1518	379	27	1876	108	0	1	0		
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA		
Protected Phases		2		1	1 6		4		3 4	3	6
Permitted Phases	2		2	1 6		4		3 4			
Detector Phase	2	2	2	1	1 6	4	4	3 4	3 4		
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	5.0		7.0	7.0			4.0	4.0
Minimum Split (s)	15.5	15.5	15.5	10.5		29.0	29.0			12.0	20.0
Total Split (s)	63.0	63.0	63.0	16.0		29.0	29.0			12.0	79.0
Total Split (%)	52.5%	52.5%	52.5%	13.3%		24.2%	24.2%			10%	66%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0			3.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5		1.0	1.0			0.5	1.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0			-2.0				
Total Lost Time (s)	3.5	3.5	3.5	3.5			2.0				
Lead/Lag	Lead	Lead	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	None		None	None			Max	C-Max
Act Effect Green (s)	71.8	71.8	71.8	87.8	87.8		14.7		27.2		
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73		0.12		0.23		
v/c Ratio	0.11	0.76	0.38	0.12	0.77		0.62		0.02		
Control Delay	25.0	25.7	8.5	2.8	5.5		28.1		0.0		
Queue Delay	0.0	7.0	0.7	0.0	2.3		5.9		0.0		
Total Delay	25.0	32.7	9.2	2.8	7.9		34.0		0.0		
LOS	C	C	A	A	A		C		A		
Approach Delay		28.0			7.8		34.0				
Approach LOS		C			A		C				

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 62 (52%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 18.5
 Intersection Capacity Utilization 72.3%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 2: S Quaker Ln & Duke St



Queues

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	7	1598	399	28	1982	160	8
v/c Ratio	0.11	0.76	0.38	0.12	0.77	0.62	0.02
Control Delay	25.0	25.7	8.5	2.8	5.5	28.1	0.0
Queue Delay	0.0	7.0	0.7	0.0	2.3	5.9	0.0
Total Delay	25.0	32.7	9.2	2.8	7.9	34.0	0.0
Queue Length 50th (ft)	3	456	81	0	46	40	0
Queue Length 95th (ft)	m6	m565	m113	m0	58	77	0
Internal Link Dist (ft)		312			222	293	73
Turn Bay Length (ft)	175			75			
Base Capacity (vph)	62	2116	1042	241	2586	389	599
Starvation Cap Reductn	0	479	342	0	191	0	0
Spillback Cap Reductn	0	0	0	0	452	174	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.98	0.57	0.12	0.93	0.74	0.01

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

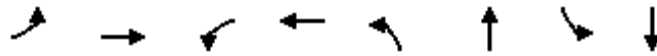
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1518	379	27	1876	7	108	0	20	1	0	1
Future Volume (vph)	7	1518	379	27	1876	7	108	0	20	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.98			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1769	3539	1537	1570	3537			1744			1695	
Flt Permitted	0.06	1.00	1.00	0.08	1.00			0.75			0.96	
Satd. Flow (perm)	104	3539	1537	126	3537			1370			1676	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.80	0.80	0.80	0.25	0.25	0.25
Adj. Flow (vph)	7	1598	399	28	1975	7	135	0	25	4	0	4
RTOR Reduction (vph)	0	0	125	0	0	0	0	92	0	0	6	0
Lane Group Flow (vph)	7	1598	274	28	1982	0	0	68	0	0	2	0
Confl. Peds. (#/hr)	9		11	11		9			7	7		
Heavy Vehicles (%)	2%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 6			4			3 4	
Permitted Phases	2		2	1 6			4			3 4		
Actuated Green, G (s)	69.8	69.8	69.8	85.8	85.8			12.7			24.7	
Effective Green, g (s)	71.8	71.8	71.8	87.8	87.8			14.7			26.7	
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73			0.12			0.22	
Clearance Time (s)	5.5	5.5	5.5	5.5				4.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0				3.0				
Lane Grp Cap (vph)	62	2117	919	242	2587			167			372	
v/s Ratio Prot		0.45		0.01	c0.56							
v/s Ratio Perm	0.07		0.18	0.07				c0.05			c0.00	
v/c Ratio	0.11	0.75	0.30	0.12	0.77			0.41			0.00	
Uniform Delay, d1	10.4	17.7	11.8	23.5	9.8			48.6			36.3	
Progression Factor	1.38	1.24	2.18	0.20	0.32			1.00			1.00	
Incremental Delay, d2	2.7	1.9	0.6	0.1	0.9			1.6			0.0	
Delay (s)	17.1	23.7	26.3	4.8	4.1			50.2			36.3	
Level of Service	B	C	C	A	A			D			D	
Approach Delay (s)		24.2			4.1			50.2			36.3	
Approach LOS		C			A			D			D	
Intersection Summary												
HCM 2000 Control Delay	15.6			HCM 2000 Level of Service					B			
HCM 2000 Volume to Capacity ratio	0.67											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)					10.5			
Intersection Capacity Utilization	72.3%			ICU Level of Service					C			
Analysis Period (min)	15											
c Critical Lane Group												

Timings

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	65	1463	7	1797	17	2	51	2
Future Volume (vph)	65	1463	7	1797	17	2	51	2
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	5.0	10.0	1.0	1.0	7.0	7.0	6.7	6.7
Minimum Split (s)	11.1	17.0	16.3	16.3	29.0	29.0	13.0	13.0
Total Split (s)	16.0	91.0	75.0	75.0	29.0	29.0	29.0	29.0
Total Split (%)	13.3%	75.8%	62.5%	62.5%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	4.0	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.6	2.3	2.3	2.3	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.1	4.3	4.3	4.3		4.0		4.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	95.2	95.0	85.2	85.2		16.7		16.7
Actuated g/C Ratio	0.79	0.79	0.71	0.71		0.14		0.14
v/c Ratio	0.37	0.56	0.04	0.77		0.22		0.70
Control Delay	28.0	1.1	7.1	9.2		40.3		44.5
Queue Delay	0.0	0.1	0.0	0.1		0.0		0.0
Total Delay	28.0	1.2	7.1	9.3		40.3		44.6
LOS	C	A	A	A		D		D
Approach Delay		2.3		9.3		40.3		44.6
Approach LOS		A		A		D		D

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 68 (57%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 8.3
 Intersection Capacity Utilization 70.2%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service C

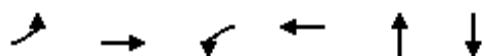
Splits and Phases: 3: Duke St & Alexandria Commons



Queues

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	69	1567	7	1930	34	188
v/c Ratio	0.37	0.56	0.04	0.77	0.22	0.70
Control Delay	28.0	1.1	7.1	9.2	40.3	44.5
Queue Delay	0.0	0.1	0.0	0.1	0.0	0.0
Total Delay	28.0	1.2	7.1	9.3	40.3	44.6
Queue Length 50th (ft)	12	2	1	161	20	90
Queue Length 95th (ft)	m33	2	m1	175	35	132
Internal Link Dist (ft)		222		571	88	97
Turn Bay Length (ft)	100		375			
Base Capacity (vph)	244	2799	199	2503	229	366
Starvation Cap Reductn	0	263	0	55	0	0
Spillback Cap Reductn	0	0	0	56	0	1
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.62	0.04	0.79	0.15	0.52

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	1463	10	7	1797	36	17	2	4	51	2	97
Future Volume (vph)	65	1463	10	7	1797	36	17	2	4	51	2	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.3		4.3	4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.98			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1770	3535		1768	3527			1746			1665	
Flt Permitted	0.05	1.00		0.15	1.00			0.60			0.89	
Satd. Flow (perm)	98	3535		281	3527			1081			1501	
Peak-hour factor, PHF	0.94	0.94	0.94	0.95	0.95	0.95	0.69	0.69	0.69	0.80	0.80	0.80
Adj. Flow (vph)	69	1556	11	7	1892	38	25	3	6	64	2	121
RTOR Reduction (vph)	0	0	0	0	1	0	0	5	0	0	59	0
Lane Group Flow (vph)	69	1567	0	7	1929	0	0	29	0	0	129	0
Confl. Peds. (#/hr)	2		15	15		2			9	9		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	93.0	93.0		81.9	81.9			14.7			14.7	
Effective Green, g (s)	95.0	95.0		83.9	83.9			16.7			16.7	
Actuated g/C Ratio	0.79	0.79		0.70	0.70			0.14			0.14	
Clearance Time (s)	6.1	6.3		6.3	6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0		0.2	0.2			2.0			2.0	
Lane Grp Cap (vph)	175	2798		196	2465			150			208	
v/s Ratio Prot	0.02	c0.44			c0.55							
v/s Ratio Perm	0.29			0.02				0.03			c0.09	
v/c Ratio	0.39	0.56		0.04	0.78			0.19			0.62	
Uniform Delay, d1	16.2	4.7		5.6	12.0			45.7			48.7	
Progression Factor	3.32	0.10		0.80	0.53			1.00			1.00	
Incremental Delay, d2	0.3	0.5		0.2	1.6			0.2			4.1	
Delay (s)	54.2	1.0		4.7	8.0			45.9			52.8	
Level of Service	D	A		A	A			D			D	
Approach Delay (s)		3.3			8.0			45.9			52.8	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			8.5			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.4			
Intersection Capacity Utilization			70.2%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	30	1485	28	1742	20	6	103	8	78
Future Volume (vph)	30	1485	28	1742	20	6	103	8	78
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	4.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	30.8	10.0	31.0	29.0	29.0	29.0	29.0	29.0
Total Split (s)	17.0	74.0	17.0	74.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	14.2%	61.7%	14.2%	61.7%	24.2%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	1.8	2.6	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	3.8	3.6	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	None	None
Act Effct Green (s)	88.2	83.9	88.2	83.4		21.7		21.7	21.7
Actuated g/C Ratio	0.74	0.70	0.74	0.70		0.18		0.18	0.18
v/c Ratio	0.20	0.65	0.13	0.79		0.44		0.86	0.26
Control Delay	13.3	7.9	8.8	22.2		15.4		91.2	9.8
Queue Delay	0.0	0.0	0.0	0.1		0.0		0.0	0.0
Total Delay	13.3	7.9	8.8	22.3		15.4		91.2	9.8
LOS	B	A	A	C		B		F	A
Approach Delay		8.0		22.1		15.4		57.7	
Approach LOS		A		C		B		E	
Intersection Summary									
Cycle Length: 120									
Actuated Cycle Length: 120									
Offset: 67 (56%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow									
Natural Cycle: 90									
Control Type: Actuated-Coordinated									
Maximum v/c Ratio: 0.86									
Intersection Signal Delay: 18.0					Intersection LOS: B				
Intersection Capacity Utilization 77.4%					ICU Level of Service D				
Analysis Period (min) 15									

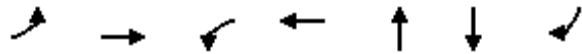
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St

		
Ø1	Ø2 (R)	Ø4
17 s	74 s	29 s
		
Ø5	Ø6 (R)	Ø8
17 s	74 s	29 s

Queues

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	33	1617	29	1933	166	133	93
v/c Ratio	0.20	0.65	0.13	0.79	0.44	0.86	0.26
Control Delay	13.3	7.9	8.8	22.2	15.4	91.2	9.8
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	13.3	7.9	8.8	22.3	15.4	91.2	9.8
Queue Length 50th (ft)	5	128	8	387	24	98	0
Queue Length 95th (ft)	m17	223	m13	m582	41	#178	37
Internal Link Dist (ft)		571		730	190	93	
Turn Bay Length (ft)	195		80				
Base Capacity (vph)	247	2474	314	2436	418	177	403
Starvation Cap Reductn	0	13	0	0	0	0	0
Spillback Cap Reductn	0	0	0	47	1	0	1
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.66	0.09	0.81	0.40	0.75	0.23

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 Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	1485	3	28	1742	113	20	6	87	103	8	78
Future Volume (vph)	30	1485	3	28	1742	113	20	6	87	103	8	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1752	3538		1770	3502			1625			1769	1583
Flt Permitted	0.05	1.00		0.10	1.00			0.93			0.46	1.00
Satd. Flow (perm)	90	3538		180	3502			1519			851	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.68	0.68	0.68	0.84	0.84	0.84
Adj. Flow (vph)	33	1614	3	29	1815	118	29	9	128	123	10	93
RTOR Reduction (vph)	0	0	0	0	3	0	0	105	0	0	0	76
Lane Group Flow (vph)	33	1617	0	29	1930	0	0	61	0	0	133	17
Confl. Peds. (#/hr)	1		10	10		1			7	7		
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	83.0	79.7		82.2	79.0			19.7			19.7	19.7
Effective Green, g (s)	87.0	81.7		86.2	81.0			21.7			21.7	21.7
Actuated g/C Ratio	0.72	0.68		0.72	0.68			0.18			0.18	0.18
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	138	2408		198	2363			274			153	286
v/s Ratio Prot	c0.01	0.46		0.01	c0.55						c0.16	0.01
v/s Ratio Perm	0.16			0.10				0.04				0.01
v/c Ratio	0.24	0.67		0.15	0.82			0.22			0.87	0.06
Uniform Delay, d1	15.6	11.3		9.0	14.1			42.0			47.8	40.7
Progression Factor	2.33	0.57		1.86	1.42			1.00			1.00	1.00
Incremental Delay, d2	0.3	1.3		0.0	1.2			0.2			36.2	0.0
Delay (s)	36.7	7.7		16.8	21.3			42.1			84.0	40.7
Level of Service	D	A		B	C			D			F	D
Approach Delay (s)		8.3			21.2			42.1			66.2	
Approach LOS		A			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			19.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			77.4%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

5: Roth St/Cambridge Rd & Duke St

03/14/2024

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	9	1660	64	1837	183	3	12	289	5	43
Future Volume (vph)	9	1660	64	1837	183	3	12	289	5	43
Turn Type	Prot	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6			8		4	
Permitted Phases			6		6	8		4		4
Detector Phase	5	2	1	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	6.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.5	30.7	11.5	15.7	15.7	13.4	13.4	30.4	30.4	30.4
Total Split (s)	13.0	60.0	13.0	60.0	60.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	10.8%	50.0%	10.8%	50.0%	50.0%	39.2%	39.2%	39.2%	39.2%	39.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	1.7	2.5	1.7	1.7	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	3.5	3.7	3.5	3.7	3.7		4.4		4.4	4.4
Lead/Lag	Lead	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?										
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	8.2	59.5	68.9	66.8	66.8		42.6		42.6	42.6
Actuated g/C Ratio	0.07	0.50	0.57	0.56	0.56		0.36		0.36	0.36
v/c Ratio	0.09	1.02	0.35	0.96	0.22		0.59		1.54	0.08
Control Delay	65.1	47.4	26.3	47.6	21.4		24.1		294.5	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	65.1	47.4	26.3	47.6	21.4		24.1		294.5	2.8
LOS	E	D	C	D	C		C		F	A
Approach Delay		47.5		44.7			24.1		257.3	
Approach LOS		D		D			C		F	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 85 (71%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.54

Intersection Signal Delay: 61.7

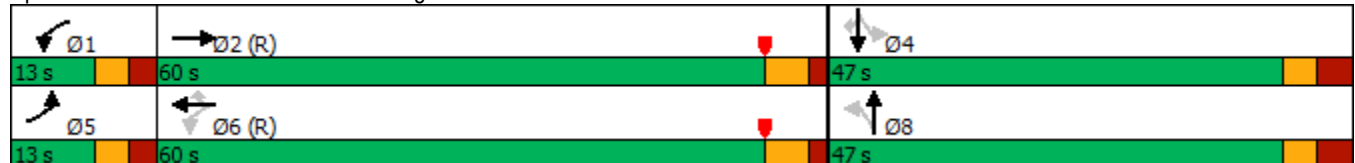
Intersection LOS: E

Intersection Capacity Utilization 103.9%

ICU Level of Service G

Analysis Period (min) 15

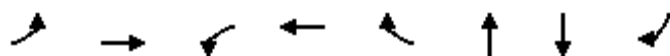
Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



Queues

5: Roth St/Cambridge Rd & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	10	1790	66	1894	189	391	342	50
v/c Ratio	0.09	1.02	0.35	0.96	0.22	0.59	1.54	0.08
Control Delay	65.1	47.4	26.3	47.6	21.4	24.1	294.5	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.1	47.4	26.3	47.6	21.4	24.1	294.5	2.8
Queue Length 50th (ft)	8	~812	38	667	111	159	~372	0
Queue Length 95th (ft)	m11	#963	59	#1067	135	264	#527	12
Internal Link Dist (ft)		730		743		286	101	
Turn Bay Length (ft)	120		250					
Base Capacity (vph)	128	1754	197	1971	863	663	222	598
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	0.08	1.02	0.34	0.96	0.22	0.59	1.54	0.08

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 Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

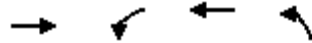
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1660	5	64	1837	183	3	12	360	289	5	43
Future Volume (vph)	9	1660	5	64	1837	183	3	12	360	289	5	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.87			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1626	3537		1752	3539	1550		1621			1770	1550
Flt Permitted	0.95	1.00		0.06	1.00	1.00		1.00			0.34	1.00
Satd. Flow (perm)	1626	3537		119	3539	1550		1618			625	1550
Peak-hour factor, PHF	0.93	0.93	0.93	0.97	0.97	0.97	0.96	0.96	0.96	0.86	0.86	0.86
Adj. Flow (vph)	10	1785	5	66	1894	189	3	12	375	336	6	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	88	0	0	0	32
Lane Group Flow (vph)	10	1790	0	66	1894	189	0	303	0	0	342	18
Confl. Peds. (#/hr)	1		2	2		1	6					6
Heavy Vehicles (%)	11%	2%	2%	3%	2%	2%	2%	2%	2%	2%	20%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	1.4	56.4		65.8	60.4	60.4		40.6			40.6	40.6
Effective Green, g (s)	3.4	58.4		69.3	62.4	62.4		42.6			42.6	42.6
Actuated g/C Ratio	0.03	0.49		0.58	0.52	0.52		0.36			0.36	0.36
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	46	1721		169	1840	806		574			221	550
v/s Ratio Prot	0.01	0.51		c0.02	c0.54							
v/s Ratio Perm				0.20		0.12		0.19			c0.55	0.01
v/c Ratio	0.22	1.04		0.39	1.03	0.23		0.53			1.55	0.03
Uniform Delay, d1	57.0	30.8		25.6	28.8	15.7		30.7			38.7	25.3
Progression Factor	1.21	0.70		1.73	1.43	1.44		1.00			1.00	1.00
Incremental Delay, d2	0.7	30.3		0.5	27.6	0.6		0.4			267.6	0.0
Delay (s)	69.8	51.9		44.8	68.8	23.2		31.1			306.3	25.3
Level of Service	E	D		D	E	C		C			F	C
Approach Delay (s)		52.0			64.0			31.1			270.4	
Approach LOS		D			E			C			F	
Intersection Summary												
HCM 2000 Control Delay	73.8			HCM 2000 Level of Service					E			
HCM 2000 Volume to Capacity ratio	1.21											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)					11.6			
Intersection Capacity Utilization	103.9%			ICU Level of Service					G			
Analysis Period (min)	15											
c Critical Lane Group												

Timings

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↑↑↑	↑
Traffic Volume (vph)	2300	30	2058	25
Future Volume (vph)	2300	30	2058	25
Turn Type	NA	pm+pt	NA	Prot
Protected Phases	2	1	6	4
Permitted Phases		6		
Detector Phase	2	1	6	4
Switch Phase				
Minimum Initial (s)	10.0	6.0	10.0	4.0
Minimum Split (s)	27.5	12.0	15.5	20.0
Total Split (s)	81.0	14.0	95.0	25.0
Total Split (%)	67.5%	11.7%	79.2%	20.8%
Yellow Time (s)	3.5	3.0	3.5	3.5
All-Red Time (s)	2.0	3.0	2.0	0.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.5	4.0	3.5	2.0
Lead/Lag	Lag	Lead		
Lead-Lag Optimize?				
Recall Mode	C-Max	None	C-Max	None
Act Effect Green (s)	94.8	101.6	102.1	12.4
Actuated g/C Ratio	0.79	0.85	0.85	0.10
v/c Ratio	0.59	0.17	0.50	0.63
Control Delay	2.3	12.5	4.9	29.2
Queue Delay	0.2	0.0	0.0	0.0
Total Delay	2.5	12.5	5.0	29.2
LOS	A	B	A	C
Approach Delay	2.5		5.1	29.2
Approach LOS	A		A	C

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 4 (3%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 4.6
Intersection Capacity Utilization 57.2%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Witter Drive & Duke St

 14 s	 31 s	 25 s
 95 s		

Queues

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	2355	32	2166	167
v/c Ratio	0.59	0.17	0.50	0.63
Control Delay	2.3	12.5	4.9	29.2
Queue Delay	0.2	0.0	0.0	0.0
Total Delay	2.5	12.5	5.0	29.2
Queue Length 50th (ft)	75	2	40	42
Queue Length 95th (ft)	m88	m16	274	39
Internal Link Dist (ft)	743		262	663
Turn Bay Length (ft)		200		
Base Capacity (vph)	4014	214	4328	403
Starvation Cap Reductn	692	0	238	0
Spillback Cap Reductn	317	0	0	6
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.71	0.15	0.53	0.42

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	2300	8	30	2058	25	74
Future Volume (vph)	2300	8	30	2058	25	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	2.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.90	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	5082		1770	5085	1642	
Flt Permitted	1.00		0.05	1.00	0.99	
Satd. Flow (perm)	5082		88	5085	1642	
Peak-hour factor, PHF	0.98	0.98	0.95	0.95	0.59	0.59
Adj. Flow (vph)	2347	8	32	2166	42	125
RTOR Reduction (vph)	0	0	0	0	99	0
Lane Group Flow (vph)	2355	0	32	2166	68	0
Confl. Peds. (#/hr)		9	9			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	90.4		100.1	100.1	10.4	
Effective Green, g (s)	92.4		102.1	102.1	12.4	
Actuated g/C Ratio	0.77		0.85	0.85	0.10	
Clearance Time (s)	5.5		6.0	5.5	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3913		154	4326	169	
v/s Ratio Prot	c0.46		0.01	c0.43	c0.04	
v/s Ratio Perm			0.17			
v/c Ratio	0.60		0.21	0.50	0.40	
Uniform Delay, d1	5.9		5.2	2.3	50.3	
Progression Factor	0.35		5.58	1.75	1.00	
Incremental Delay, d2	0.1		0.5	0.3	1.6	
Delay (s)	2.1		29.3	4.4	51.9	
Level of Service	A		C	A	D	
Approach Delay (s)	2.1			4.7	51.9	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			5.1		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.5
Intersection Capacity Utilization			57.2%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	27	734	1613	2069	188	20	
Future Volume (vph)	27	734	1613	2069	188	20	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	15.0	63.0	63.0	48.0	24.0	24.0	33.0
Total Split (%)	12.5%	52.5%	52.5%	40.0%	20.0%	20.0%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.4	86.8	86.8	75.5	18.6	18.6	
Actuated g/C Ratio	0.08	0.72	0.72	0.63	0.16	0.16	
v/c Ratio	0.22	0.30	1.24	0.73	0.75	0.06	
Control Delay	64.0	4.9	132.9	22.3	41.5	0.5	
Queue Delay	0.0	0.0	0.0	0.0	5.1	1.2	
Total Delay	64.0	4.9	132.9	22.3	46.6	1.6	
LOS	E	A	F	C	D	A	
Approach Delay		92.5		22.3			
Approach LOS		F		C			

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 57.8

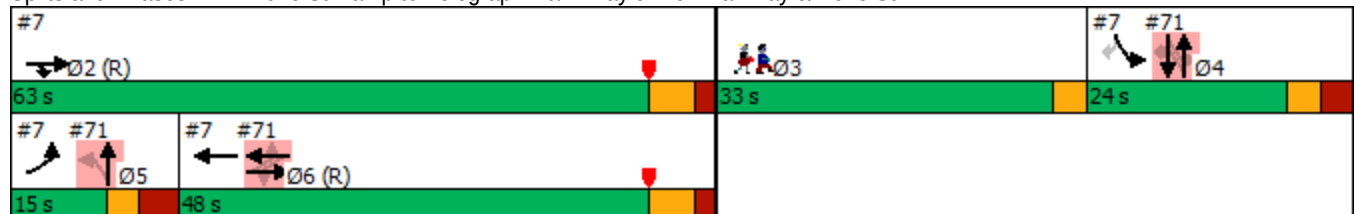
Intersection LOS: E

Intersection Capacity Utilization 103.2%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	27	741	1629	2249	198	21
v/c Ratio	0.22	0.30	1.24	0.73	0.75	0.06
Control Delay	64.0	4.9	132.9	22.3	41.5	0.5
Queue Delay	0.0	0.0	0.0	0.0	5.1	1.2
Total Delay	64.0	4.9	132.9	22.3	46.6	1.6
Queue Length 50th (ft)	22	51	~1547	471	63	0
Queue Length 95th (ft)	m31	117	#2240	#905	#104	m0
Internal Link Dist (ft)		321		576		
Turn Bay Length (ft)	180					
Base Capacity (vph)	137	2441	1309	3077	286	358
Starvation Cap Reductn	0	0	0	0	45	253
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.30	1.24	0.73	0.82	0.20

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  							
Traffic Volume (vph)	27	734	1613	0	2069	0	0	0	0	188	0	20
Future Volume (vph)	27	734	1613	0	2069	0	0	0	0	188	0	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1570	3374	1810		4893					1719		1583
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1570	3374	1810		4893					1719		1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Adj. Flow (vph)	27	741	1629	0	2249	0	0	0	0	198	0	21
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	18
Lane Group Flow (vph)	27	741	1629	0	2249	0	0	0	0	198	0	3
Confl. Peds. (#/hr)										7	7	
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	6.2	82.4	82.4		69.7					16.6		16.6
Effective Green, g (s)	8.2	84.4	84.4		71.7					18.6		18.6
Actuated g/C Ratio	0.07	0.70	0.70		0.60					0.16		0.16
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	107	2373	1273		2923					266		245
v/s Ratio Prot	0.02	0.22	c0.90		0.46					c0.12		
v/s Ratio Perm												0.00
v/c Ratio	0.25	0.31	1.28		0.77					0.74		0.01
Uniform Delay, d1	53.0	6.8	17.8		18.0					48.4		42.9
Progression Factor	1.17	0.56	0.77		1.12					0.50		1.00
Incremental Delay, d2	1.0	0.3	131.0		2.0					10.4		0.0
Delay (s)	63.1	4.1	144.6		22.2					34.7		43.0
Level of Service	E	A	F		C					C		D
Approach Delay (s)		100.3			22.2			0.0			35.5	
Approach LOS		F			C			A			D	
Intersection Summary												
HCM 2000 Control Delay			61.3									HCM 2000 Level of Service E
HCM 2000 Volume to Capacity ratio			1.17									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			103.2%									ICU Level of Service G
Analysis Period (min)			15									
c Critical Lane Group												

Timings

9: WB Duke St to SB Telegraph Rd

03/14/2024

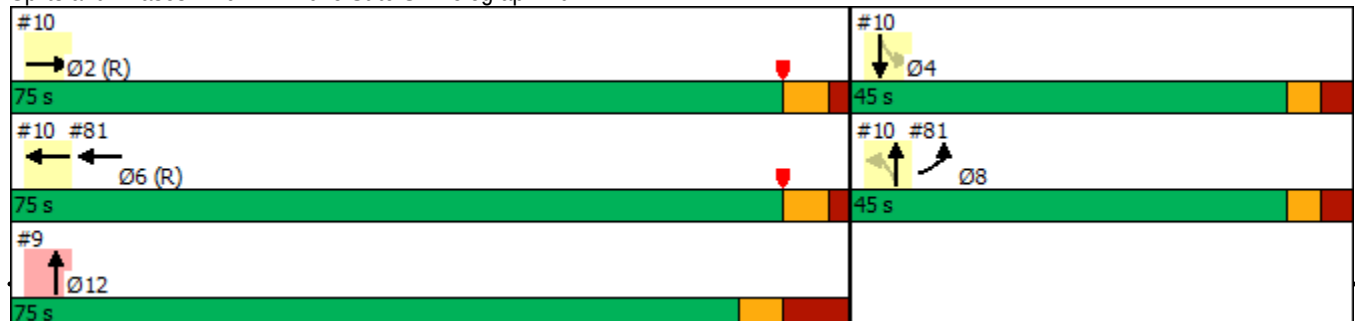


Lane Group	NBT	Ø2	Ø4	Ø6	Ø8
Lane Configurations	↑↑				
Traffic Volume (vph)	1821				
Future Volume (vph)	1821				
Turn Type	NA				
Protected Phases	12	2	4	6	8
Permitted Phases					
Detector Phase	12				
Switch Phase					
Minimum Initial (s)	4.0	10.0	7.0	4.0	7.0
Minimum Split (s)	26.0	25.0	13.0	22.0	40.0
Total Split (s)	75.0	75.0	45.0	75.0	45.0
Total Split (%)	62.5%	63%	38%	63%	38%
Yellow Time (s)	4.0	4.0	3.0	4.0	3.0
All-Red Time (s)	6.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0				
Total Lost Time (s)	8.0				
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	C-Max	None	C-Max	None
Act Effect Green (s)	80.0				
Actuated g/C Ratio	0.67				
v/c Ratio	0.77				
Control Delay	8.0				
Queue Delay	0.0				
Total Delay	8.0				
LOS	A				
Approach Delay	8.0				
Approach LOS	A				

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 8.0
Intersection LOS: A
Intersection Capacity Utilization 57.0%
ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 9: WB Duke St to SB Telegraph Rd



Queues

9: WB Duke St to SB Telegraph Rd

03/14/2024



Lane Group	NBT
Lane Group Flow (vph)	1821
v/c Ratio	0.77
Control Delay	8.0
Queue Delay	0.0
Total Delay	8.0
Queue Length 50th (ft)	149
Queue Length 95th (ft)	181
Internal Link Dist (ft)	96
Turn Bay Length (ft)	
Base Capacity (vph)	2357
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.77
Intersection Summary	

HCM Signalized Intersection Capacity Analysis

9: WB Duke St to SB Telegraph Rd

03/14/2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			
Traffic Volume (vph)	0	0	1821	0	0	0
Future Volume (vph)	0	0	1821	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			8.0			
Lane Util. Factor			0.95			
Frt			1.00			
Flt Protected			1.00			
Satd. Flow (prot)			3539			
Flt Permitted			1.00			
Satd. Flow (perm)			3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	1821	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1821	0	0	0
Turn Type			NA			
Protected Phases			12			
Permitted Phases						
Actuated Green, G (s)			78.0			
Effective Green, g (s)			80.0			
Actuated g/C Ratio			0.67			
Clearance Time (s)			10.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)			2359			
v/s Ratio Prot			c0.51			
v/s Ratio Perm						
v/c Ratio			0.77			
Uniform Delay, d1			13.7			
Progression Factor			0.38			
Incremental Delay, d2			1.9			
Delay (s)			7.1			
Level of Service			A			
Approach Delay (s)	0.0		7.1		0.0	
Approach LOS	A		A		A	
Intersection Summary						
HCM 2000 Control Delay			7.1	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		14.0
Intersection Capacity Utilization			57.0%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

03/14/2024

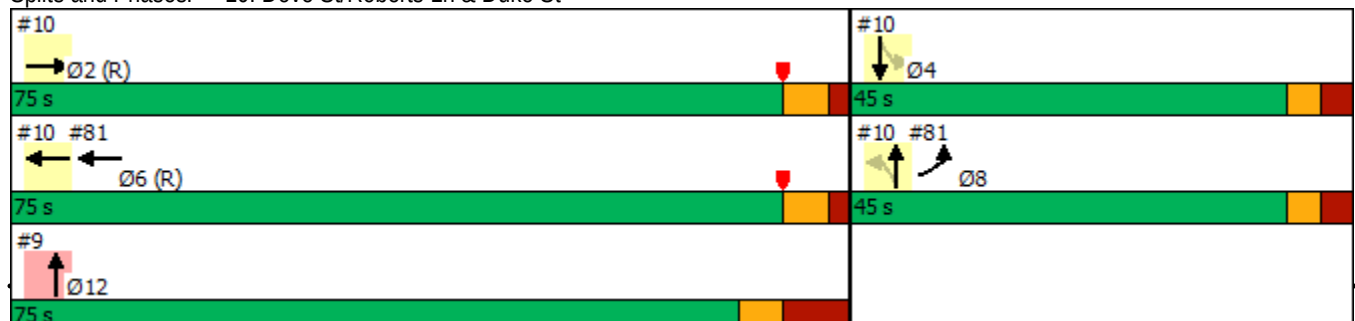


Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	Ø12
Lane Configurations	↑↑↑	↑↑↑		↑		↑	
Traffic Volume (vph)	1493	2431	136	32	15	21	
Future Volume (vph)	1493	2431	136	32	15	21	
Turn Type	NA	NA	Perm	NA	Perm	NA	
Protected Phases	2	6		8		4	12
Permitted Phases			8		4		
Detector Phase	2	6	8	8	4	4	
Switch Phase							
Minimum Initial (s)	10.0	4.0	7.0	7.0	7.0	7.0	4.0
Minimum Split (s)	25.0	22.0	40.0	40.0	13.0	13.0	26.0
Total Split (s)	75.0	75.0	45.0	45.0	45.0	45.0	75.0
Total Split (%)	62.5%	62.5%	37.5%	37.5%	37.5%	37.5%	63%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0	4.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0	6.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0	
Total Lost Time (s)	4.0	4.0		4.0		4.0	
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	None	None	None	None	Max
Act Effect Green (s)	84.0	84.0		28.0		26.3	
Actuated g/C Ratio	0.70	0.70		0.23		0.22	
v/c Ratio	0.44	0.71		0.72		0.24	
Control Delay	9.0	11.2		53.0		35.2	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	9.0	11.2		53.0		35.2	
LOS	A	B		D		D	
Approach Delay	9.0	11.2		53.0		35.2	
Approach LOS	A	B		D		D	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 13.0
Intersection Capacity Utilization 74.6%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

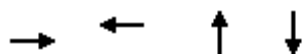
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

03/14/2024

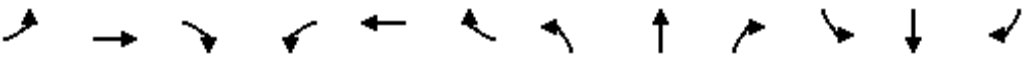


Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1572	2506	226	78
v/c Ratio	0.44	0.71	0.72	0.24
Control Delay	9.0	11.2	53.0	35.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	9.0	11.2	53.0	35.2
Queue Length 50th (ft)	154	423	160	48
Queue Length 95th (ft)	324	617	207	83
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3557	3522	459	511
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.71	0.49	0.15
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

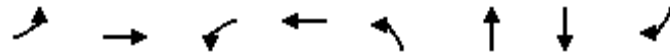
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1493	0	0	2431	0	136	32	22	15	21	36
Future Volume (vph)	0	1493	0	0	2431	0	136	32	22	15	21	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.98			0.93	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		5085			5034			1764			1590	
Flt Permitted		1.00			1.00			0.73			0.93	
Satd. Flow (perm)		5085			5034			1332			1491	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Adj. Flow (vph)	0	1572	0	0	2506	0	162	38	26	16	23	39
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	2	0
Lane Group Flow (vph)	0	1572	0	0	2506	0	0	221	0	0	76	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		82.0			82.0			26.0			26.0	
Effective Green, g (s)		84.0			84.0			28.0			28.0	
Actuated g/C Ratio		0.70			0.70			0.23			0.23	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3559			3523			310			347	
v/s Ratio Prot		0.31			c0.50							
v/s Ratio Perm								c0.17			0.05	
v/c Ratio		0.44			0.71			0.71			0.22	
Uniform Delay, d1		7.8			10.8			42.3			37.2	
Progression Factor		0.98			0.85			1.00			1.00	
Incremental Delay, d2		0.4			0.8			7.6			0.3	
Delay (s)		8.1			9.9			49.9			37.5	
Level of Service		A			A			D			D	
Approach Delay (s)		8.1			9.9			49.9			37.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay		11.8			HCM 2000 Level of Service			B				
HCM 2000 Volume to Capacity ratio		0.75										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			14.0				
Intersection Capacity Utilization		74.6%			ICU Level of Service			D				
Analysis Period (min)		15										
c Critical Lane Group												

Timings

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations		↔		↔		↔	↔	↔			
Traffic Volume (vph)	8	5	10	44	4	22	129	1			
Future Volume (vph)	8	5	10	44	4	22	129	1			
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA	Perm			
Protected Phases		6		6		4 5	4		2	3	5
Permitted Phases	6		6		4 5			4			
Detector Phase	6	6	6	6	4 5	4 5	4	4			
Switch Phase											
Minimum Initial (s)	7.0	7.0	7.0	7.0			7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0			13.0	13.0	14.0	33.0	12.5
Total Split (s)	48.0	48.0	48.0	48.0			24.0	24.0	63.0	33.0	15.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%			20.0%	20.0%	53%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0			3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0			-2.0	-2.0			
Total Lost Time (s)		4.0		4.0			4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag		Lead	Lead
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None	C-Max	None	None
Act Effect Green (s)		75.5		75.5		32.4	18.6	18.6			
Actuated g/C Ratio		0.63		0.63		0.27	0.16	0.16			
v/c Ratio		0.10		0.31		0.06	0.47	0.00			
Control Delay		5.5		7.6		2.7	51.7	0.0			
Queue Delay		0.0		0.2		3.5	0.1	0.0			
Total Delay		5.6		7.8		6.2	51.7	0.0			
LOS		A		A		A	D	A			
Approach Delay		5.6		7.8		6.2	51.4				
Approach LOS		A		A		A	D				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.24

Intersection Signal Delay: 17.4

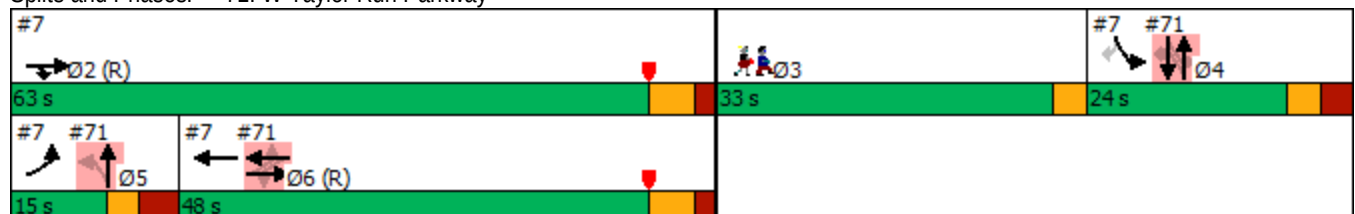
Intersection LOS: B

Intersection Capacity Utilization 38.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	101	328	29	136	1
v/c Ratio	0.10	0.31	0.06	0.47	0.00
Control Delay	5.5	7.6	2.7	51.7	0.0
Queue Delay	0.0	0.2	3.5	0.1	0.0
Total Delay	5.6	7.8	6.2	51.7	0.0
Queue Length 50th (ft)	4	43	0	96	0
Queue Length 95th (ft)	36	128	4	160	0
Internal Link Dist (ft)	56	368	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	1030	1061	490	310	358
Starvation Cap Reductn	0	0	408	0	0
Spillback Cap Reductn	187	192	0	5	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.38	0.35	0.45	0.00
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Parkway

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	5	69	10	44	199	4	22	2	0	129	1
Future Volume (vph)	8	5	69	10	44	199	4	22	2	0	129	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.97			1.00			1.00	1.00
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.89			0.89			0.99			1.00	0.85
Flt Protected		1.00			1.00			0.99			1.00	1.00
Satd. Flow (prot)		1641			1612			1815			1863	1583
Flt Permitted		0.96			0.99			0.97			1.00	1.00
Satd. Flow (perm)		1590			1599			1773			1863	1583
Peak-hour factor, PHF	0.81	0.81	0.81	0.77	0.77	0.77	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	10	6	85	13	57	258	4	23	2	0	136	1
RTOR Reduction (vph)	0	34	0	0	70	0	0	1	0	0	0	1
Lane Group Flow (vph)	0	67	0	0	258	0	0	28	0	0	136	0
Confl. Peds. (#/hr)	22					22			7	7		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	2%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		69.7			69.7			28.8			16.6	16.6
Effective Green, g (s)		71.7			71.7			30.8			18.6	18.6
Actuated g/C Ratio		0.60			0.60			0.26			0.16	0.16
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		950			955			455			288	245
v/s Ratio Prot											c0.07	
v/s Ratio Perm		0.04			c0.16			c0.02				0.00
v/c Ratio		0.07			0.27			0.06			0.47	0.00
Uniform Delay, d1		10.1			11.6			33.7			46.2	42.8
Progression Factor		1.00			0.92			0.08			1.00	1.00
Incremental Delay, d2		0.1			0.7			0.1			1.2	0.0
Delay (s)		10.3			11.4			2.8			47.4	42.8
Level of Service		B			B			A			D	D
Approach Delay (s)		10.3			11.4			2.8			47.4	
Approach LOS		B			B			A			D	
Intersection Summary												
HCM 2000 Control Delay			19.1			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.27									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			15.5			
Intersection Capacity Utilization			38.4%			ICU Level of Service			A			
Analysis Period (min)			15									

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

72: Duke St Slip Lane & Service Rd

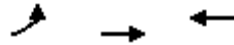
03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations				↑	↖	
Traffic Volume (veh/h)	0	0	0	24	245	0
Future Volume (Veh/h)	0	0	0	24	245	0
Sign Control	Stop			Stop	Free	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	24	245	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	490	0	490	490	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	490	0	490	490	0	
tC, single (s)	6.5	6.2	7.1	6.5	4.1	
tC, 2 stage (s)						
tF (s)	4.0	3.3	3.5	4.0	2.2	
p0 queue free %	100	100	100	94	85	
cM capacity (veh/h)	407	1085	432	407	1623	
Direction, Lane #	WB 1	NB 1				
Volume Total	24	245				
Volume Left	0	245				
Volume Right	0	0				
cSH	407	1623				
Volume to Capacity	0.06	0.15				
Queue Length 95th (ft)	5	13				
Control Delay (s)	14.4	7.6				
Lane LOS	B	A				
Approach Delay (s)	14.4	7.6				
Approach LOS	B					
Intersection Summary						
Average Delay		8.2				
Intersection Capacity Utilization		23.6%		ICU Level of Service		A
Analysis Period (min)		15				

Timings

81: Duke St

03/14/2024

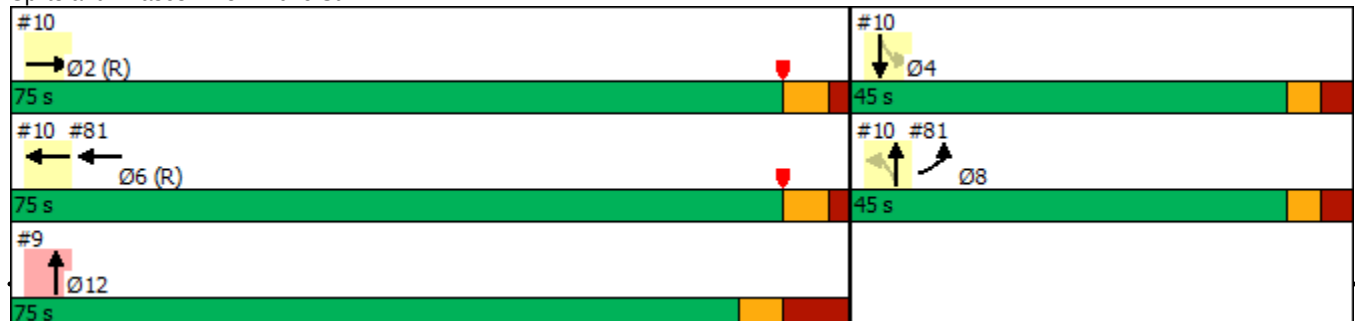


Lane Group	EBL	EBT	WBT	Ø2	Ø4	Ø12
Lane Configurations						
Traffic Volume (vph)	207	716	781			
Future Volume (vph)	207	716	781			
Turn Type	Prot	NA	NA			
Protected Phases	8	Free	6	2	4	12
Permitted Phases						
Detector Phase	8		6			
Switch Phase						
Minimum Initial (s)	7.0		4.0	10.0	7.0	4.0
Minimum Split (s)	40.0		22.0	25.0	13.0	26.0
Total Split (s)	45.0		75.0	75.0	45.0	75.0
Total Split (%)	37.5%		62.5%	63%	38%	63%
Yellow Time (s)	3.0		4.0	4.0	3.0	4.0
All-Red Time (s)	3.0		2.0	2.0	3.0	6.0
Lost Time Adjust (s)	-2.0		-2.0			
Total Lost Time (s)	4.0		4.0			
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		C-Max	C-Max	None	Max
Act Effect Green (s)	28.0	120.0	84.0			
Actuated g/C Ratio	0.23	1.00	0.70			
v/c Ratio	0.50	0.20	0.32			
Control Delay	42.9	0.1	4.2			
Queue Delay	0.0	0.0	0.0			
Total Delay	42.9	0.1	4.2			
LOS	D	A	A			
Approach Delay		9.7	4.2			
Approach LOS		A	A			

Intersection Summary

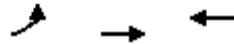
Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 7.2
 Intersection LOS: A
 Intersection Capacity Utilization 123.1%
 ICU Level of Service H
 Analysis Period (min) 15

Splits and Phases: 81: Duke St



Queues
81: Duke St

03/14/2024



Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	207	716	781
v/c Ratio	0.50	0.20	0.32
Control Delay	42.9	0.1	4.2
Queue Delay	0.0	0.0	0.0
Total Delay	42.9	0.1	4.2
Queue Length 50th (ft)	139	0	52
Queue Length 95th (ft)	m120	0	70
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	604	3539	2475
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.34	0.20	0.32

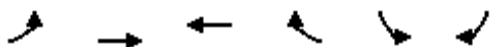
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

81: Duke St

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	207	716	781	0	0	0
Future Volume (vph)	207	716	781	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	207	716	781	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	207	716	781	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	8	Free	6			
Permitted Phases						
Actuated Green, G (s)	26.0	120.0	82.0			
Effective Green, g (s)	28.0	120.0	84.0			
Actuated g/C Ratio	0.23	1.00	0.70			
Clearance Time (s)	6.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	413	3539	2477			
v/s Ratio Prot	c0.12	0.20	c0.22			
v/s Ratio Perm						
v/c Ratio	0.50	0.20	0.32			
Uniform Delay, d1	39.9	0.0	6.9			
Progression Factor	1.01	1.00	0.49			
Incremental Delay, d2	0.9	0.1	0.3			
Delay (s)	41.3	0.1	3.7			
Level of Service	D	A	A			
Approach Delay (s)		9.4	3.7		0.0	
Approach LOS		A	A		A	
Intersection Summary						
HCM 2000 Control Delay			6.8	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.39			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		16.0
Intersection Capacity Utilization			123.1%	ICU Level of Service		H
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

82: WB Duke St to SB Telegraph Rd

03/14/2024

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		↑↑			↱	
Traffic Volume (veh/h)	0	1821	0	0	207	0
Future Volume (Veh/h)	0	1821	0	0	207	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1821	0	0	207	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		251				
pX, platoon unblocked					0.62	
vC, conflicting volume	0				910	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				0	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				67	100
cM capacity (veh/h)	1622				634	1084
Direction, Lane #	NB 1	NB 2	NE 1			
Volume Total	910	910	207			
Volume Left	0	0	207			
Volume Right	0	0	0			
cSH	1700	1700	634			
Volume to Capacity	0.54	0.54	0.33			
Queue Length 95th (ft)	0	0	35			
Control Delay (s)	0.0	0.0	13.4			
Lane LOS			B			
Approach Delay (s)	0.0		13.4			
Approach LOS			B			
Intersection Summary						
Average Delay		1.4				
Intersection Capacity Utilization		68.5%		ICU Level of Service		C
Analysis Period (min)		15				



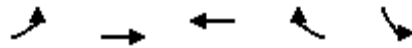
Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix X: Signal Timing 2036 Build Alternative 3A

Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	Ø2
Lane Configurations	↰	↑↑↑	↑↑	↰	↰↰	
Traffic Volume (vph)	323	1319	920	1065	573	
Future Volume (vph)	323	1319	920	1065	573	
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	2
Permitted Phases	5 2					
Detector Phase	5	5 2	6	6 4	4	
Switch Phase						
Minimum Initial (s)	5.0		10.0		7.0	10.0
Minimum Split (s)	19.6		22.0		29.5	22.0
Total Split (s)	20.0		61.0		39.0	81.0
Total Split (%)	16.7%		50.8%		32.5%	68%
Yellow Time (s)	3.0		4.0		3.5	4.0
All-Red Time (s)	2.6		2.0		3.0	2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0	
Total Lost Time (s)	3.6		4.0		4.5	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None		C-Max		None	C-Max
Act Effect Green (s)	77.4	77.4	57.0	96.0	34.5	
Actuated g/C Ratio	0.64	0.64	0.48	0.80	0.29	
v/c Ratio	0.89	0.45	0.61	0.89	1.05	
Control Delay	41.1	11.2	16.4	18.6	82.5	
Queue Delay	0.0	0.0	2.0	20.1	4.1	
Total Delay	41.1	11.2	18.4	38.7	86.6	
LOS	D	B	B	D	F	
Approach Delay		17.1	29.3		86.6	
Approach LOS		B	C		F	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.05
 Intersection Signal Delay: 35.6
 Intersection Capacity Utilization 90.9%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service E

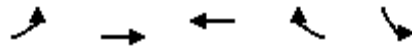
Splits and Phases: 1: Duke St & N Quaker Lane



Queues

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	351	1434	968	1121	907
v/c Ratio	0.89	0.45	0.61	0.89	1.05
Control Delay	41.1	11.2	16.4	18.6	82.5
Queue Delay	0.0	0.0	2.0	20.1	4.1
Total Delay	41.1	11.2	18.4	38.7	86.6
Queue Length 50th (ft)	130	187	154	922	~372
Queue Length 95th (ft)	#302	219	220	#1083	#501
Internal Link Dist (ft)		582	312		324
Turn Bay Length (ft)					
Base Capacity (vph)	396	3217	1587	1254	865
Starvation Cap Reductn	0	0	446	166	0
Spillback Cap Reductn	0	327	0	0	9
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.89	0.50	0.85	1.03	1.06

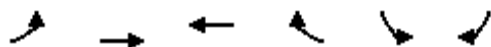
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑↑	↑↑	↰	↰↰	
Traffic Volume (vph)	323	1319	920	1065	573	279
Future Volume (vph)	323	1319	920	1065	573	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.95	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1719	4988	3343	1568	2831	
Flt Permitted	0.18	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	319	4988	3343	1568	2831	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.94	0.94
Adj. Flow (vph)	351	1434	968	1121	610	297
RTOR Reduction (vph)	0	0	0	0	52	0
Lane Group Flow (vph)	351	1434	968	1121	855	0
Confl. Peds. (#/hr)	4			4	4	2
Heavy Vehicles (%)	5%	4%	8%	3%	27%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	75.0	75.0	55.0	93.5	32.5	
Effective Green, g (s)	77.0	77.0	57.0	95.5	34.5	
Actuated g/C Ratio	0.64	0.64	0.48	0.80	0.29	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		0.2		3.0	
Lane Grp Cap (vph)	396	3200	1587	1247	813	
v/s Ratio Prot	c0.12	0.29	0.29	0.71	c0.30	
v/s Ratio Perm	c0.45					
v/c Ratio	0.89	0.45	0.61	0.90	1.05	
Uniform Delay, d1	19.2	10.8	23.3	8.8	42.8	
Progression Factor	1.00	1.00	0.64	1.13	1.00	
Incremental Delay, d2	20.5	0.1	1.3	6.7	46.0	
Delay (s)	39.7	10.9	16.2	16.6	88.8	
Level of Service	D	B	B	B	F	
Approach Delay (s)		16.6	16.4		88.8	
Approach LOS		B	B		F	
Intersection Summary						
HCM 2000 Control Delay			30.2		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.96			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			90.9%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Timings

2: S Quaker Ln & Duke St

03/14/2024

	→	↘	↙	←	↖	↑	↗	↓		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø6
Lane Configurations	↑↑	↑	↙	↑↑		↕		↕		
Traffic Volume (vph)	1763	123	25	1930	55	0	2	0		
Future Volume (vph)	1763	123	25	1930	55	0	2	0		
Turn Type	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA		
Protected Phases	2		1	1 6		4		3 4	3	6
Permitted Phases		2	1 6		4		3 4			
Detector Phase	2	2	1	1 6	4	4	3 4	3 4		
Switch Phase										
Minimum Initial (s)	10.0	10.0	5.0		7.0	7.0			4.0	4.0
Minimum Split (s)	15.5	15.5	10.5		29.0	29.0			12.0	20.0
Total Split (s)	63.0	63.0	16.0		29.0	29.0			12.0	79.0
Total Split (%)	52.5%	52.5%	13.3%		24.2%	24.2%			10%	66%
Yellow Time (s)	4.0	4.0	4.0		3.0	3.0			3.0	4.0
All-Red Time (s)	1.5	1.5	1.5		1.0	1.0			0.5	1.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0			-2.0				
Total Lost Time (s)	3.5	3.5	3.5			2.0				
Lead/Lag	Lead	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	None		None	None			None	C-Max
Act Effect Green (s)	86.6	86.6	102.6	103.3		12.6		14.6		
Actuated g/C Ratio	0.72	0.72	0.86	0.86		0.10		0.12		
v/c Ratio	0.77	0.12	0.10	0.69		0.35		0.01		
Control Delay	14.7	2.3	2.1	3.0		8.4		38.5		
Queue Delay	0.0	0.0	0.0	0.1		0.0		0.0		
Total Delay	14.7	2.3	2.1	3.0		8.4		38.5		
LOS	B	A	A	A		A		D		
Approach Delay	13.9			3.0		8.4		38.5		
Approach LOS	B			A		A		D		

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 8.4
Intersection Capacity Utilization 68.2%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service C

Splits and Phases: 2: S Quaker Ln & Duke St

Ø2 (R)	Ø1	Ø3	Ø4
63 s	16 s	12 s	29 s
Ø6 (R)			
79 s			

Queues

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1916	134	27	2053	83	2
v/c Ratio	0.77	0.12	0.10	0.69	0.35	0.01
Control Delay	14.7	2.3	2.1	3.0	8.4	38.5
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	14.7	2.3	2.1	3.0	8.4	38.5
Queue Length 50th (ft)	591	4	0	5	0	1
Queue Length 95th (ft)	m#926	m20	m3	103	21	8
Internal Link Dist (ft)	312			222	293	73
Turn Bay Length (ft)			75			
Base Capacity (vph)	2504	1088	262	2959	384	343
Starvation Cap Reductn	0	0	0	82	0	0
Spillback Cap Reductn	0	0	0	84	2	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.12	0.10	0.71	0.22	0.01

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 Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1763	123	25	1930	0	55	0	15	2	0	0
Future Volume (vph)	0	1763	123	25	1930	0	55	0	15	2	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor		0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00	0.98	1.00	1.00			1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	1.00			0.97			1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.96			0.95	
Satd. Flow (prot)		3471	1475	1770	3438			1666			1761	
Flt Permitted		1.00	1.00	0.06	1.00			0.78			0.76	
Satd. Flow (perm)		3471	1475	105	3438			1345			1418	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.84	0.84	0.84	1.00	1.00	1.00
Adj. Flow (vph)	0	1916	134	27	2053	0	65	0	18	2	0	0
RTOR Reduction (vph)	0	0	28	0	0	0	0	75	0	0	0	0
Lane Group Flow (vph)	0	1916	106	27	2053	0	0	8	0	0	2	0
Confl. Peds. (#/hr)	9		4	4		9			5	5		
Heavy Vehicles (%)	2%	4%	7%	2%	5%	2%	2%	2%	21%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 6			4			3 4	
Permitted Phases	2		2	1 6			4			3 4		
Actuated Green, G (s)		81.0	81.0	97.0	97.0			9.2			13.5	
Effective Green, g (s)		83.0	83.0	99.0	99.0			11.2			15.5	
Actuated g/C Ratio		0.69	0.69	0.82	0.82			0.09			0.13	
Clearance Time (s)		5.5	5.5	5.5				4.0				
Vehicle Extension (s)		0.2	0.2	3.0				3.0				
Lane Grp Cap (vph)		2400	1020	260	2836			125			183	
v/s Ratio Prot		c0.55		0.01	c0.60							
v/s Ratio Perm			0.07	0.08				c0.01			c0.00	
v/c Ratio		0.80	0.10	0.10	0.72			0.06			0.01	
Uniform Delay, d1		12.7	6.1	20.0	4.6			49.6			45.6	
Progression Factor		0.95	0.61	0.20	0.28			1.00			1.00	
Incremental Delay, d2		2.3	0.2	0.1	0.6			0.2			0.0	
Delay (s)		14.4	3.9	4.1	1.9			49.8			45.6	
Level of Service		B	A	A	A			D			D	
Approach Delay (s)		13.7			1.9			49.8			45.6	
Approach LOS		B			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			8.6			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			68.2%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

3: Duke St & Alexandria Commons

03/14/2024



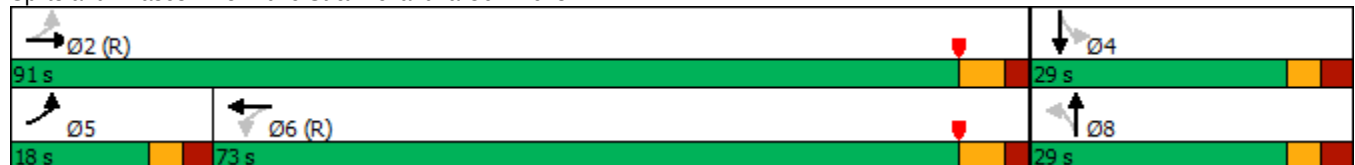
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	42	1737	1906	3	0	18	0
Future Volume (vph)	42	1737	1906	3	0	18	0
Turn Type	pm+pt	NA	NA	Perm	NA	Perm	NA
Protected Phases	5	2	6		8		4
Permitted Phases	2			8		4	
Detector Phase	5	2	6	8	8	4	4
Switch Phase							
Minimum Initial (s)	4.5	10.0	1.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.6	16.3	16.3	29.0	29.0	13.0	13.0
Total Split (s)	18.0	91.0	73.0	29.0	29.0	29.0	29.0
Total Split (%)	15.0%	75.8%	60.8%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.6	2.3	2.3	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	3.6	4.3	4.3		4.0		4.0
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	102.8	103.0	94.3		12.2		12.2
Actuated g/C Ratio	0.86	0.86	0.79		0.10		0.10
v/c Ratio	0.24	0.62	0.76		0.10		0.30
Control Delay	13.1	1.7	5.3		47.0		9.8
Queue Delay	0.0	0.2	1.0		0.0		0.0
Total Delay	13.1	1.9	6.3		47.0		9.8
LOS	B	A	A		D		A
Approach Delay		2.2	6.3		47.0		9.8
Approach LOS		A	A		D		A

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 4.6
 Intersection Capacity Utilization 70.1%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service C

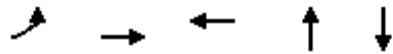
Splits and Phases: 3: Duke St & Alexandria Commons



Queues

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	44	1834	2044	12	67
v/c Ratio	0.24	0.62	0.76	0.10	0.30
Control Delay	13.1	1.7	5.3	47.0	9.8
Queue Delay	0.0	0.2	1.0	0.0	0.0
Total Delay	13.1	1.9	6.3	47.0	9.8
Queue Length 50th (ft)	0	1	10	9	0
Queue Length 95th (ft)	m3	58	#993	7	29
Internal Link Dist (ft)		222	571	88	97
Turn Bay Length (ft)	100				
Base Capacity (vph)	287	2978	2694	253	379
Starvation Cap Reductn	0	384	373	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.15	0.71	0.88	0.05	0.18

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 Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	1737	6	0	1906	36	3	0	0	18	0	46
Future Volume (vph)	42	1737	6	0	1906	36	3	0	0	18	0	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.3			4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			1.00			0.90	
Flt Protected	0.95	1.00			1.00			0.95			0.99	
Satd. Flow (prot)	1770	3469			3429			1770			1653	
Flt Permitted	0.05	1.00			1.00			0.65			0.91	
Satd. Flow (perm)	102	3469			3429			1215			1518	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.25	0.25	0.25	0.95	0.95	0.95
Adj. Flow (vph)	44	1828	6	0	2006	38	12	0	0	19	0	48
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	61	0
Lane Group Flow (vph)	44	1834	0	0	2043	0	0	12	0	0	6	0
Confl. Peds. (#/hr)	8		3	3		8			9	9		
Heavy Vehicles (%)	2%	4%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	98.9	98.9			89.1			8.8			8.8	
Effective Green, g (s)	100.9	100.9			91.1			10.8			10.8	
Actuated g/C Ratio	0.84	0.84			0.76			0.09			0.09	
Clearance Time (s)	5.6	6.3			6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0			0.2			2.0			2.0	
Lane Grp Cap (vph)	171	2916			2603			109			136	
v/s Ratio Prot	0.01	c0.53			c0.60							
v/s Ratio Perm	0.20							c0.01			0.00	
v/c Ratio	0.26	0.63			0.78			0.11			0.04	
Uniform Delay, d1	11.3	3.2			8.6			50.2			49.9	
Progression Factor	4.32	0.25			0.31			1.00			1.00	
Incremental Delay, d2	0.2	0.7			1.3			0.2			0.0	
Delay (s)	49.0	1.5			3.9			50.3			49.9	
Level of Service	D	A			A			D			D	
Approach Delay (s)		2.6			3.9			50.3			49.9	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			4.2									
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			120.0									
Intersection Capacity Utilization			70.1%									
Analysis Period (min)			15									
c Critical Lane Group												

Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	54	1699	23	1849	12	5	85	1	81
Future Volume (vph)	54	1699	23	1849	12	5	85	1	81
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	4.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	30.8	10.0	31.0	29.0	29.0	29.0	29.0	29.0
Total Split (s)	16.0	73.0	18.0	75.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	13.3%	60.8%	15.0%	62.5%	24.2%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	1.8	2.6	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	3.8	3.6	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	None	None
Act Effect Green (s)	93.4	88.7	91.6	85.6		17.0		17.0	17.0
Actuated g/C Ratio	0.78	0.74	0.76	0.71		0.14		0.14	0.14
v/c Ratio	0.33	0.70	0.13	0.88		0.23		0.61	0.34
Control Delay	19.7	9.3	0.7	8.7		21.7		61.7	10.8
Queue Delay	0.0	0.2	0.0	1.9		0.0		0.0	0.0
Total Delay	19.7	9.4	0.7	10.6		21.7		61.7	10.8
LOS	B	A	A	B		C		E	B
Approach Delay		9.7		10.5		21.7		36.9	
Approach LOS		A		B		C		D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 11.7

Intersection LOS: B

Intersection Capacity Utilization 80.1%

ICU Level of Service D

Analysis Period (min) 15

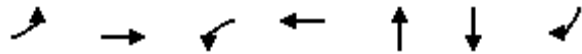
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St



Queues

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	57	1809	25	2148	55	113	107
v/c Ratio	0.33	0.70	0.13	0.88	0.23	0.61	0.34
Control Delay	19.7	9.3	0.7	8.7	21.7	61.7	10.8
Queue Delay	0.0	0.2	0.0	1.9	0.0	0.0	0.0
Total Delay	19.7	9.4	0.7	10.6	21.7	61.7	10.8
Queue Length 50th (ft)	8	140	0	65	13	84	0
Queue Length 95th (ft)	m48	450	m0	m#165	48	112	29
Internal Link Dist (ft)		571		730	190	93	
Turn Bay Length (ft)	195		80				
Base Capacity (vph)	236	2566	291	2430	342	270	409
Starvation Cap Reductn	0	25	0	89	0	0	0
Spillback Cap Reductn	0	160	0	156	1	0	4
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.75	0.09	0.94	0.16	0.42	0.26

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 Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	1699	2	23	1849	127	12	5	32	85	1	81
Future Volume (vph)	54	1699	2	23	1849	127	12	5	32	85	1	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3471		1656	3405			1617			1760	1559
Flt Permitted	0.05	1.00		0.08	1.00			0.92			0.70	1.00
Satd. Flow (perm)	86	3471		137	3405			1504			1298	1559
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.90	0.90	0.90	0.76	0.76	0.76
Adj. Flow (vph)	57	1807	2	25	2010	138	13	6	36	112	1	107
RTOR Reduction (vph)	0	0	0	0	3	0	0	31	0	0	0	92
Lane Group Flow (vph)	57	1809	0	25	2145	0	0	24	0	0	113	15
Confl. Peds. (#/hr)	3		3	3		3	2		6	6		2
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	9%	2%	3%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	89.1	84.5		85.5	82.4			15.0			15.0	15.0
Effective Green, g (s)	93.1	86.5		89.5	84.4			17.0			17.0	17.0
Actuated g/C Ratio	0.78	0.72		0.75	0.70			0.14			0.14	0.14
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	159	2502		166	2394			213			183	220
v/s Ratio Prot	c0.02	0.52		0.01	c0.63							
v/s Ratio Perm	0.26			0.11				0.02			c0.09	0.01
v/c Ratio	0.36	0.72		0.15	0.90			0.11			0.62	0.07
Uniform Delay, d1	21.0	9.8		8.7	14.3			44.9			48.4	44.6
Progression Factor	1.86	0.73		0.07	0.35			1.00			1.00	1.00
Incremental Delay, d2	0.4	1.5		0.0	2.0			0.1			4.3	0.0
Delay (s)	39.5	8.6		0.7	7.0			45.0			52.7	44.7
Level of Service	D	A		A	A			D			D	D
Approach Delay (s)		9.5			6.9			45.0			48.8	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay	10.7			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.82											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			12.0					
Intersection Capacity Utilization	80.1%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												

Timings

5: Roth St/Cambridge Rd & Duke St

03/14/2024

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	63	1749	100	1939	316	6	6	198	4	53
Future Volume (vph)	63	1749	100	1939	316	6	6	198	4	53
Turn Type	Prot	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6			8		4	
Permitted Phases			6		6	8		4		4
Detector Phase	5	2	1	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	6.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.5	30.7	11.5	15.7	15.7	13.4	13.4	30.4	30.4	30.4
Total Split (s)	16.0	67.0	18.0	69.0	69.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	13.3%	55.8%	15.0%	57.5%	57.5%	29.2%	29.2%	29.2%	29.2%	29.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	1.7	2.5	1.7	1.7	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	3.5	3.7	3.5	3.7	3.7		4.4		4.4	4.4
Lead/Lag	Lead	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?										
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	10.7	71.5	82.7	73.6	73.6		26.4		26.4	26.4
Actuated g/C Ratio	0.09	0.60	0.69	0.61	0.61		0.22		0.22	0.22
v/c Ratio	0.44	0.93	0.53	0.99	0.35		0.20		0.83	0.15
Control Delay	51.3	32.5	35.4	41.0	10.0		13.1		68.5	6.0
Queue Delay	0.0	0.1	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	51.3	32.5	35.4	41.0	10.0		13.1		68.5	6.0
LOS	D	C	D	D	A		B		E	A
Approach Delay		33.2		36.6			13.1		55.6	
Approach LOS		C		D			B		E	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 101 (84%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay: 36.0

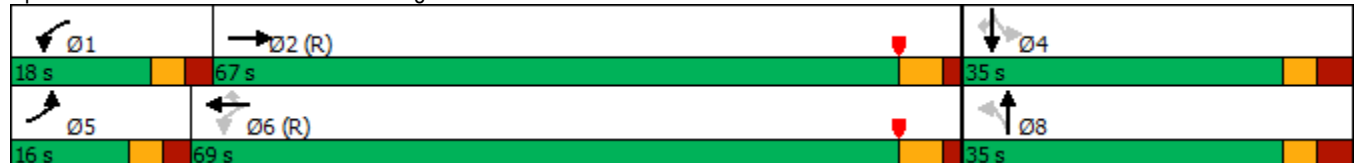
Intersection LOS: D

Intersection Capacity Utilization 87.7%

ICU Level of Service E

Analysis Period (min) 15

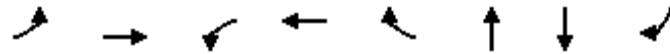
Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



Queues

5: Roth St/Cambridge Rd & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	69	1926	108	2085	340	70	230	60
v/c Ratio	0.44	0.93	0.53	0.99	0.35	0.20	0.83	0.15
Control Delay	51.3	32.5	35.4	41.0	10.0	13.1	68.5	6.0
Queue Delay	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.3	32.5	35.4	41.0	10.0	13.1	68.5	6.0
Queue Length 50th (ft)	54	538	25	~959	191	7	168	0
Queue Length 95th (ft)	m80	#1010	102	#1102	9	45	#253	23
Internal Link Dist (ft)		730		743		286	101	
Turn Bay Length (ft)	120		250					
Base Capacity (vph)	184	2067	256	2107	970	403	321	445
Starvation Cap Reductn	0	4	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	0.38	0.93	0.42	0.99	0.35	0.17	0.72	0.13

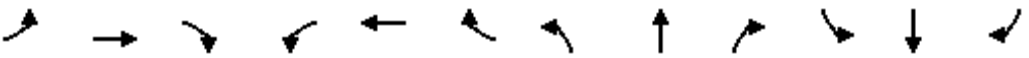
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	1749	4	100	1939	316	6	6	56	198	4	53
Future Volume (vph)	63	1749	4	100	1939	316	6	6	56	198	4	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	3470		1656	3438	1583		1450			1758	1527
Flt Permitted	0.95	1.00		0.06	1.00	1.00		0.97			0.68	1.00
Satd. Flow (perm)	1770	3470		96	3438	1583		1413			1261	1527
Peak-hour factor, PHF	0.91	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.97	0.88	0.88	0.88
Adj. Flow (vph)	69	1922	4	108	2085	340	6	6	58	225	5	60
RTOR Reduction (vph)	0	0	0	0	0	0	0	45	0	0	0	47
Lane Group Flow (vph)	69	1926	0	108	2085	340	0	25	0	0	230	13
Confl. Peds. (#/hr)			4	4			16					16
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	17%	2%	17%	2%	50%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	7.5	69.5		79.0	70.5	70.5		24.4			24.4	24.4
Effective Green, g (s)	9.5	71.5		83.0	72.5	72.5		26.4			26.4	26.4
Actuated g/C Ratio	0.08	0.60		0.69	0.60	0.60		0.22			0.22	0.22
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	140	2067		202	2077	956		310			277	335
v/s Ratio Prot	0.04	0.56		c0.05	c0.61							
v/s Ratio Perm				0.32		0.21		0.02			c0.18	0.01
v/c Ratio	0.49	0.93		0.53	1.00	0.36		0.08			0.83	0.04
Uniform Delay, d1	52.9	22.0		27.2	23.8	12.0		37.2			44.7	36.8
Progression Factor	0.87	1.07		1.42	1.03	0.67		1.00			1.00	1.00
Incremental Delay, d2	0.7	7.1		1.1	18.8	0.8		0.0			17.9	0.0
Delay (s)	46.9	30.8		39.9	43.1	8.9		37.2			62.5	36.8
Level of Service	D	C		D	D	A		D			E	D
Approach Delay (s)		31.3			38.4			37.2			57.2	
Approach LOS		C			D			D			E	
Intersection Summary												
HCM 2000 Control Delay			36.6									HCM 2000 Level of Service D
HCM 2000 Volume to Capacity ratio			0.92									
Actuated Cycle Length (s)			120.0									Sum of lost time (s) 11.6
Intersection Capacity Utilization			87.7%									ICU Level of Service E
Analysis Period (min)			15									
c Critical Lane Group												

Timings

6: Witter Drive & Duke St

03/14/2024

	→	↖	←	↙
Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↑↑↑	↙
Traffic Volume (vph)	1981	91	2348	7
Future Volume (vph)	1981	91	2348	7
Turn Type	NA	pm+pt	NA	Prot
Protected Phases	2	1	6	4
Permitted Phases		6		
Detector Phase	2	1	6	4
Switch Phase				
Minimum Initial (s)	10.0	6.0	10.0	4.0
Minimum Split (s)	27.5	12.0	15.5	13.0
Total Split (s)	79.0	16.0	95.0	25.0
Total Split (%)	65.8%	13.3%	79.2%	20.8%
Yellow Time (s)	3.5	3.0	3.5	3.0
All-Red Time (s)	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.5	4.0	3.5	4.0
Lead/Lag	Lead	Lag		
Lead-Lag Optimize?				
Recall Mode	C-Max	None	C-Max	None
Act Effect Green (s)	89.8	105.3	106.5	9.0
Actuated g/C Ratio	0.75	0.88	0.89	0.08
v/c Ratio	0.58	0.39	0.58	0.31
Control Delay	14.0	21.6	2.7	26.9
Queue Delay	0.0	0.0	0.3	0.0
Total Delay	14.0	21.6	3.0	26.9
LOS	B	C	A	C
Approach Delay	14.0		3.7	26.9
Approach LOS	B		A	C

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 69 (58%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 8.5
Intersection Capacity Utilization 57.1%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Witter Drive & Duke St



Queues

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	2154	100	2580	46
v/c Ratio	0.58	0.39	0.58	0.31
Control Delay	14.0	21.6	2.7	26.9
Queue Delay	0.0	0.0	0.3	0.0
Total Delay	14.0	21.6	3.0	26.9
Queue Length 50th (ft)	411	23	2	7
Queue Length 95th (ft)	m526	m57	768	31
Internal Link Dist (ft)	743		262	663
Turn Bay Length (ft)		200		
Base Capacity (vph)	3725	259	4426	298
Starvation Cap Reductn	0	0	948	0
Spillback Cap Reductn	88	0	826	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.59	0.39	0.74	0.15

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

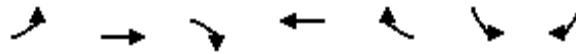
03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	1981	22	91	2348	7	26
Future Volume (vph)	1981	22	91	2348	7	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.89	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	4978		1719	4988	1538	
Flt Permitted	1.00		0.06	1.00	0.99	
Satd. Flow (perm)	4978		112	4988	1538	
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.73	0.73
Adj. Flow (vph)	2130	24	100	2580	10	36
RTOR Reduction (vph)	1	0	0	0	34	0
Lane Group Flow (vph)	2153	0	100	2580	12	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	4%	2%	5%	4%	14%	8%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	86.6		102.6	102.6	5.9	
Effective Green, g (s)	88.6		104.6	104.6	7.9	
Actuated g/C Ratio	0.74		0.87	0.87	0.07	
Clearance Time (s)	5.5		6.0	5.5	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3675		258	4347	101	
v/s Ratio Prot	0.43		0.04	c0.52	c0.01	
v/s Ratio Perm			0.30			
v/c Ratio	0.59		0.39	0.59	0.12	
Uniform Delay, d1	7.2		16.7	2.0	52.8	
Progression Factor	1.86		1.14	1.10	1.00	
Incremental Delay, d2	0.3		0.5	0.3	0.5	
Delay (s)	13.8		19.6	2.6	53.3	
Level of Service	B		B	A	D	
Approach Delay (s)	13.8			3.2	53.3	
Approach LOS	B			A	D	
Intersection Summary						
HCM 2000 Control Delay			8.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	11.5
Intersection Capacity Utilization			57.1%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



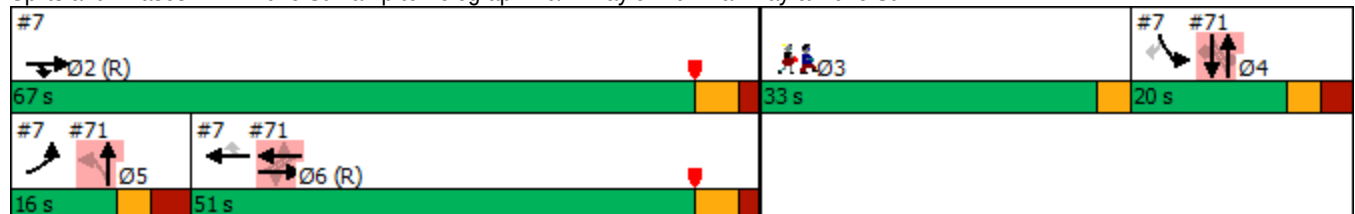
Lane Group	EBL	EBT	EBR	WBT	WBR	SBL	SBR	Ø3
Lane Configurations								
Traffic Volume (vph)	31	971	1005	2402	280	70	38	
Future Volume (vph)	31	971	1005	2402	280	70	38	
Turn Type	Prot	NA	Prot	NA	Perm	Prot	Perm	
Protected Phases	5	2	2	6		4		3
Permitted Phases					6		4	
Detector Phase	5	2	2	6	6	4	4	
Switch Phase								
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	13.0	33.0
Total Split (s)	16.0	67.0	67.0	51.0	51.0	20.0	20.0	33.0
Total Split (%)	13.3%	55.8%	55.8%	42.5%	42.5%	16.7%	16.7%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	10.4	89.4	89.4	74.5	74.5	16.0	16.0	
Actuated g/C Ratio	0.09	0.74	0.74	0.62	0.62	0.13	0.13	
v/c Ratio	0.25	0.46	0.87	0.87	0.30	0.34	0.14	
Control Delay	59.8	4.9	22.2	22.2	14.6	27.1	1.9	
Queue Delay	0.0	0.0	0.0	0.4	65.7	4.2	1.5	
Total Delay	59.8	4.9	22.2	22.6	80.3	31.3	3.5	
LOS	E	A	C	C	F	C	A	
Approach Delay		14.5		28.6				
Approach LOS		B		C				

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.87
 Intersection Signal Delay: 22.3
 Intersection Capacity Utilization 65.6%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service C

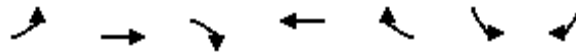
Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	35	1091	1129	2555	298	80	44
v/c Ratio	0.25	0.46	0.87	0.87	0.30	0.34	0.14
Control Delay	59.8	4.9	22.2	22.2	14.6	27.1	1.9
Queue Delay	0.0	0.0	0.0	0.4	65.7	4.2	1.5
Total Delay	59.8	4.9	22.2	22.6	80.3	31.3	3.5
Queue Length 50th (ft)	23	72	288	443	87	24	0
Queue Length 95th (ft)	m50	127	#1326	m#1004	m179	44	0
Internal Link Dist (ft)		321		722			
Turn Bay Length (ft)	180				120		
Base Capacity (vph)	157	2359	1298	2927	983	236	305
Starvation Cap Reductn	0	0	0	0	0	99	167
Spillback Cap Reductn	0	0	0	79	789	0	5
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.46	0.87	0.90	1.54	0.58	0.32

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  							
Traffic Volume (vph)	31	971	1005	0	2402	280	0	0	0	70	0	38
Future Volume (vph)	31	971	1005	0	2402	280	0	0	0	70	0	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00				1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		0.98
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		1.00
Frt	1.00	1.00	1.00		1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (prot)	1641	3167	1743		4715	1583				1770		1547
Flt Permitted	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (perm)	1641	3167	1743		4715	1583				1770		1547
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	1.00	1.00	1.00	0.87	0.87	0.87
Adj. Flow (vph)	35	1091	1129	0	2555	298	0	0	0	80	0	44
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	38
Lane Group Flow (vph)	35	1091	1129	0	2555	298	0	0	0	80	0	6
Confl. Peds. (#/hr)										3		5
Heavy Vehicles (%)	10%	14%	9%	2%	10%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Prot		NA	Perm				Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases						6						4
Actuated Green, G (s)	8.4	85.0	85.0		70.1	70.1				14.0		14.0
Effective Green, g (s)	10.4	87.0	87.0		72.1	72.1				16.0		16.0
Actuated g/C Ratio	0.09	0.72	0.72		0.60	0.60				0.13		0.13
Clearance Time (s)	6.5	6.0	6.0		6.0	6.0				6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2	0.2				3.0		3.0
Lane Grp Cap (vph)	142	2296	1263		2832	951				236		206
v/s Ratio Prot	0.02	0.34	c0.65		0.54					c0.05		
v/s Ratio Perm						0.19						0.00
v/c Ratio	0.25	0.48	0.89		0.90	0.31				0.34		0.03
Uniform Delay, d1	51.1	6.9	12.9		20.9	11.8				47.2		45.2
Progression Factor	1.11	0.53	1.09		1.01	1.02				0.49		1.00
Incremental Delay, d2	0.8	0.6	8.6		2.0	0.3				0.8		0.1
Delay (s)	57.3	4.2	22.7		23.1	12.3				23.8		45.3
Level of Service	E	A	C		C	B				C		D
Approach Delay (s)		14.3			22.0			0.0			31.4	
Approach LOS		B			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			18.9									HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			65.6%									ICU Level of Service C
Analysis Period (min)			15									
c Critical Lane Group												

Timings

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Lane Group	NBT	Ø2	Ø4	Ø5	Ø6	Ø8
Lane Configurations	↑↑					
Traffic Volume (vph)	454					
Future Volume (vph)	454					
Turn Type	NA					
Protected Phases	12	2	4	5	6	8
Permitted Phases						
Detector Phase	12					
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	7.0
Minimum Split (s)	26.0	22.0	10.0	10.0	23.0	40.0
Total Split (s)	86.0	86.0	34.0	50.0	36.0	34.0
Total Split (%)	71.7%	72%	28%	42%	30%	28%
Yellow Time (s)	4.0	4.0	3.0	3.0	4.0	3.0
All-Red Time (s)	6.0	2.0	3.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0					
Total Lost Time (s)	8.0					
Lead/Lag				Lead	Lag	
Lead-Lag Optimize?					Yes	
Recall Mode	Max	C-Max	None	None	C-Max	None
Act Effect Green (s)	78.0					
Actuated g/C Ratio	0.65					
v/c Ratio	0.20					
Control Delay	15.7					
Queue Delay	0.0					
Total Delay	15.7					
LOS	B					
Approach Delay	15.7					
Approach LOS	B					

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.03
Intersection Signal Delay: 15.7
Intersection LOS: B
Intersection Capacity Utilization 19.2%
ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 9: WB Duke St to SB Telegraph Rd & Dummy

#10 → Ø2 (R) 86 s	#10 #81 ↓ Ø4 34 s
#81 ↙ Ø5 50 s	#10 #81 ← Ø6 (R) 36 s
#9 ↑ Ø12 86 s	#10 #81 ↑ Ø8 34 s

Queues

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Lane Group	NBT
Lane Group Flow (vph)	454
v/c Ratio	0.20
Control Delay	15.7
Queue Delay	0.0
Total Delay	15.7
Queue Length 50th (ft)	97
Queue Length 95th (ft)	m115
Internal Link Dist (ft)	60
Turn Bay Length (ft)	
Base Capacity (vph)	2300
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	0.20
Intersection Summary	
m Volume for 95th percentile queue is metered by upstream signal.	

HCM Signalized Intersection Capacity Analysis

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			
Traffic Volume (vph)	0	0	454	0	0	0
Future Volume (vph)	0	0	454	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			8.0			
Lane Util. Factor			0.95			
Frt			1.00			
Flt Protected			1.00			
Satd. Flow (prot)			3539			
Flt Permitted			1.00			
Satd. Flow (perm)			3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	454	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	454	0	0	0
Turn Type			NA			
Protected Phases			12			
Permitted Phases						
Actuated Green, G (s)			76.0			
Effective Green, g (s)			78.0			
Actuated g/C Ratio			0.65			
Clearance Time (s)			10.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)			2300			
v/s Ratio Prot			c0.13			
v/s Ratio Perm						
v/c Ratio			0.20			
Uniform Delay, d1			8.4			
Progression Factor			1.84			
Incremental Delay, d2			0.1			
Delay (s)			15.6			
Level of Service			B			
Approach Delay (s)	0.0		15.6		0.0	
Approach LOS	A		B		A	
Intersection Summary						
HCM 2000 Control Delay			15.6	HCM 2000 Level of Service		B
HCM 2000 Volume to Capacity ratio			0.15			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		18.0
Intersection Capacity Utilization			19.2%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	Ø5	Ø12
Lane Configurations	↑↑↑	↑↑↑		↕		↕		
Traffic Volume (vph)	2249	1115	198	29	17	14		
Future Volume (vph)	2249	1115	198	29	17	14		
Turn Type	NA	NA	Perm	NA	Perm	NA		
Protected Phases	2	6		8		4	5	12
Permitted Phases			8		4			
Detector Phase	2	6	8	8	4	4		
Switch Phase								
Minimum Initial (s)	4.0	4.0	7.0	7.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	23.0	40.0	40.0	10.0	10.0	10.0	26.0
Total Split (s)	86.0	36.0	34.0	34.0	34.0	34.0	50.0	86.0
Total Split (%)	71.7%	30.0%	28.3%	28.3%	28.3%	28.3%	42%	72%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0	3.0	4.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0	3.0	6.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0		
Total Lost Time (s)	4.0	4.0		4.0		4.0		
Lead/Lag		Lag					Lead	
Lead-Lag Optimize?		Yes						
Recall Mode	C-Max	C-Max	None	None	None	None	None	Max
Act Effect Green (s)	82.0	32.0		30.0		30.0		
Actuated g/C Ratio	0.68	0.27		0.25		0.25		
v/c Ratio	0.73	0.93		1.03		0.23		
Control Delay	14.3	56.1		102.7		18.1		
Queue Delay	0.0	0.0		0.0		0.0		
Total Delay	14.3	56.1		102.7		18.1		
LOS	B	E		F		B		
Approach Delay	14.3	56.1		102.7		18.1		
Approach LOS	B	E		F		B		

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 33.4

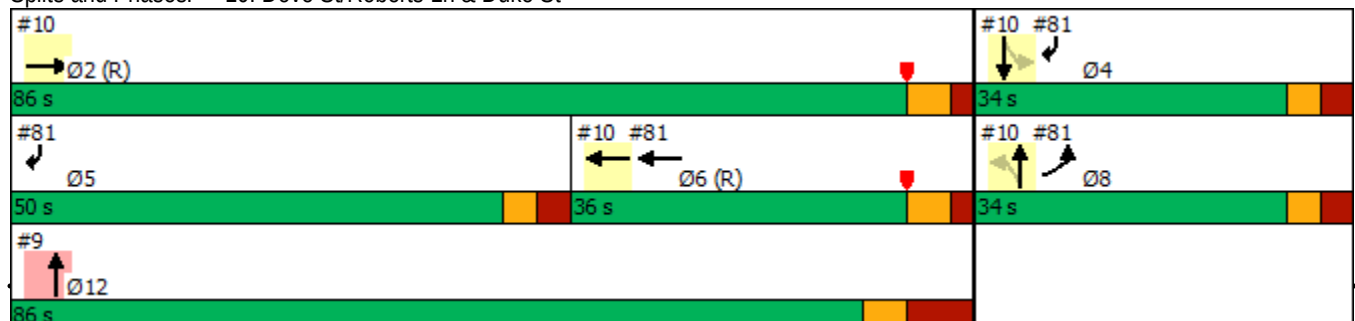
Intersection LOS: C

Intersection Capacity Utilization 72.0%

ICU Level of Service C

Analysis Period (min) 15

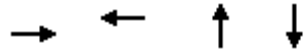
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	2499	1212	315	97
v/c Ratio	0.73	0.93	1.03	0.23
Control Delay	14.3	56.1	102.7	18.1
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	14.3	56.1	102.7	18.1
Queue Length 50th (ft)	461	335	~259	24
Queue Length 95th (ft)	572	#425	#334	53
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3441	1304	307	429
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.73	0.93	1.03	0.23

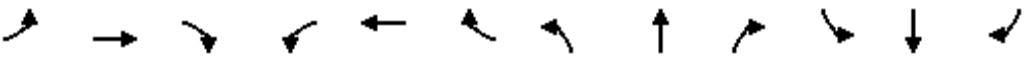
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2249	0	0	1115	0	198	29	12	17	14	44
Future Volume (vph)	0	2249	0	0	1115	0	198	29	12	17	14	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.99			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5036			4891			1754			1665	
Flt Permitted		1.00			1.00			0.67			0.92	
Satd. Flow (perm)		5036			4891			1224			1547	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.76	0.76	0.76	0.77	0.77	0.77
Adj. Flow (vph)	0	2499	0	0	1212	0	261	38	16	22	18	57
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	43	0
Lane Group Flow (vph)	0	2499	0	0	1212	0	0	314	0	0	54	0
Confl. Peds. (#/hr)	18		3	3		18			8	8		
Heavy Vehicles (%)	2%	3%	2%	2%	5%	2%	3%	2%	9%	2%	2%	5%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		80.0			30.0			28.0			28.0	
Effective Green, g (s)		82.0			32.0			30.0			30.0	
Actuated g/C Ratio		0.68			0.27			0.25			0.25	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3441			1304			306			386	
v/s Ratio Prot		c0.50			c0.25							
v/s Ratio Perm								c0.26			0.04	
v/c Ratio		0.73			0.93			1.02			0.14	
Uniform Delay, d1		11.9			42.9			45.0			35.0	
Progression Factor		1.06			1.00			1.00			1.00	
Incremental Delay, d2		1.4			12.9			57.9			0.2	
Delay (s)		14.1			55.8			102.9			35.1	
Level of Service		B			E			F			D	
Approach Delay (s)		14.1			55.8			102.9			35.1	
Approach LOS		B			E			F			D	
Intersection Summary												
HCM 2000 Control Delay			33.6				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.90									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			14.0		
Intersection Capacity Utilization			72.0%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

71: W Taylor Run Parkway

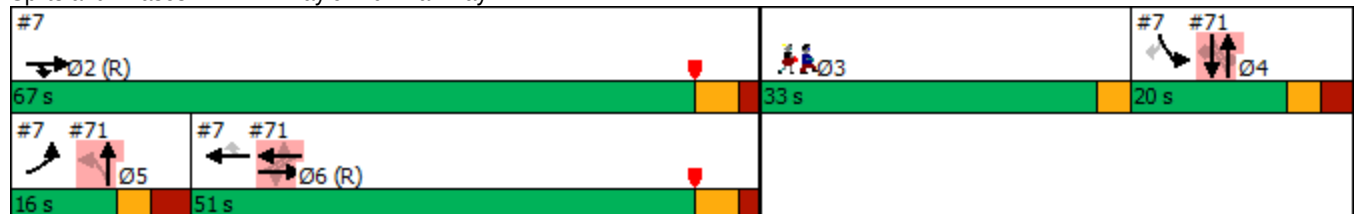
03/14/2024

												
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations												
Traffic Volume (vph)	20	8	13	6	16	231	1	71	6			
Future Volume (vph)	20	8	13	6	16	231	1	71	6			
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm			
Protected Phases		6		6		4 5		4		2	3	5
Permitted Phases	6		6		4 5		4		4			
Detector Phase	6	6	6	6	4 5	4 5	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0			13.0	13.0	13.0	14.0	33.0	12.5
Total Split (s)	51.0	51.0	51.0	51.0			20.0	20.0	20.0	67.0	33.0	16.0
Total Split (%)	42.5%	42.5%	42.5%	42.5%			16.7%	16.7%	16.7%	56%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0			3.0	3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0				-2.0	-2.0			
Total Lost Time (s)		4.0		4.0				4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None	None	C-Max	None	None
Act Effect Green (s)		74.5		74.5		30.9		16.0	16.0			
Actuated g/C Ratio		0.62		0.62		0.26		0.13	0.13			
v/c Ratio		0.07		0.02		0.73		0.34	0.02			
Control Delay		8.9		14.0		68.1		51.5	0.2			
Queue Delay		0.0		0.0		72.9		0.0	0.0			
Total Delay		8.9		14.0		141.0		51.5	0.2			
LOS		A		B		F		D	A			
Approach Delay		8.9		14.0		141.0		47.5				
Approach LOS		A		B		F		D				

Intersection Summary

Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow	
Natural Cycle: 150	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.87	
Intersection Signal Delay: 101.7	Intersection LOS: F
Intersection Capacity Utilization 38.7%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	67	25	339	83	7
v/c Ratio	0.07	0.02	0.73	0.34	0.02
Control Delay	8.9	14.0	68.1	51.5	0.2
Queue Delay	0.0	0.0	72.9	0.0	0.0
Total Delay	8.9	14.0	141.0	51.5	0.2
Queue Length 50th (ft)	9	6	248	59	0
Queue Length 95th (ft)	39	27	334	106	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	1000	1008	481	245	304
Starvation Cap Reductn	0	0	365	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.07	0.02	2.92	0.34	0.02
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Parkway

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	8	24	13	6	0	16	231	65	1	71	6
Future Volume (vph)	20	8	24	13	6	0	16	231	65	1	71	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			1.00			1.00			1.00	0.97
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.94			1.00			0.97			1.00	0.85
Flt Protected		0.98			0.97			1.00			1.00	1.00
Satd. Flow (prot)		1708			1801			1797			1862	1540
Flt Permitted		0.92			0.87			0.98			0.99	1.00
Satd. Flow (perm)		1594			1624			1774			1838	1540
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.87
Adj. Flow (vph)	26	10	31	17	8	0	17	251	71	1	82	7
RTOR Reduction (vph)	0	12	0	0	0	0	0	8	0	0	0	6
Lane Group Flow (vph)	0	55	0	0	25	0	0	331	0	0	83	1
Confl. Peds. (#/hr)	10					10	2		1	1		2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		70.1			70.1			28.4			14.0	14.0
Effective Green, g (s)		72.1			72.1			30.4			16.0	16.0
Actuated g/C Ratio		0.60			0.60			0.25			0.13	0.13
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		957			975			449			245	205
v/s Ratio Prot												
v/s Ratio Perm		c0.03			0.02			c0.19			0.05	0.00
v/c Ratio		0.06			0.03			0.74			0.34	0.00
Uniform Delay, d1		9.9			9.7			41.1			47.2	45.1
Progression Factor		1.00			1.00			1.47			1.00	1.00
Incremental Delay, d2		0.1			0.0			6.0			0.8	0.0
Delay (s)		10.0			9.8			66.7			48.0	45.1
Level of Service		B			A			E			D	D
Approach Delay (s)		10.0			9.8			66.7			47.8	
Approach LOS		B			A			E			D	
Intersection Summary												
HCM 2000 Control Delay			53.4				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.25									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			15.5		
Intersection Capacity Utilization			38.7%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024



Lane Group	EBL	EBT	WBT	SBR	Ø2	Ø4	Ø5	Ø12
Lane Configurations								
Traffic Volume (vph)	140	901	903	1779				
Future Volume (vph)	140	901	903	1779				
Turn Type	Prot	NA	NA	custom				
Protected Phases	8	Free	6	4 5	2	4	5	12
Permitted Phases								
Detector Phase	8		6	4 5				
Switch Phase								
Minimum Initial (s)	7.0		4.0		4.0	4.0	4.0	4.0
Minimum Split (s)	40.0		23.0		22.0	10.0	10.0	26.0
Total Split (s)	34.0		36.0		86.0	34.0	50.0	86.0
Total Split (%)	28.3%		30.0%		72%	28%	42%	72%
Yellow Time (s)	3.0		4.0		4.0	3.0	3.0	4.0
All-Red Time (s)	3.0		2.0		2.0	3.0	3.0	6.0
Lost Time Adjust (s)	-2.0		-2.0					
Total Lost Time (s)	4.0		4.0					
Lead/Lag			Lag				Lead	
Lead-Lag Optimize?			Yes					
Recall Mode	None		C-Max		C-Max	None	None	Max
Act Effect Green (s)	30.0	120.0	32.0	80.0				
Actuated g/C Ratio	0.25	1.00	0.27	0.67				
v/c Ratio	0.32	0.25	0.96	0.99				
Control Delay	45.0	0.2	52.7	39.6				
Queue Delay	0.0	0.0	0.0	0.0				
Total Delay	45.0	0.2	52.7	39.6				
LOS	D	A	D	D				
Approach Delay		6.2	52.7					
Approach LOS		A	D					

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.03

Intersection Signal Delay: 33.5

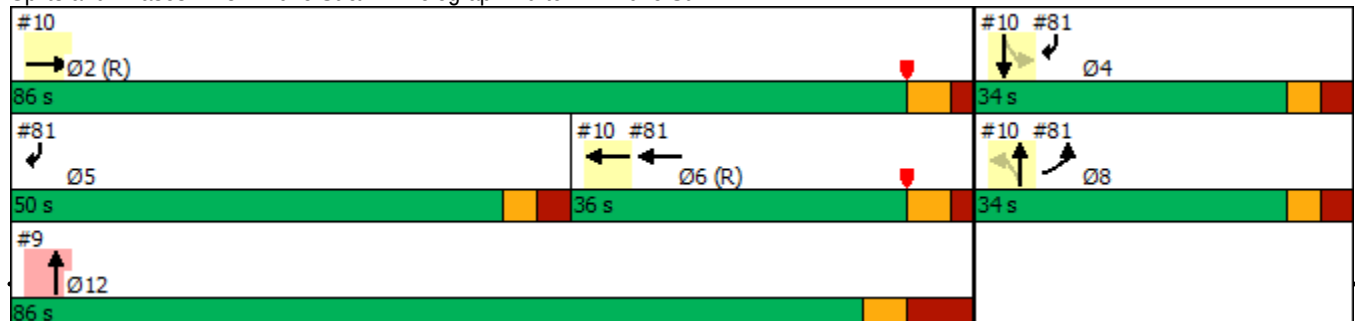
Intersection LOS: C

Intersection Capacity Utilization 93.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 81: Duke St & NB Telegraph Rd to WB Duke St



Queues

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024



Lane Group	EBL	EBT	WBT	SBR
Lane Group Flow (vph)	140	901	903	1815
v/c Ratio	0.32	0.25	0.96	0.99
Control Delay	45.0	0.2	52.7	39.6
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	45.0	0.2	52.7	39.6
Queue Length 50th (ft)	92	0	207	717
Queue Length 95th (ft)	122	0	m#246	#975
Internal Link Dist (ft)		184	95	
Turn Bay Length (ft)	300			
Base Capacity (vph)	442	3539	943	1828
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.32	0.25	0.96	0.99

Intersection Summary

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

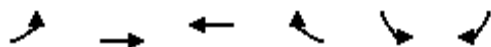
Queue shown is maximum after two cycles.

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

HCM Signalized Intersection Capacity Analysis

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	140	901	903	0	0	1779
Future Volume (vph)	140	901	903	0	0	1779
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			4.0
Lane Util. Factor	1.00	0.95	0.95			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	3539	3539			2733
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	3539	3539			2733
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.98
Adj. Flow (vph)	140	901	903	0	0	1815
RTOR Reduction (vph)	0	0	0	0	0	6
Lane Group Flow (vph)	140	901	903	0	0	1809
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	NA	NA			custom
Protected Phases	8	Free	6			4 5
Permitted Phases						
Actuated Green, G (s)	28.0	120.0	30.0			78.0
Effective Green, g (s)	30.0	120.0	32.0			80.0
Actuated g/C Ratio	0.25	1.00	0.27			0.67
Clearance Time (s)	6.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	442	3539	943			1822
v/s Ratio Prot	0.08	0.25	c0.26			c0.66
v/s Ratio Perm						
v/c Ratio	0.32	0.25	0.96			0.99
Uniform Delay, d1	36.7	0.0	43.3			19.7
Progression Factor	1.16	1.00	0.93			1.00
Incremental Delay, d2	0.4	0.2	12.1			19.3
Delay (s)	43.0	0.2	52.2			39.0
Level of Service	D	A	D			D
Approach Delay (s)		5.9	52.2		39.0	
Approach LOS		A	D		D	
Intersection Summary						
HCM 2000 Control Delay			33.0		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			1.04			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			93.9%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

82: NB Telegraph Rd to WB Duke St & WB Duke St to SB Telegraph Rd

03/14/2024



Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		↑↑		↑	↑	
Traffic Volume (veh/h)	0	454	0	1779	140	0
Future Volume (Veh/h)	0	454	0	1779	140	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	454	0	1779	140	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		373				
pX, platoon unblocked					0.96	
vC, conflicting volume	1779				227	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1779				101	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				83	100
cM capacity (veh/h)	345				848	1084
Direction, Lane #	NB 1	NB 2	SB 1	NE 1		
Volume Total	227	227	1779	140		
Volume Left	0	0	0	140		
Volume Right	0	0	1779	0		
cSH	1700	1700	1700	848		
Volume to Capacity	0.13	0.13	1.05	0.17		
Queue Length 95th (ft)	0	0	0	15		
Control Delay (s)	0.0	0.0	0.0	10.1		
Lane LOS				B		
Approach Delay (s)	0.0		0.0	10.1		
Approach LOS				B		
Intersection Summary						
Average Delay			0.6			
Intersection Capacity Utilization			113.5%		ICU Level of Service	H
Analysis Period (min)			15			

Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	Ø2
Lane Configurations	↰	↑↑↑	↑↑	↱	↰↰↰	
Traffic Volume (vph)	314	1040	1250	735	864	
Future Volume (vph)	314	1040	1250	735	864	
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	2
Permitted Phases	5 2					
Detector Phase	5	5 2	6	6 4	4	
Switch Phase						
Minimum Initial (s)	5.0		10.0		7.0	10.0
Minimum Split (s)	19.6		22.0		29.5	22.0
Total Split (s)	25.0		50.0		45.0	75.0
Total Split (%)	20.8%		41.7%		37.5%	63%
Yellow Time (s)	3.0		4.0		3.5	4.0
All-Red Time (s)	2.6		2.0		3.0	2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0	
Total Lost Time (s)	3.6		4.0		4.5	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None		C-Max		None	C-Max
Act Effect Green (s)	71.4	71.4	46.0	91.0	40.5	
Actuated g/C Ratio	0.60	0.60	0.38	0.76	0.34	
v/c Ratio	0.96	0.39	0.95	0.63	0.99	
Control Delay	73.1	13.3	47.2	6.0	64.5	
Queue Delay	0.0	0.3	43.8	0.5	0.6	
Total Delay	73.1	13.6	91.1	6.4	65.1	
LOS	E	B	F	A	E	
Approach Delay		27.4	59.7		65.1	
Approach LOS		C	E		E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 20 (17%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.99
Intersection Signal Delay: 50.6
Intersection Capacity Utilization 92.3%
Analysis Period (min) 15
Intersection LOS: D
ICU Level of Service F

Splits and Phases: 1: Duke St & N Quaker Lane



Queues

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	353	1169	1289	758	1146
v/c Ratio	0.96	0.39	0.95	0.63	0.99
Control Delay	73.1	13.3	47.2	6.0	64.5
Queue Delay	0.0	0.3	43.8	0.5	0.6
Total Delay	73.1	13.6	91.1	6.4	65.1
Queue Length 50th (ft)	221	164	518	107	447
Queue Length 95th (ft)	#405	192	#647	121	#602
Internal Link Dist (ft)		582	312		324
Turn Bay Length (ft)					
Base Capacity (vph)	367	2996	1356	1200	1152
Starvation Cap Reductn	0	0	248	136	0
Spillback Cap Reductn	0	1108	0	0	3
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.96	0.62	1.16	0.71	1.00

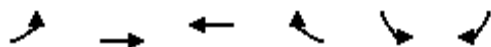
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024

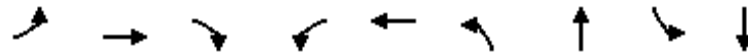


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	314	1040	1250	735	864	167
Future Volume (vph)	314	1040	1250	735	864	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1719	5036	3539	1583	3372	
Flt Permitted	0.08	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	146	5036	3539	1583	3372	
Peak-hour factor, PHF	0.89	0.89	0.97	0.97	0.90	0.90
Adj. Flow (vph)	353	1169	1289	758	960	186
RTOR Reduction (vph)	0	0	0	0	14	0
Lane Group Flow (vph)	353	1169	1289	758	1132	0
Confl. Peds. (#/hr)	2			2		1
Heavy Vehicles (%)	5%	3%	2%	2%	2%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	69.0	69.0	44.0	88.5	38.5	
Effective Green, g (s)	71.0	71.0	46.0	90.5	40.5	
Actuated g/C Ratio	0.59	0.59	0.38	0.75	0.34	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	366	2979	1356	1193	1138	
v/s Ratio Prot	c0.17	0.23	0.36	0.48	c0.34	
v/s Ratio Perm	c0.40					
v/c Ratio	0.96	0.39	0.95	0.64	0.99	
Uniform Delay, d1	38.3	13.0	35.9	7.0	39.6	
Progression Factor	1.00	1.00	1.00	0.61	1.00	
Incremental Delay, d2	37.4	0.1	11.1	0.7	25.3	
Delay (s)	75.7	13.1	46.9	5.0	64.9	
Level of Service	E	B	D	A	E	
Approach Delay (s)		27.6	31.3		64.9	
Approach LOS		C	C		E	
Intersection Summary						
HCM 2000 Control Delay			38.3		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			1.00			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			92.3%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

Timings

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø6
Lane Configurations	↰	↱	↱	↰	↱	↰	↱	↰	↱		
Traffic Volume (vph)	7	1518	379	27	1876	108	0	1	0		
Future Volume (vph)	7	1518	379	27	1876	108	0	1	0		
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA		
Protected Phases		2		1	1 6		4		3 4	3	6
Permitted Phases	2		2	1 6		4		3 4			
Detector Phase	2	2	2	1	1 6	4	4	3 4	3 4		
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	5.0		7.0	7.0			4.0	4.0
Minimum Split (s)	15.5	15.5	15.5	10.5		29.0	29.0			12.0	20.0
Total Split (s)	63.0	63.0	63.0	16.0		29.0	29.0			12.0	79.0
Total Split (%)	52.5%	52.5%	52.5%	13.3%		24.2%	24.2%			10%	66%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0			3.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5		1.0	1.0			0.5	1.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0			-2.0				
Total Lost Time (s)	3.5	3.5	3.5	3.5			2.0				
Lead/Lag	Lead	Lead	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	None		None	None			Max	C-Max
Act Effect Green (s)	71.8	71.8	71.8	87.8	87.8		14.7		27.2		
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73		0.12		0.23		
v/c Ratio	0.11	0.76	0.38	0.12	0.77		0.62		0.02		
Control Delay	25.6	26.8	8.7	4.9	6.5		28.1		0.0		
Queue Delay	0.0	5.1	0.7	0.0	2.6		29.3		0.0		
Total Delay	25.6	31.9	9.4	4.9	9.1		57.4		0.0		
LOS	C	C	A	A	A		E		A		
Approach Delay		27.4			9.1		57.4				
Approach LOS		C			A		E				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 52 (43%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 120

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 19.7

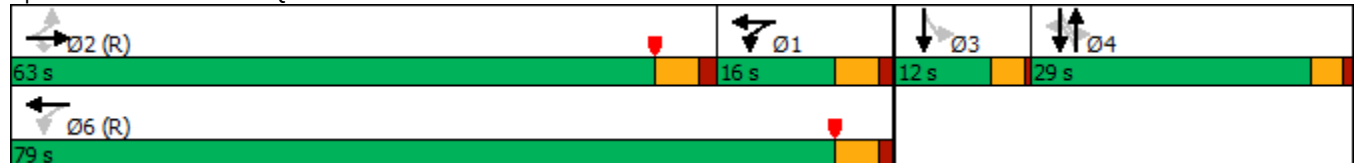
Intersection LOS: B

Intersection Capacity Utilization 72.3%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: S Quaker Ln & Duke St



Queues

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	7	1598	399	28	1982	160	8
v/c Ratio	0.11	0.76	0.38	0.12	0.77	0.62	0.02
Control Delay	25.6	26.8	8.7	4.9	6.5	28.1	0.0
Queue Delay	0.0	5.1	0.7	0.0	2.6	29.3	0.0
Total Delay	25.6	31.9	9.4	4.9	9.1	57.4	0.0
Queue Length 50th (ft)	3	481	88	3	117	40	0
Queue Length 95th (ft)	m7	m576	m123	m4	131	77	0
Internal Link Dist (ft)		312			222	293	73
Turn Bay Length (ft)	175			75			
Base Capacity (vph)	62	2116	1042	241	2586	389	599
Starvation Cap Reductn	0	451	334	0	76	0	0
Spillback Cap Reductn	0	0	0	0	465	223	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.96	0.56	0.12	0.93	0.96	0.01

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

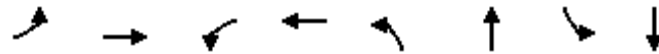
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1518	379	27	1876	7	108	0	20	1	0	1
Future Volume (vph)	7	1518	379	27	1876	7	108	0	20	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.98			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1769	3539	1537	1570	3537			1744			1695	
Flt Permitted	0.06	1.00	1.00	0.08	1.00			0.75			0.96	
Satd. Flow (perm)	104	3539	1537	126	3537			1370			1676	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.80	0.80	0.80	0.25	0.25	0.25
Adj. Flow (vph)	7	1598	399	28	1975	7	135	0	25	4	0	4
RTOR Reduction (vph)	0	0	125	0	0	0	0	92	0	0	6	0
Lane Group Flow (vph)	7	1598	274	28	1982	0	0	68	0	0	2	0
Confl. Peds. (#/hr)	9		11	11		9			7	7		
Heavy Vehicles (%)	2%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 6			4			3 4	
Permitted Phases	2		2	1 6			4			3 4		
Actuated Green, G (s)	69.8	69.8	69.8	85.8	85.8			12.7			24.7	
Effective Green, g (s)	71.8	71.8	71.8	87.8	87.8			14.7			26.7	
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73			0.12			0.22	
Clearance Time (s)	5.5	5.5	5.5	5.5				4.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0				3.0				
Lane Grp Cap (vph)	62	2117	919	242	2587			167			372	
v/s Ratio Prot		0.45		0.01	c0.56							
v/s Ratio Perm	0.07		0.18	0.07				c0.05			c0.00	
v/c Ratio	0.11	0.75	0.30	0.12	0.77			0.41			0.00	
Uniform Delay, d1	10.4	17.7	11.8	23.5	9.8			48.6			36.3	
Progression Factor	1.42	1.30	2.25	0.40	0.41			1.00			1.00	
Incremental Delay, d2	2.7	1.9	0.6	0.1	0.9			1.6			0.0	
Delay (s)	17.4	24.8	27.2	9.6	5.0			50.2			36.3	
Level of Service	B	C	C	A	A			D			D	
Approach Delay (s)		25.3			5.0			50.2			36.3	
Approach LOS		C			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			16.5			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			72.3%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	65	1463	7	1797	17	2	51	2
Future Volume (vph)	65	1463	7	1797	17	2	51	2
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	5.0	10.0	1.0	1.0	7.0	7.0	6.7	6.7
Minimum Split (s)	11.1	17.0	16.3	16.3	29.0	29.0	13.0	13.0
Total Split (s)	16.0	91.0	75.0	75.0	29.0	29.0	29.0	29.0
Total Split (%)	13.3%	75.8%	62.5%	62.5%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	4.0	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.6	2.3	2.3	2.3	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.1	4.3	4.3	4.3		4.0		4.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	95.2	95.0	85.2	85.2		16.7		16.7
Actuated g/C Ratio	0.79	0.79	0.71	0.71		0.14		0.14
v/c Ratio	0.37	0.56	0.04	0.77		0.22		0.70
Control Delay	29.1	0.8	7.1	9.5		40.3		44.5
Queue Delay	0.0	0.2	0.0	0.1		0.0		0.0
Total Delay	29.1	1.0	7.1	9.6		40.3		44.5
LOS	C	A	A	A		D		D
Approach Delay		2.2		9.6		40.3		44.5
Approach LOS		A		A		D		D

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 68 (57%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 100
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 8.4
 Intersection Capacity Utilization 70.2%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service C

Splits and Phases: 3: Duke St & Alexandria Commons



Queues

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	69	1567	7	1930	34	188
v/c Ratio	0.37	0.56	0.04	0.77	0.22	0.70
Control Delay	29.1	0.8	7.1	9.5	40.3	44.5
Queue Delay	0.0	0.2	0.0	0.1	0.0	0.0
Total Delay	29.1	1.0	7.1	9.6	40.3	44.5
Queue Length 50th (ft)	12	2	1	161	20	90
Queue Length 95th (ft)	m33	5	m1	175	35	132
Internal Link Dist (ft)		222		571	88	97
Turn Bay Length (ft)	100		375			
Base Capacity (vph)	244	2799	199	2503	229	366
Starvation Cap Reductn	0	367	0	55	0	0
Spillback Cap Reductn	0	0	0	17	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.64	0.04	0.79	0.15	0.51

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	1463	10	7	1797	36	17	2	4	51	2	97
Future Volume (vph)	65	1463	10	7	1797	36	17	2	4	51	2	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.3		4.3	4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.98			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1770	3535		1768	3527			1746			1665	
Flt Permitted	0.05	1.00		0.15	1.00			0.60			0.89	
Satd. Flow (perm)	98	3535		281	3527			1081			1501	
Peak-hour factor, PHF	0.94	0.94	0.94	0.95	0.95	0.95	0.69	0.69	0.69	0.80	0.80	0.80
Adj. Flow (vph)	69	1556	11	7	1892	38	25	3	6	64	2	121
RTOR Reduction (vph)	0	0	0	0	1	0	0	5	0	0	59	0
Lane Group Flow (vph)	69	1567	0	7	1929	0	0	29	0	0	129	0
Confl. Peds. (#/hr)	2		15	15		2			9	9		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	93.0	93.0		81.9	81.9			14.7			14.7	
Effective Green, g (s)	95.0	95.0		83.9	83.9			16.7			16.7	
Actuated g/C Ratio	0.79	0.79		0.70	0.70			0.14			0.14	
Clearance Time (s)	6.1	6.3		6.3	6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0		0.2	0.2			2.0			2.0	
Lane Grp Cap (vph)	175	2798		196	2465			150			208	
v/s Ratio Prot	0.02	c0.44			c0.55							
v/s Ratio Perm	0.29			0.02				0.03			c0.09	
v/c Ratio	0.39	0.56		0.04	0.78			0.19			0.62	
Uniform Delay, d1	16.2	4.7		5.6	12.0			45.7			48.7	
Progression Factor	3.46	0.06		0.80	0.55			1.00			1.00	
Incremental Delay, d2	0.3	0.5		0.2	1.6			0.2			4.1	
Delay (s)	56.5	0.8		4.7	8.3			45.9			52.8	
Level of Service	E	A		A	A			D			D	
Approach Delay (s)		3.2			8.2			45.9			52.8	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay		8.6			HCM 2000 Level of Service			A				
HCM 2000 Volume to Capacity ratio		0.75										
Actuated Cycle Length (s)		120.0			Sum of lost time (s)			12.4				
Intersection Capacity Utilization		70.2%			ICU Level of Service			C				
Analysis Period (min)		15										
c Critical Lane Group												

Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

									
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	30	1485	28	1742	20	6	103	8	78
Future Volume (vph)	30	1485	28	1742	20	6	103	8	78
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	4.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	30.8	10.0	31.0	29.0	29.0	29.0	29.0	29.0
Total Split (s)	17.0	74.0	17.0	74.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	14.2%	61.7%	14.2%	61.7%	24.2%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	1.8	2.6	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	3.8	3.6	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	None	None
Act Effect Green (s)	88.2	83.9	88.2	83.4		21.7		21.7	21.7
Actuated g/C Ratio	0.74	0.70	0.74	0.70		0.18		0.18	0.18
v/c Ratio	0.20	0.65	0.13	0.79		0.44		0.86	0.26
Control Delay	12.4	3.7	8.8	21.1		15.4		91.2	9.8
Queue Delay	0.0	0.0	0.0	0.1		0.0		0.0	0.0
Total Delay	12.4	3.8	8.8	21.2		15.4		91.2	9.8
LOS	B	A	A	C		B		F	A
Approach Delay		3.9		21.0		15.4		57.7	
Approach LOS		A		C		B		E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 67 (56%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 15.8
Intersection Capacity Utilization 77.4%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

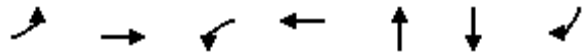
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St

 Ø1	 Ø2 (R)	 Ø4
17 s	74 s	29 s
 Ø5	 Ø6 (R)	 Ø8
17 s	74 s	29 s

Queues

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	33	1617	29	1933	166	133	93
v/c Ratio	0.20	0.65	0.13	0.79	0.44	0.86	0.26
Control Delay	12.4	3.7	8.8	21.1	15.4	91.2	9.8
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Total Delay	12.4	3.8	8.8	21.2	15.4	91.2	9.8
Queue Length 50th (ft)	2	56	8	387	24	98	0
Queue Length 95th (ft)	m13	96	m13	m582	41	#178	37
Internal Link Dist (ft)		571		730	190	93	
Turn Bay Length (ft)	195		80				
Base Capacity (vph)	247	2474	314	2436	418	177	403
Starvation Cap Reductn	0	13	0	0	0	0	0
Spillback Cap Reductn	0	0	0	47	1	0	1
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.66	0.09	0.81	0.40	0.75	0.23

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 Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	1485	3	28	1742	113	20	6	87	103	8	78
Future Volume (vph)	30	1485	3	28	1742	113	20	6	87	103	8	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1752	3538		1770	3502			1625			1769	1583
Flt Permitted	0.05	1.00		0.10	1.00			0.93			0.46	1.00
Satd. Flow (perm)	90	3538		180	3502			1519			851	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.68	0.68	0.68	0.84	0.84	0.84
Adj. Flow (vph)	33	1614	3	29	1815	118	29	9	128	123	10	93
RTOR Reduction (vph)	0	0	0	0	3	0	0	105	0	0	0	76
Lane Group Flow (vph)	33	1617	0	29	1930	0	0	61	0	0	133	17
Confl. Peds. (#/hr)	1		10	10		1			7	7		
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	83.0	79.7		82.2	79.0			19.7			19.7	19.7
Effective Green, g (s)	87.0	81.7		86.2	81.0			21.7			21.7	21.7
Actuated g/C Ratio	0.72	0.68		0.72	0.68			0.18			0.18	0.18
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	138	2408		198	2363			274			153	286
v/s Ratio Prot	c0.01	0.46		0.01	c0.55						c0.16	0.01
v/s Ratio Perm	0.16			0.10				0.04				0.01
v/c Ratio	0.24	0.67		0.15	0.82			0.22			0.87	0.06
Uniform Delay, d1	15.6	11.3		9.0	14.1			42.0			47.8	40.7
Progression Factor	2.16	0.22		1.86	1.35			1.00			1.00	1.00
Incremental Delay, d2	0.3	1.3		0.0	1.2			0.2			36.2	0.0
Delay (s)	33.9	3.7		16.9	20.2			42.1			84.0	40.7
Level of Service	C	A		B	C			D			F	D
Approach Delay (s)		4.3			20.2			42.1			66.2	
Approach LOS		A			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			17.2			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.0			
Intersection Capacity Utilization			77.4%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

5: Roth St/Cambridge Rd & Duke St

03/14/2024

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	9	1660	64	1837	183	3	12	289	5	43
Future Volume (vph)	9	1660	64	1837	183	3	12	289	5	43
Turn Type	Prot	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6			8		4	
Permitted Phases			6		6	8		4		4
Detector Phase	5	2	1	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	6.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.5	30.7	11.5	15.7	15.7	13.4	13.4	30.4	30.4	30.4
Total Split (s)	13.0	60.0	13.0	60.0	60.0	47.0	47.0	47.0	47.0	47.0
Total Split (%)	10.8%	50.0%	10.8%	50.0%	50.0%	39.2%	39.2%	39.2%	39.2%	39.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	1.7	2.5	1.7	1.7	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	3.5	3.7	3.5	3.7	3.7		4.4		4.4	4.4
Lead/Lag	Lead	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?										
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	8.2	59.5	68.9	66.8	66.8		42.6		42.6	42.6
Actuated g/C Ratio	0.07	0.50	0.57	0.56	0.56		0.36		0.36	0.36
v/c Ratio	0.09	1.02	0.35	0.96	0.22		0.59		1.54	0.08
Control Delay	69.9	47.3	24.8	46.9	19.9		24.1		294.5	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0
Total Delay	69.9	47.3	24.8	46.9	19.9		24.1		294.5	2.8
LOS	E	D	C	D	B		C		F	A
Approach Delay		47.4		43.9			24.1		257.3	
Approach LOS		D		D			C		F	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 85 (71%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.54

Intersection Signal Delay: 61.3

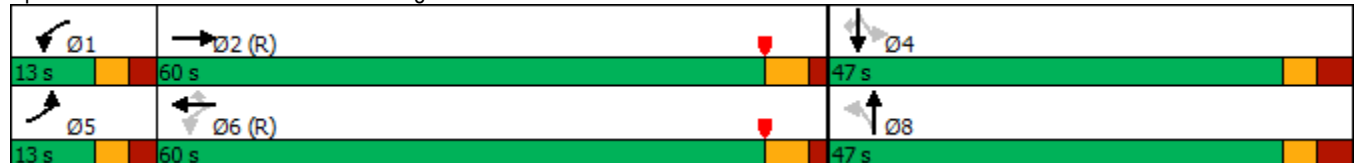
Intersection LOS: E

Intersection Capacity Utilization 103.9%

ICU Level of Service G

Analysis Period (min) 15

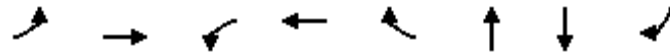
Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



Queues

5: Roth St/Cambridge Rd & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	10	1790	66	1894	189	391	342	50
v/c Ratio	0.09	1.02	0.35	0.96	0.22	0.59	1.54	0.08
Control Delay	69.9	47.3	24.8	46.9	19.9	24.1	294.5	2.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	69.9	47.3	24.8	46.9	19.9	24.1	294.5	2.8
Queue Length 50th (ft)	7	~813	32	666	98	159	~372	0
Queue Length 95th (ft)	m12	#964	59	#1067	135	264	#527	12
Internal Link Dist (ft)		730		743		286	101	
Turn Bay Length (ft)	120		250					
Base Capacity (vph)	128	1754	197	1971	863	663	222	598
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	0.08	1.02	0.34	0.96	0.22	0.59	1.54	0.08

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 Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1660	5	64	1837	183	3	12	360	289	5	43
Future Volume (vph)	9	1660	5	64	1837	183	3	12	360	289	5	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.87			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1626	3537		1752	3539	1550		1621			1770	1550
Flt Permitted	0.95	1.00		0.06	1.00	1.00		1.00			0.34	1.00
Satd. Flow (perm)	1626	3537		119	3539	1550		1618			625	1550
Peak-hour factor, PHF	0.93	0.93	0.93	0.97	0.97	0.97	0.96	0.96	0.96	0.86	0.86	0.86
Adj. Flow (vph)	10	1785	5	66	1894	189	3	12	375	336	6	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	88	0	0	0	32
Lane Group Flow (vph)	10	1790	0	66	1894	189	0	303	0	0	342	18
Confl. Peds. (#/hr)	1		2	2		1	6					6
Heavy Vehicles (%)	11%	2%	2%	3%	2%	2%	2%	2%	2%	2%	20%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	1.4	56.4		65.8	60.4	60.4		40.6			40.6	40.6
Effective Green, g (s)	3.4	58.4		69.3	62.4	62.4		42.6			42.6	42.6
Actuated g/C Ratio	0.03	0.49		0.58	0.52	0.52		0.36			0.36	0.36
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	46	1721		169	1840	806		574			221	550
v/s Ratio Prot	0.01	0.51		c0.02	c0.54							
v/s Ratio Perm				0.20		0.12		0.19			c0.55	0.01
v/c Ratio	0.22	1.04		0.39	1.03	0.23		0.53			1.55	0.03
Uniform Delay, d1	57.0	30.8		25.6	28.8	15.7		30.7			38.7	25.3
Progression Factor	1.30	0.70		1.61	1.40	1.33		1.00			1.00	1.00
Incremental Delay, d2	0.7	30.3		0.5	27.6	0.6		0.4			267.6	0.0
Delay (s)	75.0	51.8		41.7	67.9	21.5		31.1			306.3	25.3
Level of Service	E	D		D	E	C		C			F	C
Approach Delay (s)		51.9			63.0			31.1			270.4	
Approach LOS		D			E			C			F	
Intersection Summary												
HCM 2000 Control Delay	73.3			HCM 2000 Level of Service					E			
HCM 2000 Volume to Capacity ratio	1.21											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)					11.6			
Intersection Capacity Utilization	103.9%			ICU Level of Service					G			
Analysis Period (min)	15											
c Critical Lane Group												

Timings

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↑↑↑	↑
Traffic Volume (vph)	2300	30	2058	25
Future Volume (vph)	2300	30	2058	25
Turn Type	NA	pm+pt	NA	Prot
Protected Phases	2	1	6	4
Permitted Phases		6		
Detector Phase	2	1	6	4
Switch Phase				
Minimum Initial (s)	10.0	6.0	10.0	4.0
Minimum Split (s)	27.5	12.0	15.5	20.0
Total Split (s)	81.0	14.0	95.0	25.0
Total Split (%)	67.5%	11.7%	79.2%	20.8%
Yellow Time (s)	3.5	3.0	3.5	3.5
All-Red Time (s)	2.0	3.0	2.0	0.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.5	4.0	3.5	2.0
Lead/Lag	Lag	Lead		
Lead-Lag Optimize?				
Recall Mode	C-Max	None	C-Max	None
Act Effect Green (s)	94.8	101.6	102.1	12.4
Actuated g/C Ratio	0.79	0.85	0.85	0.10
v/c Ratio	0.59	0.17	0.50	0.63
Control Delay	2.3	12.6	5.7	29.2
Queue Delay	0.2	0.0	0.0	0.0
Total Delay	2.5	12.6	5.7	29.2
LOS	A	B	A	C
Approach Delay	2.5		5.8	29.2
Approach LOS	A		A	C

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 4 (3%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 5.0
Intersection Capacity Utilization 57.2%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

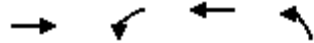
Splits and Phases: 6: Witter Drive & Duke St



Queues

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	2355	32	2166	167
v/c Ratio	0.59	0.17	0.50	0.63
Control Delay	2.3	12.6	5.7	29.2
Queue Delay	0.2	0.0	0.0	0.0
Total Delay	2.5	12.6	5.7	29.2
Queue Length 50th (ft)	75	3	83	42
Queue Length 95th (ft)	m88	m14	274	39
Internal Link Dist (ft)	743		262	663
Turn Bay Length (ft)		200		
Base Capacity (vph)	4014	214	4328	403
Starvation Cap Reductn	692	0	238	0
Spillback Cap Reductn	317	0	0	6
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.71	0.15	0.53	0.42

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

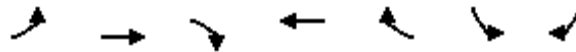
03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	2300	8	30	2058	25	74
Future Volume (vph)	2300	8	30	2058	25	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	2.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.90	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	5082		1770	5085	1642	
Flt Permitted	1.00		0.05	1.00	0.99	
Satd. Flow (perm)	5082		88	5085	1642	
Peak-hour factor, PHF	0.98	0.98	0.95	0.95	0.59	0.59
Adj. Flow (vph)	2347	8	32	2166	42	125
RTOR Reduction (vph)	0	0	0	0	99	0
Lane Group Flow (vph)	2355	0	32	2166	68	0
Confl. Peds. (#/hr)		9	9			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	90.4		100.1	100.1	10.4	
Effective Green, g (s)	92.4		102.1	102.1	12.4	
Actuated g/C Ratio	0.77		0.85	0.85	0.10	
Clearance Time (s)	5.5		6.0	5.5	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3913		154	4326	169	
v/s Ratio Prot	c0.46		0.01	c0.43	c0.04	
v/s Ratio Perm			0.17			
v/c Ratio	0.60		0.21	0.50	0.40	
Uniform Delay, d1	5.9		5.2	2.3	50.3	
Progression Factor	0.35		5.65	2.04	1.00	
Incremental Delay, d2	0.1		0.4	0.3	1.6	
Delay (s)	2.1		29.7	5.0	51.9	
Level of Service	A		C	A	D	
Approach Delay (s)	2.1			5.4	51.9	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			5.4		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.5
Intersection Capacity Utilization			57.2%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	WBR	SBL	SBR	Ø3
Lane Configurations								
Traffic Volume (vph)	27	734	1613	2069	245	188	20	
Future Volume (vph)	27	734	1613	2069	245	188	20	
Turn Type	Prot	NA	Prot	NA	Perm	Prot	Perm	
Protected Phases	5	2	2	6		4		3
Permitted Phases					6		4	
Detector Phase	5	2	2	6	6	4	4	
Switch Phase								
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	13.0	33.0
Total Split (s)	15.0	63.0	63.0	48.0	48.0	24.0	24.0	33.0
Total Split (%)	12.5%	52.5%	52.5%	40.0%	40.0%	20.0%	20.0%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lag	Lead
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.3	86.0	86.0	72.1	72.1	19.4	19.4	
Actuated g/C Ratio	0.08	0.72	0.72	0.60	0.60	0.16	0.16	
v/c Ratio	0.22	0.31	1.26	0.76	0.29	0.71	0.06	
Control Delay	63.9	5.0	138.3	23.0	18.0	39.0	0.6	
Queue Delay	0.0	0.0	0.0	0.0	71.3	5.3	1.2	
Total Delay	63.9	5.0	138.3	23.0	89.3	44.3	1.8	
LOS	E	A	F	C	F	D	A	
Approach Delay		96.2		30.0				
Approach LOS		F		C				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.26

Intersection Signal Delay: 61.4

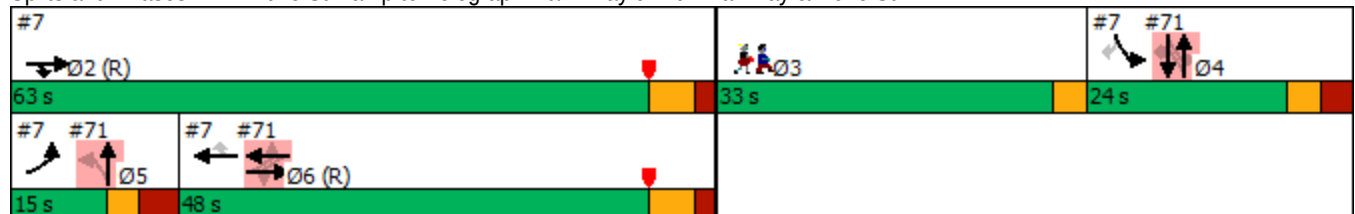
Intersection LOS: E

Intersection Capacity Utilization 103.2%

ICU Level of Service G

Analysis Period (min) 15

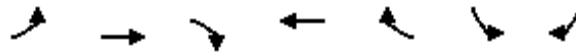
Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	WBR	SBL	SBR
Lane Group Flow (vph)	27	741	1629	2249	266	198	21
v/c Ratio	0.22	0.31	1.26	0.76	0.29	0.71	0.06
Control Delay	63.9	5.0	138.3	23.0	18.0	39.0	0.6
Queue Delay	0.0	0.0	0.0	0.0	71.3	5.3	1.2
Total Delay	63.9	5.0	138.3	23.0	89.3	44.3	1.8
Queue Length 50th (ft)	22	51	~1547	374	90	63	0
Queue Length 95th (ft)	m31	117	#2240	m#660	m151	#105	m0
Internal Link Dist (ft)		321		722			
Turn Bay Length (ft)	180				120		
Base Capacity (vph)	137	2417	1296	2941	933	286	358
Starvation Cap Reductn	0	0	0	0	0	46	253
Spillback Cap Reductn	0	0	0	0	792	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.31	1.26	0.76	1.89	0.82	0.20

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  							
Traffic Volume (vph)	27	734	1613	0	2069	245	0	0	0	188	0	20
Future Volume (vph)	27	734	1613	0	2069	245	0	0	0	188	0	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0	4.0				4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00				1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00				1.00		1.00
Frt	1.00	1.00	1.00		1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (prot)	1570	3374	1810		4893	1553				1719		1583
Flt Permitted	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (perm)	1570	3374	1810		4893	1553				1719		1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Adj. Flow (vph)	27	741	1629	0	2249	266	0	0	0	198	0	21
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	18
Lane Group Flow (vph)	27	741	1629	0	2249	266	0	0	0	198	0	3
Confl. Peds. (#/hr)									7	7		
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA	Perm				Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases						6						4
Actuated Green, G (s)	7.3	81.6	81.6		67.8	67.8				17.4		17.4
Effective Green, g (s)	9.3	83.6	83.6		69.8	69.8				19.4		19.4
Actuated g/C Ratio	0.08	0.70	0.70		0.58	0.58				0.16		0.16
Clearance Time (s)	6.5	6.0	6.0		6.0	6.0				6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2	0.2				3.0		3.0
Lane Grp Cap (vph)	121	2350	1260		2846	903				277		255
v/s Ratio Prot	0.02	0.22	c0.90		0.46					c0.12		
v/s Ratio Perm						0.17						0.00
v/c Ratio	0.22	0.32	1.29		0.79	0.29				0.71		0.01
Uniform Delay, d1	52.0	7.1	18.2		19.4	12.7				47.7		42.3
Progression Factor	1.17	0.56	0.74		1.13	1.16				0.51		1.00
Incremental Delay, d2	0.8	0.3	136.8		1.0	0.3				8.2		0.0
Delay (s)	61.4	4.3	150.2		23.0	15.0				32.5		42.3
Level of Service	E	A	F		C	B				C		D
Approach Delay (s)		104.1			22.1			0.0			33.4	
Approach LOS		F			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			60.9									HCM 2000 Level of Service E
HCM 2000 Volume to Capacity ratio			1.17									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			103.2%									ICU Level of Service G
Analysis Period (min)			15									
c Critical Lane Group												

Timings

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Lane Group	NBT	Ø2	Ø4	Ø6	Ø8
Lane Configurations	↑↑				
Traffic Volume (vph)	1821				
Future Volume (vph)	1821				
Turn Type	NA				
Protected Phases	12	2	4	6	8
Permitted Phases					
Detector Phase	12				
Switch Phase					
Minimum Initial (s)	4.0	4.0	4.0	4.0	7.0
Minimum Split (s)	26.0	22.0	22.0	22.0	40.0
Total Split (s)	69.0	69.0	51.0	69.0	51.0
Total Split (%)	57.5%	58%	43%	58%	43%
Yellow Time (s)	4.0	4.0	3.0	4.0	3.0
All-Red Time (s)	6.0	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0				
Total Lost Time (s)	8.0				
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	Max	C-Max	None	C-Max	None
Act Effect Green (s)	61.0				
Actuated g/C Ratio	0.51				
v/c Ratio	1.01				
Control Delay	35.1				
Queue Delay	0.0				
Total Delay	35.1				
LOS	D				
Approach Delay	35.1				
Approach LOS	D				

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.26
Intersection Signal Delay: 35.1
Intersection LOS: D
Intersection Capacity Utilization 57.0%
ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 9: WB Duke St to SB Telegraph Rd & Dummy

#10 → Ø2 (R) 69 s	#10 #81 ↓ Ø4 51 s
#10 #81 ← Ø6 (R) 69 s	#10 #81 ↑ Ø8 51 s
#9 ↑ Ø12 69 s	

Queues

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Lane Group	NBT
Lane Group Flow (vph)	1821
v/c Ratio	1.01
Control Delay	35.1
Queue Delay	0.0
Total Delay	35.1
Queue Length 50th (ft)	~221
Queue Length 95th (ft)	m#903
Internal Link Dist (ft)	104
Turn Bay Length (ft)	
Base Capacity (vph)	1798
Starvation Cap Reductn	0
Spillback Cap Reductn	0
Storage Cap Reductn	0
Reduced v/c Ratio	1.01

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 Signalized Intersection Capacity Analysis

9: WB Duke St to SB Telegraph Rd & Dummy

03/14/2024



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations			↑↑			
Traffic Volume (vph)	0	0	1821	0	0	0
Future Volume (vph)	0	0	1821	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)			8.0			
Lane Util. Factor			0.95			
Frt			1.00			
Flt Protected			1.00			
Satd. Flow (prot)			3539			
Flt Permitted			1.00			
Satd. Flow (perm)			3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	1821	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	0	0	1821	0	0	0
Turn Type			NA			
Protected Phases			12			
Permitted Phases						
Actuated Green, G (s)			59.0			
Effective Green, g (s)			61.0			
Actuated g/C Ratio			0.51			
Clearance Time (s)			10.0			
Vehicle Extension (s)			3.0			
Lane Grp Cap (vph)			1798			
v/s Ratio Prot			c0.51			
v/s Ratio Perm						
v/c Ratio			1.01			
Uniform Delay, d1			29.5			
Progression Factor			0.49			
Incremental Delay, d2			18.9			
Delay (s)			33.3			
Level of Service			C			
Approach Delay (s)	0.0		33.3		0.0	
Approach LOS	A		C		A	
Intersection Summary						
HCM 2000 Control Delay			33.3	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		14.0
Intersection Capacity Utilization			57.0%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						

Timings

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT	Ø12
Lane Configurations	↑↑↑	↑↑↑		↕		↕	
Traffic Volume (vph)	1493	2431	136	32	15	21	
Future Volume (vph)	1493	2431	136	32	15	21	
Turn Type	NA	NA	Perm	NA	Perm	NA	
Protected Phases	2	6		8		4	12
Permitted Phases			8		4		
Detector Phase	2	6	8	8	4	4	
Switch Phase							
Minimum Initial (s)	4.0	4.0	7.0	7.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	40.0	40.0	22.0	22.0	26.0
Total Split (s)	69.0	69.0	51.0	51.0	51.0	51.0	69.0
Total Split (%)	57.5%	57.5%	42.5%	42.5%	42.5%	42.5%	58%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0	4.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0	6.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0	
Total Lost Time (s)	4.0	4.0		4.0		4.0	
Lead/Lag							
Lead-Lag Optimize?							
Recall Mode	C-Max	C-Max	None	None	None	None	Max
Act Effect Green (s)	65.0	65.0		47.0		47.0	
Actuated g/C Ratio	0.54	0.54		0.39		0.39	
v/c Ratio	0.57	0.92		0.42		0.13	
Control Delay	19.9	29.0		28.8		24.0	
Queue Delay	0.0	0.0		0.0		0.0	
Total Delay	19.9	29.0		28.8		24.0	
LOS	B	C		C		C	
Approach Delay	19.9	29.0		28.8		24.0	
Approach LOS	B	C		C		C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.26

Intersection Signal Delay: 25.6

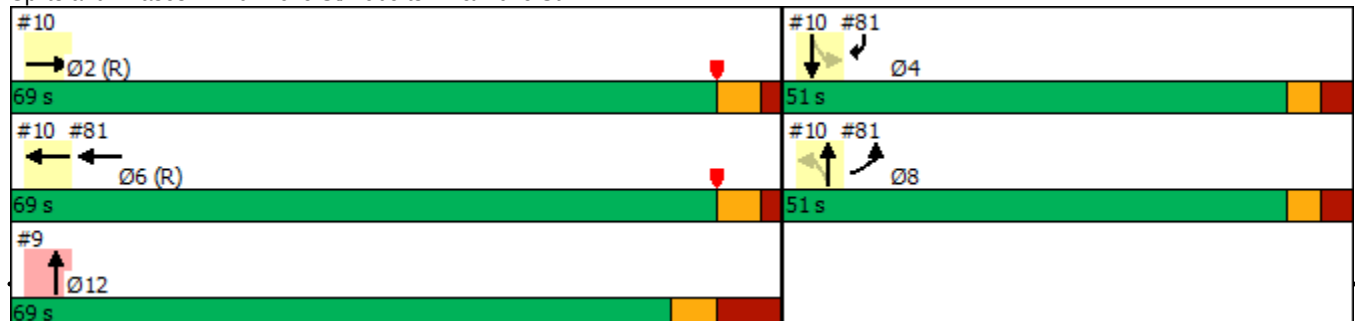
Intersection LOS: C

Intersection Capacity Utilization 74.6%

ICU Level of Service D

Analysis Period (min) 15

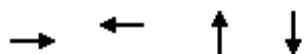
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1572	2506	226	78
v/c Ratio	0.57	0.92	0.42	0.13
Control Delay	19.9	29.0	28.8	24.0
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	19.9	29.0	28.8	24.0
Queue Length 50th (ft)	283	654	122	38
Queue Length 95th (ft)	404	731	177	73
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	2754	2726	539	583
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.57	0.92	0.42	0.13
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

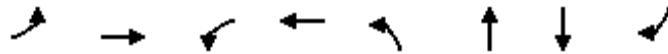
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1493	0	0	2431	0	136	32	22	15	21	36
Future Volume (vph)	0	1493	0	0	2431	0	136	32	22	15	21	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.98			0.93	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		5085			5034			1763			1589	
Flt Permitted		1.00			1.00			0.75			0.93	
Satd. Flow (perm)		5085			5034			1368			1489	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Adj. Flow (vph)	0	1572	0	0	2506	0	162	38	26	16	23	39
RTOR Reduction (vph)	0	0	0	0	0	0	0	4	0	0	1	0
Lane Group Flow (vph)	0	1572	0	0	2506	0	0	222	0	0	77	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		63.0			63.0			45.0			45.0	
Effective Green, g (s)		65.0			65.0			47.0			47.0	
Actuated g/C Ratio		0.54			0.54			0.39			0.39	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		2754			2726			535			583	
v/s Ratio Prot		0.31			c0.50							
v/s Ratio Perm								c0.16			0.05	
v/c Ratio		0.57			0.92			0.42			0.13	
Uniform Delay, d1		18.2			25.1			26.5			23.4	
Progression Factor		1.03			0.98			1.00			1.00	
Incremental Delay, d2		0.9			4.1			0.5			0.1	
Delay (s)		19.7			28.6			27.0			23.5	
Level of Service		B			C			C			C	
Approach Delay (s)		19.7			28.6			27.0			23.5	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay			25.2				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			14.0		
Intersection Capacity Utilization			74.6%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations		↔		↔		↔	↔	↔			
Traffic Volume (vph)	8	5	10	12	37	219	129	1			
Future Volume (vph)	8	5	10	12	37	219	129	1			
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA	Perm			
Protected Phases		6		6		4 5	4		2	3	5
Permitted Phases	6		6		4 5			4			
Detector Phase	6	6	6	6	4 5	4 5	4	4			
Switch Phase											
Minimum Initial (s)	7.0	7.0	7.0	7.0			7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0			13.0	13.0	14.0	33.0	12.5
Total Split (s)	48.0	48.0	48.0	48.0			24.0	24.0	63.0	33.0	15.0
Total Split (%)	40.0%	40.0%	40.0%	40.0%			20.0%	20.0%	53%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0			3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0			-2.0	-2.0			
Total Lost Time (s)		4.0		4.0			4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag		Lead	Lead
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None	C-Max	None	None
Act Effect Green (s)		72.1		72.1		33.3	19.4	19.4			
Actuated g/C Ratio		0.60		0.60		0.28	0.16	0.16			
v/c Ratio		0.10		0.03		0.60	0.45	0.00			
Control Delay		5.5		14.3		62.7	50.6	0.0			
Queue Delay		0.0		0.0		79.1	0.1	0.0			
Total Delay		5.6		14.3		141.8	50.7	0.0			
LOS		A		B		F	D	A			
Approach Delay		5.6		14.3		141.8	50.3				
Approach LOS		A		B		F	D				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.26

Intersection Signal Delay: 87.4

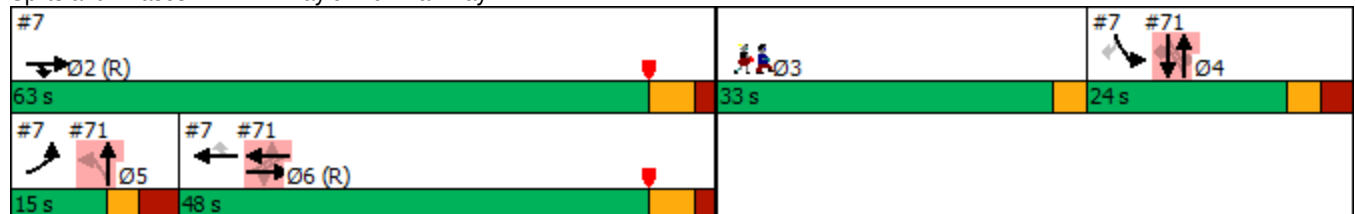
Intersection LOS: F

Intersection Capacity Utilization 37.3%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway



Queues

71: W Taylor Run Parkway

03/14/2024



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	101	32	288	136	1
v/c Ratio	0.10	0.03	0.60	0.45	0.00
Control Delay	5.5	14.3	62.7	50.6	0.0
Queue Delay	0.0	0.0	79.1	0.1	0.0
Total Delay	5.6	14.3	141.8	50.7	0.0
Queue Length 50th (ft)	4	7	216	96	0
Queue Length 95th (ft)	36	31	301	160	0
Internal Link Dist (ft)	56	63	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	1006	1008	493	310	358
Starvation Cap Reductn	0	0	400	0	0
Spillback Cap Reductn	198	200	0	5	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.13	0.04	3.10	0.45	0.00
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Parkway

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	5	69	10	12	2	37	219	17	0	129	1
Future Volume (vph)	8	5	69	10	12	2	37	219	17	0	129	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.89			0.99			0.99			1.00	0.85
Flt Protected		1.00			0.98			0.99			1.00	1.00
Satd. Flow (prot)		1640			1796			1818			1863	1583
Flt Permitted		0.98			0.92			0.94			1.00	1.00
Satd. Flow (perm)		1620			1679			1724			1863	1583
Peak-hour factor, PHF	0.81	0.81	0.81	0.77	0.77	0.77	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	10	6	85	13	16	3	39	231	18	0	136	1
RTOR Reduction (vph)	0	36	0	0	1	0	0	2	0	0	0	1
Lane Group Flow (vph)	0	65	0	0	31	0	0	286	0	0	136	0
Confl. Peds. (#/hr)	22					22			7	7		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	2%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		67.8			67.8			30.7			17.4	17.4
Effective Green, g (s)		69.8			69.8			32.7			19.4	19.4
Actuated g/C Ratio		0.58			0.58			0.27			0.16	0.16
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		942			976			469			301	255
v/s Ratio Prot											0.07	
v/s Ratio Perm		c0.04			0.02			c0.17				0.00
v/c Ratio		0.07			0.03			0.61			0.45	0.00
Uniform Delay, d1		10.9			10.7			38.1			45.5	42.2
Progression Factor		1.00			1.00			1.54			1.00	1.00
Incremental Delay, d2		0.1			0.1			2.2			1.1	0.0
Delay (s)		11.1			10.8			60.7			46.6	42.2
Level of Service		B			B			E			D	D
Approach Delay (s)		11.1			10.8			60.7			46.5	
Approach LOS		B			B			E			D	
Intersection Summary												
HCM 2000 Control Delay			45.4				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.24									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			15.5		
Intersection Capacity Utilization			37.3%				ICU Level of Service			A		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024



Lane Group	EBL	EBT	WBT	SBR	Ø2	Ø12
Lane Configurations	↰	↑↑	↑↑	↰↰		
Traffic Volume (vph)	207	715	781	1532		
Future Volume (vph)	207	715	781	1532		
Turn Type	Prot	NA	NA	Prot		
Protected Phases	8	Free	6	4	2	12
Permitted Phases						
Detector Phase	8		6	4		
Switch Phase						
Minimum Initial (s)	7.0		4.0	4.0	4.0	4.0
Minimum Split (s)	40.0		22.0	22.0	22.0	26.0
Total Split (s)	51.0		69.0	51.0	69.0	69.0
Total Split (%)	42.5%		57.5%	42.5%	58%	58%
Yellow Time (s)	3.0		4.0	3.0	4.0	4.0
All-Red Time (s)	3.0		2.0	3.0	2.0	6.0
Lost Time Adjust (s)	-2.0		-2.0	-2.0		
Total Lost Time (s)	4.0		4.0	4.0		
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		C-Max	None	C-Max	Max
Act Effect Green (s)	47.0	120.0	65.0	47.0		
Actuated g/C Ratio	0.39	1.00	0.54	0.39		
v/c Ratio	0.30	0.20	0.41	1.26		
Control Delay	24.1	0.1	9.8	149.2		
Queue Delay	0.0	0.0	0.0	0.0		
Total Delay	24.1	0.1	9.8	149.2		
LOS	C	A	A	F		
Approach Delay		5.5	9.8			
Approach LOS		A	A			

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.26
Intersection Signal Delay: 75.3
Intersection Capacity Utilization 81.8%
Analysis Period (min) 15
Intersection LOS: E
ICU Level of Service D

Splits and Phases: 81: Duke St & NB Telegraph Rd to WB Duke St

#10 → Ø2 (R) 69 s	#10 #81 ↓ Ø4 51 s
#10 #81 ← Ø6 (R) 69 s	#10 #81 ↑ Ø8 51 s
#9 ↑ Ø12 69 s	

Queues

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024



Lane Group	EBL	EBT	WBT	SBR
Lane Group Flow (vph)	207	715	781	1563
v/c Ratio	0.30	0.20	0.41	1.26
Control Delay	24.1	0.1	9.8	149.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	24.1	0.1	9.8	149.2
Queue Length 50th (ft)	104	0	74	~782
Queue Length 95th (ft)	m83	0	m105	#935
Internal Link Dist (ft)		184	95	
Turn Bay Length (ft)	300			
Base Capacity (vph)	693	3539	1916	1245
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.30	0.20	0.41	1.26

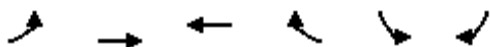
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

81: Duke St & NB Telegraph Rd to WB Duke St

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	207	715	781	0	0	1532
Future Volume (vph)	207	715	781	0	0	1532
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			4.0
Lane Util. Factor	1.00	0.95	0.95			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	3539	3539			2733
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	3539	3539			2733
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	0.98
Adj. Flow (vph)	207	715	781	0	0	1563
RTOR Reduction (vph)	0	0	0	0	0	175
Lane Group Flow (vph)	207	715	781	0	0	1388
Heavy Vehicles (%)	2%	2%	2%	2%	2%	4%
Turn Type	Prot	NA	NA			Prot
Protected Phases	8	Free	6			4
Permitted Phases						
Actuated Green, G (s)	45.0	120.0	63.0			45.0
Effective Green, g (s)	47.0	120.0	65.0			47.0
Actuated g/C Ratio	0.39	1.00	0.54			0.39
Clearance Time (s)	6.0		6.0			6.0
Vehicle Extension (s)	3.0		3.0			3.0
Lane Grp Cap (vph)	693	3539	1916			1070
v/s Ratio Prot	0.12	0.20	c0.22			c0.51
v/s Ratio Perm						
v/c Ratio	0.30	0.20	0.41			1.30
Uniform Delay, d1	25.1	0.0	16.2			36.5
Progression Factor	0.90	1.00	0.58			1.00
Incremental Delay, d2	0.2	0.1	0.4			140.6
Delay (s)	23.0	0.1	9.7			177.1
Level of Service	C	A	A			F
Approach Delay (s)		5.2	9.7		177.1	
Approach LOS		A	A		F	
Intersection Summary						
HCM 2000 Control Delay			88.6		HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio			0.82			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	14.0
Intersection Capacity Utilization			81.8%		ICU Level of Service	D
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

82: NB Telegraph Rd to WB Duke St & WB Duke St to SB Telegraph Rd

03/14/2024



Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		↑↑		↑	↑	
Traffic Volume (veh/h)	0	1821	0	1532	207	0
Future Volume (Veh/h)	0	1821	0	1532	207	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1821	0	1532	207	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)		329				
pX, platoon unblocked					0.50	
vC, conflicting volume	1532				910	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1532				0	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				59	100
cM capacity (veh/h)	430				509	1084
Direction, Lane #	NB 1	NB 2	SB 1	NE 1		
Volume Total	910	910	1532	207		
Volume Left	0	0	0	207		
Volume Right	0	0	1532	0		
cSH	1700	1700	1700	509		
Volume to Capacity	0.54	0.54	0.90	0.41		
Queue Length 95th (ft)	0	0	0	49		
Control Delay (s)	0.0	0.0	0.0	16.8		
Lane LOS				C		
Approach Delay (s)	0.0		0.0	16.8		
Approach LOS				C		
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			98.2%		ICU Level of Service	F
Analysis Period (min)			15			



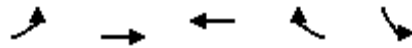
Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix Y: Signal Timing2036 Build Alternative 3C

Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	Ø2
Lane Configurations	↖	↑↑↑	↑↑	↗	↖↖	
Traffic Volume (vph)	323	1319	920	1065	573	
Future Volume (vph)	323	1319	920	1065	573	
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	2
Permitted Phases	5 2					
Detector Phase	5	5 2	6	6 4	4	
Switch Phase						
Minimum Initial (s)	5.0		10.0		7.0	10.0
Minimum Split (s)	19.6		22.0		29.5	22.0
Total Split (s)	20.0		61.0		39.0	81.0
Total Split (%)	16.7%		50.8%		32.5%	68%
Yellow Time (s)	3.0		4.0		3.5	4.0
All-Red Time (s)	2.6		2.0		3.0	2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0	
Total Lost Time (s)	3.6		4.0		4.5	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None		C-Max		None	C-Max
Act Effect Green (s)	77.4	77.4	57.0	96.0	34.5	
Actuated g/C Ratio	0.64	0.64	0.48	0.80	0.29	
v/c Ratio	0.89	0.45	0.61	0.89	1.05	
Control Delay	41.1	11.2	14.1	20.2	82.5	
Queue Delay	0.0	0.0	2.0	20.1	4.5	
Total Delay	41.1	11.2	16.1	40.3	87.0	
LOS	D	B	B	D	F	
Approach Delay		17.1	29.1		87.0	
Approach LOS		B	C		F	

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.05
 Intersection Signal Delay: 35.6
 Intersection Capacity Utilization 90.9%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service E

Splits and Phases: 1: Duke St & N Quaker Lane



Queues

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	351	1434	968	1121	907
v/c Ratio	0.89	0.45	0.61	0.89	1.05
Control Delay	41.1	11.2	14.1	20.2	82.5
Queue Delay	0.0	0.0	2.0	20.1	4.5
Total Delay	41.1	11.2	16.1	40.3	87.0
Queue Length 50th (ft)	130	187	114	922	~372
Queue Length 95th (ft)	#302	219	220	#1083	#501
Internal Link Dist (ft)		582	312		324
Turn Bay Length (ft)					
Base Capacity (vph)	396	3217	1587	1254	865
Starvation Cap Reductn	0	0	446	166	0
Spillback Cap Reductn	0	329	0	0	10
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.89	0.50	0.85	1.03	1.06

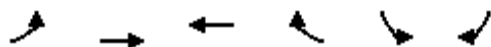
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	323	1319	920	1065	573	279
Future Volume (vph)	323	1319	920	1065	573	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.95	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1719	4988	3343	1568	2831	
Flt Permitted	0.18	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	319	4988	3343	1568	2831	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.94	0.94
Adj. Flow (vph)	351	1434	968	1121	610	297
RTOR Reduction (vph)	0	0	0	0	52	0
Lane Group Flow (vph)	351	1434	968	1121	855	0
Confl. Peds. (#/hr)	4			4	4	2
Heavy Vehicles (%)	5%	4%	8%	3%	27%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	75.0	75.0	55.0	93.5	32.5	
Effective Green, g (s)	77.0	77.0	57.0	95.5	34.5	
Actuated g/C Ratio	0.64	0.64	0.48	0.80	0.29	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		0.2		3.0	
Lane Grp Cap (vph)	396	3200	1587	1247	813	
v/s Ratio Prot	c0.12	0.29	0.29	0.71	c0.30	
v/s Ratio Perm	c0.45					
v/c Ratio	0.89	0.45	0.61	0.90	1.05	
Uniform Delay, d1	19.2	10.8	23.3	8.8	42.8	
Progression Factor	1.00	1.00	0.54	1.31	1.00	
Incremental Delay, d2	20.5	0.1	1.3	6.7	46.0	
Delay (s)	39.7	10.9	14.0	18.2	88.8	
Level of Service	D	B	B	B	F	
Approach Delay (s)		16.6	16.2		88.8	
Approach LOS		B	B		F	
Intersection Summary						
HCM 2000 Control Delay			30.1		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.96			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			90.9%		ICU Level of Service	E
Analysis Period (min)			15			
c Critical Lane Group						

Timings

2: S Quaker Ln & Duke St

03/14/2024

	→	↘	↙	←	↖	↑	↗	↓		
Lane Group	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø6
Lane Configurations	↑↑	↑	↙	↑↑		↕		↕		
Traffic Volume (vph)	1769	123	25	1930	55	0	2	0		
Future Volume (vph)	1769	123	25	1930	55	0	2	0		
Turn Type	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA		
Protected Phases	2		1	1 6		4		3 4	3	6
Permitted Phases		2	1 6		4		3 4			
Detector Phase	2	2	1	1 6	4	4	3 4	3 4		
Switch Phase										
Minimum Initial (s)	10.0	10.0	5.0		7.0	7.0			4.0	4.0
Minimum Split (s)	15.5	15.5	10.5		29.0	29.0			12.0	20.0
Total Split (s)	63.0	63.0	16.0		29.0	29.0			12.0	79.0
Total Split (%)	52.5%	52.5%	13.3%		24.2%	24.2%			10%	66%
Yellow Time (s)	4.0	4.0	4.0		3.0	3.0			3.0	4.0
All-Red Time (s)	1.5	1.5	1.5		1.0	1.0			0.5	1.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0			-2.0				
Total Lost Time (s)	3.5	3.5	3.5			2.0				
Lead/Lag	Lead	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?										
Recall Mode	C-Max	C-Max	None		None	None			None	C-Max
Act Effect Green (s)	86.6	86.6	102.6	103.3		12.6		14.6		
Actuated g/C Ratio	0.72	0.72	0.86	0.86		0.10		0.12		
v/c Ratio	0.77	0.12	0.10	0.69		0.35		0.01		
Control Delay	14.8	2.3	2.1	3.0		8.4		38.5		
Queue Delay	0.0	0.0	0.0	0.1		0.0		0.0		
Total Delay	14.8	2.3	2.1	3.0		8.4		38.5		
LOS	B	A	A	A		A		D		
Approach Delay	14.0			3.0		8.4		38.5		
Approach LOS	B			A		A		D		

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 10 (8%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 8.5

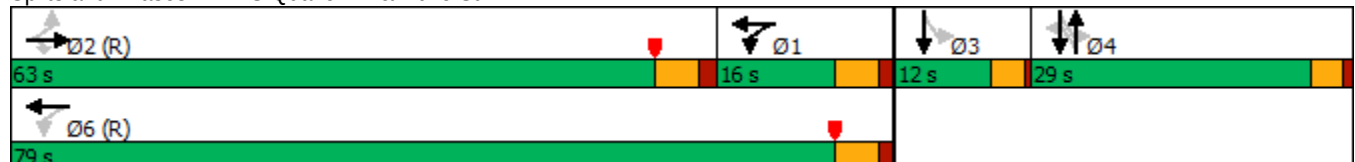
Intersection LOS: A

Intersection Capacity Utilization 68.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 2: S Quaker Ln & Duke St



Queues

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	1923	134	27	2053	83	2
v/c Ratio	0.77	0.12	0.10	0.69	0.35	0.01
Control Delay	14.8	2.3	2.1	3.0	8.4	38.5
Queue Delay	0.0	0.0	0.0	0.1	0.0	0.0
Total Delay	14.8	2.3	2.1	3.0	8.4	38.5
Queue Length 50th (ft)	594	4	0	5	0	1
Queue Length 95th (ft)	m#932	m20	m3	103	21	8
Internal Link Dist (ft)	312			222	293	73
Turn Bay Length (ft)			75			
Base Capacity (vph)	2504	1088	260	2959	384	343
Starvation Cap Reductn	0	0	0	82	0	0
Spillback Cap Reductn	0	0	0	84	2	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.12	0.10	0.71	0.22	0.01

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 Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1769	123	25	1930	0	55	0	15	2	0	0
Future Volume (vph)	0	1769	123	25	1930	0	55	0	15	2	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor		0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes		1.00	0.98	1.00	1.00			1.00			1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00			1.00	
Frt		1.00	0.85	1.00	1.00			0.97			1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.96			0.95	
Satd. Flow (prot)		3471	1475	1770	3438			1666			1761	
Flt Permitted		1.00	1.00	0.06	1.00			0.78			0.76	
Satd. Flow (perm)		3471	1475	103	3438			1345			1418	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.84	0.84	0.84	1.00	1.00	1.00
Adj. Flow (vph)	0	1923	134	27	2053	0	65	0	18	2	0	0
RTOR Reduction (vph)	0	0	28	0	0	0	0	75	0	0	0	0
Lane Group Flow (vph)	0	1923	106	27	2053	0	0	8	0	0	2	0
Confl. Peds. (#/hr)	9		4	4		9			5	5		
Heavy Vehicles (%)	2%	4%	7%	2%	5%	2%	2%	2%	21%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 6			4			3 4	
Permitted Phases	2		2	1 6			4			3 4		
Actuated Green, G (s)		81.0	81.0	97.0	97.0			9.2			13.5	
Effective Green, g (s)		83.0	83.0	99.0	99.0			11.2			15.5	
Actuated g/C Ratio		0.69	0.69	0.82	0.82			0.09			0.13	
Clearance Time (s)		5.5	5.5	5.5				4.0				
Vehicle Extension (s)		0.2	0.2	3.0				3.0				
Lane Grp Cap (vph)		2400	1020	258	2836			125			183	
v/s Ratio Prot		c0.55		0.01	c0.60							
v/s Ratio Perm			0.07	0.08				c0.01			c0.00	
v/c Ratio		0.80	0.10	0.10	0.72			0.06			0.01	
Uniform Delay, d1		12.8	6.1	20.2	4.6			49.6			45.6	
Progression Factor		0.95	0.61	0.19	0.28			1.00			1.00	
Incremental Delay, d2		2.3	0.2	0.1	0.6			0.2			0.0	
Delay (s)		14.5	3.9	4.0	1.9			49.8			45.6	
Level of Service		B	A	A	A			D			D	
Approach Delay (s)		13.8			1.9			49.8			45.6	
Approach LOS		B			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			8.7			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			68.2%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

3: Duke St & Alexandria Commons

03/14/2024



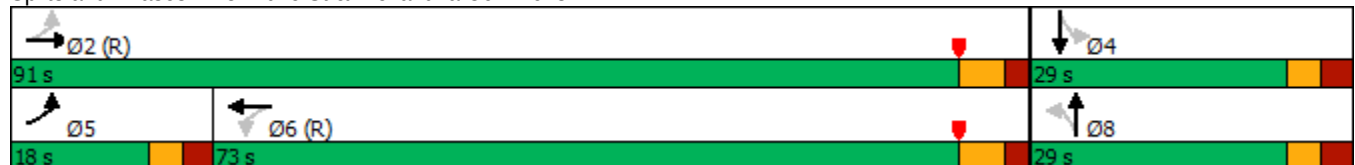
Lane Group	EBL	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	42	1737	1906	3	0	18	0
Future Volume (vph)	42	1737	1906	3	0	18	0
Turn Type	pm+pt	NA	NA	Perm	NA	Perm	NA
Protected Phases	5	2	6		8		4
Permitted Phases	2			8		4	
Detector Phase	5	2	6	8	8	4	4
Switch Phase							
Minimum Initial (s)	4.5	10.0	1.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.6	16.3	16.3	29.0	29.0	13.0	13.0
Total Split (s)	18.0	91.0	73.0	29.0	29.0	29.0	29.0
Total Split (%)	15.0%	75.8%	60.8%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.6	2.3	2.3	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	3.6	4.3	4.3		4.0		4.0
Lead/Lag	Lead		Lag				
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	102.8	103.0	94.3		12.2		12.2
Actuated g/C Ratio	0.86	0.86	0.79		0.10		0.10
v/c Ratio	0.24	0.62	0.76		0.10		0.30
Control Delay	13.1	1.7	6.9		47.0		9.8
Queue Delay	0.0	0.2	1.0		0.0		0.0
Total Delay	13.1	1.9	8.0		47.0		9.8
LOS	B	A	A		D		A
Approach Delay		2.2	8.0		47.0		9.8
Approach LOS		A	A		D		A

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 26 (22%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 110
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 5.4
 Intersection Capacity Utilization 70.1%
 Analysis Period (min) 15

Intersection LOS: A
 ICU Level of Service C

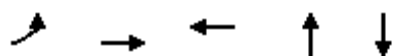
Splits and Phases: 3: Duke St & Alexandria Commons



Queues

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	44	1834	2044	12	67
v/c Ratio	0.24	0.62	0.76	0.10	0.30
Control Delay	13.1	1.7	6.9	47.0	9.8
Queue Delay	0.0	0.2	1.0	0.0	0.0
Total Delay	13.1	1.9	8.0	47.0	9.8
Queue Length 50th (ft)	0	1	10	9	0
Queue Length 95th (ft)	m3	60	#993	7	29
Internal Link Dist (ft)		222	571	88	97
Turn Bay Length (ft)	100				
Base Capacity (vph)	287	2978	2694	253	379
Starvation Cap Reductn	0	391	373	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.15	0.71	0.88	0.05	0.18

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 Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	42	1737	6	0	1906	36	3	0	0	18	0	46
Future Volume (vph)	42	1737	6	0	1906	36	3	0	0	18	0	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	4.3			4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95			0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	
Frt	1.00	1.00			1.00			1.00			0.90	
Flt Protected	0.95	1.00			1.00			0.95			0.99	
Satd. Flow (prot)	1770	3469			3429			1770			1653	
Flt Permitted	0.05	1.00			1.00			0.65			0.91	
Satd. Flow (perm)	102	3469			3429			1215			1518	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.25	0.25	0.25	0.95	0.95	0.95
Adj. Flow (vph)	44	1828	6	0	2006	38	12	0	0	19	0	48
RTOR Reduction (vph)	0	0	0	0	1	0	0	0	0	0	61	0
Lane Group Flow (vph)	44	1834	0	0	2043	0	0	12	0	0	6	0
Confl. Peds. (#/hr)	8		3	3		8			9	9		
Heavy Vehicles (%)	2%	4%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	98.9	98.9			89.1			8.8			8.8	
Effective Green, g (s)	100.9	100.9			91.1			10.8			10.8	
Actuated g/C Ratio	0.84	0.84			0.76			0.09			0.09	
Clearance Time (s)	5.6	6.3			6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0			0.2			2.0			2.0	
Lane Grp Cap (vph)	171	2916			2603			109			136	
v/s Ratio Prot	0.01	c0.53			c0.60							
v/s Ratio Perm	0.20							c0.01			0.00	
v/c Ratio	0.26	0.63			0.78			0.11			0.04	
Uniform Delay, d1	11.3	3.2			8.6			50.2			49.9	
Progression Factor	4.31	0.26			0.48			1.00			1.00	
Incremental Delay, d2	0.2	0.7			1.3			0.2			0.0	
Delay (s)	49.0	1.5			5.4			50.3			49.9	
Level of Service	D	A			A			D			D	
Approach Delay (s)		2.6			5.4			50.3			49.9	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			5.0				HCM 2000 Level of Service			A		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			11.9		
Intersection Capacity Utilization			70.1%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	54	1699	23	1849	12	5	85	1	81
Future Volume (vph)	54	1699	23	1849	12	5	85	1	81
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	4.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	30.8	10.0	31.0	29.0	29.0	29.0	29.0	29.0
Total Split (s)	16.0	73.0	18.0	75.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	13.3%	60.8%	15.0%	62.5%	24.2%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	1.8	2.6	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	3.8	3.6	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	None	None
Act Effect Green (s)	93.4	88.7	91.6	85.6		17.0		17.0	17.0
Actuated g/C Ratio	0.78	0.74	0.76	0.71		0.14		0.14	0.14
v/c Ratio	0.33	0.70	0.13	0.88		0.23		0.61	0.34
Control Delay	19.6	9.3	1.1	11.1		21.7		61.7	10.8
Queue Delay	0.0	0.1	0.0	21.1		0.0		0.0	0.0
Total Delay	19.6	9.4	1.1	32.3		21.7		61.7	10.8
LOS	B	A	A	C		C		E	B
Approach Delay		9.7		31.9		21.7		36.9	
Approach LOS		A		C		C		D	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 110

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 22.4

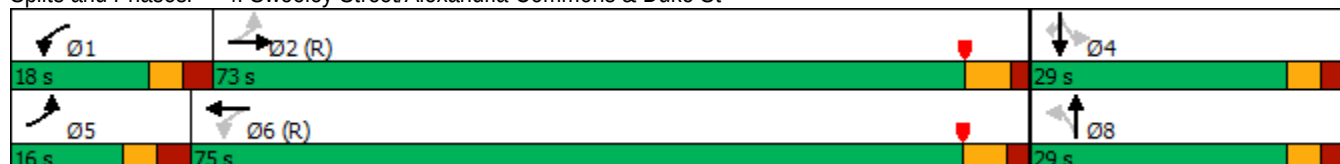
Intersection LOS: C

Intersection Capacity Utilization 80.1%

ICU Level of Service D

Analysis Period (min) 15

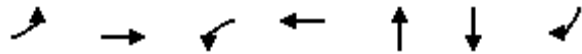
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St



Queues

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	57	1809	25	2148	55	113	107
v/c Ratio	0.33	0.70	0.13	0.88	0.23	0.61	0.34
Control Delay	19.6	9.3	1.1	11.1	21.7	61.7	10.8
Queue Delay	0.0	0.1	0.0	21.1	0.0	0.0	0.0
Total Delay	19.6	9.4	1.1	32.3	21.7	61.7	10.8
Queue Length 50th (ft)	8	141	1	936	13	84	0
Queue Length 95th (ft)	m48	450	m0	m#1034	48	112	29
Internal Link Dist (ft)		571		730	190	93	
Turn Bay Length (ft)	195		80				
Base Capacity (vph)	236	2566	291	2430	342	270	409
Starvation Cap Reductn	0	25	0	362	0	0	0
Spillback Cap Reductn	0	90	0	199	0	0	5
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.24	0.73	0.09	1.04	0.16	0.42	0.26

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 Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	1699	2	23	1849	127	12	5	32	85	1	81
Future Volume (vph)	54	1699	2	23	1849	127	12	5	32	85	1	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.99			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.91			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.95	1.00
Satd. Flow (prot)	1770	3471		1656	3405			1617			1760	1559
Flt Permitted	0.05	1.00		0.08	1.00			0.92			0.70	1.00
Satd. Flow (perm)	86	3471		137	3405			1504			1298	1559
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.90	0.90	0.90	0.76	0.76	0.76
Adj. Flow (vph)	57	1807	2	25	2010	138	13	6	36	112	1	107
RTOR Reduction (vph)	0	0	0	0	3	0	0	31	0	0	0	92
Lane Group Flow (vph)	57	1809	0	25	2145	0	0	24	0	0	113	15
Confl. Peds. (#/hr)	3		3	3		3	2		6	6		2
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	9%	2%	3%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	89.1	84.5		85.5	82.4			15.0			15.0	15.0
Effective Green, g (s)	93.1	86.5		89.5	84.4			17.0			17.0	17.0
Actuated g/C Ratio	0.78	0.72		0.75	0.70			0.14			0.14	0.14
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	159	2502		166	2394			213			183	220
v/s Ratio Prot	c0.02	0.52		0.01	c0.63							
v/s Ratio Perm	0.26			0.11				0.02			c0.09	0.01
v/c Ratio	0.36	0.72		0.15	0.90			0.11			0.62	0.07
Uniform Delay, d1	21.0	9.8		8.7	14.3			44.9			48.4	44.6
Progression Factor	1.86	0.73		0.16	0.51			1.00			1.00	1.00
Incremental Delay, d2	0.4	1.5		0.1	2.2			0.1			4.3	0.0
Delay (s)	39.5	8.6		1.4	9.5			45.0			52.7	44.7
Level of Service	D	A		A	A			D			D	D
Approach Delay (s)		9.5			9.4			45.0			48.8	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			11.9	HCM 2000 Level of Service					B			
HCM 2000 Volume to Capacity ratio			0.82									
Actuated Cycle Length (s)			120.0	Sum of lost time (s)					12.0			
Intersection Capacity Utilization			80.1%	ICU Level of Service					D			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

5: Roth St/Cambridge Rd & Duke St

03/14/2024

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	63	1749	100	1939	316	6	6	198	4	53
Future Volume (vph)	63	1749	100	1939	316	6	6	198	4	53
Turn Type	Prot	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6			8		4	
Permitted Phases			6		6	8		4		4
Detector Phase	5	2	1	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	6.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.5	30.7	11.5	15.7	15.7	13.0	13.0	30.0	30.0	30.0
Total Split (s)	16.0	72.0	18.0	74.0	74.0	30.0	30.0	30.0	30.0	30.0
Total Split (%)	13.3%	60.0%	15.0%	61.7%	61.7%	25.0%	25.0%	25.0%	25.0%	25.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	1.7	2.5	1.7	1.7	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	3.5	3.7	3.5	3.7	3.7		4.0		4.0	4.0
Lead/Lag	Lead	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?										
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	10.7	73.3	84.6	75.5	75.5		24.9		24.9	24.9
Actuated g/C Ratio	0.09	0.61	0.70	0.63	0.63		0.21		0.21	0.21
v/c Ratio	0.44	0.91	0.53	0.96	0.34		0.21		0.89	0.16
Control Delay	43.5	33.6	38.7	31.5	7.4		14.4		81.4	6.7
Queue Delay	0.0	0.1	0.0	42.9	0.0		0.0		0.0	0.0
Total Delay	43.5	33.7	38.7	74.4	7.4		14.4		81.4	6.7
LOS	D	C	D	E	A		B		F	A
Approach Delay		34.0		63.9			14.4		65.9	
Approach LOS		C		E			B		E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 89 (74%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 110
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.96
Intersection Signal Delay: 51.1
Intersection Capacity Utilization 87.3%
Analysis Period (min) 15
Intersection LOS: D
ICU Level of Service E

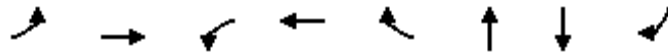
Splits and Phases: 5: Roth St/Cambridge Rd & Duke St



Queues

5: Roth St/Cambridge Rd & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	69	1926	108	2085	340	70	230	60
v/c Ratio	0.44	0.91	0.53	0.96	0.34	0.21	0.89	0.16
Control Delay	43.5	33.6	38.7	31.5	7.4	14.4	81.4	6.7
Queue Delay	0.0	0.1	0.0	42.9	0.0	0.0	0.0	0.0
Total Delay	43.5	33.7	38.7	74.4	7.4	14.4	81.4	6.7
Queue Length 50th (ft)	51	677	28	~921	118	7	173	0
Queue Length 95th (ft)	m71	#921	113	#1032	69	47	#305	24
Internal Link Dist (ft)		730		743		286	101	
Turn Bay Length (ft)	120		250					
Base Capacity (vph)	184	2121	256	2162	995	351	268	389
Starvation Cap Reductn	0	7	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	308	0	0	0	6
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.91	0.42	1.12	0.34	0.20	0.86	0.16

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 Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	63	1749	4	100	1939	316	6	6	56	198	4	53
Future Volume (vph)	63	1749	4	100	1939	316	6	6	56	198	4	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.89			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1770	3470		1656	3438	1583		1450			1758	1527
Flt Permitted	0.95	1.00		0.05	1.00	1.00		0.97			0.67	1.00
Satd. Flow (perm)	1770	3470		94	3438	1583		1414			1238	1527
Peak-hour factor, PHF	0.91	0.91	0.91	0.93	0.93	0.93	0.97	0.97	0.97	0.88	0.88	0.88
Adj. Flow (vph)	69	1922	4	108	2085	340	6	6	58	225	5	60
RTOR Reduction (vph)	0	0	0	0	0	0	0	46	0	0	0	48
Lane Group Flow (vph)	69	1926	0	108	2085	340	0	24	0	0	230	12
Confl. Peds. (#/hr)			4	4			16					16
Heavy Vehicles (%)	2%	4%	2%	9%	5%	2%	17%	2%	17%	2%	50%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	7.5	71.4		80.9	72.4	72.4		22.9			22.9	22.9
Effective Green, g (s)	9.5	73.4		84.9	74.4	74.4		24.9			24.9	24.9
Actuated g/C Ratio	0.08	0.61		0.71	0.62	0.62		0.21			0.21	0.21
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	140	2122		203	2131	981		293			256	316
v/s Ratio Prot	0.04	0.56		c0.05	c0.61							
v/s Ratio Perm				0.33		0.21		0.02			c0.19	0.01
v/c Ratio	0.49	0.91		0.53	0.98	0.35		0.08			0.90	0.04
Uniform Delay, d1	52.9	20.3		27.1	22.0	11.0		38.3			46.3	38.0
Progression Factor	0.72	1.32		1.62	0.87	0.55		1.00			1.00	1.00
Incremental Delay, d2	0.7	5.5		1.1	13.3	0.8		0.0			30.1	0.0
Delay (s)	38.8	32.2		44.9	32.4	6.8		38.4			76.4	38.0
Level of Service	D	C		D	C	A		D			E	D
Approach Delay (s)		32.5			29.5			38.4			68.5	
Approach LOS		C			C			D			E	
Intersection Summary												
HCM 2000 Control Delay			33.2									
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			120.0									
Intersection Capacity Utilization			87.3%									
Analysis Period (min)			15									
c Critical Lane Group												

Timings

6: Witter Drive & Duke St

03/14/2024

	→	↖	←	↙
Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↑↑↑	↙
Traffic Volume (vph)	1981	91	2348	7
Future Volume (vph)	1981	91	2348	7
Turn Type	NA	pm+pt	NA	Prot
Protected Phases	2	1	6	4
Permitted Phases		6		
Detector Phase	2	1	6	4
Switch Phase				
Minimum Initial (s)	10.0	6.0	10.0	4.0
Minimum Split (s)	27.5	12.0	15.5	13.0
Total Split (s)	79.0	16.0	95.0	25.0
Total Split (%)	65.8%	13.3%	79.2%	20.8%
Yellow Time (s)	3.5	3.0	3.5	3.0
All-Red Time (s)	2.0	3.0	2.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.5	4.0	3.5	4.0
Lead/Lag	Lead	Lag		
Lead-Lag Optimize?				
Recall Mode	C-Max	None	C-Max	None
Act Effect Green (s)	89.8	105.3	106.5	9.0
Actuated g/C Ratio	0.75	0.88	0.89	0.08
v/c Ratio	0.58	0.39	0.58	0.31
Control Delay	10.6	24.0	3.6	26.9
Queue Delay	0.0	0.0	0.3	0.0
Total Delay	10.6	24.0	3.9	26.9
LOS	B	C	A	C
Approach Delay	10.6		4.6	26.9
Approach LOS	B		A	C

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 69 (58%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 60
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.58
Intersection Signal Delay: 7.5
Intersection Capacity Utilization 57.1%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Witter Drive & Duke St

→ Ø2 (R)	↖ Ø1	↙ Ø4
79 s	16 s	25 s
↖ Ø6 (R)		
95 s		

Queues

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	2154	100	2580	46
v/c Ratio	0.58	0.39	0.58	0.31
Control Delay	10.6	24.0	3.6	26.9
Queue Delay	0.0	0.0	0.3	0.0
Total Delay	10.6	24.0	3.9	26.9
Queue Length 50th (ft)	291	25	2	7
Queue Length 95th (ft)	397	m66	768	31
Internal Link Dist (ft)	743		262	663
Turn Bay Length (ft)		200		
Base Capacity (vph)	3725	259	4426	298
Starvation Cap Reductn	0	0	950	0
Spillback Cap Reductn	142	0	550	1
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.60	0.39	0.74	0.15

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	1981	22	91	2348	7	26
Future Volume (vph)	1981	22	91	2348	7	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	4.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.89	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	4978		1719	4988	1538	
Flt Permitted	1.00		0.06	1.00	0.99	
Satd. Flow (perm)	4978		112	4988	1538	
Peak-hour factor, PHF	0.93	0.93	0.91	0.91	0.73	0.73
Adj. Flow (vph)	2130	24	100	2580	10	36
RTOR Reduction (vph)	1	0	0	0	34	0
Lane Group Flow (vph)	2153	0	100	2580	12	0
Confl. Peds. (#/hr)		5	5			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	4%	2%	5%	4%	14%	8%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	86.6		102.6	102.6	5.9	
Effective Green, g (s)	88.6		104.6	104.6	7.9	
Actuated g/C Ratio	0.74		0.87	0.87	0.07	
Clearance Time (s)	5.5		6.0	5.5	6.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3675		258	4347	101	
v/s Ratio Prot	0.43		0.04	c0.52	c0.01	
v/s Ratio Perm			0.30			
v/c Ratio	0.59		0.39	0.59	0.12	
Uniform Delay, d1	7.2		16.7	2.0	52.8	
Progression Factor	1.40		1.26	1.47	1.00	
Incremental Delay, d2	0.3		0.6	0.4	0.5	
Delay (s)	10.4		21.6	3.4	53.3	
Level of Service	B		C	A	D	
Approach Delay (s)	10.4			4.1	53.3	
Approach LOS	B			A	D	
Intersection Summary						
HCM 2000 Control Delay			7.3		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	11.5
Intersection Capacity Utilization			57.1%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



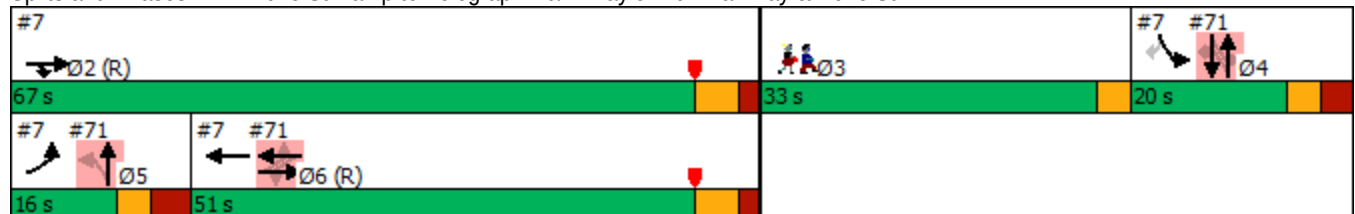
Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	31	971	1005	2402	70	38	
Future Volume (vph)	31	971	1005	2402	70	38	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	16.0	67.0	67.0	51.0	20.0	20.0	33.0
Total Split (%)	13.3%	55.8%	55.8%	42.5%	16.7%	16.7%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.9	92.8	92.8	80.9	12.6	12.6	
Actuated g/C Ratio	0.08	0.77	0.77	0.67	0.10	0.10	
v/c Ratio	0.26	0.45	0.84	0.80	0.43	0.17	
Control Delay	57.5	9.9	23.6	21.0	29.6	1.7	
Queue Delay	0.0	0.0	0.0	0.1	1.9	0.9	
Total Delay	57.5	9.9	23.6	21.1	31.5	2.7	
LOS	E	A	C	C	C	A	
Approach Delay		17.5		21.1			
Approach LOS		B		C			

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 130
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 19.4
 Intersection Capacity Utilization 65.6%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	35	1091	1129	2555	80	44
v/c Ratio	0.26	0.45	0.84	0.80	0.43	0.17
Control Delay	57.5	9.9	23.6	21.0	29.6	1.7
Queue Delay	0.0	0.0	0.0	0.1	1.9	0.9
Total Delay	57.5	9.9	23.6	21.1	31.5	2.7
Queue Length 50th (ft)	24	179	385	527	24	1
Queue Length 95th (ft)	m50	240	#1357	#1071	42	0
Internal Link Dist (ft)		321		722		
Turn Bay Length (ft)	180					
Base Capacity (vph)	157	2448	1347	3178	236	305
Starvation Cap Reductn	0	0	0	0	71	142
Spillback Cap Reductn	0	0	0	79	0	5
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.22	0.45	0.84	0.82	0.48	0.27

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  							
Traffic Volume (vph)	31	971	1005	0	2402	0	0	0	0	70	0	38
Future Volume (vph)	31	971	1005	0	2402	0	0	0	0	70	0	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		0.97
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1641	3167	1743		4715					1770		1542
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1641	3167	1743		4715					1770		1542
Peak-hour factor, PHF	0.89	0.89	0.89	0.94	0.94	0.94	1.00	1.00	1.00	0.87	0.87	0.87
Adj. Flow (vph)	35	1091	1129	0	2555	0	0	0	0	80	0	44
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	39
Lane Group Flow (vph)	35	1091	1129	0	2555	0	0	0	0	80	0	5
Confl. Peds. (#/hr)										3		5
Heavy Vehicles (%)	10%	14%	9%	2%	10%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	6.7	88.4	88.4		75.2					10.6		10.6
Effective Green, g (s)	8.7	90.4	90.4		77.2					12.6		12.6
Actuated g/C Ratio	0.07	0.75	0.75		0.64					0.10		0.10
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	118	2385	1313		3033					185		161
v/s Ratio Prot	0.02	0.34	c0.65		0.54					c0.05		
v/s Ratio Perm												0.00
v/c Ratio	0.30	0.46	0.86		0.84					0.43		0.03
Uniform Delay, d1	52.7	5.6	10.4		16.7					50.3		48.2
Progression Factor	1.04	1.24	1.62		1.09					0.46		1.00
Incremental Delay, d2	1.2	0.5	6.4		3.0					1.6		0.1
Delay (s)	56.2	7.5	23.3		21.2					24.5		48.3
Level of Service	E	A	C		C					C		D
Approach Delay (s)		16.1			21.2			0.0			33.0	
Approach LOS		B			C			A			C	
Intersection Summary												
HCM 2000 Control Delay			19.2		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					15.5		
Intersection Capacity Utilization			65.6%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑↑↑	↑↑↑		↑↓		↑↓
Traffic Volume (vph)	2249	1115	198	27	17	14
Future Volume (vph)	2249	1115	198	27	17	14
Turn Type	NA	NA	Perm	NA	Perm	NA
Protected Phases	2	6		8		4
Permitted Phases			8		4	
Detector Phase	2	6	8	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	4.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.0	25.0	40.0	40.0	13.0	13.0
Total Split (s)	71.0	71.0	49.0	49.0	49.0	49.0
Total Split (%)	59.2%	59.2%	40.8%	40.8%	40.8%	40.8%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.0	4.0		4.0		4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	75.9	75.9		36.1		36.1
Actuated g/C Ratio	0.63	0.63		0.30		0.30
v/c Ratio	0.78	0.39		0.83		0.20
Control Delay	20.9	12.1		56.5		14.3
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	20.9	12.1		56.5		14.3
LOS	C	B		E		B
Approach Delay	20.9	12.1		56.5		14.3
Approach LOS	C	B		E		B

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 20.8

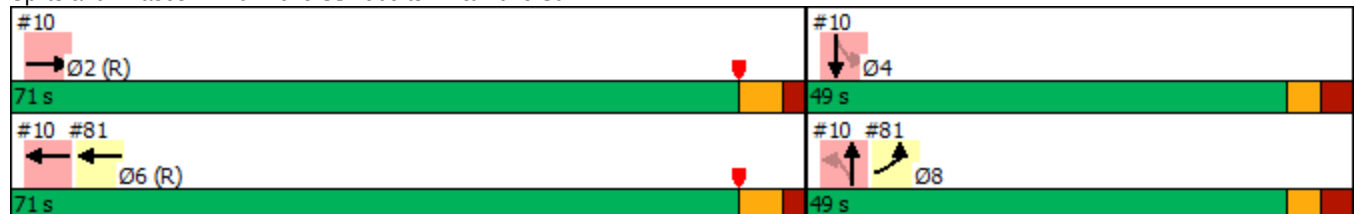
Intersection LOS: C

Intersection Capacity Utilization 71.8%

ICU Level of Service C

Analysis Period (min) 15

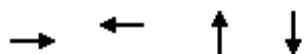
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

03/14/2024



Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	2499	1212	310	97
v/c Ratio	0.78	0.39	0.83	0.20
Control Delay	20.9	12.1	56.5	14.3
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	20.9	12.1	56.5	14.3
Queue Length 50th (ft)	502	159	220	24
Queue Length 95th (ft)	741	228	237	45
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3186	3094	467	604
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.78	0.39	0.66	0.16
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	2249	0	0	1115	0	198	27	10	17	14	44
Future Volume (vph)	0	2249	0	0	1115	0	198	27	10	17	14	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.99			0.92	
Flt Protected		1.00			1.00			0.96			0.99	
Satd. Flow (prot)		5036			4891			1756			1665	
Flt Permitted		1.00			1.00			0.68			0.90	
Satd. Flow (perm)		5036			4891			1245			1521	
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.92	0.92	0.76	0.76	0.76	0.77	0.77	0.77
Adj. Flow (vph)	0	2499	0	0	1212	0	261	36	13	22	18	57
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	38	0
Lane Group Flow (vph)	0	2499	0	0	1212	0	0	309	0	0	59	0
Confl. Peds. (#/hr)	18		3	3		18			8	8		
Heavy Vehicles (%)	2%	3%	2%	2%	5%	2%	3%	2%	9%	2%	2%	5%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		73.9			73.9			34.1			34.1	
Effective Green, g (s)		75.9			75.9			36.1			36.1	
Actuated g/C Ratio		0.63			0.63			0.30			0.30	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3185			3093			374			457	
v/s Ratio Prot		c0.50			0.25							
v/s Ratio Perm								c0.25			0.04	
v/c Ratio		0.78			0.39			0.83			0.13	
Uniform Delay, d1		16.1			10.8			39.0			30.5	
Progression Factor		1.06			1.00			1.00			1.00	
Incremental Delay, d2		2.0			0.4			13.8			0.1	
Delay (s)		19.1			11.1			52.8			30.6	
Level of Service		B			B			D			C	
Approach Delay (s)		19.1			11.1			52.8			30.6	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM 2000 Control Delay			19.6				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			71.8%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

71: W Taylor Run Parkway & Service Rd

03/14/2024

										Ø2	Ø3	Ø5
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR			
Lane Configurations												
Traffic Volume (vph)	20	8	13	20	2	23	1	71	6			
Future Volume (vph)	20	8	13	20	2	23	1	71	6			
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA	Perm			
Protected Phases		6		6		4 5		4		2	3	5
Permitted Phases	6		6		4 5		4		4			
Detector Phase	6	6	6	6	4 5	4 5	4	4	4			
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0			7.0	7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0			13.0	13.0	13.0	14.0	33.0	12.5
Total Split (s)	51.0	51.0	51.0	51.0			20.0	20.0	20.0	67.0	33.0	16.0
Total Split (%)	42.5%	42.5%	42.5%	42.5%			16.7%	16.7%	16.7%	56%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0			3.0	3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0				-2.0	-2.0			
Total Lost Time (s)		4.0		4.0				4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag	Lag		Lead	Lead
Lead-Lag Optimize?												
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None	None	C-Max	None	None
Act Effect Green (s)		80.9		80.9		27.0		12.6	12.6			
Actuated g/C Ratio		0.67		0.67		0.22		0.10	0.10			
v/c Ratio		0.07		0.27		0.09		0.43	0.03			
Control Delay		8.6		2.8		0.6		56.3	0.2			
Queue Delay		0.0		0.0		2.8		0.0	0.0			
Total Delay		8.6		2.8		3.4		56.3	0.2			
LOS		A		A		A		E	A			
Approach Delay		8.6		2.8		3.4		52.0				
Approach LOS		A		A		A		D				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 48 (40%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 130

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 12.4

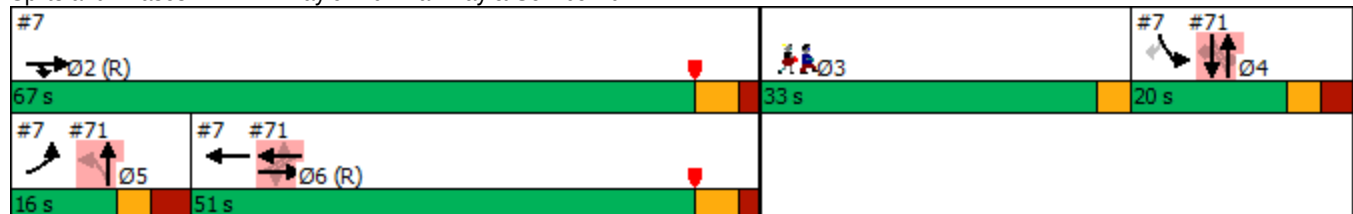
Intersection LOS: B

Intersection Capacity Utilization 37.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway & Service Rd



Queues

71: W Taylor Run Parkway & Service Rd

03/14/2024

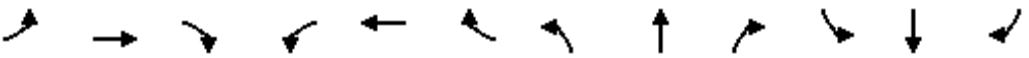


Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	67	310	35	83	7
v/c Ratio	0.07	0.27	0.09	0.43	0.03
Control Delay	8.6	2.8	0.6	56.3	0.2
Queue Delay	0.0	0.0	2.8	0.0	0.0
Total Delay	8.6	2.8	3.4	56.3	0.2
Queue Length 50th (ft)	8	0	0	61	0
Queue Length 95th (ft)	39	57	0	106	0
Internal Link Dist (ft)	56	593	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	1000	1152	421	247	304
Starvation Cap Reductn	0	0	322	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.07	0.27	0.35	0.34	0.02
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Parkway & Service Rd

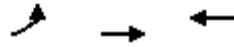
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Volume (vph)	20	8	24	13	20	208	2	23	7	1	71	6
Future Volume (vph)	20	8	24	13	20	208	2	23	7	1	71	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.98			0.99			1.00	0.97
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.94			0.88			0.97			1.00	0.85
Flt Protected		0.98			1.00			1.00			1.00	1.00
Satd. Flow (prot)		1710			1603			1791			1862	1537
Flt Permitted		0.84			0.99			0.99			1.00	1.00
Satd. Flow (perm)		1469			1586			1777			1857	1537
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.92	0.92	0.92	0.87	0.87	0.87
Adj. Flow (vph)	26	10	31	17	26	267	2	25	8	1	82	7
RTOR Reduction (vph)	0	11	0	0	95	0	0	6	0	0	0	6
Lane Group Flow (vph)	0	56	0	0	215	0	0	29	0	0	83	1
Confl. Peds. (#/hr)	10					10	2		1	1		2
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		75.2			75.2			23.3			10.6	10.6
Effective Green, g (s)		77.2			77.2			25.3			12.6	12.6
Actuated g/C Ratio		0.64			0.64			0.21			0.10	0.10
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		945			1020			374			194	161
v/s Ratio Prot												
v/s Ratio Perm		0.04			c0.14			c0.02			c0.04	0.00
v/c Ratio		0.06			0.21			0.08			0.43	0.00
Uniform Delay, d1		7.9			8.8			38.0			50.3	48.1
Progression Factor		1.00			0.68			0.01			1.00	1.00
Incremental Delay, d2		0.1			0.5			0.1			1.5	0.0
Delay (s)		8.1			6.5			0.3			51.8	48.1
Level of Service		A			A			A			D	D
Approach Delay (s)		8.1			6.5			0.3			51.5	
Approach LOS		A			A			A			D	
Intersection Summary												
HCM 2000 Control Delay		14.3				HCM 2000 Level of Service		B				
HCM 2000 Volume to Capacity ratio		0.22										
Actuated Cycle Length (s)		120.0				Sum of lost time (s)		15.5				
Intersection Capacity Utilization		37.2%				ICU Level of Service		A				
Analysis Period (min)		15										
c Critical Lane Group												

Timings

81: Duke St

03/14/2024



Lane Group	EBL	EBT	WBT	Ø2	Ø4
Lane Configurations	↰	↑↑	↑↑		
Traffic Volume (vph)	140	901	903		
Future Volume (vph)	140	901	903		
Turn Type	Prot	NA	NA		
Protected Phases	8	Free	6	2	4
Permitted Phases					
Detector Phase	8		6		
Switch Phase					
Minimum Initial (s)	7.0		4.0	10.0	7.0
Minimum Split (s)	40.0		25.0	25.0	13.0
Total Split (s)	49.0		71.0	71.0	49.0
Total Split (%)	40.8%		59.2%	59%	41%
Yellow Time (s)	3.0		4.0	4.0	3.0
All-Red Time (s)	3.0		2.0	2.0	3.0
Lost Time Adjust (s)	-2.0		-2.0		
Total Lost Time (s)	4.0		4.0		
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None		C-Max	C-Max	None
Act Effect Green (s)	36.1	120.0	75.9		
Actuated g/C Ratio	0.30	1.00	0.63		
v/c Ratio	0.26	0.25	0.40		
Control Delay	25.5	0.2	8.0		
Queue Delay	0.0	0.0	0.0		
Total Delay	25.5	0.2	8.0		
LOS	C	A	A		
Approach Delay		3.6	8.0		
Approach LOS		A	A		

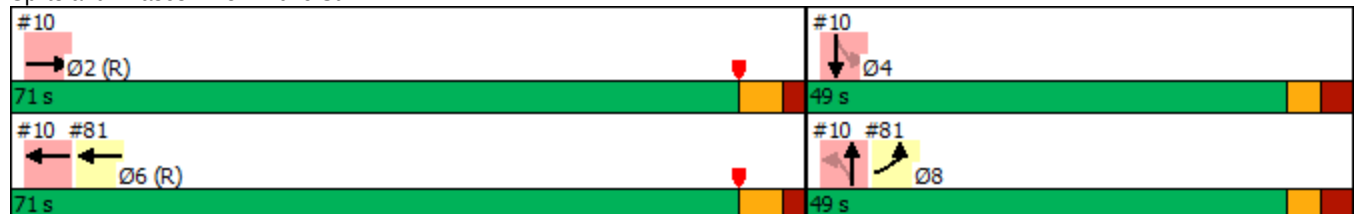
Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.83
 Intersection Signal Delay: 5.6
 Intersection Capacity Utilization 39.4%
 Analysis Period (min) 15

Intersection LOS: A

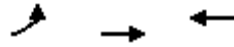
ICU Level of Service A

Splits and Phases: 81: Duke St



Queues
81: Duke St

03/14/2024

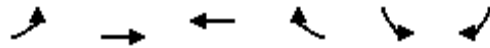


Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	140	901	903
v/c Ratio	0.26	0.25	0.40
Control Delay	25.5	0.2	8.0
Queue Delay	0.0	0.0	0.0
Total Delay	25.5	0.2	8.0
Queue Length 50th (ft)	78	0	111
Queue Length 95th (ft)	56	0	135
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	663	3539	2238
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.21	0.25	0.40
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

81: Duke St

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	140	901	903	0	0	0
Future Volume (vph)	140	901	903	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	140	901	903	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	140	901	903	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	8	Free	6			
Permitted Phases						
Actuated Green, G (s)	34.1	120.0	73.9			
Effective Green, g (s)	36.1	120.0	75.9			
Actuated g/C Ratio	0.30	1.00	0.63			
Clearance Time (s)	6.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	532	3539	2238			
v/s Ratio Prot	0.08	0.25	c0.26			
v/s Ratio Perm						
v/c Ratio	0.26	0.25	0.40			
Uniform Delay, d1	31.9	0.0	10.9			
Progression Factor	0.81	1.00	0.62			
Incremental Delay, d2	0.2	0.2	0.5			
Delay (s)	26.0	0.2	7.3			
Level of Service	C	A	A			
Approach Delay (s)		3.6	7.3		0.0	
Approach LOS		A	A		A	
Intersection Summary						
HCM 2000 Control Delay			5.3	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.38			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		12.0
Intersection Capacity Utilization			39.4%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

82: WB Duke St to SB Telegraph Rd

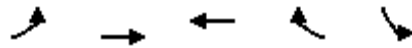
03/14/2024

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations		↑↑			↓	
Traffic Volume (veh/h)	0	453	0	0	140	0
Future Volume (Veh/h)	0	453	0	0	140	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	453	0	0	140	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				226	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				226	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				81	100
cM capacity (veh/h)	1622				741	1084
Direction, Lane #	NB 1	NB 2	NE 1			
Volume Total	226	226	140			
Volume Left	0	0	140			
Volume Right	0	0	0			
cSH	1700	1700	741			
Volume to Capacity	0.13	0.13	0.19			
Queue Length 95th (ft)	0	0	17			
Control Delay (s)	0.0	0.0	11.0			
Lane LOS			B			
Approach Delay (s)	0.0		11.0			
Approach LOS			B			
Intersection Summary						
Average Delay			2.6			
Intersection Capacity Utilization			26.9%	ICU Level of Service		A
Analysis Period (min)			15			

Timings

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL	Ø2
Lane Configurations						
Traffic Volume (vph)	314	1040	1250	735	864	
Future Volume (vph)	314	1040	1250	735	864	
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	2
Permitted Phases	5 2					
Detector Phase	5	5 2	6	6 4	4	
Switch Phase						
Minimum Initial (s)	5.0		10.0		7.0	10.0
Minimum Split (s)	19.6		22.0		29.5	22.0
Total Split (s)	23.0		56.0		41.0	79.0
Total Split (%)	19.2%		46.7%		34.2%	66%
Yellow Time (s)	3.0		4.0		3.5	4.0
All-Red Time (s)	2.6		2.0		3.0	2.0
Lost Time Adjust (s)	-2.0		-2.0		-2.0	
Total Lost Time (s)	3.6		4.0		4.5	
Lead/Lag	Lead		Lag			
Lead-Lag Optimize?						
Recall Mode	None		C-Max		None	C-Max
Act Effect Green (s)	75.4	75.4	52.0	93.0	36.5	
Actuated g/C Ratio	0.63	0.63	0.43	0.78	0.30	
v/c Ratio	1.04	0.37	0.84	0.62	1.10	
Control Delay	96.3	11.2	30.0	2.4	98.9	
Queue Delay	0.0	0.2	27.0	0.4	0.0	
Total Delay	96.3	11.4	56.9	2.8	99.0	
LOS	F	B	E	A	F	
Approach Delay		31.1	36.9		99.0	
Approach LOS		C	D		F	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 33 (28%), Referenced to phase 2:EBTL and 6:WBT, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.10
Intersection Signal Delay: 50.1
Intersection Capacity Utilization 92.3%
Analysis Period (min) 15
Intersection LOS: D
ICU Level of Service F

Splits and Phases: 1: Duke St & N Quaker Lane



Queues

1: Duke St & N Quaker Lane

03/14/2024



Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Group Flow (vph)	353	1169	1289	758	1146
v/c Ratio	1.04	0.37	0.84	0.62	1.10
Control Delay	96.3	11.2	30.0	2.4	98.9
Queue Delay	0.0	0.2	27.0	0.4	0.0
Total Delay	96.3	11.4	56.9	2.8	99.0
Queue Length 50th (ft)	~246	149	398	32	~515
Queue Length 95th (ft)	#430	174	452	34	#650
Internal Link Dist (ft)		582	312		324
Turn Bay Length (ft)					
Base Capacity (vph)	338	3164	1533	1226	1040
Starvation Cap Reductn	0	0	303	139	0
Spillback Cap Reductn	0	1059	0	0	3
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	1.04	0.56	1.05	0.70	1.11

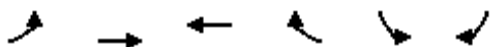
Intersection Summary

- ~ 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 Signalized Intersection Capacity Analysis

1: Duke St & N Quaker Lane

03/14/2024

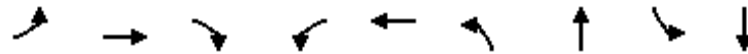


Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	314	1040	1250	735	864	167
Future Volume (vph)	314	1040	1250	735	864	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.6	3.6	4.0	4.0	4.5	
Lane Util. Factor	1.00	0.91	0.95	1.00	0.97	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1719	5036	3539	1583	3372	
Flt Permitted	0.07	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	130	5036	3539	1583	3372	
Peak-hour factor, PHF	0.89	0.89	0.97	0.97	0.90	0.90
Adj. Flow (vph)	353	1169	1289	758	960	186
RTOR Reduction (vph)	0	0	0	0	14	0
Lane Group Flow (vph)	353	1169	1289	758	1132	0
Confl. Peds. (#/hr)	2			2		1
Heavy Vehicles (%)	5%	3%	2%	2%	2%	2%
Turn Type	pm+pt	NA	NA	pt+ov	Prot	
Protected Phases	5	5 2	6	6 4	4	
Permitted Phases	5 2					
Actuated Green, G (s)	73.0	73.0	50.0	90.5	34.5	
Effective Green, g (s)	75.0	75.0	52.0	92.5	36.5	
Actuated g/C Ratio	0.62	0.62	0.43	0.77	0.30	
Clearance Time (s)	5.6		6.0		6.5	
Vehicle Extension (s)	3.0		3.0		3.0	
Lane Grp Cap (vph)	338	3147	1533	1220	1025	
v/s Ratio Prot	c0.17	0.23	0.36	0.48	c0.34	
v/s Ratio Perm	c0.48					
v/c Ratio	1.04	0.37	0.84	0.62	1.10	
Uniform Delay, d1	39.2	11.0	30.3	6.0	41.8	
Progression Factor	1.00	1.00	0.85	0.14	1.00	
Incremental Delay, d2	61.0	0.1	3.8	0.6	61.3	
Delay (s)	100.2	11.1	29.6	1.5	103.0	
Level of Service	F	B	C	A	F	
Approach Delay (s)		31.7	19.2		103.0	
Approach LOS		C	B		F	
Intersection Summary						
HCM 2000 Control Delay			43.6		HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			1.09			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	12.1
Intersection Capacity Utilization			92.3%		ICU Level of Service	F
Analysis Period (min)			15			
c Critical Lane Group						

Timings

2: S Quaker Ln & Duke St

03/14/2024



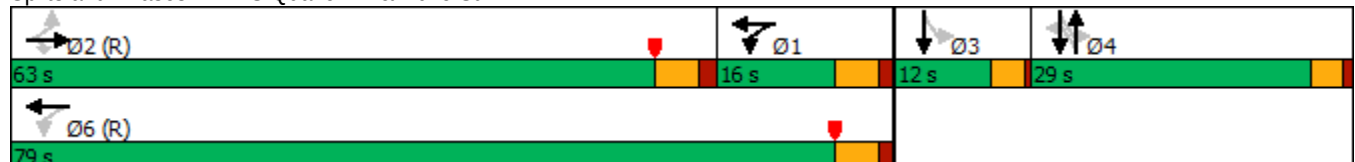
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	Ø3	Ø6
Lane Configurations	↰	↱↱	↱	↰	↱↱		↱↱		↱↱		
Traffic Volume (vph)	7	1518	379	27	1876	108	0	1	0		
Future Volume (vph)	7	1518	379	27	1876	108	0	1	0		
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	NA	Perm	NA		
Protected Phases		2		1	1 6		4		3 4	3	6
Permitted Phases	2		2	1 6		4		3 4			
Detector Phase	2	2	2	1	1 6	4	4	3 4	3 4		
Switch Phase											
Minimum Initial (s)	10.0	10.0	10.0	5.0		7.0	7.0			4.0	4.0
Minimum Split (s)	15.5	15.5	15.5	10.5		29.0	29.0			12.0	20.0
Total Split (s)	63.0	63.0	63.0	16.0		29.0	29.0			12.0	79.0
Total Split (%)	52.5%	52.5%	52.5%	13.3%		24.2%	24.2%			10%	66%
Yellow Time (s)	4.0	4.0	4.0	4.0		3.0	3.0			3.0	4.0
All-Red Time (s)	1.5	1.5	1.5	1.5		1.0	1.0			0.5	1.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0			-2.0				
Total Lost Time (s)	3.5	3.5	3.5	3.5			2.0				
Lead/Lag	Lead	Lead	Lead	Lag		Lag	Lag			Lead	
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	None		None	None			Max	C-Max
Act Effect Green (s)	71.8	71.8	71.8	87.8	87.8		14.7		27.2		
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73		0.12		0.23		
v/c Ratio	0.11	0.76	0.38	0.12	0.77		0.62		0.02		
Control Delay	27.4	31.2	10.4	4.9	6.6		28.1		0.0		
Queue Delay	0.0	3.2	0.6	0.0	0.8		2.2		0.0		
Total Delay	27.4	34.4	11.0	4.9	7.4		30.3		0.0		
LOS	C	C	B	A	A		C		A		
Approach Delay		29.7			7.4		30.3				
Approach LOS		C			A		C				

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 52 (43%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
 Natural Cycle: 120
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.77
 Intersection Signal Delay: 18.9
 Intersection Capacity Utilization 72.3%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 2: S Quaker Ln & Duke St



Queues

2: S Quaker Ln & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	7	1598	399	28	1982	160	8
v/c Ratio	0.11	0.76	0.38	0.12	0.77	0.62	0.02
Control Delay	27.4	31.2	10.4	4.9	6.6	28.1	0.0
Queue Delay	0.0	3.2	0.6	0.0	0.8	2.2	0.0
Total Delay	27.4	34.4	11.0	4.9	7.4	30.3	0.0
Queue Length 50th (ft)	3	551	113	3	117	40	0
Queue Length 95th (ft)	m8	m627	m142	m4	131	77	0
Internal Link Dist (ft)		312			222	293	73
Turn Bay Length (ft)	175			75			
Base Capacity (vph)	62	2116	1042	241	2586	389	599
Starvation Cap Reductn	0	405	321	0	76	0	0
Spillback Cap Reductn	0	0	0	0	301	128	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.93	0.55	0.12	0.87	0.61	0.01

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

2: S Quaker Ln & Duke St

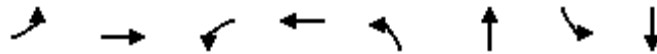
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1518	379	27	1876	7	108	0	20	1	0	1
Future Volume (vph)	7	1518	379	27	1876	7	108	0	20	1	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.5	3.5	3.5	3.5			2.0			1.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00			0.98			0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1769	3539	1537	1570	3537			1744			1695	
Flt Permitted	0.06	1.00	1.00	0.08	1.00			0.75			0.96	
Satd. Flow (perm)	104	3539	1537	126	3537			1370			1676	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.80	0.80	0.80	0.25	0.25	0.25
Adj. Flow (vph)	7	1598	399	28	1975	7	135	0	25	4	0	4
RTOR Reduction (vph)	0	0	125	0	0	0	0	92	0	0	6	0
Lane Group Flow (vph)	7	1598	274	28	1982	0	0	68	0	0	2	0
Confl. Peds. (#/hr)	9		11	11		9			7	7		
Heavy Vehicles (%)	2%	2%	2%	15%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases		2		1	1 6			4			3 4	
Permitted Phases	2		2	1 6			4			3 4		
Actuated Green, G (s)	69.8	69.8	69.8	85.8	85.8			12.7			24.7	
Effective Green, g (s)	71.8	71.8	71.8	87.8	87.8			14.7			26.7	
Actuated g/C Ratio	0.60	0.60	0.60	0.73	0.73			0.12			0.22	
Clearance Time (s)	5.5	5.5	5.5	5.5				4.0				
Vehicle Extension (s)	3.0	3.0	3.0	3.0				3.0				
Lane Grp Cap (vph)	62	2117	919	242	2587			167			372	
v/s Ratio Prot		0.45		0.01	c0.56							
v/s Ratio Perm	0.07		0.18	0.07				c0.05			c0.00	
v/c Ratio	0.11	0.75	0.30	0.12	0.77			0.41			0.00	
Uniform Delay, d1	10.4	17.7	11.8	23.5	9.8			48.6			36.3	
Progression Factor	1.55	1.54	2.75	0.40	0.42			1.00			1.00	
Incremental Delay, d2	2.6	1.8	0.6	0.1	0.9			1.6			0.0	
Delay (s)	18.6	29.0	33.0	9.6	5.0			50.2			36.3	
Level of Service	B	C	C	A	A			D			D	
Approach Delay (s)		29.8			5.1			50.2			36.3	
Approach LOS		C			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			18.7			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			10.5			
Intersection Capacity Utilization			72.3%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	65	1463	7	1797	17	2	51	2
Future Volume (vph)	65	1463	7	1797	17	2	51	2
Turn Type	pm+pt	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases	5	2		6		8		4
Permitted Phases	2		6		8		4	
Detector Phase	5	2	6	6	8	8	4	4
Switch Phase								
Minimum Initial (s)	5.0	10.0	1.0	1.0	7.0	7.0	6.7	6.7
Minimum Split (s)	11.1	17.0	16.3	16.3	29.0	29.0	13.0	13.0
Total Split (s)	16.0	91.0	75.0	75.0	29.0	29.0	29.0	29.0
Total Split (%)	13.3%	75.8%	62.5%	62.5%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.5	4.0	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.6	2.3	2.3	2.3	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.1	4.3	4.3	4.3		4.0		4.0
Lead/Lag	Lead		Lag	Lag				
Lead-Lag Optimize?								
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None	None
Act Effect Green (s)	95.2	95.0	85.2	85.2		16.7		16.7
Actuated g/C Ratio	0.79	0.79	0.71	0.71		0.14		0.14
v/c Ratio	0.37	0.56	0.04	0.77		0.22		0.70
Control Delay	29.7	0.8	13.9	19.1		40.3		44.5
Queue Delay	0.0	0.2	0.0	0.1		0.0		0.1
Total Delay	29.7	1.0	13.9	19.2		40.3		44.6
LOS	C	A	B	B		D		D
Approach Delay		2.2		19.2		40.3		44.6
Approach LOS		A		B		D		D

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 68 (57%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 13.3
Intersection Capacity Utilization 70.2%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service C

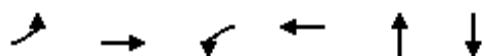
Splits and Phases: 3: Duke St & Alexandria Commons



Queues

3: Duke St & Alexandria Commons

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT
Lane Group Flow (vph)	69	1567	7	1930	34	188
v/c Ratio	0.37	0.56	0.04	0.77	0.22	0.70
Control Delay	29.7	0.8	13.9	19.1	40.3	44.5
Queue Delay	0.0	0.2	0.0	0.1	0.0	0.1
Total Delay	29.7	1.0	13.9	19.2	40.3	44.6
Queue Length 50th (ft)	14	2	3	434	20	90
Queue Length 95th (ft)	m33	5	m3	432	35	132
Internal Link Dist (ft)		222		571	88	97
Turn Bay Length (ft)	100		375			
Base Capacity (vph)	244	2799	199	2503	229	366
Starvation Cap Reductn	0	367	0	55	0	0
Spillback Cap Reductn	0	316	0	17	0	5
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.28	0.64	0.04	0.79	0.15	0.52

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

3: Duke St & Alexandria Commons

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	65	1463	10	7	1797	36	17	2	4	51	2	97
Future Volume (vph)	65	1463	10	7	1797	36	17	2	4	51	2	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.1	4.3		4.3	4.3			4.0			4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			1.00	
Frt	1.00	1.00		1.00	1.00			0.98			0.91	
Flt Protected	0.95	1.00		0.95	1.00			0.96			0.98	
Satd. Flow (prot)	1770	3535		1768	3527			1746			1665	
Flt Permitted	0.05	1.00		0.15	1.00			0.60			0.89	
Satd. Flow (perm)	98	3535		281	3527			1081			1501	
Peak-hour factor, PHF	0.94	0.94	0.94	0.95	0.95	0.95	0.69	0.69	0.69	0.80	0.80	0.80
Adj. Flow (vph)	69	1556	11	7	1892	38	25	3	6	64	2	121
RTOR Reduction (vph)	0	0	0	0	1	0	0	5	0	0	59	0
Lane Group Flow (vph)	69	1567	0	7	1929	0	0	29	0	0	129	0
Confl. Peds. (#/hr)	2		15	15		2			9	9		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	93.0	93.0		81.9	81.9			14.7			14.7	
Effective Green, g (s)	95.0	95.0		83.9	83.9			16.7			16.7	
Actuated g/C Ratio	0.79	0.79		0.70	0.70			0.14			0.14	
Clearance Time (s)	6.1	6.3		6.3	6.3			6.0			6.0	
Vehicle Extension (s)	2.0	2.0		0.2	0.2			2.0			2.0	
Lane Grp Cap (vph)	175	2798		196	2465			150			208	
v/s Ratio Prot	0.02	c0.44			c0.55							
v/s Ratio Perm	0.29			0.02				0.03			c0.09	
v/c Ratio	0.39	0.56		0.04	0.78			0.19			0.62	
Uniform Delay, d1	16.2	4.7		5.6	12.0			45.7			48.7	
Progression Factor	3.54	0.06		1.57	1.28			1.00			1.00	
Incremental Delay, d2	0.3	0.5		0.2	1.6			0.2			4.1	
Delay (s)	57.8	0.8		8.9	17.0			45.9			52.8	
Level of Service	E	A		A	B			D			D	
Approach Delay (s)		3.2			17.0			45.9			52.8	
Approach LOS		A			B			D			D	
Intersection Summary												
HCM 2000 Control Delay			13.1			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			12.4			
Intersection Capacity Utilization			70.2%			ICU Level of Service			C			
Analysis Period (min)			15									

c Critical Lane Group

Timings

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Configurations									
Traffic Volume (vph)	30	1485	28	1742	20	6	103	8	78
Future Volume (vph)	30	1485	28	1742	20	6	103	8	78
Turn Type	pm+pt	NA	pm+pt	NA	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6		8		4	
Permitted Phases	2		6		8		4		4
Detector Phase	5	2	1	6	8	8	4	4	4
Switch Phase									
Minimum Initial (s)	4.0	10.0	4.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	10.0	30.8	10.0	31.0	29.0	29.0	29.0	29.0	29.0
Total Split (s)	17.0	74.0	17.0	74.0	29.0	29.0	29.0	29.0	29.0
Total Split (%)	14.2%	61.7%	14.2%	61.7%	24.2%	24.2%	24.2%	24.2%	24.2%
Yellow Time (s)	3.0	4.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	3.0	1.8	2.6	2.0	3.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	4.0	3.8	3.6	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	None	None
Act Effect Green (s)	88.2	83.9	88.2	83.4		21.7		21.7	21.7
Actuated g/C Ratio	0.74	0.70	0.74	0.70		0.18		0.18	0.18
v/c Ratio	0.20	0.65	0.13	0.79		0.44		0.86	0.26
Control Delay	13.3	8.9	5.5	9.7		15.4		91.2	9.8
Queue Delay	0.0	0.2	0.0	0.1		0.0		0.0	0.0
Total Delay	13.3	9.1	5.5	9.8		15.4		91.2	9.8
LOS	B	A	A	A		B		F	A
Approach Delay		9.2		9.7		15.4		57.7	
Approach LOS		A		A		B		E	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 89 (74%), Referenced to phase 2:EBTL and 6:WBTL, Start of Yellow
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.86
Intersection Signal Delay: 12.4
Intersection Capacity Utilization 77.4%
Analysis Period (min) 15
Intersection LOS: B
ICU Level of Service D

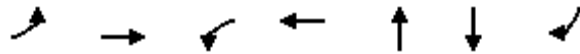
Splits and Phases: 4: Sweeley Street/Alexandria Commons & Duke St

Ø1	Ø2 (R)	Ø4
17 s	74 s	29 s
Ø5	Ø6 (R)	Ø8
17 s	74 s	29 s

Queues

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	33	1617	29	1933	166	133	93
v/c Ratio	0.20	0.65	0.13	0.79	0.44	0.86	0.26
Control Delay	13.3	8.9	5.5	9.7	15.4	91.2	9.8
Queue Delay	0.0	0.2	0.0	0.1	0.0	0.0	0.0
Total Delay	13.3	9.1	5.5	9.8	15.4	91.2	9.8
Queue Length 50th (ft)	1	615	2	93	24	98	0
Queue Length 95th (ft)	m9	35	m10	324	41	#178	37
Internal Link Dist (ft)		571		730	190	93	
Turn Bay Length (ft)	195		80				
Base Capacity (vph)	247	2474	314	2436	418	177	403
Starvation Cap Reductn	0	241	0	0	0	0	0
Spillback Cap Reductn	0	92	0	47	2	0	1
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.72	0.09	0.81	0.40	0.75	0.23

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 Signalized Intersection Capacity Analysis

4: Sweeley Street/Alexandria Commons & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	1485	3	28	1742	113	20	6	87	103	8	78
Future Volume (vph)	30	1485	3	28	1742	113	20	6	87	103	8	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	3.8		3.6	4.0			4.0			4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	1.00
Frbp, ped/bikes	1.00	1.00		1.00	1.00			0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	1.00
Frt	1.00	1.00		1.00	0.99			0.90			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.96	1.00
Satd. Flow (prot)	1752	3538		1770	3502			1625			1769	1583
Flt Permitted	0.05	1.00		0.10	1.00			0.93			0.46	1.00
Satd. Flow (perm)	90	3538		180	3502			1519			851	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.96	0.96	0.96	0.68	0.68	0.68	0.84	0.84	0.84
Adj. Flow (vph)	33	1614	3	29	1815	118	29	9	128	123	10	93
RTOR Reduction (vph)	0	0	0	0	3	0	0	105	0	0	0	76
Lane Group Flow (vph)	33	1617	0	29	1930	0	0	61	0	0	133	17
Confl. Peds. (#/hr)	1		10	10		1			7	7		
Heavy Vehicles (%)	3%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2			6			8			4		4
Actuated Green, G (s)	83.0	79.7		82.2	79.0			19.7			19.7	19.7
Effective Green, g (s)	87.0	81.7		86.2	81.0			21.7			21.7	21.7
Actuated g/C Ratio	0.72	0.68		0.72	0.68			0.18			0.18	0.18
Clearance Time (s)	6.0	5.8		5.6	6.0			6.0			6.0	6.0
Vehicle Extension (s)	2.0	0.2		2.0	0.2			2.0			2.0	2.0
Lane Grp Cap (vph)	138	2408		198	2363			274			153	286
v/s Ratio Prot	c0.01	0.46		0.01	c0.55						c0.16	0.01
v/s Ratio Perm	0.16			0.10				0.04				0.01
v/c Ratio	0.24	0.67		0.15	0.82			0.22			0.87	0.06
Uniform Delay, d1	15.6	11.3		9.0	14.1			42.0			47.8	40.7
Progression Factor	2.34	0.65		1.07	0.53			1.00			1.00	1.00
Incremental Delay, d2	0.3	1.3		0.1	1.9			0.2			36.2	0.0
Delay (s)	36.9	8.6		9.8	9.4			42.1			84.0	40.7
Level of Service	D	A		A	A			D			F	D
Approach Delay (s)		9.2			9.4			42.1			66.2	
Approach LOS		A			A			D			E	
Intersection Summary												
HCM 2000 Control Delay	13.9			HCM 2000 Level of Service			B					
HCM 2000 Volume to Capacity ratio	0.80											
Actuated Cycle Length (s)	120.0			Sum of lost time (s)			12.0					
Intersection Capacity Utilization	77.4%			ICU Level of Service			D					
Analysis Period (min)	15											
c Critical Lane Group												

Timings

5: Roth St/Cambridge Rd & Duke St

03/14/2024

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Configurations										
Traffic Volume (vph)	9	1660	64	1837	183	3	12	289	5	43
Future Volume (vph)	9	1660	64	1837	183	3	12	289	5	43
Turn Type	Prot	NA	pm+pt	NA	Perm	Perm	NA	Perm	NA	Perm
Protected Phases	5	2	1	6			8		4	
Permitted Phases			6		6	8		4		4
Detector Phase	5	2	1	6	6	8	8	4	4	4
Switch Phase										
Minimum Initial (s)	6.0	10.0	6.0	10.0	10.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	11.5	30.7	11.5	15.7	15.7	13.4	13.4	30.4	30.4	30.4
Total Split (s)	13.0	71.0	13.0	71.0	71.0	36.0	36.0	36.0	36.0	36.0
Total Split (%)	10.8%	59.2%	10.8%	59.2%	59.2%	30.0%	30.0%	30.0%	30.0%	30.0%
Yellow Time (s)	3.0	4.0	3.0	4.0	4.0	3.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.5	1.7	2.5	1.7	1.7	3.4	3.4	3.4	3.4	3.4
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0		-2.0	-2.0
Total Lost Time (s)	3.5	3.7	3.5	3.7	3.7		4.4		4.4	4.4
Lead/Lag	Lead	Lag	Lead	Lag	Lag					
Lead-Lag Optimize?										
Recall Mode	None	C-Max	None	C-Max	C-Max	None	None	None	None	None
Act Effect Green (s)	8.2	70.7	79.9	77.8	77.8		31.6		31.6	31.6
Actuated g/C Ratio	0.07	0.59	0.67	0.65	0.65		0.26		0.26	0.26
v/c Ratio	0.09	0.86	0.36	0.83	0.19		0.75		3.00	0.11
Control Delay	72.6	14.7	23.0	16.4	3.9		37.7		941.3	3.8
Queue Delay	0.0	0.0	0.0	1.2	0.0		0.0		0.0	0.0
Total Delay	72.6	14.8	23.0	17.6	3.9		37.7		941.3	3.8
LOS	E	B	C	B	A		D		F	A
Approach Delay		15.1		16.6			37.7		821.7	
Approach LOS		B		B			D		F	

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 95 (79%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 150
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 3.00
Intersection Signal Delay: 84.4
Intersection Capacity Utilization 103.9%
Analysis Period (min) 15
Intersection LOS: F
ICU Level of Service G

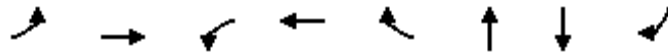
Splits and Phases: 5: Roth St/Cambridge Rd & Duke St

 Ø1	 Ø2 (R)	 Ø4
13 s	71 s	36 s
 Ø5	 Ø6 (R)	 Ø8
13 s	71 s	36 s

Queues

5: Roth St/Cambridge Rd & Duke St

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	10	1790	66	1894	189	391	342	50
v/c Ratio	0.09	0.86	0.36	0.83	0.19	0.75	3.00	0.11
Control Delay	72.6	14.7	23.0	16.4	3.9	37.7	941.3	3.8
Queue Delay	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0
Total Delay	72.6	14.8	23.0	17.6	3.9	37.7	941.3	3.8
Queue Length 50th (ft)	9	91	11	621	40	194	~459	0
Queue Length 95th (ft)	m13	223	60	#922	15	317	#540	13
Internal Link Dist (ft)		730		743		286	101	
Turn Bay Length (ft)	120		250					
Base Capacity (vph)	128	2084	198	2295	1005	518	114	463
Starvation Cap Reductn	0	6	0	197	0	0	0	0
Spillback Cap Reductn	0	0	0	61	0	0	0	1
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.08	0.86	0.33	0.90	0.19	0.75	3.00	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.
- m Volume for 95th percentile queue is metered by upstream signal.

HCM Signalized Intersection Capacity Analysis

5: Roth St/Cambridge Rd & Duke St

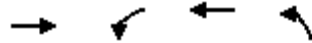
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	1660	5	64	1837	183	3	12	360	289	5	43
Future Volume (vph)	9	1660	5	64	1837	183	3	12	360	289	5	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5	3.7		3.5	3.7	3.7		4.4			4.4	4.4
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.87			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00			0.95	1.00
Satd. Flow (prot)	1626	3537		1752	3539	1550		1621			1770	1550
Flt Permitted	0.95	1.00		0.05	1.00	1.00		1.00			0.23	1.00
Satd. Flow (perm)	1626	3537		101	3539	1550		1617			432	1550
Peak-hour factor, PHF	0.93	0.93	0.93	0.97	0.97	0.97	0.96	0.96	0.96	0.86	0.86	0.86
Adj. Flow (vph)	10	1785	5	66	1894	189	3	12	375	336	6	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	92	0	0	0	37
Lane Group Flow (vph)	10	1790	0	66	1894	189	0	299	0	0	342	13
Confl. Peds. (#/hr)	1		2	2		1	6					6
Heavy Vehicles (%)	11%	2%	2%	3%	2%	2%	2%	2%	2%	2%	20%	2%
Turn Type	Prot	NA		pm+pt	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases				6		6	8			4		4
Actuated Green, G (s)	1.4	67.6		76.6	71.4	71.4		29.6			29.6	29.6
Effective Green, g (s)	3.4	69.6		80.3	73.4	73.4		31.6			31.6	31.6
Actuated g/C Ratio	0.03	0.58		0.67	0.61	0.61		0.26			0.26	0.26
Clearance Time (s)	5.5	5.7		5.5	5.7	5.7		6.4			6.4	6.4
Vehicle Extension (s)	2.0	0.2		2.0	0.2	0.2		2.0			2.0	2.0
Lane Grp Cap (vph)	46	2051		166	2164	948		425			113	408
v/s Ratio Prot	0.01	0.51		c0.02	c0.54							
v/s Ratio Perm				0.24		0.12		0.18			c0.79	0.01
v/c Ratio	0.22	0.87		0.40	0.88	0.20		0.70			3.03	0.03
Uniform Delay, d1	57.0	21.4		21.9	19.5	10.3		40.0			44.2	32.8
Progression Factor	1.36	0.48		1.69	0.75	0.38		1.00			1.00	1.00
Incremental Delay, d2	0.7	4.3		0.5	4.7	0.4		4.3			935.1	0.0
Delay (s)	77.9	14.6		37.6	19.4	4.3		44.2			979.3	32.9
Level of Service	E	B		D	B	A		D			F	C
Approach Delay (s)		15.0			18.6			44.2			858.6	
Approach LOS		B			B			D			F	
Intersection Summary												
HCM 2000 Control Delay			88.9	HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio			1.48									
Actuated Cycle Length (s)			120.0	Sum of lost time (s)					11.6			
Intersection Capacity Utilization			103.9%	ICU Level of Service					G			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Configurations	↑↑↑	↑	↑↑↑	↑
Traffic Volume (vph)	2300	30	2058	25
Future Volume (vph)	2300	30	2058	25
Turn Type	NA	pm+pt	NA	Prot
Protected Phases	2	1	6	4
Permitted Phases		6		
Detector Phase	2	1	6	4
Switch Phase				
Minimum Initial (s)	10.0	6.0	10.0	4.0
Minimum Split (s)	27.5	12.0	15.5	20.0
Total Split (s)	81.0	14.0	95.0	25.0
Total Split (%)	67.5%	11.7%	79.2%	20.8%
Yellow Time (s)	3.5	3.0	3.5	3.5
All-Red Time (s)	2.0	3.0	2.0	0.5
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.5	4.0	3.5	2.0
Lead/Lag	Lag	Lead		
Lead-Lag Optimize?				
Recall Mode	C-Max	None	C-Max	None
Act Effect Green (s)	94.8	101.6	102.1	12.4
Actuated g/C Ratio	0.79	0.85	0.85	0.10
v/c Ratio	0.59	0.17	0.50	0.63
Control Delay	9.3	13.5	1.8	29.2
Queue Delay	0.1	0.0	0.0	0.7
Total Delay	9.3	13.5	1.9	29.9
LOS	A	B	A	C
Approach Delay	9.3		2.0	29.9
Approach LOS	A		A	C

Intersection Summary

Cycle Length: 120
Actuated Cycle Length: 120
Offset: 72 (60%), Referenced to phase 2:EBT and 6:WBTL, Start of Yellow
Natural Cycle: 70
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 6.7
Intersection Capacity Utilization 57.2%
Analysis Period (min) 15
Intersection LOS: A
ICU Level of Service B

Splits and Phases: 6: Witter Drive & Duke St



Queues

6: Witter Drive & Duke St

03/14/2024



Lane Group	EBT	WBL	WBT	NBL
Lane Group Flow (vph)	2355	32	2166	167
v/c Ratio	0.59	0.17	0.50	0.63
Control Delay	9.3	13.5	1.8	29.2
Queue Delay	0.1	0.0	0.0	0.7
Total Delay	9.3	13.5	1.9	29.9
Queue Length 50th (ft)	301	0	0	42
Queue Length 95th (ft)	m412	m8	86	39
Internal Link Dist (ft)	743		262	663
Turn Bay Length (ft)		200		
Base Capacity (vph)	4014	214	4328	403
Starvation Cap Reductn	365	0	439	0
Spillback Cap Reductn	251	0	41	72
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.65	0.15	0.56	0.50

Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

6: Witter Drive & Duke St

03/14/2024

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↑		↘	↑↑↑	↘	
Traffic Volume (vph)	2300	8	30	2058	25	74
Future Volume (vph)	2300	8	30	2058	25	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.5		4.0	3.5	2.0	
Lane Util. Factor	0.91		1.00	0.91	1.00	
Frpb, ped/bikes	1.00		1.00	1.00	1.00	
Flpb, ped/bikes	1.00		1.00	1.00	1.00	
Frt	1.00		1.00	1.00	0.90	
Flt Protected	1.00		0.95	1.00	0.99	
Satd. Flow (prot)	5082		1770	5085	1642	
Flt Permitted	1.00		0.05	1.00	0.99	
Satd. Flow (perm)	5082		88	5085	1642	
Peak-hour factor, PHF	0.98	0.98	0.95	0.95	0.59	0.59
Adj. Flow (vph)	2347	8	32	2166	42	125
RTOR Reduction (vph)	0	0	0	0	99	0
Lane Group Flow (vph)	2355	0	32	2166	68	0
Confl. Peds. (#/hr)		9	9			
Confl. Bikes (#/hr)		2				
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%
Turn Type	NA		pm+pt	NA	Prot	
Protected Phases	2		1	6	4	
Permitted Phases			6			
Actuated Green, G (s)	90.4		100.1	100.1	10.4	
Effective Green, g (s)	92.4		102.1	102.1	12.4	
Actuated g/C Ratio	0.77		0.85	0.85	0.10	
Clearance Time (s)	5.5		6.0	5.5	4.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	
Lane Grp Cap (vph)	3913		154	4326	169	
v/s Ratio Prot	c0.46		0.01	c0.43	c0.04	
v/s Ratio Perm			0.17			
v/c Ratio	0.60		0.21	0.50	0.40	
Uniform Delay, d1	5.9		5.2	2.3	50.3	
Progression Factor	1.44		6.03	0.57	1.00	
Incremental Delay, d2	0.1		0.5	0.3	1.6	
Delay (s)	8.6		31.7	1.6	51.9	
Level of Service	A		C	A	D	
Approach Delay (s)	8.6			2.1	51.9	
Approach LOS	A			A	D	
Intersection Summary						
HCM 2000 Control Delay			7.1		HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio			0.58			
Actuated Cycle Length (s)			120.0		Sum of lost time (s)	9.5
Intersection Capacity Utilization			57.2%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

Timings

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



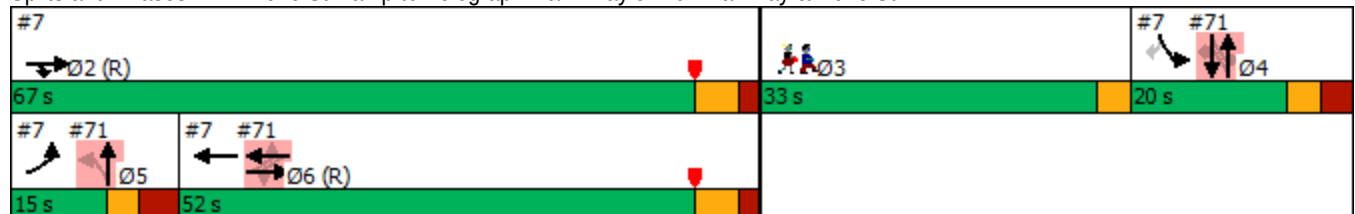
Lane Group	EBL	EBT	EBR	WBT	SBL	SBR	Ø3
Lane Configurations							
Traffic Volume (vph)	27	734	1613	2069	188	20	
Future Volume (vph)	27	734	1613	2069	188	20	
Turn Type	Prot	NA	Prot	NA	Prot	Perm	
Protected Phases	5	2	2	6	4		3
Permitted Phases						4	
Detector Phase	5	2	2	6	4	4	
Switch Phase							
Minimum Initial (s)	6.0	7.0	7.0	7.0	7.0	7.0	1.0
Minimum Split (s)	12.5	14.0	14.0	13.0	13.0	13.0	33.0
Total Split (s)	15.0	67.0	67.0	52.0	20.0	20.0	33.0
Total Split (%)	12.5%	55.8%	55.8%	43.3%	16.7%	16.7%	28%
Yellow Time (s)	3.0	4.0	4.0	4.0	3.0	3.0	3.0
All-Red Time (s)	3.5	2.0	2.0	2.0	3.0	3.0	0.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	
Total Lost Time (s)	4.5	4.0	4.0	4.0	4.0	4.0	
Lead/Lag	Lead			Lag	Lag	Lag	Lead
Lead-Lag Optimize?							
Recall Mode	None	C-Max	C-Max	C-Max	None	None	None
Act Effect Green (s)	9.4	89.4	89.4	78.0	16.0	16.0	
Actuated g/C Ratio	0.08	0.74	0.74	0.65	0.13	0.13	
v/c Ratio	0.22	0.29	1.21	0.71	0.86	0.07	
Control Delay	59.8	5.9	121.3	18.7	59.8	0.5	
Queue Delay	0.0	0.0	0.0	0.0	7.9	1.2	
Total Delay	59.8	5.9	121.3	18.7	67.7	1.8	
LOS	E	A	F	B	E	A	
Approach Delay		84.9		18.7			
Approach LOS		F		B			

Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 50 (42%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 150
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 1.21
 Intersection Signal Delay: 53.3
 Intersection Capacity Utilization 103.2%
 Analysis Period (min) 15

Intersection LOS: D
 ICU Level of Service G

Splits and Phases: 7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St



Queues

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024



Lane Group	EBL	EBT	EBR	WBT	SBL	SBR
Lane Group Flow (vph)	27	741	1629	2249	198	21
v/c Ratio	0.22	0.29	1.21	0.71	0.86	0.07
Control Delay	59.8	5.9	121.3	18.7	59.8	0.5
Queue Delay	0.0	0.0	0.0	0.0	7.9	1.2
Total Delay	59.8	5.9	121.3	18.7	67.7	1.8
Queue Length 50th (ft)	19	65	~1507	310	65	0
Queue Length 95th (ft)	m39	130	#2174	#843	#257	m1
Internal Link Dist (ft)		321		722		
Turn Bay Length (ft)	180					
Base Capacity (vph)	137	2513	1348	3182	229	309
Starvation Cap Reductn	0	0	0	0	16	207
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.29	1.21	0.71	0.93	0.21

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 Signalized Intersection Capacity Analysis

7: Duke St Ramp to Telegraph Rd/W Taylor Run Parkway & Duke St

03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  							
Traffic Volume (vph)	27	734	1613	0	2069	0	0	0	0	188	0	20
Future Volume (vph)	27	734	1613	0	2069	0	0	0	0	188	0	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.0	4.0		4.0					4.0		4.0
Lane Util. Factor	1.00	0.95	1.00		0.91					1.00		1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00					1.00		1.00
Frt	1.00	1.00	1.00		1.00					1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (prot)	1570	3374	1810		4893					1719		1583
Flt Permitted	0.95	1.00	1.00		1.00					0.95		1.00
Satd. Flow (perm)	1570	3374	1810		4893					1719		1583
Peak-hour factor, PHF	0.99	0.99	0.99	0.92	0.92	0.92	1.00	1.00	1.00	0.95	0.95	0.95
Adj. Flow (vph)	27	741	1629	0	2249	0	0	0	0	198	0	21
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	18
Lane Group Flow (vph)	27	741	1629	0	2249	0	0	0	0	198	0	3
Confl. Peds. (#/hr)										7	7	
Heavy Vehicles (%)	15%	7%	5%	2%	6%	4%	2%	2%	2%	5%	5%	2%
Turn Type	Prot	NA	Prot		NA					Prot		Perm
Protected Phases	5	2	2		6					4		
Permitted Phases												4
Actuated Green, G (s)	6.2	85.0	85.0		72.3					14.0		14.0
Effective Green, g (s)	8.2	87.0	87.0		74.3					16.0		16.0
Actuated g/C Ratio	0.07	0.72	0.72		0.62					0.13		0.13
Clearance Time (s)	6.5	6.0	6.0		6.0					6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		0.2					3.0		3.0
Lane Grp Cap (vph)	107	2446	1312		3029					229		211
v/s Ratio Prot	0.02	0.22	c0.90		0.46					c0.12		
v/s Ratio Perm												0.00
v/c Ratio	0.25	0.30	1.24		0.74					0.86		0.01
Uniform Delay, d1	53.0	5.8	16.5		16.1					50.9		45.1
Progression Factor	1.09	0.81	1.33		1.03					0.51		1.00
Incremental Delay, d2	1.0	0.3	114.2		1.7					25.9		0.0
Delay (s)	58.7	5.0	136.3		18.3					51.7		45.2
Level of Service	E	A	F		B					D		D
Approach Delay (s)		94.8			18.3			0.0			51.1	
Approach LOS		F			B			A			D	
Intersection Summary												
HCM 2000 Control Delay			57.5									HCM 2000 Level of Service E
HCM 2000 Volume to Capacity ratio			1.17									
Actuated Cycle Length (s)			120.0							15.5		
Intersection Capacity Utilization			103.2%									ICU Level of Service G
Analysis Period (min)			15									
c Critical Lane Group												

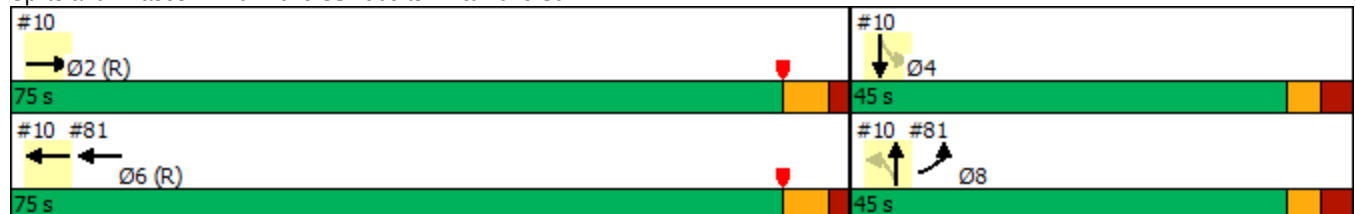
Timings

10: Dove St/Roberts Ln & Duke St

03/14/2024

	→	←	↖	↑	↘	↓
Lane Group	EBT	WBT	NBL	NBT	SBL	SBT
Lane Configurations	↑↑↑↑	↑↑↑↑		↕		↕
Traffic Volume (vph)	1493	2431	136	32	15	21
Future Volume (vph)	1493	2431	136	32	15	21
Turn Type	NA	NA	Perm	NA	Perm	NA
Protected Phases	2	6		8		4
Permitted Phases			8		4	
Detector Phase	2	6	8	8	4	4
Switch Phase						
Minimum Initial (s)	10.0	4.0	7.0	7.0	7.0	7.0
Minimum Split (s)	25.0	22.0	40.0	40.0	13.0	13.0
Total Split (s)	75.0	75.0	45.0	45.0	45.0	45.0
Total Split (%)	62.5%	62.5%	37.5%	37.5%	37.5%	37.5%
Yellow Time (s)	4.0	4.0	3.0	3.0	3.0	3.0
All-Red Time (s)	2.0	2.0	3.0	3.0	3.0	3.0
Lost Time Adjust (s)	-2.0	-2.0		-2.0		-2.0
Total Lost Time (s)	4.0	4.0		4.0		4.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	C-Max	C-Max	None	None	None	None
Act Effct Green (s)	84.0	84.0		28.0		26.3
Actuated g/C Ratio	0.70	0.70		0.23		0.22
v/c Ratio	0.44	0.71		0.72		0.24
Control Delay	8.2	11.2		53.0		35.2
Queue Delay	0.0	0.0		0.0		0.0
Total Delay	8.2	11.2		53.0		35.2
LOS	A	B		D		D
Approach Delay	8.2	11.2		53.0		35.2
Approach LOS	A	B		D		D
Intersection Summary						
Cycle Length: 120						
Actuated Cycle Length: 120						
Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow						
Natural Cycle: 90						
Control Type: Actuated-Coordinated						
Maximum v/c Ratio: 0.72						
Intersection Signal Delay: 12.7				Intersection LOS: B		
Intersection Capacity Utilization 74.6%				ICU Level of Service D		
Analysis Period (min) 15						

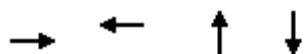
Splits and Phases: 10: Dove St/Roberts Ln & Duke St



Queues

10: Dove St/Roberts Ln & Duke St

03/14/2024

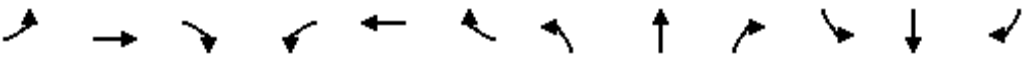


Lane Group	EBT	WBT	NBT	SBT
Lane Group Flow (vph)	1572	2506	226	78
v/c Ratio	0.44	0.71	0.72	0.24
Control Delay	8.2	11.2	53.0	35.2
Queue Delay	0.0	0.0	0.0	0.0
Total Delay	8.2	11.2	53.0	35.2
Queue Length 50th (ft)	146	423	160	48
Queue Length 95th (ft)	197	617	207	83
Internal Link Dist (ft)	117	230	74	34
Turn Bay Length (ft)				
Base Capacity (vph)	3557	3522	459	511
Starvation Cap Reductn	0	0	0	0
Spillback Cap Reductn	0	0	0	0
Storage Cap Reductn	0	0	0	0
Reduced v/c Ratio	0.44	0.71	0.49	0.15
Intersection Summary				

HCM Signalized Intersection Capacity Analysis

10: Dove St/Roberts Ln & Duke St

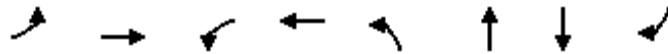
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑↑			↑↑↑			↕			↕	
Traffic Volume (vph)	0	1493	0	0	2431	0	136	32	22	15	21	36
Future Volume (vph)	0	1493	0	0	2431	0	136	32	22	15	21	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			2%			0%			0%	
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.91			0.91			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			1.00			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			1.00			0.98			0.93	
Flt Protected		1.00			1.00			0.97			0.99	
Satd. Flow (prot)		5085			5034			1764			1590	
Flt Permitted		1.00			1.00			0.73			0.93	
Satd. Flow (perm)		5085			5034			1332			1491	
Peak-hour factor, PHF	0.95	0.95	0.95	0.97	0.97	0.97	0.84	0.84	0.84	0.93	0.93	0.93
Adj. Flow (vph)	0	1572	0	0	2506	0	162	38	26	16	23	39
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	0	0	2	0
Lane Group Flow (vph)	0	1572	0	0	2506	0	0	221	0	0	76	0
Confl. Peds. (#/hr)	15		4	4		15	1		12	12		1
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	27%	2%
Turn Type		NA			NA		Perm	NA		Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)		82.0			82.0			26.0			26.0	
Effective Green, g (s)		84.0			84.0			28.0			28.0	
Actuated g/C Ratio		0.70			0.70			0.23			0.23	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		3559			3523			310			347	
v/s Ratio Prot		0.31			c0.50							
v/s Ratio Perm								c0.17			0.05	
v/c Ratio		0.44			0.71			0.71			0.22	
Uniform Delay, d1		7.8			10.8			42.3			37.2	
Progression Factor		0.89			0.85			1.00			1.00	
Incremental Delay, d2		0.4			0.8			7.6			0.3	
Delay (s)		7.4			9.9			49.9			37.5	
Level of Service		A			A			D			D	
Approach Delay (s)		7.4			9.9			49.9			37.5	
Approach LOS		A			A			D			D	
Intersection Summary												
HCM 2000 Control Delay			11.6				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.71									
Actuated Cycle Length (s)			120.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			74.6%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Timings

71: W Taylor Run Parkway & Service Rd

03/14/2024



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBT	SBR	Ø2	Ø3	Ø5
Lane Configurations		↔		↔		↔	↔	↔			
Traffic Volume (vph)	8	5	10	44	4	22	129	1			
Future Volume (vph)	8	5	10	44	4	22	129	1			
Turn Type	Perm	NA	Perm	NA	Perm	NA	NA	Perm			
Protected Phases		6		6		4 5	4		2	3	5
Permitted Phases	6		6		4 5			4			
Detector Phase	6	6	6	6	4 5	4 5	4	4			
Switch Phase											
Minimum Initial (s)	7.0	7.0	7.0	7.0			7.0	7.0	7.0	1.0	6.0
Minimum Split (s)	13.0	13.0	13.0	13.0			13.0	13.0	14.0	33.0	12.5
Total Split (s)	52.0	52.0	52.0	52.0			20.0	20.0	67.0	33.0	15.0
Total Split (%)	43.3%	43.3%	43.3%	43.3%			16.7%	16.7%	56%	28%	13%
Yellow Time (s)	4.0	4.0	4.0	4.0			3.0	3.0	4.0	3.0	3.0
All-Red Time (s)	2.0	2.0	2.0	2.0			3.0	3.0	2.0	0.0	3.5
Lost Time Adjust (s)		-2.0		-2.0			-2.0	-2.0			
Total Lost Time (s)		4.0		4.0			4.0	4.0			
Lead/Lag	Lag	Lag	Lag	Lag			Lag	Lag		Lead	Lead
Lead-Lag Optimize?											
Recall Mode	C-Max	C-Max	C-Max	C-Max			None	None	C-Max	None	None
Act Effect Green (s)		78.0		78.0		29.9	16.0	16.0			
Actuated g/C Ratio		0.65		0.65		0.25	0.13	0.13			
v/c Ratio		0.10		0.30		0.10	0.55	0.00			
Control Delay		4.9		8.2		5.3	57.8	0.0			
Queue Delay		0.0		0.2		2.3	0.2	0.0			
Total Delay		4.9		8.4		7.7	57.9	0.0			
LOS		A		A		A	E	A			
Approach Delay		4.9		8.4		7.7	57.5				
Approach LOS		A		A		A	E				

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 50 (42%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow

Natural Cycle: 150

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.21

Intersection Signal Delay: 18.8

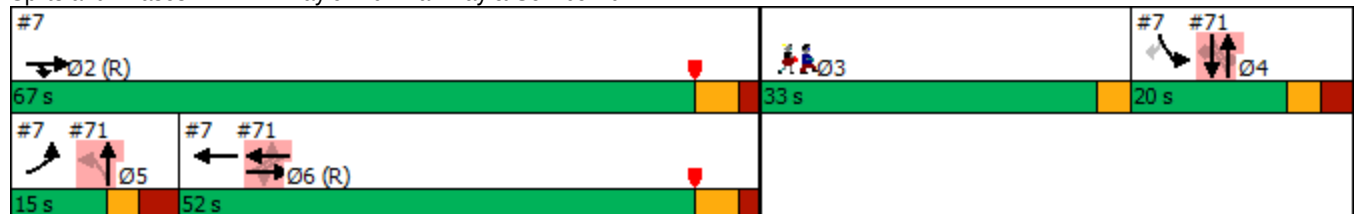
Intersection LOS: B

Intersection Capacity Utilization 38.4%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 71: W Taylor Run Parkway & Service Rd



Queues

71: W Taylor Run Parkway & Service Rd

03/14/2024



Lane Group	EBT	WBT	NBT	SBT	SBR
Lane Group Flow (vph)	101	328	45	136	1
v/c Ratio	0.10	0.30	0.10	0.55	0.00
Control Delay	4.9	8.2	5.3	57.8	0.0
Queue Delay	0.0	0.2	2.3	0.2	0.0
Total Delay	4.9	8.4	7.7	57.9	0.0
Queue Length 50th (ft)	4	42	1	100	0
Queue Length 95th (ft)	34	111	12	167	0
Internal Link Dist (ft)	56	593	50	190	
Turn Bay Length (ft)					
Base Capacity (vph)	1063	1097	449	248	309
Starvation Cap Reductn	0	0	325	0	0
Spillback Cap Reductn	214	220	0	5	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.12	0.37	0.36	0.56	0.00
Intersection Summary					

HCM Signalized Intersection Capacity Analysis

71: W Taylor Run Parkway & Service Rd

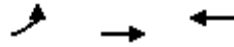
03/14/2024

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	↔
Traffic Volume (vph)	8	5	69	10	44	199	4	22	17	0	129	1
Future Volume (vph)	8	5	69	10	44	199	4	22	17	0	129	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	4.0
Lane Util. Factor		1.00			1.00			1.00			1.00	1.00
Frpb, ped/bikes		1.00			0.97			0.99			1.00	1.00
Flpb, ped/bikes		1.00			1.00			1.00			1.00	1.00
Frt		0.89			0.89			0.95			1.00	0.85
Flt Protected		1.00			1.00			1.00			1.00	1.00
Satd. Flow (prot)		1641			1613			1716			1863	1583
Flt Permitted		0.96			0.99			0.98			1.00	1.00
Satd. Flow (perm)		1590			1600			1688			1863	1583
Peak-hour factor, PHF	0.81	0.81	0.81	0.77	0.77	0.77	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	10	6	85	13	57	258	4	23	18	0	136	1
RTOR Reduction (vph)	0	32	0	0	70	0	0	14	0	0	0	1
Lane Group Flow (vph)	0	69	0	0	258	0	0	31	0	0	136	0
Confl. Peds. (#/hr)	22					22			7	7		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	7%	2%	3%	2%	2%	2%
Turn Type	Perm	NA		Perm	NA		Perm	NA			NA	Perm
Protected Phases		6			6			4 5			4	
Permitted Phases	6			6			4 5			4		4
Actuated Green, G (s)		72.3			72.3			26.2			14.0	14.0
Effective Green, g (s)		74.3			74.3			28.2			16.0	16.0
Actuated g/C Ratio		0.62			0.62			0.23			0.13	0.13
Clearance Time (s)		6.0			6.0						6.0	6.0
Vehicle Extension (s)		0.2			0.2						3.0	3.0
Lane Grp Cap (vph)		984			990			396			248	211
v/s Ratio Prot											c0.07	
v/s Ratio Perm		0.04			c0.16			c0.02				0.00
v/c Ratio		0.07			0.26			0.08			0.55	0.00
Uniform Delay, d1		9.1			10.4			35.8			48.6	45.1
Progression Factor		1.00			1.20			0.21			1.00	1.00
Incremental Delay, d2		0.1			0.6			0.1			2.5	0.0
Delay (s)		9.2			13.1			7.5			51.1	45.1
Level of Service		A			B			A			D	D
Approach Delay (s)		9.2			13.1			7.5			51.1	
Approach LOS		A			B			A			D	
Intersection Summary												
HCM 2000 Control Delay			20.6			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.28									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			15.5			
Intersection Capacity Utilization			38.4%			ICU Level of Service			A			
Analysis Period (min)			15									
c Critical Lane Group												

Timings

81: Duke St

03/14/2024



Lane Group	EBL	EBT	WBT	Ø2	Ø4
Lane Configurations					
Traffic Volume (vph)	207	716	781		
Future Volume (vph)	207	716	781		
Turn Type	Prot	NA	NA		
Protected Phases	8	Free	6	2	4
Permitted Phases					
Detector Phase	8		6		
Switch Phase					
Minimum Initial (s)	7.0		4.0	10.0	7.0
Minimum Split (s)	40.0		22.0	25.0	13.0
Total Split (s)	45.0		75.0	75.0	45.0
Total Split (%)	37.5%		62.5%	63%	38%
Yellow Time (s)	3.0		4.0	4.0	3.0
All-Red Time (s)	3.0		2.0	2.0	3.0
Lost Time Adjust (s)	-2.0		-2.0		
Total Lost Time (s)	4.0		4.0		
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None		C-Max	C-Max	None
Act Effect Green (s)	28.0	120.0	84.0		
Actuated g/C Ratio	0.23	1.00	0.70		
v/c Ratio	0.50	0.20	0.32		
Control Delay	46.4	0.1	4.2		
Queue Delay	0.0	0.0	0.0		
Total Delay	46.4	0.1	4.2		
LOS	D	A	A		
Approach Delay		10.5	4.2		
Approach LOS		B	A		

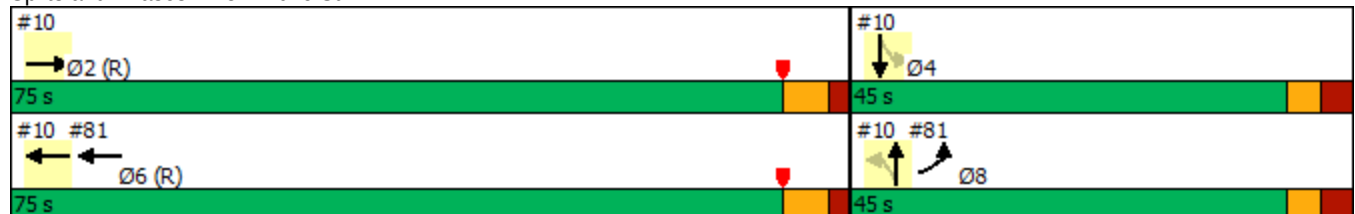
Intersection Summary

Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 66 (55%), Referenced to phase 2:EBT and 6:WBT, Start of Yellow
 Natural Cycle: 90
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 7.6
 Intersection Capacity Utilization 39.7%
 Analysis Period (min) 15

Intersection LOS: A

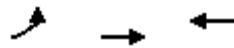
ICU Level of Service A

Splits and Phases: 81: Duke St



Queues
81: Duke St

03/14/2024



Lane Group	EBL	EBT	WBT
Lane Group Flow (vph)	207	716	781
v/c Ratio	0.50	0.20	0.32
Control Delay	46.4	0.1	4.2
Queue Delay	0.0	0.0	0.0
Total Delay	46.4	0.1	4.2
Queue Length 50th (ft)	136	0	52
Queue Length 95th (ft)	m241	m0	70
Internal Link Dist (ft)		184	95
Turn Bay Length (ft)	300		
Base Capacity (vph)	604	3539	2475
Starvation Cap Reductn	0	0	0
Spillback Cap Reductn	0	0	0
Storage Cap Reductn	0	0	0
Reduced v/c Ratio	0.34	0.20	0.32

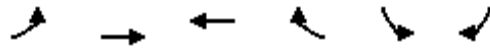
Intersection Summary

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

HCM Signalized Intersection Capacity Analysis

81: Duke St

03/14/2024



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	207	716	781	0	0	0
Future Volume (vph)	207	716	781	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	2.0	4.0			
Lane Util. Factor	1.00	0.95	0.95			
Frt	1.00	1.00	1.00			
Flt Protected	0.95	1.00	1.00			
Satd. Flow (prot)	1770	3539	3539			
Flt Permitted	0.95	1.00	1.00			
Satd. Flow (perm)	1770	3539	3539			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	207	716	781	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	207	716	781	0	0	0
Turn Type	Prot	NA	NA			
Protected Phases	8	Free	6			
Permitted Phases						
Actuated Green, G (s)	26.0	120.0	82.0			
Effective Green, g (s)	28.0	120.0	84.0			
Actuated g/C Ratio	0.23	1.00	0.70			
Clearance Time (s)	6.0		6.0			
Vehicle Extension (s)	3.0		3.0			
Lane Grp Cap (vph)	413	3539	2477			
v/s Ratio Prot	c0.12	0.20	c0.22			
v/s Ratio Perm						
v/c Ratio	0.50	0.20	0.32			
Uniform Delay, d1	39.9	0.0	6.9			
Progression Factor	1.10	1.00	0.49			
Incremental Delay, d2	0.9	0.1	0.3			
Delay (s)	44.9	0.1	3.7			
Level of Service	D	A	A			
Approach Delay (s)		10.2	3.7		0.0	
Approach LOS		B	A		A	
Intersection Summary						
HCM 2000 Control Delay			7.2	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.38			
Actuated Cycle Length (s)			120.0	Sum of lost time (s)		12.0
Intersection Capacity Utilization			39.7%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						

HCM Unsignalized Intersection Capacity Analysis

82: WB Duke St to SB Telegraph Rd

03/14/2024

						
Movement	NBL	NBT	SBT	SBR	NEL	NER
Lane Configurations						
Traffic Volume (veh/h)	0	1821	0	0	207	0
Future Volume (Veh/h)	0	1821	0	0	207	0
Sign Control		Free	Free		Yield	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	1821	0	0	207	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	0				910	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	0				910	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				24	100
cM capacity (veh/h)	1622				274	1084
Direction, Lane #	NB 1	NB 2	NE 1			
Volume Total	910	910	207			
Volume Left	0	0	207			
Volume Right	0	0	0			
cSH	1700	1700	274			
Volume to Capacity	0.54	0.54	0.76			
Queue Length 95th (ft)	0	0	139			
Control Delay (s)	0.0	0.0	49.8			
Lane LOS			E			
Approach Delay (s)	0.0		49.8			
Approach LOS			E			
Intersection Summary						
Average Delay		5.1				
Intersection Capacity Utilization		68.5%	ICU Level of Service		C	
Analysis Period (min)		15				



Duke Street and West Taylor Run Parkway
Intersection Improvement Project

Appendix Z: VISSIM Results for 2026 & 2036 Build Conditions Alternatives 1, 3A, 3C

Intersection MOE - 2026 Build AM Peak (Alternative 1)

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	Balanced Count (vph)	VISSIM Throughput (vph)	Δ	Δ %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)
1	Duke St and N Quaker Ln	Signalized	EBL	315	315	326	10	3%	39.4	D	1616	19.3	B	22.2	C	200	93	408
			EBT	1286	1286	1291	4	0%	14.3	B			360			93	408	
			WBT	898	898	860	-38	-4%	19.7	B	1840	12.3	B			330	73	444
			WBR	1039	1039	980	-58	-6%	5.7	A			300			25	421	
			SBL	559	559	564	5	1%	54.2	D	829	50.1	D			1290	181	619
2	Duke St and S Quaker Ln	Signalized	SBR	272	272	265	-7	-3%	41.3	D				6.8	A	1270	114	593
			EBL	0	0	0	0	N/A	0.0	A						200	54	442
			EBT	1725	1725	1738	13	1%	6.9	A	1854	6.6	A			330	54	442
			EBR	120	120	116	-4	-3%	2.7	A						300	62	471
			WBL	24	24	26	1	4%	20.9	C						80	30	359
			WBT	1882	1882	1787	-96	-5%	5.4	A	1812	5.6	A			210	30	359
			WBR	0	0	0	0	N/A	0.0	A						210	32	373
			NBL	54	54	52	-2	-4%	47.6	D						335	18	136
			NBT	0	0	0	0	N/A	0.0	A	67	42.6	D			335	18	136
			NBR	14	14	15	1	7%	25.3	C						335	14	137
			SBL	2	2	2	0	0%	38.9	D						40	0	19
			SBT	0	0	0	0	N/A	0.0	A	2	38.9	D			40	0	19
3	Duke St and Alexandria Commons	Signalized	SBR	0	0	0	0	N/A	0.0	A				5.9	A	40	0	22
			EBL	41	41	41	0	0%	37.9	D						105	10	318
			EBT	1695	1695	1706	11	1%	2.2	A	1753	3.0	A			210	10	318
			EBR	6	6	7	1	16%	2.3	A						210	11	351
			WBL	0	0	0	0	N/A	0.0	A						315	83	653
			WBT	1859	1859	1765	-94	-5%	7.7	A	1798	7.8	A			520	83	653
			WBR	35	35	33	-2	-6%	13.0	B						520	40	662
			NBL	3	3	3	0	0%	43.4	D						50	1	23
			NBT	0	0	0	0	N/A	0.0	A	3	43.4	D			50	1	23
			NBR	0	0	0	0	N/A	0.0	A						50	1	22
			SBL	17	17	19	1	6%	58.4	E						215	9	141
			SBT	0	0	0	0	N/A	0.0	A	61	31.0	C			215	9	141
4	Duke St and Sweeley St	Signalized	SBR	45	45	43	-2	-4%	19.0	B				8.3	A	215	12	152
			EBL	53	53	54	1	2%	28.0	C						190	42	440
			EBT	1657	1657	1664	7	0%	7.9	A	1720	8.5	A			520	43	444
			EBR	2	2	2	0	0%	2.9	A						520	44	452
			WBL	22	22	24	1	4%	25.4	C						70	33	652
			WBT	1804	1804	1714	-90	-5%	5.1	A	1853	5.4	A			225	33	652
			WBR	123	123	116	-8	-6%	5.3	A						225	34	668
			NBL	11	11	10	-1	-9%	47.7	D						230	6	82
			NBT	5	5	5	0	0%	52.5	D	45	28.8	C			230	6	82
			NBR	32	32	30	-2	-6%	18.3	B						230	9	93
			SBL	83	83	84	1	1%	52.6	D						110	26	148
			SBT	1	1	1	0	0%	34.4	C	160	33.6	C			110	26	148
			SBR	79	79	76	-3	-4%	12.6	B						110	26	148
5	Duke St at Roth St/ Cambridge Rd	Signalized	EBL	61	61	57	-4	-7%	81.5	F				20.6	C	115	228	827
			EBT	1706	1706	1717	11	1%	17.9	B	1778	20.0	B			350	228	827
			EBR	4	4	4	0	0%	18.9	B						350	230	835
			WBL	98	98	94	-4	-4%	36.4	D						230	307	763
			WBT	1891	1891	1798	-94	-5%	20.5	C	2181	21.1	C			670	307	763
			WBR	308	308	289	-19	-6%	19.6	B						670	307	763
			NBL	6	6	5	-1	-16%	36.9	D						150	6	97
			NBT	6	6	6	0	0%	39.4	D	65	19.2	B			150	6	97
			NBR	55	55	54	-1	-2%	15.2	B						150	7	99
			SBL	193	193	186	-7	-4%	25.0	C						40	57	121
			SBT	4	4	4	0	0%	17.0	B	240	21.7	C			40	57	121
			SBR	52	52	50	-2	-4%	9.9	A						40	74	144
			5a	Cambridge Rd and Service Rd	Unsignalized	EBT	9	9	9	-1	-11%	38.2	E			223	40.5	E
EBR	221	221				214	-7	-3%	40.6	E				1330	42	308		
WBL	28	28				25	-2	-7%	60.2	F	25	60.2	F	825	6	69		
WBT	0	0				0	0	N/A	0.0	A				825	6	83		
NBL	366	366				316	-50	-14%	0.5	A	352	0.5	A	40	1	32		
6	Duke St and Witter Dr	Signalized	NBR	42	42	36	-6	-14%	0.7	A				9.9	A	40	1	32
			EBT	1932	1932	1937	5	0%	5.0	A	1958	5.0	A			675	38	541
			EBR	21	21	21	-1	-5%	6.7	A						675	39	548
			WBL	89	89	83	-6	-7%	19.7	B	2267	14.0	B			215	163	728
			WBT	2290	2290	2184	-107	-5%	13.8	B						700	163	728
7	Duke St and W Taylor Run Pkwy	Signalized	NBL	7	7	7	-1	-14%	55.5	E	32	24.6	C	9.5	A	170	3	77
			NBR	26	26	25	0	0%	16.5	B						170	4	97
			EBL	31	31	31	0	0%	64.8	E						165	12	109
			EBT (Continue on Duke St)	947	947	951	4	0%	3.8	A	1963	6.0	A			710	17	557
			EBT (to Telegraph Rd)	980	980	981	0	0%	6.3	A						710	65	773
7a	W Taylor Run Pkwy and Service Rd	Signalized	WBT	2342	2342	2230	-113	-5%	12.4	B	2230	12.4	B	15.5	B	1955	94	640
			SBL	68	68	65	-3	-4%	21.6	C						140	9	78
			SBT	37	37	35	-1	-3%	5.0	A	100	15.8	B			140	15	96
			EBL	19	19	19	-1	-5%	7.2	A						70	2	71
			EBT	8	8	8	0	0%	6.7	A	49	9.0	A			70	2	71
			EBR	23	23	22	-2	-9%	11.4	B						70	2	71
			WBL	12	12	11	-1	-8%	6.4	A						320	8	161
			WBT	20	20	17	-3	-15%	6.9	A	215	7.2	A			320	8	161
			WBR	203	203	187	-15	-7%	7.2	A						320	8	161
			NBL	2	2	1	0	0%	0.1	A						40	0	0
			NBT	23	23	25	2	9%	0.8	A	31	0.6	A			40	0	0
			NBR	6	6	5	-1	-16%	0.3	A						40	0	0
			SBL	1	1	1	0	0%	14.9	B						650	25	106
SBT	69	69	68	-2	-3%	50.9	D	75	50.0	D	650	25	106					
7b	Duke St WB to West Taylor Run Parkway Service Rd	Unsignal	SBR	6	6	7	1	16%	45.9	D				180	24	106		
			WBT	19	19	16	-3	-16%	8.6	A	16	8.6	A	4.3	A	800	1	40
8	Duke St WB and Telegraph Rd Off-ramp	Unsignal	Slip Lane from Duke St WB	274	274	255	-19	-7%	4.1	A	255	4.1	A	0.9	A	150	0	0
			WBT	881	881	879	-2	0%	0.4	A	879	0.4	A			700	0	0
8a	Duke St EB and Telegraph Rd On-ramp (New)	Signalized	SBR	1735	1735	1617	-119	-7%	1.2	A	1617	1.2	A	10.5	B	2400	0	0
			EBL	137	137	134	-3	-2%	32.7	C	134	32.7	C			250	27	194
8b	Telegraph Rd On-ramp at New Ramp from Duke St WB	Unsignal	WBT	880	880	881	1	0%	7.1	A	881	7.1	A	0.1	A	375	23	244
			WBT	441	441	433	-8	-2%	0.1	A	433	0.1	A			550	0	0
9	Duke St WB and Telegraph Rd On-ramp	Signalized	NBT	137	137	134	-3	-2%	0.2	A	134	0.2	A	3.5	A	300	0	0
			WBR	441	441	434	-7	-2%	3.5	A	434	3.5	A			225	6	68
10	Duke St and S Dove St/Roberts Ln	Signalized	EBT	2193	2193	2087	-106	-5%	15.2	B	2333	15.1	B	14.6	B	1965	459	1505
			EBR	265	265	246	-19	-7%	14.0	B						260	38	542
			WBT	1088	1088	1101	14	1%	10.8	B	1135	10.7	B			855	34	314
			WBR	33	33	33	1	3%	7.5	A						855	0	41
			NBL	193	193	175	-18	-9%	28.0	C						185	83	656
			NBT	29	29	24	-5	-18%	0.2	A	210	27.9	C			185	83	656
			NBR	11	11	10	-1	-9%	20.4	C						185	81	659
			SBL	16	16	15	-2	-12%	39.1	D						50	10	120
			SBT	13	13	14	0	0%	33.3	C	71	20.0	C			50	10	120
SBR	43	43	42	-1	-2%	9.0	A				50	10	120					

Intersection MOE - 2026 Build PM Peak (Alternative 1)

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	Balanced Count (vph)	VISSIM Throughput (vph)	Δ	Δ %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)					
1	Duke St and N Quaker Ln	Signalized	EBL	306	306	308	2	1%	75.4	E	1325	45.7	D	38.8	D	200	350	982					
			EBT	1014	1014	1017	3	0%	36.7	D			360			350	982						
			WBT	1219	1219	1165	-54	-4%	41.0	D	1838	30.5	C			330	229	465					
			WBR	717	717	673	-45	-6%	12.4	B			300			16	430						
			SBL	843	843	843	0	0%	46.0	D	1003	44.6	D			1290	182	619					
2	Duke St and S Quaker Ln	Signalized	SBR	163	163	160	-3	-2%	37.5	D				21.4	C	1270	65	562					
			EBL	7	7	7	-1	-14%	61.1	E	1860	14.1	B			200	113	440					
			EBT	1480	1480	1493	13	1%	15.5	B			330			113	440						
			EBR	369	369	360	-9	-2%	7.4	A			300			126	468						
			WBL	27	27	28	1	4%	25.0	C			80			151	377						
			WBT	1830	1830	1738	-93	-5%	20.2	C	1772	20.2	C			210	151	377					
			WBR	7	7	6	-1	-14%	13.8	B			210			160	391						
			NBL	105	105	100	-5	-5%	159.1	F	118	155.6	F			335	121	328					
			NBT	0	0	0	0	N/A	0.0	A			335			121	328						
			NBR	19	19	18	-1	-5%	136.3	F			335			121	329						
			SBL	1	1	1	0	0%	23.6	C			40			0	23						
			SBT	0	0	0	0	N/A	0.0	A	2	24.4	C			40	0	23					
			SBR	1	1	1	0	0%	25.5	C			40			0	23						
			3	Duke St and Alexandria Commons	Signalized	EBL	63	63	63	0	0%	44.9	D						24.5	C	105	31	273
						EBT	1427	1427	1440	12	1%	6.0	A			1513	7.6	A			210	31	273
EBR	10	10				10	0	0%	3.4	A			210	38	298								
WBL	7	7				6	-1	-14%	20.6	C			315	323	668								
WBT	1753	1753				1665	-88	-5%	34.4	C	1702	34.2	C	520	323	668							
WBR	35	35				32	-3	-9%	28.4	C			520	315	719								
NBL	16	16				15	-1	-6%	58.9	E			50	4	51								
NBT	2	2				2	0	0%	29.0	C	20	48.9	D	50	4	51							
NBR	4	4				4	0	0%	16.6	B			50	4	50								
SBL	50	50				50	0	0%	80.9	F			215	70	182								
SBT	2	2				2	0	0%	84.6	F	141	85.6	F	215	70	182							
SBR	95	95				89	-6	-6%	88.2	F			215	79	193								
EBL	30	30				32	2	7%	17.1	B			190	35	371								
4	Duke St and Sweeley St	Signalized				EBT	1449	1449	1463	14	1%	7.8	A	1497	8.0	A	21.5	C			520	35	371
						EBR	3	3	3	0	0%	5.9	A			520					38	382	
			WBL	28	28	29	1	4%	30.8	C			70	364	814								
			WBT	1699	1699	1613	-86	-5%	31.4	C	1744	31.2	C	225	364	814							
			WBR	110	110	103	-7	-6%	27.7	C			225	377	830								
			NBL	19	19	19	-1	-5%	50.1	D			230	13	165								
			NBT	6	6	5	-1	-16%	34.7	C	110	24.8	C	230	13	165							
			NBR	85	85	86	2	2%	18.7	B			230	17	175								
			SBL	100	100	100	0	0%	52.2	D			110	33	158								
			SBT	8	8	7	-1	-12%	42.9	D	183	38.9	D	110	33	158							
			SBR	77	77	76	-1	-1%	21.0	C			110	33	158								
			EBL	9	9	9	0	0%	76.4	E			115	129	773								
			EBT	1619	1619	1634	15	1%	15.8	B	1647	16.1	B	350	129	773							
			EBR	5	5	4	-1	-20%	16.6	B			350	132	781								
			5	Duke St at Roth St/ Cambridge Rd	Signalized	WBL	62	62	62	0	0%	44.2	D						24.9	C	230	495	781
WBT	1791	1791				1703	-88	-5%	35.2	D	1934	34.5	C	670	495	781							
WBR	179	179				169	-9	-5%	23.9	C			670	495	781								
NBL	3	3				3	0	0%	21.9	C			150	42	200								
NBT	11	11				10	-1	-9%	35.2	D	358	19.6	B	150	42	200							
NBR	351	351				345	-6	-2%	19.2	B			150	44	202								
SBL	282	282				251	-30	-11%	18.8	B			40	56	118								
SBT	5	5				5	0	0%	15.2	B	295	18.0	B	40	56	118							
SBR	42	42				37	-5	-12%	13.3	B			40	72	141								
EBT	36	36				35	-1	-3%	33.9	D			1330	53	346								
EBR	281	281				248	-33	-12%	37.8	E	282	37.3	E	1330	51	345							
WBL	48	48				47	-1	-2%	62.9	F			825	12	101								
WBT	0	0				0	0	N/A	0.0	A	47	62.9	F	825	13	115							
5a	Cambridge Rd and Service Rd	Unsignalized				NBL	193	193	160	-33	-17%	0.8	A	188	0.7	A	26.3	D			40	1	54
						NBR	36	36	28	-8	-22%	0.4	A			40					1	54	
			EBT	2243	2243	2231	-12	-1%	8.5	A	2239	8.5	A	675	54	493							
			EBR	8	8	8	0	0%	12.2	B			675	56	504								
			WBL	30	30	29	0	0%	46.3	D	1947	39.6	D	215	442	797							
			WBT	2008	2008	1918	-89	-4%	39.5	D			700	442	797								
6	Duke St and Witter Dr	Signalized	NBL	24	24	25	1	4%	139.1	F	94	81.6	F	24.3	C	170	35	185					
			NBR	72	72	69	-3	-4%	60.8	E			170			43	205						
			EBL	27	27	27	0	0%	68.0	E			165			10	88						
			EBT (Continue on Duke St)	716	716	722	6	1%	9.9	A	2303	11.0	B			710	17	358					
			EBT (to Telegraph Rd)	1573	1573	1554	-20	-1%	10.6	B			710			93	752						
			WBT	2018	2018	1952	-66	-3%	39.2	D	1952	39.2	D			1955	607	2138					
7	Duke St and W Taylor Run Pkwy	Signalized	SBL	184	184	180	-4	-2%	19.0	B				23.9	C	140	29	105					
			SBR	19	19	18	-1	-5%	42.0	D	198	21.2	C			140	40	122					
			EBL	8	8	8	0	0%	28.4	C						70	14	130					
			EBT	5	5	5	0	0%	31.7	C	78	37.6	D			70	14	130					
			EBR	67	67	64	-3	-4%	39.2	D						70	14	130					
			WBL	10	10	10	0	0%	23.8	C						320	20	252					
7a	W Taylor Run Pkwy and Service Rd	Signalized	WBT	43	43	39	-4	-9%	16.2	B	234	15.6	B	29.5	C	320	20	252					
			WBR	194	194	185	-9	-5%	15.1	B			320			20	252						
			NBL	4	4	3	0	0%	2.5	A			40			0	2						
			NBT	21	21	22	0	0%	0.8	A	27	1.0	A			40	0	0					
			NBR	2	2	2	0	0%	0.3	A			40			0	0						
			SBL	0	0	0	0	N/A	0.0	A			650			53	248						
			SBT	125	125	125	-1	-1%	56.5	E	126	56.3	E			650	53	248					
			SBR	1	1	1	0	0%	23.1	C			180			52	247						
			7b	Duke St WB to West Taylor Run Parkway Service Rd	Unsignalized	WBT	23	23	22	-1	-4%	8.0	A			22	8.0	A	9.6	A	800	1	46
						Slip Lane from Duke St WB	239	239	225	-14	-6%	9.7	A			225	9.7	A			150	0	8
8	Duke St WB and Telegraph Rd Off-ramp	Unsignalized	WBT	762	762	766	4	1%	0.9	A	766	0.9	A	2.5	A	700	1	87					
			SBR	1495	1495	1447	-49	-3%	3.4	A	1447	3.4	A			2400	569	1800					
8a	Duke St EB and Telegraph Rd On-ramp (New)	Signalized	EBL	202	202	193	-9	-4%	35.8	D	193	35.8	D	12.7	B	250	43	315					
			WBT	762	762	767	5	1%	6.9	A	767	6.9	A			375	19	189					
8b	Telegraph Rd On-ramp at New Ramp from Duke St WB	Unsignalized	WBT	1776	1776	1782	6	0%	2.9	A	1782	2.9	A	2.6	A	550	2	279					
			NBT	201	201	193	-8	-4%	0.3	A	193	0.3	A			300	0	11					
9	Duke St WB and Telegraph Rd On-ramp	Signalized	WBR	1776	1776	1783	7	0%	4.1	A	1783	4.1	A	4.1	A	225	22	221					
10	Duke St and S Dove St/Roberts Ln	Signalized	EBT	1456	1456	1457	2	0%	12.0	B	1600	11.7	B	13.9	B	1965	52	485					
			EBR	147	147	142	-5	-3%	8.6	A			260			4	122						
			WBT	2371	2371	2395	25	1%	13.6	B	2435	13.7	B			855	147	805					
			WBR	42	42	40	-2	-5%	17.4	B			855			2	71						
			NBL	133	133	128	-4	-3%	35.1	D			185			44	239						
			NBR	32	32	31	1	3%	33.2	A	181	33.2	C			185	44	239					
			NBT	21	21	20	-1	-5%	20.5	C			185			42	235						
			SBL	14	14	13	-1	-7%	39.1	D			50			14	147						
			SBT	20	20	20	-1	-5%	35.2	D	66	22.8	C			50	14	147					
			SBR	35	35	33	-1	-3%	9.0	A			50			15	149						

Intersection MOE - 2036 Build AM Peak (Alternative 1)

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	Balanced Count (vph)	VISSIM Throughput (vph)	Δ	Δ %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)					
1	Duke St and N Quaker Ln	Signalized	EBL	323	323	331	8	2%	36.1	D	1657	17.6	B	31.3	C	200	85	427					
			EBT	1319	1319	1325	6	0%	13.0	B						360	85	427					
			WBT	920	920	876	-44	-5%	17.5	B	1872	11.2	B			330	65	445					
			WBR	1065	1065	995	-70	-7%	5.6	A						300	23	419					
			SBL	573	573	509	-65	-11%	119.2	F	745	112.5	F			1290	872	1049					
2	Duke St and S Quaker Ln	Signalized	SBR	279	279	237	-43	-15%	98.1	F				6.6	A	1270	853	1034					
			EBL	0	0	0	0	N/A	0.0	A	1834	6.7	A			200	57	436					
			EBT	1769	1769	1719	-49	-3%	7.0	A						330	57	436					
			EBR	123	123	114	-9	-7%	3.1	A						300	65	465					
			WBL	25	25	26	1	4%	24.3	C						80	25	359					
			WBT	1930	1930	1818	-111	-6%	4.9	A	1845	5.1	A			210	25	359					
			WBR	0	0	0	0	N/A	0.0	A						210	27	373					
			NBL	55	55	53	-2	-4%	46.4	D						335	18	137					
			NBT	0	0	0	0	N/A	0.0	A	69	42.5	D			335	18	137					
			NBR	15	15	16	1	7%	29.1	C						335	14	138					
			SBL	2	2	2	0	0%	38.2	D						40	0	19					
			SBT	0	0	0	0	N/A	0.0	A	2	38.2	D			40	0	19					
3	Duke St and Alexandria Commons	Signalized	SBR	0	0	0	0	N/A	0.0	A				5.8	A	40	0	22					
			EBL	42	42	41	-1	-2%	37.1	D	1737	3.3	A			105	10	320					
			EBT	1737	1737	1690	-47	-3%	2.4	A						210	10	320					
			EBR	6	6	6	0	0%	2.6	A						210	12	353					
			WBL	0	0	0	0	N/A	0.0	A						315	85	647					
			WBT	1906	1906	1800	-106	-6%	7.3	A	1834	7.4	A			520	85	647					
			WBR	36	36	34	-1	-3%	12.3	B						520	45	698					
			NBL	3	3	3	0	0%	44.0	D						50	1	23					
			NBT	0	0	0	0	N/A	0.0	A	3	44.0	D			50	1	23					
			NBR	0	0	0	0	N/A	0.0	A						50	1	22					
			SBL	18	18	19	1	6%	57.8	E						215	9	141					
			SBT	0	0	0	0	N/A	0.0	A	61	31.6	C			215	9	141					
			SBR	46	46	42	-4	-9%	19.7	B						215	12	152					
4	Duke St and Sweeley St	Signalized	EBL	54	54	54	0	0%	27.6	C	1703	8.3	A	8.3	A	190	41	473					
			EBT	1699	1699	1647	-52	-3%	7.6	A						520	43	473					
			EBR	2	2	2	0	0%	5.6	A						520	44	482					
			WBL	23	23	25	2	9%	24.2	C						70	36	716					
			WBT	1849	1849	1742	-107	-6%	5.4	A	1885	5.6	A			225	36	716					
			WBR	127	127	118	-9	-7%	5.5	A						225	38	731					
			NBL	12	12	12	0	0%	49.1	D						230	7	88					
			NBT	5	5	5	0	0%	55.4	E	49	29.1	C			230	7	88					
			NBR	32	32	32	-1	-3%	16.9	B						230	10	99					
			SBL	85	85	86	1	1%	52.6	D						110	27	152					
			SBT	1	1	1	0	0%	36.0	D	165	33.5	C			110	27	152					
			SBR	81	81	78	-2	-2%	12.6	B						110	27	152					
			5	Duke St at Roth St/ Cambridge Rd	Signalized	EBL	63	63	57	-6	-10%	81.5	F			1763	18.7	B	19.7	B	115	203	823
EBT	1749	1749				1701	-48	-3%	16.6	B				350	203	823							
EBR	4	4				5	1	24%	16.2	B				350	203	830							
WBL	100	100				96	-5	-5%	33.6	C	2217	19.8	B	230	302	759							
WBT	1939	1939				1827	-112	-6%	19.5	B				670	302	759							
WBR	316	316				294	-22	-7%	17.3	B				670	302	759							
NBL	6	6				5	-1	-16%	37.6	D				150	6	100							
NBT	6	6				6	0	0%	41.6	D	68	19.6	B	150	6	100							
NBR	56	56				57	0	0%	15.5	B				150	8	101							
SBL	198	198				171	-27	-14%	32.2	C				40	76	118							
SBT	4	4				3	-1	-24%	28.3	C	222	27.3	C	40	76	118							
SBR	53	53				48	-6	-11%	9.7	A				40	96	142							
5a	Cambridge Rd and Service Rd	Unsignalized				EBT	10	10	9	0	0%	38.1	E	228	42.6	E	19.5	C			1330	1147	1610
						EBR	227	227	219	-8	-4%	42.8	E								1330	1143	1610
						WBL	28	28	28	0	0%	73.1	F	28	73.1	F					825	10	86
						WBT	0	0	0	0	N/A	0.0	A								825	10	100
			NBL	375	375	322	-53	-14%	0.6	A	358	0.5	A	40	1	48							
6	Duke St and Witter Dr	Signalized	NBR	43	43	36	-7	-16%	0.2	A				10.3	B	40	1	48					
			EBT	1981	1981	1911	-71	-4%	5.8	A	1933	5.8	A			675	42	522					
			EBR	22	22	22	0	0%	7.1	A						675	44	529					
			WBL	91	91	84	-7	-8%	19.5	B	2297	13.9	B			215	158	746					
			WBT	2348	2348	2213	-136	-6%	13.7	B						700	158	746					
7	Duke St and W Taylor Run Pkwy	Signalized	NBL	7	7	7	-1	-14%	55.9	E	32	24.5	C	9.5	A	170	3	77					
			NBR	26	26	26	-1	-4%	16.3	B						170	4	97					
			EBL	31	31	30	-1	-3%	58.9	E	1935	6.7	A			165	11	93					
			EBT (Continue on Duke St)	971	971	937	-34	-4%	4.8	A						710	30	732					
			EBT (to Telegraph Rd)	1005	1005	968	-38	-4%	7.0	A						710	71	777					
			WBT	2402	2402	2262	-140	-6%	11.6	B	2262	11.6	B			1955	111	893					
			SBL	70	70	67	-3	-4%	21.3	C						140	9	85					
			SBR	38	38	36	-2	-5%	4.2	A	103	15.3	B			140	15	102					
			EBL	20	20	20	0	0%	6.4	A						70	2	65					
			EBT	8	8	8	0	0%	5.0	A	51	7.7	A			70	2	65					
7a	W Taylor Run Pkwy and Service Rd	Signalized	EBR	24	24	22	-2	-8%	9.9	A				15.4	B	70	2	65					
			WBL	13	13	11	-1	-8%	7.1	A						320	8	164					
			WBT	20	20	18	-3	-15%	7.3	A	220	7.5	A			320	8	164					
			WBR	208	208	191	-17	-8%	7.5	A						320	8	164					
			NBL	2	2	1	0	0%	0.1	A						40	0	0					
			NBT	23	23	23	0	0%	0.7	A	30	0.6	A			40	0	0					
			NBR	7	7	6	0	0%	0.3	A						40	0	0					
			SBL	1	1	1	0	0%	13.0	B						650	25	110					
			SBT	71	71	70	-1	-1%	49.3	D	77	49.1	D			650	25	110					
			SBR	6	6	6	0	0%	50.1	D						180	24	110					
7b	Duke St WB to West Taylor Run Parkway Service Rd	Unsignal	WBT	19	19	17	-2	-11%	8.2	A	17	8.2	B	6.2	A	800	1	45					
			Slip Lane from Duke St WB	280	280	257	-24	-9%	6.1	A	257	6.1	B			150	0	0					
8	Duke St WB and Telegraph Rd Off-ramp	Unsignal	WBT	904	904	901	-3	0%	0.6	A	901	0.6	C	1.4	A	700	0	34					
			SBR	1779	1779	1616	-164	-9%	1.8	A	1616	1.8	C			2400	569	907					
8a	Duke St EB and Telegraph Rd On-ramp (New)	Signal	EBL	140	140	136	-4	-3%	31.9	C	136	31.9	B	10.4	B	250	27	194					
			WBT	903	903	902	-1	0%	7.2	A	902	7.2	B			375	23	225					
8b	Telegraph Rd On-ramp at New Ramp from Duke St WB	Unsignal	WBT	453	453	449	-4	-1%	0.2	A	449	0.2	C	0.2	A	550	0	0					
			NBT	140	140	135	-5	-4%	0.2	A	135	0.2	C			300	0	0					
9	Duke St WB and Telegraph Rd On-ramp	Signal	WBR	453	453	450	-4	-1%	3.2	C	450	3.2	C	3.2	A	225	6	76					
10	Duke St and S Dove St/Roberts Ln	Signalized	EBT	2249	2249	2114	-134	-6%	15.1	B	2363	15.0	B	14.5	B	1965	107	439					
			EBR	272	272	248	-24	-9%	14.2	B						260	16	349					
			WBT	1115	1115	1132	17	2%	11.0	B	1165	11.0	B			855	36	335					
			WBR	33	33	33	-1	-3%	8.5	A						855	1	53					
			NBL	198	198	177	-21	-11%	27.6	C						195	60	463					
			NBT	29	29	24	-5	-17%	29.8	C	211	27.5	C			185	60	463					
			NBR	12	12	10	-1	-9%	20.3	C						185	58	466					
			SBL	17	17	15	-2	-12%	39.9	D						50	10	126					
			SBT	14	14	14	1	7%	32.3	C	71	19.6	B			50	10	126					
			SBR	44	44	42	-2	-5%	8.1	A						50	10	127					

Intersection MOE - 2036 Build PM Peak (Alternative 1)

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	Balanced Count (vph)	VISSIM Throughput (vph)	Δ	Δ %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)	
1	Duke St and N Quaker Ln	Signalized	EBL	314	314	310	-4	-1%	80.7	F	1345	55.6	E	43.6	D	200	398	1154	
			EBT	1040	1040	1035	-4	0%	48.1	D			360			398	1154		
			WBT	1250	1250	1154	-96	-8%	42.0	D	1824	31.3	C			330	236	468	
			WBR	735	735	670	-65	-9%	13.0	B			300			14	395		
			SBL	864	864	867	3	0%	51.3	D	1031	49.8	D			1290	228	766	
2	Duke St and S Quaker Ln	Signalized	SBR	167	167	164	-3	-2%	41.6	D				23.7	C	1270	107	705	
			EBL	7	7	6	-1	-14%	48.8	D	1900	15.0	B			200	133	448	
			EBT	1518	1518	1524	6	0%	16.7	B			330			133	448		
			EBR	379	379	370	-8	-2%	7.5	A			300			147	476		
			WBL	27	27	28	0	0%	26.7	C			80			160	380		
			WBT	1876	1876	1723	-154	-8%	21.5	C	1756	21.5	C			210	160	380	
			WBR	7	7	6	-2	-27%	18.2	B			210			170	395		
			NBL	108	108	104	-4	-4%	193.7	F	123	188.6	F			335	160	387	
			NBT	0	0	0	0	N/A	0.0	A			335			160	387		
			NBR	20	20	20	0	0%	162.2	F			335			160	388		
			SBL	1	1	1	0	0%	17.0	B	2	15.8	B			40	0	21	
			SBT	0	0	0	0	N/A	0.0	A			40			0	21		
			SBR	1	1	1	0	0%	13.9	B			40			0	23		
			3	Duke St and Alexandria Commons	Signalized	EBL	65	65	65	0	0%	48.5	D			1546	8.0	A	26.3
EBT	1463	1463				1472	8	1%	6.3	A			210	35	282				
EBR	10	10				10	-1	-10%	6.7	A			210	41	311				
WBL	7	7				5	-2	-27%	28.5	C	1683	36.8	D	315	349	660			
WBT	1797	1797				1648	-149	-8%	36.9	D			520	349	660				
WBR	36	36				30	-6	-17%	32.5	C			520	349	712				
NBL	17	17				16	-1	-6%	65.1	E	22	52.8	D	50	4	55			
NBT	2	2				2	0	0%	32.3	C			50	4	55				
NBR	4	4				4	0	0%	10.3	B			50	3	55				
SBL	51	51				49	-2	-4%	89.2	F	141	97.3	F	215	83	182			
SBT	2	2				0	0	0%	85.8	F			215	83	182				
SBR	97	97				89	-8	-8%	102.0	F			215	93	193				
EBL	30	30				32	2	7%	16.0	B	1528	8.0	A	190	36	347			
EBT	1485	1485				1493	8	1%	7.9	A			520	36	347				
4	Duke St and Sweeley St	Signalized	EBR	3	3	3	0	0%	5.6	A	1711	35.0	C	23.3	C	520	39	357	
			WBL	28	28	27	-2	-7%	32.7	C			70			402	818		
			WBT	1742	1742	1583	-159	-9%	35.3	D			225			402	818		
			WBR	113	113	102	-11	-10%	30.8	C			225			415	834		
			NBL	20	20	19	-1	-5%	50.0	D			230			14	175		
			NBT	6	6	5	-1	-16%	49.0	D	111	26.9	C			230	14	175	
			NBR	87	87	87	0	0%	20.5	C			230			19	185		
			SBL	103	103	102	0	0%	48.4	D			110			33	157		
			SBT	8	8	8	-1	-12%	56.3	E	188	38.1	D			110	33	157	
			SBR	78	78	78	-1	-1%	22.7	C			110			33	157		
			EBL	9	9	9	0	0%	77.9	E			115			130	811		
			EBT	1660	1660	1670	10	1%	15.8	B	1684	16.1	B			350	130	811	
			EBR	5	5	4	-1	-19%	21.0	C			350			133	818		
			WBL	64	64	60	-4	-6%	46.3	D	1899	39.6	D			230	568	788	
5	Duke St at Roth St/ Cambridge Rd	Signalized	WBT	1837	1837	1672	-165	-9%	40.4	D				27.1	C	670	568	788	
			WBR	183	183	167	-16	-9%	29.3	C			670			568	788		
			NBL	3	3	3	0	0%	32.0	C	365	20.5	C			150	45	193	
			NBT	12	12	11	-1	-9%	41.9	D			150			45	193		
			NBR	360	360	351	-9	-3%	19.8	B			150			47	195		
			SBL	289	289	258	-31	-11%	18.1	B			40			57	117		
			SBT	5	5	6	1	19%	26.5	C	302	17.7	B			40	57	117	
			SBR	43	43	38	-5	-12%	13.5	B			40			73	141		
			EBT	37	37	34	-2	-5%	36.6	E	290	40.7	E			1330	64	387	
			EBR	288	288	256	-32	-11%	41.3	E			1330			61	386		
			WBL	49	49	47	-3	-6%	69.7	F	47	69.7	F			825	14	109	
			WBT	0	0	0	0	N/A	0.0	A			825			15	122		
			6	Duke St and Witter Dr	Signalized	NBL	198	198	159	-40	-20%	1.2	A			188	1.0	A	32.0
NBR	38	38				29	-9	-24%	0.4	A			40	1	72				
EBT	2300	2300				2275	-25	-1%	11.6	B	2283	11.6	B	675	73	588			
EBR	8	8				8	-1	-12%	9.6	A			675	77	600				
WBL	30	30				27	-3	-10%	51.3	D			215	594	837				
WBT	2058	2058				1875	-183	-9%	53.5	D	1902	53.4	D	700	594	837			
NBL	25	25				26	1	4%	153.3	F	98	90.7	F	170	38	189			
NBR	74	74				72	-2	-3%	68.5	E			170	48	209				
EBL	27	27				27	0	0%	67.9	E			165	10	98				
EBT (Continue on Duke St)	734	734				739	4	1%	12.8	B	2357	12.4	B	710	30	588			
EBT (to Telegraph Rd)	1613	1613				1591	-22	-1%	11.3	B			710	110	791				
WBT	2069	2069				1899	-170	-8%	58.3	E	1899	58.3	E	1955	1776	2678			
7	Duke St and W Taylor Run Pkwy	Signalized				SBL	188	188	184	-4	-2%	19.5	B	204	22.8	C	32.4	C	
			SBR	20	20	19	-1	-5%	55.1	E			140	45	127				
			EBL	8	8	9	0	0%	38.7	D			70	23	168				
			EBT	5	5	5	0	0%	45.0	D	81	53.7	D	70	23	168			
			EBR	69	69	67	-2	-3%	56.3	E			70	23	168				
			WBL	10	10	11	0	0%	30.7	C			320	26	284				
			WBT	44	44	39	-5	-11%	19.7	B	227	19.9	B	320	26	284			
			WBR	199	199	177	-22	-11%	19.2	B			320	26	284				
			NBL	4	4	3	-1	-27%	0.0	A	27	0.7	A	40	0	0			
			NBT	22	22	22	1	5%	0.8	A			40	0	0				
			NBR	2	2	2	0	0%	0.3	A			40	0	0				
			SBL	0	0	0	0	N/A	0.0	A			650	56	278				
			SBT	129	129	127	-2	-2%	59.6	E	127	59.4	E	650	56	278			
7b	Duke St WB to West Taylor Run Parkway Service Rd	Unsignalized	SBR	1	1	1	0	0%	22.0	C				14.9	B	180	56	278	
			WBT	24	24	24	0	0%	8.2	A	24	8.2	A			800	1	50	
8	Duke St WB and Telegraph Rd Off-ramp	Unsignalized	Slip Lane from Duke St WB	245	245	220	-25	-10%	15.6	C	220	15.6	C	4.8	A	150	0	0	
			WBT	781	781	781	0	0%	2.2	A	781	2.2	A			700	3	170	
8a	Duke St EB and Telegraph Rd On-ramp (New)	Unsignalized	SBR	1532	1532	1390	-142	-9%	6.2	A	1390	6.2	A	12.7	B	2400	1569	2732	
			EBL	207	207	196	-11	-5%	35.5	D	196	35.5	D			250	45	357	
8b	Telegraph Rd On-ramp at New Ramp from Duke St WB	Unsignalized	WBT	781	781	784	2	0%	6.9	A	784	6.9	A	2.9	A	375	19	192	
			WBT	1821	1821	1830	9	0%	3.1	A	1830	3.1	A			550	1	194	
			NBT	207	207	197	-10	-5%	0.3	A	197	0.3	A			300	0	24	
9	Duke St WB and Telegraph Rd On-ramp	Signalized	WBR	1821	1821	1835	14	1%	4.2	A	1835	4.2	A	4.2	A	225	23	225	
10	Duke St and S Dove St/Roberts Ln	Signalized	EBT	1493	1493	1434	-59	-4%	12.1	B	1572	11.9	B	14.1	B	1965	51	504	
			EBR	151	151	139	-12	-8%	9.1	A			260			4	136		
			WBT	2431	2431	2447	17	1%	13.9	B	2489	14.0	B			855	156	851	
			WBR	43	43	42	-1	-2%	18.9	B			855			3	68		
			NBL	138	138	124	-12	-9%	34.4	C	178	32.7	C			138	42	254	
			NBT	32	32	34	1	3%	33.9	C			185			42	254		
			NBR	22	22	20	-2	-9%	20.3	C			185			40	257		
			SBL	15	15	14	-1	-7%	41.0	D			50			18	145		
			SBT	21	21	19	-2	-10%	37.0	D	68	22.5	C			50	18	145	
			SBR	36	36	35	-1	-3%	7.2	A			50			18	147		

Intersection MOE - 2026 Build AM Peak (Alternative 3A)

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	Balanced Count (vph)	VISSIM Throughput (vph)	Δ	Δ %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)								
1	Duke St and N Quaker Ln	Signalized	EBL	315	315	324	9	3%	38.7	D	1615	19.5	B	23.2	C	200	94	432								
			EBT	1286	1286	1290	4	0%	14.6	B						360	94	432								
			WBT	898	898	859	-38	-4%	20.3	C						330	76	448								
			WBR	1039	1039	979	-60	-6%	5.6	A						300	24	424								
			SBL	559	559	563	4	1%	57.8	E						1290	223	730								
			SBR	272	272	266	-7	-3%	46.3	D						828	54.1	D	1270	165	713					
2	Duke St and S Quaker Ln	Signalized	EBL	0	0	0	0	N/A	0.0	A	1854	6.5	A	6.7	A	200	53	441								
			EBT	1725	1725	1738	13	1%	6.8	A						330	53	441								
			EBR	120	120	116	-5	-4%	2.7	A						300	61	470								
			WBL	24	24	26	1	4%	22.2	C						80	31	363								
			WBT	1882	1882	1785	-97	-5%	5.3	A						210	31	363								
			WBR	0	0	0	0	N/A	0.0	A						210	33	377								
			NBL	54	54	52	-2	-4%	48.2	D						335	18	136								
			NBT	0	0	0	0	N/A	0.0	A						335	18	136								
			NBR	14	14	15	1	7%	24.9	C						335	14	137								
			SBL	2	2	2	0	0%	38.2	D						40	0	19								
			SBT	0	0	0	0	N/A	0.0	A						40	0	19								
			SBR	0	0	0	0	N/A	0.0	A						40	0	22								
3	Duke St and Alexandria Commons	Signalized	EBL	41	41	41	0	0%	36.9	D	1754	3.1	A	5.8	A	105	10	313								
			EBT	1695	1695	1706	12	1%	2.3	A						210	10	313								
			EBR	6	6	7	0	0%	3.0	A						210	11	346								
			WBL	0	0	0	0	N/A	0.0	A						315	81	653								
			WBT	1859	1859	1763	-95	-5%	7.4	A						520	81	653								
			WBR	35	35	33	-2	-6%	12.4	B						520	42	687								
			NBL	3	3	3	0	0%	43.2	D						50	1	23								
			NBT	0	0	0	0	N/A	0.0	A						50	1	23								
			NBR	0	0	0	0	N/A	0.0	A						50	1	22								
			SBL	17	17	19	1	6%	59.5	E						215	9	150								
			SBT	0	0	0	0	N/A	0.0	A						215	9	150								
			SBR	45	45	42	-3	-7%	20.1	C						215	13	160								
			EBL	53	53	55	2	4%	25.9	C						190	43	489								
			EBT	1657	1657	1666	9	1%	7.6	A						520	45	490								
			EBR	2	2	2	0	0%	3.8	A						520	46	499								
			WBL	22	22	24	1	4%	27.8	C						70	36	727								
			4	Duke St and Sweeley St	Signalized	WBT	1804	1804	1715	-89						-5%	5.2	A	1854	5.6	A	8.2	A	225	36	727
						WBR	123	123	115	-8						-6%	5.8	A						225	38	743
NBL	11	11				10	-1	-9%	52.6	D	230	6	82													
NBT	5	5				5	0	0%	46.7	D	230	6	82													
NBR	32	32				30	-2	-6%	17.8	B	230	9	93													
SBL	83	83				84	1	1%	52.6	D	110	27	151													
SBT	1	1				1	0	0%	33.8	C	110	27	151													
SBR	79	79				76	-3	-4%	12.5	B	110	27	151													
EBL	61	61				57	-4	-7%	82.8	F	115	212	830													
EBT	1706	1706				1717	11	1%	17.1	B	350	212	830													
EBR	4	4				4	0	0%	15.4	B	350	214	838													
WBL	98	98				94	-4	-4%	34.4	C	230	267	763													
5	Duke St at Roth St/ Cambridge Rd	Signalized	WBT	1891	1891	1802	-90	-5%	17.8	B	2187	18.1	B	18.8	B	670	267	763								
			WBR	308	308	291	-17	-6%	15.1	B						670	267	763								
			NBL	6	6	5	-1	-16%	36.9	D						150	6	91								
			NBT	6	6	6	0	0%	39.3	D						150	6	91								
			NBR	55	55	54	-1	-2%	15.4	B						150	7	92								
			SBL	193	193	186	-7	-4%	24.4	C						40	55	120								
			SBT	4	4	4	0	0%	26.3	C						40	55	120								
			SBR	52	52	51	-2	-4%	10.1	B						40	72	144								
			EBT	9	9	9	-1	-11%	32.1	D						223	36.6	E	1330	39	282					
			EBR	221	221	215	-7	-3%	36.8	E						1330	37	281								
			WBL	28	28	26	-2	-7%	58.4	F						825	5	67								
			WBT	0	0	0	0	N/A	0.0	A						26	58.4	F	825	5	81					
5a	Cambridge Rd and Service Rd	Unsignalized	NBL	366	366	319	-47	-13%	0.5	A	354	0.5	A	16.3	C	40	1	34								
			NBR	42	42	36	-6	-14%	0.2	A						40	1	34								
			EBT	1932	1932	1938	5	0%	6.9	A						675	51	557								
			EBR	21	21	21	-1	-5%	9.1	A						675	53	564								
			WBL	89	89	84	-5	-6%	20.7	C						215	116	752								
			WBT	2290	2290	2188	-102	-4%	12.0	B						700	116	752								
6	Duke St and Witter Dr	Signalized	NBL	7	7	7	-1	-14%	55.5	E	32	25.6	C	10.0	A	170	3	77								
			NBR	26	26	25	0	0%	17.8	B						170	4	97								
			EBL	31	31	32	1	3%	55.7	E						165	10	96								
			EBT (Continue on Duke St)	947	947	950	4	0%	10.7	B						710	93	771								
			EBT (to Telegraph Rd)	980	980	979	-2	0%	14.0	B						710	162	778								
			WBT	2342	2342	2238	-104	-4%	17.4	B						1955	155	726								
7	Duke St and W Taylor Run Pkwy	Signalized	WBR	273	273	252	-21	-8%	48.9	D	1961	13.1	B	17.2	B	110	86	560								
			SBL	68	68	65	-3	-4%	19.2	B						140	8	82								
			SBR	37	37	35	-1	-3%	4.3	A						100	14.0	B	140	8	82					
			EBL	19	19	19	-1	-5%	12.4	B						70	3	71								
			EBT	8	8	8	0	0%	12.1	B						70	3	71								
			EBR	23	23	22	-2	-9%	15.0	B						70	3	71								
7a	W Taylor Run Pkwy and Service Rd	Signalized	WBL	12	12	11	-2	-16%	9.0	A	49	13.5	B	8.5	A	320	1	32								
			WBT	6	6	5	-1	-16%	5.3	A						320	1	32								
			WBR	0	0	0	0	N/A	0.0	A						320	1	32								
			NBL	15	15	13	-2	-13%	0.6	A						40	0	36								
			NBT	225	225	212	-14	-6%	0.6	A						40	0	37								
			NBR	63	63	59	-4	-6%	0.2	A						40	0	36								
			SBL	1	1	1	0	0%	14.9	B						650	18	102								
			SBT	69	69	68	-2	-3%	35.8	D						650	18	102								
			SBR	6	6	7	1	16%	31.8	C						180	18	102								
			8a	Duke St EB and Telegraph Rd On-ramp (New)	Signalized	EBL	137	137	133	-3						-2%	41.1	D	133	41.1	D	37.9	D	250	35	217
						WBT	880	880	886	6						1%	44.4	D						375	152	565
						SBR	1735	1735	1608	-127						-7%	34.0	C						2400	2334	3034
8b	Telegraph Rd On-ramp at New Ramp from Duke St WB	Unsignalized	WBT	441	441	437	-4	-1%	0.3	A	437	0.3	A	0.3	A	550	0	0								
			NBT	137	137	133	-3	-2%	0.2	A						133	0.2	A	300	0	0					
9	Duke St WB and Telegraph Rd On-ramp	Unsignalized	WBR	441	441	438	-3	-1%	8.2	A	438	8.2	A	8.2	A	225	13	150								
10	Duke St and S Dove St/Roberts Ln	Signalized	EBT	2193	2193	2097	-96	-4%	14.1	B	2346	14.6	B	27.2	C	1965	469	1495								
			EBR	265	265	248	-17	-6%	18.4	B						260	69	979								
			WBT	1088	1088	1109	21	2%	53.2	D						855	167	520								
			WBR	33	33	33	1	3%	14.9	B						855	0	43								
			NBL	193	193	176	-17	-9%	33.4	C						185	127	1093								
			NBT	29	29	24	-5	-18%	36.9	D						185	127	1093								
			NBR	11	11	10	-1	-9%	27.0	C						185	125	1095								
			SBL	16	16	15	-2	-12%	48.3	D						50	13	126								
			SBT	13	13	14	0	0%	44.1	D						50	13	126								
			SBR	43	43	42	-1	-2%	11.2	B						50	13	126								

Intersection MOE - 2026 Build PM Peak (Alternative 3A)

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	Balanced Count (vph)	VISSIM Throughput (vph)	Δ	Δ %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)								
1	Duke St and N Quaker Ln	Signalized	EBL	306	306	307	1	0%	59.8	E	1321	38.9	D	37.1	D	200	201	771								
			EBT	1014	1014	1014	0	0%	32.6	C						360	201	771								
			WBT	1219	1219	1189	-30	-2%	41.6	D						1876	31.1	C	330	250	467					
			WBR	717	717	687	-31	-4%	12.9	B						300	24	436								
			SBL	843	843	842	-1	0%	47.1	D						1002	45.8	D	1290	198	647					
2	Duke St and S Quaker Ln	Signalized	SBR	163	163	160	-4	-2%	38.5	D	1852	14.7	B	26.9	C	1270	181	633								
			EBL	7	7	7	-1	-14%	57.4	E						200	121	442								
			EBT	1480	1480	1486	6	0%	16.2	B						330	121	442								
			SBR	369	369	359	-11	-3%	7.8	A						300	137	472								
			WBL	27	27	29	2	8%	24.8	C						80	141	377								
			WBT	1830	1830	1786	-44	-2%	21.2	C						210	141	377								
			WBR	7	7	6	-1	-14%	9.2	A						210	149	392								
			NBL	105	105	89	-16	-15%	344.0	F						335	287	502								
			NBT	0	0	0	0	N/A	0.0	A						335	287	502								
			NBR	19	19	17	-2	-10%	296.7	F						335	287	503								
			SBL	1	1	1	0	0%	13.2	B						40	0	21								
			SBT	0	0	0	0	N/A	0.0	A						40	0	21								
			SBR	1	1	1	0	0%	5.6	A						40	0	24								
3	Duke St and Alexandria Commons	Signalized	EBL	63	63	63	-1	-2%	47.2	D	1507	5.6	A	21.9	C	105	21	257								
			EBT	1427	1427	1435	7	0%	3.8	A						210	21	257								
			EBR	10	10	10	0	0%	2.4	A						210	26	292								
			WBL	7	7	6	-1	-14%	25.7	C						315	271	660								
			WBT	1753	1753	1716	-37	-2%	29.8	C						520	271	660								
			WBR	35	35	33	-2	-6%	26.6	C						520	269	712								
			NBL	16	16	15	-1	-6%	61.3	E						50	4	50								
			NBT	2	2	2	0	0%	28.8	C						50	4	50								
			NBR	4	4	4	0	0%	10.7	B						50	3	49								
			SBL	50	50	49	-1	-2%	86.4	F						215	78	182								
			SBT	2	2	2	0	0%	111.5	F						215	78	182								
			SBR	95	95	88	-7	-7%	97.7	F						215	87	193								
			EBL	30	30	31	2	7%	20.1	C						190	39	402								
4	Duke St and Sweeley St	Signalized	EBT	1449	1449	1457	9	1%	8.4	A	1492	8.7	A	18.4	B	520	39	402								
			EBR	3	3	3	0	0%	8.1	A						520	42	412								
			WBL	28	28	29	2	7%	28.2	C						70	231	814								
			WBT	1699	1699	1663	-35	-2%	24.0	C						225	231	814								
			WBR	110	110	107	-4	-4%	22.3	C						225	241	830								
			NBL	19	19	19	-1	-5%	50.5	D						230	13	165								
			NBT	6	6	5	-1	-16%	34.7	C						230	13	165								
			NBR	85	85	86	1	1%	20.2	C						230	18	176								
			SBL	100	100	100	0	0%	52.5	D						110	33	158								
			SBT	8	8	7	-1	-12%	43.1	D						110	33	158								
			SBR	77	77	76	-1	-1%	18.0	B						110	33	158								
			EBL	9	9	9	0	0%	74.9	E						115	157	814								
			5	Duke St at Roth St/ Cambridge Rd	Signalized	EBT	1619	1619	1627	8						0%	18.4	B	1640	18.7	B	25.0	C	350	157	814
EBR	5	5				4	-1	-20%	26.6	C	350	161	821													
WBL	62	62				64	1	2%	56.8	E	230	549	784													
WBT	1791	1791				1761	-31	-2%	31.8	C	670	549	784													
WBR	179	179				175	-4	-2%	29.7	C	670	549	784													
NBL	3	3				3	0	0%	22.7	C	150	40	193													
NBT	11	11				10	-2	-18%	39.9	D	150	40	193													
NBR	351	351				347	-4	-1%	18.8	B	150	42	195													
SBL	282	282				250	-31	-11%	18.2	B	40	55	118													
SBT	5	5				6	1	20%	12.3	B	40	55	118													
SBR	42	42				37	-5	-12%	9.9	A	40	71	141													
EBT	45	45				35	-10	-22%	36.6	E	1330	58	377													
EBR	281	281				247	-33	-12%	39.8	E	1330	56	377													
5a	Cambridge Rd and Service Rd	Unsignalized	WBL	48	48	46	-2	-4%	65.5	F	282	39.4	E	27.4	D	825	13	103								
			WBT	0	0	0	0	N/A	0.0	A						825	15	117								
			NBL	193	193	165	-29	-15%	0.8	A						40	1	41								
			NBR	36	36	29	-8	-22%	0.2	A						40	1	41								
			EBT	2243	2243	2222	-21	-1%	10.9	B						675	203	796								
			EBR	8	8	8	0	0%	17.8	B						675	215	816								
6	Duke St and Witter Dr	Signalized	WBL	30	30	31	1	3%	35.3	D	2231	10.9	B	22.5	C	675	215	816								
			WBT	2008	2008	1989	-19	-1%	29.0	C						215	267	773								
			NBL	24	24	23	-1	-4%	236.6	F						700	267	773								
			NBR	72	72	60	-12	-17%	145.8	F						170	76	185								
			EBL	27	27	27	0	0%	71.3	E						170	89	205								
			EBT (Continue on Duke St)	716	716	716	-1	0%	6.0	A						165	11	89								
7	Duke St and W Taylor Run Pkwy	Signalized	EBT (to Telegraph Rd)	1573	1573	1541	-32	-2%	8.1	A	2283	8.1	A	17.1	B	710	15	248								
			WBT	2018	2018	2021	3	0%	22.7	C						710	86	777								
			WBR	239	239	231	-7	-3%	56.6	E						1955	179	801								
			SBL	184	184	180	-3	-2%	16.3	B						110	136	782								
			SBR	19	19	19	-1	-5%	23.0	C						140	26	98								
			EBL	8	8	8	0	0%	28.0	C						140	35	116								
			EBT	5	5	5	0	0%	38.2	D						70	12	122								
			EBR	67	67	64	-3	-4%	34.6	C						70	12	122								
			WBL	10	10	10	0	0%	19.2	B						320	1	39								
			WBT	11	11	11	0	0%	9.4	A						320	1	39								
			WBR	2	2	2	0	0%	10.8	B						320	1	39								
			NBL	36	36	33	-3	-8%	2.1	A						40	1	127								
			NBT	213	213	209	-4	-2%	0.8	A						40	1	118								
7a	W Taylor Run Pkwy and Service Rd	Signalized	NBR	16	16	16	-1	-6%	0.4	A	258	1.0	A	17.9	B	0	4	144								
			SBL	0	0	0	0	N/A	0.0	A						650	41	198								
			SBT	125	125	125	-1	-1%	43.4	D						650	41	198								
			SBR	1	1	1	0	0%	25.4	C						180	40	197								
			EBL	202	202	193	-9	-4%	29.8	C						250	35	235								
			WBT	762	762	765	3	0%	11.9	B						375	33	207								
			SBR	1495	1495	1499	4	0%	29.5	C						2400	265	880								
			8a	Duke St EB and Telegraph Rd On-ramp (New)	Unsignalized	WBT	1776	1776	1782	6						0%	4.0	A	193	29.8	C	24.0	C	550	3	346
						NBT	202	202	193	-9						-4%	0.5	A						300	0	54
			8b	Telegraph Rd On-ramp at New Ramp from Duke St WB	Unsignalized	WBT	1776	1776	1782	6						0%	4.0	A	193	4.0	A	3.6	A	550	3	346
						NBT	202	202	193	-9						-4%	0.5	A						300	0	54
			9	Duke St WB and Telegraph Rd On-ramp	Signalized	WBR	1776	1776	1779	3						0%	9.3	A	1779	9.3	A	9.3	A	225	57	335
10	Duke St and S Dove St/Roberts Ln	Signalized	EBT	1456	1456	1451	-5	0%	20.0	B	1594	19.3	B	22.6	C	1965	90	597								
			EBR	147	147	144	-3	-2%	12.3	B						260	4	134								
			WBT	2371	2371	2384	13	1%	24.6	C						855	312	978								
			NBL	42	42	42	-2	-5%	21.2	C						855	2	73								
			NBT	133	133	129	-3	-2%	28.7	C						185	37	251								
			NBR	32	32	33	1	3%	26.9	C						185	37	251								
			SBL	21	21	20	-1	-5%	16.6	B						185	35	254								
			SBT	14	14	13	-1	-7%	30.6	C						50	12	145								
			SBR	20	20	19	-1	-5%	26.9	C						50	12	145								
			SBR	35	35	33	-2	-6%	8.0	A						50	13	148								

Intersection MOE - 2036 Build AM Peak (Alternative 3A)

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	Balanced Count (vph)	VISSIM Throughput (vph)	Δ	Δ %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)			
1	Duke St and N Quaker Ln	Signalized	EBL	323	323	332	9	3%	48.4	D	1657	22.9	C	23.8	C	200	117	498			
			EBT	1319	1319	1325	6	0%	16.5	B						360	117	498			
			WBT	920	920	867	-53	-6%	20.2	C						1856	12.3	B	330	74	443
			WBR	1065	1065	989	-76	-7%	5.3	A						300	22	420			
			SBL	573	573	578	5	1%	54.5	D						852	50.4	D	1290	193	638
2	Duke St and S Quaker Ln	Signalized	SBR	279	279	274	-6	-2%	41.8	D	1903	6.9	A	6.8	A	1270	124	620			
			EBL	0	0	0	0	N/A	0.0	A						200	61	439			
			EBT	1769	1769	1783	14	1%	7.2	A						330	61	439			
			EBR	123	123	120	-3	-2%	3.4	A						300	70	468			
			WBL	25	25	26	1	4%	23.2	C						80	29	364			
			WBT	1930	1930	1803	-127	-7%	5.0	A						210	29	364			
			WBR	0	0	0	0	N/A	0.0	A						210	31	379			
			NBL	55	55	53	-2	-4%	46.4	D						335	19	143			
			NBT	0	0	0	0	N/A	0.0	A						335	19	143			
			NBR	15	15	16	1	7%	28.8	C						335	14	145			
			SBL	2	2	2	0	0%	38.7	D						40	0	19			
			SBT	0	0	0	0	N/A	0.0	A						40	0	19			
3	Duke St and Alexandria Commons	Signalized	SBR	0	0	0	0	N/A	0.0	A	1801	3.6	A	6.0	A	40	0	22			
			EBL	42	42	42	1	2%	38.5	D						105	13	316			
			EBT	1737	1737	1753	15	1%	2.8	A						210	13	316			
			EBR	6	6	6	0	0%	1.7	A						210	15	349			
			WBL	0	0	0	0	N/A	0.0	A						315	79	649			
			WBT	1906	1906	1787	-119	-6%	7.4	A						520	79	649			
			WBR	36	36	33	-3	-8%	11.9	B						520	43	687			
			NBL	3	3	3	0	0%	39.3	D						50	1	23			
			NBT	0	0	0	0	N/A	0.0	A						50	1	23			
			NBR	0	0	0	0	N/A	0.0	A						50	1	22			
			SBL	18	18	19	1	6%	57.0	E						215	9	134			
			SBT	0	0	0	0	N/A	0.0	A						215	9	134			
4	Duke St and Sweeley St	Signalized	SBR	46	46	42	-4	-9%	19.1	B	1770	9.3	A	8.9	A	215	12	145			
			EBL	54	54	55	1	2%	29.3	C						190	54	541			
			EBT	1699	1699	1713	14	1%	8.7	A						520	56	546			
			EBR	2	2	2	0	0%	8.4	A						520	57	555			
			WBL	23	23	24	1	4%	25.1	C						70	37	679			
			WBT	1849	1849	1732	-118	-6%	5.5	A						225	37	679			
			WBR	127	127	118	-9	-7%	6.2	A						225	39	695			
			NBL	12	12	12	0	0%	49.4	D						230	7	88			
			NBT	5	5	5	0	0%	56.4	E						230	7	88			
			NBR	32	32	32	-1	-3%	19.2	B						230	10	99			
			SBL	85	85	86	1	1%	53.6	D						110	27	148			
			SBT	1	1	1	0	0%	35.9	D						110	27	148			
5	Duke St at Roth St/ Cambridge Rd	Signalized	SBR	81	81	78	-3	-4%	12.3	B	1826	18.9	B	19.3	B	115	227	831			
			EBL	63	63	60	-3	-5%	82.4	F						350	227	831			
			EBT	1749	1749	1762	13	1%	16.8	B						350	229	839			
			EBR	4	4	5	1	24%	13.1	B						230	293	768			
			WBL	100	100	94	-6	-6%	37.1	D						670	293	768			
			WBT	1939	1939	1816	-123	-6%	19.0	B						670	293	768			
			WBR	316	316	293	-23	-7%	16.3	B						150	6	89			
			NBL	6	6	5	-1	-16%	36.9	D						150	6	89			
			NBT	6	6	6	0	0%	41.1	D						150	8	92			
			NBR	56	56	57	0	0%	16.3	B						40	55	119			
			SBL	198	198	191	-6	-3%	23.6	C						40	55	119			
			SBT	4	4	4	0	0%	33.3	C						40	72	143			
5a	Cambridge Rd and Service Rd	Unsignalized	SBR	53	53	52	-1	-2%	11.4	B	229	37.3	E	17.1	C	1330	43	305			
			EBT	10	10	9	0	0%	32.4	D						1330	41	304			
			EBR	227	227	220	-7	-3%	37.5	E						825	7	83			
			WBL	28	28	28	0	0%	66.6	F						825	8	96			
			WBT	0	0	0	0	N/A	0.0	A						40	0	25			
			NBL	375	375	323	-52	-14%	0.5	A						40	0	25			
6	Duke St and Witter Dr	Signalized	NBR	43	43	35	-7	-16%	0.1	A	358	0.4	A	11.6	B	40	0	25			
			EBT	1981	1981	1990	9	0%	7.2	A						675	58	544			
			EBR	22	22	22	0	0%	12.1	B						675	60	551			
			WBL	91	91	83	-8	-9%	23.2	C						215	165	817			
			WBT	2348	2348	2205	-143	-6%	14.9	B						700	165	817			
			NBL	7	7	7	-1	-14%	55.8	E						170	3	77			
7	Duke St and W Taylor Run Pkwy	Signalized	NBR	26	26	25	-1	-4%	17.8	B	2012	25.7	C	18.0	B	170	4	97			
			EBL	31	31	32	1	3%	63.8	E						165	12	104			
			EBT (Continue on Duke St)	971	971	976	5	1%	10.8	B						710	105	780			
			EBT (to Telegraph Rd)	1005	1005	1004	-1	0%	13.9	B						710	173	787			
			WBT	2402	2402	2256	-145	-6%	18.9	B						1955	187	825			
			WBR	280	280	256	-24	-9%	49.5	D						110	113	743			
7a	W Taylor Run Pkwy and Service Rd	Signalized	SBL	70	70	67	-3	-4%	18.5	B	2512	22.0	C	10.3	A	140	8	83			
			SBR	38	38	36	-2	-5%	5.2	A						140	13	100			
			EBL	20	20	20	0	0%	11.3	B						70	3	63			
			EBT	8	8	8	0	0%	10.8	B						70	3	63			
			EBR	24	24	22	-2	-8%	15.1	B						70	3	63			
			WBL	13	13	11	-1	-8%	7.3	A						320	1	31			
			WBT	6	6	6	0	0%	8.4	A						320	1	31			
			WBR	0	0	0	0	N/A	0.0	A						320	1	31			
			NBL	16	16	14	-1	-6%	0.4	A						40	0	10			
			NBT	231	231	214	-17	-7%	0.7	A						40	0	10			
			NBR	65	65	60	-5	-8%	0.2	A						40	0	10			
			SBT	1	1	1	0	0%	13.9	B						650	19	107			
8a	Duke St EB and Telegraph Rd On-ramp (New)	Signalized/Unsignal Signal	SBT	71	71	70	-1	-1%	36.7	D	136	41.3	D	39.7	D	650	19	107			
			SBR	6	6	6	0	0%	35.9	D						180	19	107			
			EBL	140	140	136	-4	-3%	41.3	D						250	35	210			
			WBT	903	903	911	8	1%	49.3	D						375	176	609			
8b	Telegraph Rd On-ramp at New Ramp from Duke St WB	Unsignal	SBR	1779	1779	1615	-164	-9%	34.2	C	1615	49.3	C	0.3	A	2400	2413	3036			
			WBT	453	453	451	-2	0%	0.3	A						550	0	0			
9	Duke St WB and Telegraph Rd On-ramp	Signalized/Unsignal	NBT	140	140	136	-5	-4%	0.2	A	140	0.2	A	10.3	B	300	0	0			
			WBR	453	453	450	-3	-1%	10.3	B						225	16	152			
10	Duke St and S Dove St/Roberts Ln	Signalized	EBT	2249	2249	2126	-123	-5%	13.8	B	2373	14.2	B	27.8	C	1965	521	1495			
			EBR	272	272	246	-26	-10%	18.1	B						260	241	1037			
			WBT	1115	1115	1141	26	2%	55.7	E						855	188	552			
			WBR	33	33	33	-1	-3%	17.0	C						855	0	55			
			NBL	198	198	178	-20	-10%	32.8	C						185	305	1151			
			NBT	29	29	24	-5	-17%	39.5	D						185	305	1151			
			NBR	12	12	10	-2	-17%	24.9	C						185	304	1154			
			SBL	17	17	15	-2	-12%	47.5	D						50	11	128			
			SBT	14	14	14	0	0%	35.9	D						50	11	128			
			SBR	44	44	42	-2	-5%	11.1	B						50	12	129			

Intersection MOE - 2036 Build PM Peak (Alternative 3A)

Node	Intersection	Control	Movement	Peak Hour Demand (vph)	Balanced Count (vph)	VISSIM Throughput (vph)	Δ	Δ %	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thrput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)											
1	Duke St and N Quaker Ln	Signalized	EBL	314	314	315	1	0%	69.7	E	1360	48.0	D	40.5	D	200	323	939											
			EBT	1040	1040	1044	5	0%	41.5	D						360	323	939											
			WBT	1250	1250	1181	-69	-6%	42.3	D						330	255	472											
			WBR	735	735	684	-52	-7%	12.8	B						300	16	435											
			SBL	864	864	863	-1	0%	48.4	D						1290	205	665											
			SBR	167	167	164	-4	-2%	39.6	D						1270	190	651											
2	Duke St and S Quaker Ln	Signalized	EBL	7	7	7	0	0%	54.3	D	1904	15.1	B	29.0	C	200	135	441											
			EBT	1518	1518	1526	8	1%	16.8	B						330	135	441											
			EBR	379	379	372	-7	-2%	7.7	A						300	151	471											
			WBL	27	27	28	1	4%	32.6	C						80	146	374											
			WBT	1876	1876	1781	-96	-5%	22.0	C						210	146	374											
			WBR	7	7	6	-2	-27%	17.5	B						210	154	389											
			NBL	108	108	89	-19	-18%	400.8	F						335	364	526											
			NBT	0	0	0	0	N/A	0.0	A						335	364	526											
			NBR	20	20	18	-2	-10%	364.5	F						335	365	527											
			SBL	1	1	1	0	0%	13.3	B						40	0	21											
			SBT	0	0	0	0	N/A	0.0	A						40	0	21											
			SBR	1	1	1	0	0%	5.3	A						40	0	24											
			3	Duke St and Alexandria Commons	Signalized	EBL	65	65	64	-1						-2%	52.5	D	1543	7.3	A	23.8	C	105	29	259			
						EBT	1463	1463	1469	6						0%	5.3	A						210	29	259			
						EBR	10	10	10	-1						-10%	3.4	A						210	37	294			
WBL	7	7				6	-2	-27%	27.2	C	315	290	663																
WBT	1797	1797				1704	-93	-5%	31.5	C	520	290	663																
WBR	36	36				32	-3	-8%	26.8	C	520	289	716																
NBL	17	17				16	-1	-6%	63.9	E	50	4	55																
NBT	2	2				1	-1	-48%	32.4	C	50	4	55																
NBR	4	4				4	0	0%	11.6	B	50	4	54																
SBL	51	51				49	-2	-4%	97.1	F	215	90	182																
SBT	2	2				2	0	0%	111.3	F	215	90	182																
SBR	97	97				88	-10	-10%	111.3	F	215	99	193																
EBL	30	30				32	2	7%	20.6	C	190	96	537																
EBT	1485	1485				1489	4	0%	16.2	B	520	96	537																
EBR	3	3				3	0	0%	12.2	B	520	100	548																
WBL	28	28	29	0	0%	30.6	C	70	247	795																			
WBT	1742	1742	1654	-87	-5%	25.6	C	225	247	795																			
WBR	113	113	107	-6	-5%	22.6	C	225	257	811																			
4	Duke St and Sweeley St	Signalized	NBL	20	20	19	-1	-5%	50.6	D	1790	25.5	C	22.3	C	230	15	175											
			NBT	6	6	5	-1	-16%	48.9	D						230	15	175											
			NBR	87	87	87	0	0%	22.8	C						230	20	186											
			SBL	103	103	103	0	0%	47.9	D						110	32	155											
			SBT	8	8	8	-1	-12%	55.2	E						110	32	155											
			SBR	78	78	78	-1	-1%	19.2	B						110	32	155											
			EBL	9	9	9	0	0%	85.6	F						115	256	826											
			EBT	1660	1660	1665	5	0%	24.4	C						350	256	826											
			EBR	5	5	4	-1	-19%	22.5	C						350	262	834											
			WBL	64	64	63	-1	-2%	66.4	E						230	671	785											
			WBT	1837	1837	1746	-90	-5%	38.4	D						670	671	785											
			WBR	183	183	173	-10	-5%	40.9	D						670	671	785											
			NBL	3	3	3	0	0%	30.1	C						150	46	193											
			NBT	12	12	10	-1	-9%	42.3	D						150	46	193											
			NBR	360	360	352	-8	-2%	20.4	C						150	48	195											
5	Duke St at Roth St/ Cambridge Rd	Signalized	SBL	289	289	258	-30	-10%	17.7	B	1982	39.5	D	30.7	C	40	56	117											
			SBT	5	5	6	1	19%	19.8	B						40	56	117											
			SBR	43	43	38	-4	-9%	11.8	B						40	72	141											
			EBT	45	45	34	-11	-24%	35.7	E						1330	63	370											
			EBR	288	288	256	-32	-11%	40.8	E						1330	60	370											
			WBL	49	49	47	-2	-4%	62.6	F						825	12	93											
			WBT	0	0	0	0	N/A	0.0	A						825	13	107											
			NBL	198	198	163	-35	-18%	0.9	A						40	1	65											
			NBR	38	38	30	-8	-21%	0.2	A						40	1	65											
			EBT	2300	2300	2277	-23	-1%	14.6	B						675	293	798											
			EBR	8	8	8	-1	-12%	21.5	C						675	307	817											
			WBL	30	30	30	0	0%	44.1	D						215	478	835											
			WBT	2058	2058	1977	-81	-4%	46.3	D						700	478	835											
			NBL	25	25	17	-8	-32%	428.2	F						170	141	192											
			NBR	74	74	46	-28	-38%	314.6	F						170	159	212											
6	Duke St and W Taylor Run Pkwy	Signalized	EBL	27	27	27	0	0%	72.5	E	2327	8.9	A	24.2	C	165	11	81											
			EBT (Continue on Duke St)	734	734	729	-6	-1%	6.5	A						710	17	192											
			EBT (to Telegraph Rd)	1613	1613	1572	-41	-3%	8.9	A						710	108	783											
			WBT	2069	2069	2006	-63	-3%	37.9	D						1955	496	1294											
			WBR	245	245	230	-15	-6%	64.7	E						110	463	1292											
			SBL	188	188	185	-4	-2%	16.8	B						140	29	99											
			SBR	20	20	19	-1	-5%	38.8	D						140	39	116											
			EBL	8	8	9	0	0%	32.9	C						70	20	155											
			EBT	5	5	5	0	0%	42.5	D						70	20	155											
			EBR	69	69	68	-1	-1%	50.9	D						70	20	155											
			WBL	10	10	11	0	0%	24.7	C						320	1	36											
			WBT	12	12	12	0	0%	11.7	B						320	1	36											
			WBR	2	2	2	0	0%	3.8	A						320	1	36											
			NBL	37	37	33	-3	-8%	2.1	A						40	2	125											
			7	Duke St and W Taylor Run Pkwy and Service Rd	Signalized	NBT	219	219	207	-11						-5%	0.9	A	257	1.0	A	20.5	C	40	1	115			
NBR	17	17				16	0	0%	0.2	A	40	2	139																
SBL	0	0				0	0	N/A	0.0	A	650	41	198																
SBT	129	129				126	-2	-2%	42.9	D	650	41	198																
SBR	1	1				1	0	0%	24.0	C	180	41	197																
EBL	207	207				199	-8	-4%	29.0	C	250	35	266																
WBT	781	781				786	5	1%	13.8	B	375	38	235																
SBR	1532	1532				1498	-35	-2%	35.3	D	2400	628	1306																
WBT	1821	1821				1830	9	0%	4.2	A	1821	4.2	A	550	4	356													
NBT	207	207				198	-9	-4%	0.8	A	207	0.8	A	300	0	82													
8	Duke St WB and Telegraph Rd On-ramp	Signalize Unsignal				WBR	1821	1821	1825	4	0%	11.1	B	1821	11.1	B	11.1	B						225	71	345			
						EBT	1493	1493	1484	-9	-1%	19.9	B											1633	19.3	B	1965	94	696
						EBR	151	151	149	-2	-1%	12.6	B											2485	26.9	C	260	5	163
						WBT	2431	2431	2444	13	1%	27.0	C											855	378	1012			
						WBR	43	43	41	-2	-5%	21.4	C											855	2	66			
			NBL	136	136	133	-3	-2%	27.8	C	185	39	281																
			NBT	32	32	34	1	3%	27.3	C	185	39	281																
			NBR	22	22	20	-2	-9%	19.7	B	185	37	276																
			SBL	15	15	14	-1	-7%	33.3	C	50	14	142																
			SBT	21	21	20	-1	-5%	29.4	C	50	14	142																
			SBR	36	36	35	-1	-3%	8.5	A	50	15	143																
			9	Duke St and S Dove St/Roberts Ln	Signalized	EBL	1493	1493	1484	-9	-1%	19.9	B						1633	19.3	B	23.9	C	1965	94	696			
						EBR	151	151	149	-2	-1%	12.6	B											2485	26.9	C	260	5	163
						WBT	2431	2431	2444	13	1%	27.0	C											855	378	1012			
						WBR	43	43	41	-2	-5%	21.4	C											855	2	66			
NBL	136	136				133	-3	-2%	27.8	C	185	39	281																
NBT	32	32				34	1	3%	27.3	C	185	39	281																
NBR	22	22				20	-2	-9%	19.7	B	185	37	276																
SBL	15	15				14	-1	-7%	33.3	C	50	14	142																
SBT	21	21				20	-1	-5%	29.4	C	50	14	142																
SBR	36	36				35	-1	-3%	8.5	A	50	15	143																

Intersection MOE - 2026 Build AM Peak (Preferred Alternative 3C)

Node	Intersection	Movement	Peak Hour Demand (vph)	VISSIM Throughput (vph)	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)												
1	Duke St and N Quaker Ln	EBL	315	325	45.9	D	1617	21.1	C	25.2	C	200	105	441												
		EBT	1286	1292	14.9	B						360	105	441												
		WBT	898	873	16.0	B						330	58	445												
		WBR	1039	993	5.2	A						300	18	407												
		SBL	559	558	71.9	E						1290	431	943												
2	Duke St and S Quaker Ln	SBR	272	261	57.4	E	1839	6.8	A	6.5	A	1270	370	928												
		EBL	0	0	0.0	A						200	60	452												
		EBT	1725	1735	7.0	A						330	60	452												
		EBR	120	115	3.0	A						300	68	481												
		WBL	24	26	21.0	C						80	26	362												
		WBT	1882	1814	4.7	A						210	26	362												
		WBR	0	0	0.0	A						210	28	376												
		NBL	54	52	48.4	D						335	18	136												
		NBT	0	0	0.0	A						335	18	136												
		NBR	14	15	25.0	C						335	14	137												
		SBL	2	2	38.2	D						40	0	19												
		SBT	0	0	0.0	A						40	0	19												
		SBR	0	0	0.0	A						40	0	22												
		3	Duke St and Alexandria Commons	EBL	41	41						38.1	D	1750	3.2	A	6.0	A	105	10	313					
EBT	1695			1703	2.4	A	210	10	313																	
EBR	6			7	2.3	A	210	12	347																	
WBL	0			0	0.0	A	315	88	651																	
WBT	1859			1794	7.8	A	520	88	651																	
WBR	35			34	12.9	B	520	47	702																	
NBL	3			3	39.3	D	50	1	23																	
NBT	0			0	0.0	A	50	1	23																	
NBR	0			0	0.0	A	50	22	1																	
SBL	17			19	58.2	E	215	9	137																	
SBT	0			0	0.0	A	215	9	137																	
SBR	45			42	19.9	B	215	12	148																	
EBL	53			55	23.5	C	190	41	518																	
4	Duke St and Sweeley St			EBT	1657	1667	7.2	A	1723	7.7	A	7.9	A						520	42	519					
				EBR	2	2	3.9	A											520	44	527					
		WBL	22	24	24.1	C	70	31						716												
		WBT	1804	1745	5.0	A	225	31						716												
		WBR	123	118	5.2	A	225	32						732												
		NBL	11	10	52.5	D	230	6						85												
		NBT	5	5	50.2	D	230	6						85												
		NBR	32	30	18.2	B	230	9						95												
		SBL	83	84	54.4	D	110	27						148												
		SBT	1	1	33.6	C	110	27						148												
		SBR	79	75	12.3	B	110	27						148												
		EBL	61	57	79.8	E	115	189						820												
		EBT	1706	1720	14.5	B	350	189						820												
		5	Duke St at Roth St	EBR	4	4	13.4	B						1781	16.6	B	17.1	B	350	189	828					
				WBL	98	97	33.7	C											230	247	755					
WBT	1891			1828	16.5	B	670	247	755																	
WBR	308			294	13.4	B	670	247	755																	
NBL	6			5	35.4	D	150	6	101																	
NBT	6			6	38.1	D	150	6	101																	
NBR	55			54	16.7	B	150	6	102																	
SBL	193			186	26.5	C	40	63	122																	
SBT	4			4	7.1	A	40	63	122																	
SBR	52			51	9.9	A	40	80	145																	
EBT	10			8	53.3	F	1330	60	321																	
EBR	227			214	51.3	F	1330	57	321																	
WBL	28			25	81.9	F	825	8	75																	
WBT	0			0	0.0	A	825	8	88																	
51	Cambridge Rd and Service Rd			NBL	375	321	0.7	A	357	0.7	A	22.7	C						40	1	62					
		NBR	43	37	0.4	A	40	1						62												
		EBT	1932	1939	5.4	A	675	39						478												
		EBR	21	21	8.2	A	675	40						485												
		WBL	89	85	20.6	C	215	131						679												
		WBT	2290	2218	11.3	B	700	131						679												
		NBL	7	7	55.5	E	170	3						78												
		NBR	26	25	17.5	B	170	4						98												
		EBL	31	31	56.6	E	165	10						90												
		6	Duke St and W Taylor Run Pkwy	EBT (Continue on Duke St)	947	949	6.8	A						1959	8.9	A	10.1	B	710	46	710					
				EBT (to Telegraph Rd)	980	978	9.5	A											710	113	778					
				WBT	2342	2275	10.8	B											1955	71	577					
				SBL	68	66	21.7	C											140	10	89					
				SBR	37	36	5.5	A											140	16	106					
				EBL	19	19	7.5	A											70	2	65					
EBT	8			8	5.6	A	70	2	65																	
EBR	23			22	11.1	B	320	8	138																	
WBL	12			12	7.5	A	320	8	138																	
WBT	20			17	5.8	A	320	8	138																	
WBR	208			191	7.0	A	320	8	138																	
NBL	2			1	0.1	A	40	0	0																	
NBT	23			25	0.8	A	40	0	0																	
NBR	7			5	0.3	A	40	0	0																	
71	W Taylor Run Pkwy and Service Rd			SBL	1	0	14.9	B	31	0.7	A	15.3	B						650	25	106					
		SBT	69	68	51.3	D	650	25						106												
		SBR	6	7	43.5	D	180	24						106												
		EBL	15	14	7.2	A	220	1						41												
		WBT	14	12	9.6	A	220	1						41												
		SBR	4	4	7.4	A	500	0						33												
		72	Duke St WB to West Taylor Run Parkway Service Rd	Duke St WB to Moncure Dr	57	55	4.1	A						55	4.1	A	4.4	A	65	0	0					
				Duke St WB to West Taylor Run Parkway Service Rd	217	204	3.9	A											204	3.9	A	65	0	0		
				WBT	880	891	0.3	A											891	0.3	A	1.2	A	700	0	0
				SBR	1735	1646	1.7	A											1646	1.7	A	2400	252	362		
				EBL	137	133	32.7	C											133	32.7	C	10.0	A	250	27	187
				WBT	880	890	6.6	A											890	6.6	A	375	21	242		
				WBT	443	436	0.1	A											436	0.1	A	0.3	A	550	0	0
				NBT	137	133	0.6	A											133	0.6	A	300	0	55		
				8	Duke St WB and Telegraph Rd Off-ramp	WBR	443	437											0.4	A	437	0.4	A	0.4	A	225
81	Duke St EB and Telegraph Rd On-ramp			EBT	2193	2142	12.8	B	2398	12.8	B	12.5	B						1965	89	453					
				EBR	265	257	12.3	B											260	12	245					
				WBT	1088	1100	8.6	A											1134	8.5	A	855	26	301		
				WBR	33	33	7.6	A											855	0	43					
				NBL	193	182	27.9	C											185	57	359					
		NBT	29	25	30.1	C	185	57						359												
		NBR	11	10	21.5	D	185	57						359												
82	Telegraph Rd On-ramp at New Ramp from Duke St WB	SBL	11	10	38.5	D	217	27.8	C	0.3	A	50	10	117												
		SBT	13	14	32.5	C						70	19.3	B	50	10	117									
		SBR	43	42	8.2	A									50	10	119									

Intersection MOE - 2026 Build PM Peak (Preferred Alternative 3C)

Node	Intersection	Movement	Peak Hour Demand (vph)	VISSIM Throughput (vph)	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)							
1	Duke St and N Quaker Ln	EBL	306	307	61.6	E	1328	31.1	C	34.7	C	200	137	655							
		EBT	1014	1021	21.9	C						360	137	655							
		WBT	1219	1224	28.7	C						1928	20.8	C	330	155	460				
		WBR	717	704	7.1	A						300	18	402							
		SBL	843	846	67.5	E						1005	66.1	E	1290	380	896				
2	Duke St and S Quaker Ln	SBR	163	160	59.0	E	1859	10.3	B	12.1	B	1270	362	882							
		EBL	7	7	44.4	D						200	83	441							
		EBT	1480	1498	11.2	B						330	83	441							
		EBR	369	360	6.2	A						300	95	471							
		WBL	27	28	21.6	C						80	69	369							
		WBT	1830	1824	10.1	B						210	69	369							
		WBR	7	6	9.9	A						210	74	383							
		NBL	105	102	70.3	E						335	48	236							
		NBT	0	0	0.0	A						335	48	236							
		NBR	19	19	49.6	D						335	45	237							
		SBL	1	1	48.0	D						40	0	23							
		SBT	0	0	0.0	A						40	0	23							
3	Duke St and Alexandria Commons	SBR	1	1	3.7	A	1518	5.2	A	15.6	B	40	0	27							
		EBL	63	64	31.2	C						105	20	311							
		EBT	1427	1444	4.1	A						210	20	311							
		EBR	10	10	2.8	A						210	26	345							
		WBL	7	6	31.8	C						315	202	652							
		WBT	1753	1750	21.5	C						520	202	652							
		WBR	35	34	22.6	C						520	170	703							
		NBL	16	15	49.9	D						50	4	57							
		NBT	2	1	31.0	C						50	4	57							
		NBR	4	4	17.7	B						50	4	56							
		SBL	50	51	58.0	E						215	37	181							
		SBT	2	2	54.3	D						215	37	181							
4	Duke St and Sweeley St	SBR	95	92	39.7	D	145	46.3	D	11.9	B	215	44	192							
		EBL	30	32	19.1	B						190	33	551							
		EBT	1449	1467	6.0	A						520	33	551							
		EBR	3	3	2.5	A						520	35	562							
		WBL	28	30	21.2	C						70	92	678							
		WBT	1699	1700	13.0	B						225	92	678							
		WBR	110	109	12.2	B						225	98	693							
		NBL	19	19	50.4	D						230	14	161							
		NBT	6	5	47.3	D						230	14	161							
		NBR	85	86	20.5	C						230	19	172							
		SBL	100	100	50.7	D						110	33	152							
		SBT	8	7	46.4	D						110	33	152							
5	Duke St at Roth St	SBR	77	76	17.6	B	183	36.8	D	13.7	B	110	33	152							
		EBL	9	9	77.1	E						115	96	779							
		EBT	1619	1639	11.5	B						350	96	779							
		EBR	5	4	7.2	A						350	98	787							
		WBL	62	65	35.6	D						230	160	753							
		WBT	1791	1798	12.2	B						670	160	753							
		WBR	179	179	9.9	A						670	160	753							
		NBL	3	3	24.5	C						150	52	197							
		NBT	11	9	40.0	D						150	52	197							
		NBR	351	344	22.7	C						150	54	199							
		SBL	282	250	21.5	C						40	72	117							
		SBT	5	6	16.6	B						40	72	117							
51	Cambridge Rd and Service Rd	SBR	42	37	9.7	A	281	78.8	F	53.2	F	40	90	141							
		EBT	37	34	75.9	F						1330	139	503							
		EBR	288	247	79.2	F						1330	136	503							
		WBL	49	46	118.9	F						825	26	124							
		WBT	0	0	0.0	A						825	30	137							
		NBL	198	169	1.5	A						40	3	81							
6	Duke St and Witter Dr	NBR	38	29	1.0	A	2245	10.1	B	7.8	A	40	3	81							
		EBT	2243	2237	10.1	B						675	166	782							
		EBR	8	8	13.5	B						675	176	801							
		WBL	30	32	30.9	C						215	16	397							
		WBT	2008	2020	3.6	A						700	16	397							
		NBL	24	25	57.1	E						170	15	181							
7	Duke St and W Taylor Run Pkwy	NBR	72	69	28.3	C	93	35.9	D	10.6	B	170	20	201							
		EBL	27	27	54.4	D						165	8	80							
		EBT (Continue on Duke St)	716	723	8.0	A						710	23	558							
		EBT (to Telegraph Rd)	1573	1558	8.2	A						710	100	781							
		WBT	2018	2030	12.1	B						1955	73	606							
		SBL	184	181	17.9	B						140	28	110							
71	W Taylor Run Pkwy and Service Rd	SBR	19	19	15.8	B	199	17.7	B	27.4	C	140	38	127							
		EBL	8	8	22.2	C						70	12	121							
		EBT	5	5	32.0	C						70	12	121							
		EBR	67	65	35.3	D						70	12	121							
		WBL	10	10	18.2	B						320	17	232							
		WBT	44	39	11.5	B						320	17	232							
		WBR	199	188	13.4	B						320	17	232							
		NBL	4	3	6.5	A						40	0	3							
		NBT	22	22	0.7	A						40	0	0							
		NBR	2	2	0.2	A						40	0	0							
		SBL	0	0	0.0	A						650	52	246							
		72	Duke St WB to West Taylor Run Parkway Service Rd	SBT	125	125						55.8	E	126	55.6	E	3.7	A	650	52	246
SBR	1			1	28.9	C	180	52	246												
EBL	7			7	8.0	A	220	0	37												
WBT	18			16	9.3	A	220	1	42												
SBR	5			4	8.7	A	500	0	38												
Duke St WB to Moncure Dr	15			13	2.6	A	65	0	12												
Duke St WB to West Taylor Run Parkway Service Rd	224			218	3.2	A	65	0	12												
8	Duke St WB and Telegraph Rd Off-ramp			WBT	762	766	0.2	A	766	0.2	A	1.0	A						700	0	0
				SBR	1495	1498	1.5	A											2400	0	0
81	Duke St EB and Telegraph Rd On-ramp			EBL	202	195	38.2	D	195	38.2	D	13.3	B						250	46	261
Telegraph Rd On-ramp at New Ramp from Duke St WB	WBT			762	766	7.0	A	766	7.0	A	375								19	193	
82	Telegraph Rd On-ramp at New Ramp from Duke St WB			NBT	1821	1780	2.2	A	1780	2.2	A	2.2	A						550	0	0
NBT	202	194	2.1	A	194	2.1	A	300	1	150											
9	Duke St WB and Telegraph Rd On-ramp	WBR	1821	1779	1.2	A	1779	1.2	A	1.2	A	225	3	293							
10	Duke St and S Dove St/Roberts Ln	EBT	1456	1458	11.7	B	1602	11.4	B	13.5	B	1965	49	384							
		EBR	147	144	8.7	A						260	4	113							
		WBT	2371	2383	13.1	B						855	133	773							
		WBR	42	40	16.4	B						855	2	59							
		NBL	133	129	35.2	D						185	45	231							
		NBT	32	32	33.6	C						185	45	231							
		NBR	21	20	21.1	C						185	43	233							
		SBL	14	13	33.4	C						50	14	135							
		SBT	20	20	38.1	D						50	14	135							
		SBR	35	33	8.5	A						50	15	138							

Intersection MOE - 2036 Build AM Peak (Preferred Alternative 3C)

Node	Intersection	Movement	Peak Hour Demand (vph)	VISSIM Throughput (vph)	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)
1	Duke St and N Quaker Ln	EBL	323	331	47.6	D	1656	22.0	C	25.3	C	200	114	560
		EBT	1319	1325	15.6	B						360	114	560
		WBT	920	877	17.1	B	1876	10.7	B			330	64	430
		WBR	1065	998	5.2	A						300	20	408
		SBL	573	574	68.6	E	846	64.1	E			1290	370	817
2	Duke St and S Quaker Ln	SBR	279	272	54.4	D				6.5	A	1270	300	793
		EBL	0	0	0.0	A						200	61	440
		EBT	1769	1780	7.0	A	1899	6.8	A			330	61	440
		EBR	123	120	3.1	A						300	69	469
		WBL	25	26	24.6	C						80	24	360
		WBT	1930	1823	4.6	A	1850	4.9	A			210	24	360
		WBR	0	0	0.0	A						210	26	374
		NBL	55	53	46.6	D						335	18	137
		NBT	0	0	0.0	A	69	42.4	D			335	18	137
		NBR	15	16	28.2	C						335	14	138
		SBL	2	2	38.2	D						40	0	19
		SBT	0	0	0.0	A	2	38.2	D			40	0	19
		SBR	0	0	0.0	A						40	0	22
		EBL	42	42	36.1	D						105	10	313
		EBT	1737	1748	2.3	A	1796	3.1	A			210	10	313
		EBR	6	6	2.3	A						210	12	346
3	Duke St and Alexandria Commons	WBL	0	0	0.0	A				5.9	A	315	86	660
		WBT	1906	1805	7.6	B	1839	7.7	A			520	86	660
		WBR	36	34	12.6	B						520	48	703
		NBL	3	3	39.6	D						50	1	23
		NBT	0	0	0.0	A	3	39.6	D			50	1	23
		NBR	0	0	0.0	A						50	1	22
		SBL	18	19	57.6	E						215	9	135
		SBT	0	0	0.0	A	61	31.7	C			215	9	135
		SBR	46	42	19.9	B						215	12	146
		EBL	54	55	24.9	C						190	43	499
		EBT	1699	1706	7.4	A	1763	8.0	A			520	44	499
		EBR	2	2	8.5	A						520	46	508
		WBL	23	25	24.7	C						70	31	639
		WBT	1849	1746	4.9	A	1889	5.2	A			225	31	639
		WBR	127	118	5.0	A						225	32	655
4	Duke St and Sweeley St	NBL	12	12	48.6	D				8.0	A	230	7	88
		NBT	5	5	55.5	E	49	29.8	C			230	7	88
		NBR	32	31	18.2	B						230	10	99
		SBL	85	86	53.2	D						110	27	154
		SBT	1	1	35.5	D	165	34.0	C			110	27	154
		SBR	81	78	12.9	B						110	27	154
		EBL	63	59	81.7	F						115	202	821
		EBT	1749	1758	14.4	B	1822	16.6	B			350	202	821
		EBR	4	5	9.3	A						350	202	828
		WBL	100	96	36.4	D						230	258	762
		WBT	1939	1834	17.3	B	2223	17.6	B			670	258	762
		WBR	316	294	13.2	B						670	258	762
		NBL	6	6	45.4	D						150	8	122
		NBT	6	6	49.8	D	68	23.0	C			150	8	122
		NBR	56	57	18.0	B						150	9	123
5	Duke St at Roth St	SBL	198	191	26.4	C				17.5	B	40	66	119
		SBT	4	4	26.4	C	246	23.0	C			40	66	119
		SBR	53	52	10.4	B						40	84	143
		EBT	10	9	53.2	F						1330	76	378
		EBR	227	219	59.3	F	228	59.1	F			1330	73	377
		WBL	28	28	94.1	F	28	94.1	F			825	10	81
		WBT	0	0	0.0	A						825	11	94
		NBL	375	322	0.7	A	359	0.6	A			40	1	79
		NBR	43	37	0.2	A						40	1	79
		EBT	1981	1985	6.0	A	2007	6.0	A			675	43	496
6	Duke St and Witter Dr	EBR	22	22	8.6	A				9.0	A	675	45	503
		WBL	91	84	22.0	C	2308	11.4	B			215	120	664
		WBT	2348	2223	11.0	B						700	120	664
		NBL	7	7	55.7	E	32	25.1	C			170	3	78
		NBR	26	25	17.2	B						170	4	97
7	Duke St and W Taylor Run Pkwy	EBL	31	32	54.7	D				10.0	A	165	10	96
		EBT (Continue on Duke St)	971	975	6.7	A	2011	8.8	A			710	45	728
		EBT (to Telegraph Rd)	1005	1004	9.3	A						710	113	781
		WBT	2402	2278	10.9	B	2278	10.9	B			1955	86	587
		SBL	70	68	21.9	C						140	9	84
		SBR	38	36	4.0	A	104	15.7	B			140	16	104
		EBL	20	20	6.8	A						70	2	65
		EBT	8	8	4.7	A	51	8.1	A			70	2	65
71	W Taylor Run Pkwy and Service Rd	EBR	24	22	10.6	B				14.8	B	70	2	65
		WBL	13	12	7.1	A						320	6	146
		WBT	20	16	7.6	A	219	6.4	A			320	6	146
		WBR	208	191	6.2	A						320	6	146
		NBL	2	0	0.0	A						40	0	0
		NBT	23	24	0.8	A	32	0.6	A			40	0	0
		NBR	7	7	0.3	A						40	0	0
		SBL	1	1	13.0	B						650	25	110
		SBT	71	70	49.2	D	77	49.0	D			650	25	110
		SBR	6	6	50.2	D						180	24	110
		EBL	16	15	7.8	A	16	7.8	A			220	1	41
		WBT	14	12	9.5	A	14	9.5	A			220	1	42
72	Duke St WB to West Taylor Run Parkway Service Rd	SBR	5	4	7.4	A	5	7.4	A	4.6	A	500	0	33
		Duke St WB to Moncure Dr	58	54	4.2	A	58	4.2	A			65	0	0
		Duke St WB to West Taylor Run Parkway Service Rd	222	203	4.2	A	222	4.2	A			65	0	0
		WBT	903	906	0.3	A	903	0.3	A			700	0	8
		SBR	1779	1635	1.8	A	1779	1.8	A			2400	294	762
81	Duke St EB and Telegraph Rd On-ramp	EBL	140	135	31.1	C	140	31.1	C	9.7	A	250	26	188
		WBT	903	906	6.6	A	903	6.6	A			375	22	232
82	Telegraph Rd On-ramp at New Ramp from Duke St WB	WBT	454	450	0.2	A	454	0.2	A	0.3	A	550	0	0
		NBT	140	135	0.7	A	140	0.7	A			300	0	59
9	Duke St WB and Telegraph Rd On-ramp	WBR	454	451	0.4	A	454	0.4	A	0.4	A	225	0	37
10	Duke St and S Dove St/Roberts Ln	EBT	2249	2139	12.8	B	2391	12.6	B	12.3	B	1965	90	451
		EBR	272	252	11.5	B						260	13	300
		WBT	1115	1134	8.7	A	1166	8.7	A			855	27	311
		WBR	33	33	8.6	A						855	0	55
		NBL	198	179	26.1	C						185	55	414
		NBT	29	24	29.6	C	213	26.2	C			185	55	414
		NBR	12	10	17.9	B						185	52	417
		SBL	17	15	38.2	D						50	10	128
		SBT	14	14	33.1	C	70	19.4	B			50	10	128
		SBR	44	42	8.2	A						50	11	129

Intersection MOE - 2036 Build PM Peak (Preferred Alternative 3C)

Node	Intersection	Movement	Peak Hour Demand (vph)	VISSIM Throughput (vph)	Movement Delay (sec/veh)	Movement Equivalent LOS	Approach VISSIM Thruput (vph)	Average Delay by Approach (sec/veh)	Approach Equivalent LOS	Average Delay by Intersection (sec/veh)	Intersection Equivalent LOS	Turn Bay Storage (ft)	Avg. Queue (ft)	Max. Queue (ft)				
1	Duke St and N Quaker Ln	EBL	314	312	70.2	E	1355	35.2	D	39.7	D	200	209	974				
		EBT	1040	1042	24.7	C						360	209	974				
		WBT	1250	1251	31.4	C						330	179	466				
		WBR	735	721	8.7	A						300	17	415				
		SBL	864	842	80.0	F						1290	709	1274				
		SBR	167	157	72.0	E						1270	694	1260				
2	Duke St and S Quaker Ln	EBL	7	7	41.8	D	1884	10.7	B	13.3	B	200	93	439				
		EBT	1518	1512	11.6	A						330	93	439				
		EBR	379	366	6.5	A						300	105	469				
		WBL	27	28	22.9	C						80	84	373				
		WBT	1876	1864	11.5	B						210	84	373				
		WBR	7	6	5.3	A						210	90	388				
		NBL	108	105	81.7	F	125	78.4	E			335	57	248				
		NBT	0	0	0.0	A						335	57	248				
		NBR	20	20	61.1	E						335	55	249				
		SBL	1	1	28.0	C						40	0	21				
		SBT	0	0	0.0	A						40	0	21				
		SBR	1	1	3.3	A						40	0	25				
3	Duke St and Alexandria Commons	EBL	65	65	32.4	C	1535	5.2	A			16.5	B	105	19	312		
		EBT	1463	1460	4.0	A								210	19	312		
		EBR	10	10	2.9	A								210	24	345		
		WBL	7	6	25.4	C								315	224	657		
		WBT	1797	1789	23.1	C								520	224	657		
		WBR	36	35	23.6	C								520	193	709		
		NBL	17	16	52.1	D	21	43.5	D					50	4	55		
		NBT	2	1	33.6	C								50	4	55		
		NBR	4	4	10.5	B								50	4	55		
		SBL	51	52	55.6	E								215	38	180		
		SBT	2	2	42.0	D								215	38	180		
		SBR	97	94	43.5	D								215	46	191		
4	Duke St and Sweeley St	EBL	30	32	21.4	C	1518	6.9	A	13.3	B			190	40	589		
		EBT	1485	1483	6.6	A								520	40	589		
		EBR	3	3	4.7	A								520	42	599		
		WBL	28	30	27.0	C								70	114	738		
		WBT	1742	1737	14.9	B								225	114	738		
		WBR	113	112	14.9	B								225	121	754		
		NBL	20	19	51.7	D	111	28.0	C					230	14	163		
		NBT	6	5	47.3	D								230	14	163		
		NBR	87	87	21.6	C								230	19	174		
		SBL	103	102	51.6	D								110	35	159		
		SBT	8	8	52.5	D								110	35	159		
		SBR	78	78	20.2	C								110	35	159		
5	Duke St at Roth St	EBL	9	9	74.8	E	1670	13.6	B			15.5	B	115	120	784		
		EBT	1660	1657	13.2	B								350	120	784		
		EBR	5	4	14.9	B								350	124	792		
		WBL	64	66	40.7	D								230	202	753		
		WBT	1837	1838	13.9	B								670	202	753		
		WBR	183	185	12.4	B								670	202	753		
		NBL	3	3	36.2	D	365	25.8	C					150	60	193		
		NBT	12	11	44.0	D								150	60	193		
		NBR	360	351	25.1	C								150	62	195		
		SBL	289	257	20.4	C								40	70	117		
		SBT	5	6	24.9	C								40	70	117		
		SBR	43	38	13.2	B								40	88	140		
51	Cambridge Rd and Service Rd	EBT	37	34	71.1	F	289	74.0	F	50.8	F			1330	133	433		
		EBR	288	255	74.4	F								1330	130	432		
		WBL	49	46	123.7	F								825	27	118		
		WBT	0	0	0.0	A								825	31	131		
		NBL	198	174	1.8	A								40	3	92		
		NBR	38	31	1.0	A								40	3	92		
6	Duke St and Witter Dr	EBT	2300	2268	14.2	B	2275	14.2	B	10.8	B			675	253	784		
		EBR	8	8	17.3	B								675	265	804		
		WBL	30	32	37.2	D								215	29	525		
		WBT	2058	2071	5.4	A								700	29	525		
		NBL	25	26	59.3	E								170	17	176		
		NBR	74	73	30.8	C								170	23	196		
7	Duke St and W Taylor Run Pkwy	EBL	27	27	56.5	E	2342	9.5	A	11.3	B	165	9	76				
		EBT (Continue on Duke St)	734	734	7.4	A						710	20	423				
		EBT (to Telegraph Rd)	1613	1581	9.7	A						710	142	787				
		WBT	2069	2088	12.5	B						1955	78	592				
		SBL	188	185	18.7	B						140	33	101				
		SBR	20	20	16.4	B						140	44	119				
71	W Taylor Run Pkwy and Service Rd	EBL	8	9	42.9	D	82	50.4	D			31.1	C	70	20	154		
		EBT	5	5	39.7	D								70	20	154		
		EBR	69	68	52.2	D								70	20	154		
		WBL	10	10	18.3	B								320	17	240		
		WBT	44	40	13.4	B								320	17	240		
		WBR	199	193	12.7	B								320	17	240		
		NBL	4	3	0.1	A	27	0.6	A					40	0	0		
		NBT	22	23	0.7	A								40	0	0		
		NBR	2	2	0.2	A								40	0	0		
		SBL	0	0	0.0	A								650	56	279		
		SBT	129	127	59.6	E								650	56	279		
		SBR	1	1	34.1	C								180	56	278		
72	Duke St WB to West Taylor Run Parkway Service Rd	EBL	7	7	8.7	A	7	8.7	A					3.9	A	220	0	35
		WBT	19	17	9.8	A										220	1	44
		SBR	5	4	7.2	A										500	0	39
		Duke St WB to Moncure Dr	15	14	3.4	A										65	0	0
		B to West Taylor Run Parkway	230	223	3.3	A										65	0	0
		WBT	781	788	0.2	A										781	0.2	A
8	Duke St WB and Telegraph Rd Off-ramp	SBR	1532	1534	1.5	A	1532	1.5	A	2400	0			0				
		WBT	207	200	37.0	D	207	37.0	D	13.3	B			250	46	293		
81	Duke St EB and Telegraph Rd On-ramp	WBT	781	787	7.3	A	781	7.3	A	375	21			208				
		WBT	1821	1828	2.3	A	1821	2.3	A	2.3	A			550	0	0		
82	Telegraph Rd On-ramp at New Ramp from Duke St WB	NBT	207	199	2.4	A	207	2.4	A	300	2			187				
9	Duke St WB and Telegraph Rd On-ramp	WBR	1821	1824	1.4	A	1821	1.4	A	1.4	A	225	4	314				
10	Duke St and S Dove St/Roberts Ln	EBT	1493	1489	11.8	B	1638	11.5	B	14.2	B	1965	51	394				
		EBR	151	149	9.1	A						260	4	131				
		WBT	2431	2439	14.2	B						855	154	817				
		WBR	43	42	21.5	C						855	4	124				
		NBL	136	132	33.8	C	186	32.2	C			185	45	249				
		NBT	32	34	33.6	C						185	45	249				
		NBR	22	20	20.8	C						185	42	252				
		SBL	15	14	37.6	D						50	19	197				
		SBT	21	20	38.3	D						50	19	197				
		SBR	36	35	8.0	A						50	20	197				

Duke Street West Taylor Run Interchange Project Travel Time Summary (AM Peak 2026)

Eastbound Duke St Segment	Length (mi)	2026 Build Alt 1 Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 1	2026 Build Alt 3A Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 3A	2026 Build Preferred Alt. 3C Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Preferred Alt. 3C	2026 No-Build Travel Time Vissim (min)	2018 Base Year Travel Time Vissim (min)
N Quaker Ln to Callahan Dr	1.25	4.1	-4%	4.3	-1%	4.2	-3%	4.3	4.3
Average Speed (mph)-->		18.2	+4%	17.6	+1%	17.9	+3%	17.4	17.6

Westbound Duke St Segment	Length (mi)	2026 Build Alt 1 Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 1	2026 Build Alt 3A Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 3A	2026 Build Preferred Alt. 3C Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Preferred Alt. 3C	2026 No-Build Travel Time Vissim (min)	2018 Base Year Travel Time Vissim (min)
Callahan Dr to N Quaker Ln	1.25	4.8	+9%	6.0	+37%	4.3	-1%	4.4	4.3
Average Speed (mph)-->		15.7	-8%	12.5	-27%	17.4	+1%	17.1	17.6

Duke Street West Taylor Run Interchange Project Travel Time Summary (PM Peak 2026)

Eastbound Duke St Segment	Length (mi)	2026 Build Alt 1 Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 1	2026 Build Alt 3A Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 3A	2026 Build Preferred Alt. 3C Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Preferred Alt. 3C	2026 No-Build Travel Time Vissim (min)	2018 Base Year Travel Time Vissim (min)
N Quaker Ln to Callahan Dr	1.25	4.1	-49%	4.0	-51%	3.7	-55%	8.1	7.9
Average Speed (mph)-->		18.2	+98%	18.9	+105%	20.4	+121%	9.2	9.5

Westbound Duke St Segment	Length (mi)	2026 Build Alt 1 Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 1	2026 Build Alt 3A Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 3A	2026 Build Preferred Alt. 3C Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Preferred Alt. 3C	2026 No-Build Travel Time Vissim (min)	2018 Base Year Travel Time Vissim (min)
Callahan Dr to N Quaker Ln	1.25	8.4	+67%	7.3	+44%	4.6	-8%	5.0	5.3
Average Speed (mph)-->		8.9	-40%	10.4	-30%	16.2	+9%	14.9	14.1

Duke Street West Taylor Run Interchange Project Travel Time Summary (AM Peak 2036)

Eastbound Duke St Segment	Length (mi)	2036 Build Alt 1 Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 1	2036 Build Alt 3A Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 3A	2036 Build Preferred Alt. 3C Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Preferred Alt. 3C	2036 No-Build Travel Time Vissim (min)	2018 Base Year Travel Time Vissim (min)
N Quaker Ln to Callahan Dr	1.25	4.1	-7%	4.3	-1%	4.3	-2%	4.4	4.3
Average Speed (mph)-->		18.4	+8%	17.3	+1%	17.5	+2%	17.1	17.6

Westbound Duke St Segment	Length (mi)	2036 Build Alt 1 Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 1	2036 Build Alt 3A Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 3A	2036 Build Preferred Alt. 3C Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Preferred Alt. 3C	2036 No-Build Travel Time Vissim (min)	2018 Base Year Travel Time Vissim (min)
Callahan Dr to N Quaker Ln	1.25	4.7	+4%	6.4	+43%	4.3	-4%	4.5	4.3
Average Speed (mph)-->		16.0	-4%	11.7	-30%	17.4	+4%	16.7	17.6

Duke Street West Taylor Run Interchange Project Travel Time Summary (PM Peak 2036)

Eastbound Duke St Segment	Length (mi)	2036 Build Alt 1 Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 1	2036 Build Alt 3A Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 3A	2036 Build Preferred Alt. 3C Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Preferred Alt. 3C	2036 No-Build Travel Time Vissim (min)	2018 Base Year Travel Time Vissim (min)
N Quaker Ln to Callahan Dr	1.25	4.3	-45%	4.4	-45%	3.7	-53%	8.0	7.9
Average Speed (mph)-->		17.3	+83%	17.2	+82%	20.2	+114%	9.4	9.5

Westbound Duke St Segment	Length (mi)	2036 Build Alt 1 Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 1	2036 Build Alt 3A Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Alt 3A	2036 Build Preferred Alt. 3C Travel Time Vissim (min)	Percent Change in Travel Time from No-Build to Build Preferred Alt. 3C	2036 No-Build Travel Time Vissim (min)	2018 Base Year Travel Time Vissim (min)
Callahan Dr to N Quaker Ln	1.25	10.3	+98%	8.6	+67%	4.9	-4%	5.2	5.3
Average Speed (mph)-->		7.3	-50%	8.7	-40%	15.2	+5%	14.5	14.1